Remedial Design Report
(50-75% Submission)
NYSDEC Site No. 1-52-182
Village of Patchogue
Suffolk County, New York

Prepared for

National Grid, Hicksville, New York

December 2012

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Prepared for
National Grid
175 East Old Country Road
Hicksville, New York 11801

December 2012

Project Number: 142128.550.001

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Table of Contents

Appendices iv

List of Tables v

List of Figures v

List of Abbreviations vi

1. Introduction 1-1

1.1 Site Background 1-1

1.1.1 Site Location and Setting 1-1

1.1.2 Regulatory History 1-2

1.1.3 Remedial Investigation Summary 1-2

1.1.4 Utility Corridor Activities 1-3

1.2 Summary of Remedial Design Work Plan 1-3

1.3 Remedial Design Report Objectives 1-3

1.3.1 Summary of the Remedy 1-4

1.4 Remedial Design Report Organization 1-6

2. Pre-Remedial Design Investigation Activities 2-1

2.1 Property Access Activities 2-1

2.2 Utility Clearance 2-1

2.3 Investigation Derived Waste Management 2-1

2.4 Groundwater Flow Modeling Study 2-2

2.5 Field Activities to Support Groundwater Flow Modeling Study 2-2

2.5.1 Install and Develop Temporary Piezometers 2-3

2.5.2 Water Level Measurements 2-4

2.5.3 Slug Test Monitoring Wells and Temporary Piezometers 2-5

2.6 In-Situ Solidification Treatability/Compatibility Study 2-5

2.6.1 ISS Mix Evaluation Criteria 2-6

2.6.2 Treatability Study Overview 2-7

2.6.3 Sample Collection 2-7

2.6.4 Laboratory Study 2-8

2.6.4.1 Laboratory Study Methods 2-8

2.6.4.2 Sample Receipt and Untreated Material Characterization 2-9

2.6.4.3 Solidification Treatment 2-9

2.6.5 Treatability Study Results 2-10

2.6.5.1 Untreated Soil 2-11

2.6.5.2 Selection of Mixing Agents 2-11
2.6.5.3 Preliminary Evaluation 2-11
2.6.5.4 Optimization Evaluation 2-12
2.6.5.5 Temporal Effects 2-14
2.6.5.6 Evaluation of Dissolved-Phase Impact Following Completion of ISS 2-14
2.6.6 Summary and Recommendations 2-14
2.7 Supplemental Geotechnical Investigation 2-15
2.7.1 Soil Borings 2-15
2.7.1.1 Collection of Soil Samples 2-15
2.7.1.2 Sample Analysis (Geotechnical) 2-15
2.7.2 Summary and Recommendations 2-16
2.8 Limited Field Investigation for Utility Corridor Implementation 2-16
2.9 Community Air Monitoring 2-17
3. Remedial Activities 3-1
3.1 Submittals/Preparation of Final RDR (100%) 3-1
3.2 Mobilization 3-2
3.2.1 Office Trailers 3-3
3.3 Site Preparation 3-3
3.3.1 Site Security 3-3
3.3.2 Stabilized Construction Entrance(s)/Exit(s) 3-4
3.3.3 Clearing and Grubbing 3-4
3.3.4 Equipment and Material Staging Areas 3-4
3.3.5 Decontamination Area 3-5
3.3.6 Monitoring Well Decommissioning 3-5
3.3.7 Soil Erosion and Sediment Control 3-5
3.3.7.1 Storm Water Pollution Prevention Plan 3-6
3.4 Remedial Activities 3-6
3.4.1 Selective Demolition 3-6
3.4.2 Dewatering and On-Site Water Treatment 3-7
3.4.3 Installation of Temporary Shoring 3-7
3.4.4 Excavation 3-8
3.4.4.1 Off-Site Excavation 3-8
3.4.4.2 On-Site Excavation 3-8
3.4.4.3 Former MGP Structures 3-9
3.4.5 In-Situ Solidification 3-9
3.4.6 In-Situ Solidification 3-10
3.4.7 Backfilling and Compaction 3-12

3.4.7.1 Backfill Materials 3-13
3.4.7.2 Off-Site Backfilling 3-14
3.4.7.3 On-Site Backfilling 3-14
3.4.8 Construction of Environmental Cap 3-14
3.4.8.1 Soil Cover 3-15
3.4.8.2 Coarse Stone Cover 3-15
3.4.9 Site Restoration 3-15
3.5 Post-Remedial Action Activities 3-15
3.5.1 Environmental Easement/Site Management Plan/Operations, Maintenance, and Monitoring (OM & M) Plan 3-16
3.5.1.1 Environmental Easement 3-16
3.5.1.2 Site Management Plan 3-16
3.5.1.3 Operations, Maintenance and Monitoring Plan 3-16
3.6 Air Monitoring 3-17
3.6.1 Vapors 3-17
3.6.2 Odors 3-17
3.6.3 Dust 3-17
3.6.3.1 Work Zone Air Monitoring 3-18
3.6.3.2 Community Air Monitoring 3-18
3.7 Odor Control/Vapor Management 3-18
3.8 Decontamination 3-19
3.8.1 Equipment Decontamination 3-19
3.9 Waste Management 3-20
3.9.1.1 Transportation 3-20
3.9.1.2 Waste Management Plan 3-21
3.10 Discharge Requirements for Water Disposal 3-21
4. Schedule 4-1
5. Identification of Federal, State, and Local Permits and Approvals 5-1
5.1 Property Access Agreements 5-1
5.1.1 Citizens Participation Plan 5-1
5.2 Federal, State, and Local Permits 5-1
5.2.1 Federal Permits 5-1
5.2.2 State Permits 5-2
5.2.3 Local Permits 5-2
6. Project Implementation and Contractor Selection 6-1
6.1 Construction Implementation 6-1
6.2 Contractor Selection 6-1
6.3 Contractor Design Submittal 6-1

7. Construction Quality Assurance/Quality Control 7-1
8. Health and Safety Plan 8-1
References 1

Appendices

Appendix A Design Drawings (Bound Separately)
Appendix B Groundwater Flow Modeling Report
Appendix C Piezometer Construction Logs
Appendix D Slug Test Plots and K_h Calculations
Appendix E ISS Treatability Study Laboratory Report (CD-ROM)
Appendix F Pre-Design Investigation Soil Boring Logs
Appendix G Geotechnical Laboratory Report
Appendix H Community Air Monitoring Plan (CAMP)
Appendix I Health and Safety Plan (HASP)
Appendix J Technical Specifications
Appendix K Maintenance and Protection of Traffic Plan (MPTP)
Appendix L Storm Water Pollution Prevention Plan (SWPPP)
Appendix M Construction Quality Assurance Project Plan (CQAPP)
Appendix N Waste Management Plan
Appendix O Citizens Participation Plan (CPP)

List of Tables

Table 2-1. Water Level Data, July 2012 and August 2012

Table 2-2. Vertical Hydraulic Gradients

Table 2-3. Hydraulic Conductivity (K_h) Summary

Table 2-4. Treatability Study Testing Matrix

Table 2-5. Treatability Study Testing Results – Untreated Soils

Table 2-6. Treatability Study Testing Results – Treatment Aliquots

Table 2-7. Treatability Study Testing Results – Immersion Test Observations

List of Figures

Figure 2-1. Aliquots of Native Soil, UCS as a Function of Cement and Bentonite Content

Figure 2-2. Aliquots of Fill, UCS as a Function of Cement and Bentonite Content

Figure 2-3. Aliquots of Native Soil, Hydraulic Conductivity as a Function of Cement and Bentonite Content

Figure 2-4. Aliquots of Fill, Hydraulic Conductivity as a Function of Cement and Bentonite Content

Figure 2-5. Aliquots of Native Soil, Volumetric Expansion as a Function of Cement and Bentonite Content

Figure 2-6. Aliquots of Fill, Volumetric Expansion as a Function of Cement and Bentonite Content

List of Abbreviations

ADT	Aquifer Drilling and Testing, Inc.
BC	Brown and Caldwell Associates
BGS	Below ground surface
BMP	Best Management Practice
CAMP	Community Air Monitoring Plan
CIH	Certified Industrial Hygienist
CMP	Construction Management Plan
COC	Chain-of-custody
CPP	Citizens Participation Plan
CQAPP	Construction Quality Assurance Project Plan
CQC	Construction Quality Control
CQCPP	Construction Quality Control Project Plan
DER	Division of Environmental Remediation
DI	Deionized water
EE	Environmental Easement
FER	Final Engineering Report
FFS	Focused Feasibility Study Report
HASP	Health & Safety Plan
IC	Institutional control
ICON	ICON Shoring System
ISS	In-situ solidification
LIPA	Long Island Power Authority
MGP	Manufactured Gas Plant
MPTP	Maintenance and Protection of Traffic Plan
MSL	Mean sea level
NAD	North American Datum
NAPL	Non-aqueous phase liquids
NAVD	North American Vertical Datum
NYCRR	New York State Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
O.D.	Outside diameter
OM&M	Operation, Monitoring and Maintenance
OWS	Oil-Water Separator

PDI	Pre-design Investigation
PID	Photoionization Detector
PRAP	Proposed Remedial Action Plan
PSA	Preliminary Site Assessment
PVC	Polyvinyl Chloride
QA	Quality assurance
RAOs	Remedial Action Objectives
RDR	Remedial Design Report
RDWP	Remedial Design Work Plan
RFP	Request for Proposal
RI	Remedial Investigation
RIR	Remedial Investigation Report
ROD	Record of Decision
SCDHS	Suffolk County Department of Health Services
SCOs	Soil Cleanup Objectives
SESC	Soil erosion and sediment control
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SPDI	Supplemental Pre-Design Investigation
SPT	Standard Penetration Test
SWPPP	Storm Water Pollution Prevention Plan
TCLP	Toxicity Characteristic Leaching Procedure
TS	Treatability Study
TSD	Treatment, storage and disposal
UCS	Unconfined Compressive Strength
UCWP	Utility Corridor Work Plan
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
VHB	Vanasse, Hangen, Brustlin
VOCs	Volatile organic chemicals
WMP	Waste Management Plan
WW.	Wet weight

Section 1
Introduction

This Remedial Design Report (RDR) has been prepared by Brown and Caldwell Associates (BC) to present the design elements associated with the construction and implementation of the selected remedy to address known soil and groundwater impacts at the Patchogue Former Manufactured Gas Plant (MGP) Site (i.e., herein referred to as the Site). The remedy to be implemented at the Site is described in a document entitled "Record of Decision (ROD), Patchogue Former Manufactured Gas Plant Site, Patchogue, New York" prepared by the New York State Department of Environmental Conservation (NYSDEC) and dated March 31, 2011.

This RDR has been prepared in accordance with the Order on Consent, Index Number A2-0552-0606 (the Order) signed by KeySpan Corporation (a predecessor company of National Grid) and the NYSDEC. The Order on Consent was signed March 4, 2007. The development of an RDR is a requirement of the Order on Consent based on the findings of the presence of contamination requiring remedial action.

The remedy was selected for the Site to address contaminated media resulting from the operation of the former MGP located at 234 West Main Street in the Village of Patchogue, Town of Brookhaven, Suffolk County, New York (refer to the cover sheet of the Design Drawings, Appendix A). Contaminated media are present primarily in the subsurface of certain portions of the National Grid owned property and in the adjacent property.

A draft Remedial Design Work Plan (RDWP) was submitted to the NYSDEC on August 30, 2011. The NYSDEC approved the draft RDWP in a letter dated December 22, 2011. The "Remedial Design Work Plan, Patchogue Former Manufactured Gas Plant Site, NYSDEC Site No. 1-52-182, Village of Patchogue, Suffolk County, New York" (Brown and Caldwell Associates, February 2012) was finalized and submitted to the NYSDEC on February 24, 2012.

This RDR represents the culmination of these efforts by presenting the design for the implementation of the selected remedy detailed in the March 2011 ROD.

1.1 Site Background

1.1.1 Site Location and Setting

The Site is located in a mixed commercial and residential area, and is currently undeveloped and vacant. The perimeter of the Site is secured with a locked chain-link fence. The Site is generally rectangular in shape and encompasses approximately 3.6 acres with a maximum length (north-south) of approximately 680 feet and a maximum width (east-west) of 180 feet. The Site has relatively flat topography with a typical elevation of approximately five feet above mean sea level (msl). The Site is, in general, bordered as follows:

- To the north by West Main Street beyond which is a property occupied by Briarcliff College and Patchogue Lake;
- To the east by an unpaved access driveway and two commercial properties beyond which is the Patchogue River;
- To the south by a residential area and an overflow pond to the south/southwest; and
- To the west by a steep slope beyond which are a residential area and a municipal storage yard.

The Site is informally divided into three areas: the Northern Area, the Central/Core Area, and the Southern Area. The Northern Area is a rectangular area comprising the northern portion of the Site, bordered by West Main Street, and is enclosed with a chain-link fence. This area is mostly clear of vegetation and the ground surface is comprised of two adjacent concrete slabs with a combined size of approximately 240 feet by 60 feet. The Central/Core area consists of the central portion of the Site where the majority of the former MGP structures were located and where the UCWP was implemented. The Central/Core area is also rectangular in shape and is enclosed by a chain-link fence. This area is vegetated primarily by grass, weeds and low brush and stone installed during the implementation of the UCWP. A steep slope runs along the western boundary of the Site. The Southern Area comprises the tapered southern end of the property. This area has considerable concrete debris and dense vegetation. The overall layout of the Site is shown on Drawing C-101 (Appendix A).

1.1.2 Regulatory History

The history of the Site is detailed in historic documents related to the investigation and remediation of the Site including:

- "Final Remedial Investigation Report for the Patchogue Former MGP Site, Patchogue, Suffolk County, New York", as prepared by TetraTech EC, Inc. and dated December 2009 (referred to as RIR);
- "Preliminary Site Assessment Report, Order on Consent D1-0001-99-05, NYSDEC Site No. 1-52-182, Former Patchogue MGP Site, Village of Patchogue, Suffolk County, New York" prepared by Vanasse, Hangen, Brustlin (VHB) and dated March 2002 (referred to as PSA);
- "Focused Feasibility Study, Patchogue Former Manufactured Gas Plant Site, NYSDEC Site No. 1-52-182, Village of Patchogue, Suffolk" prepared by Brown and Caldwell Associates and dated May 2011;
- "Remedial Design Work Plan, Patchogue Former Manufactured Gas Plant Site, NYSDEC Site No. 1-52-182, Village of Patchogue, Suffolk County, New York" (Brown and Caldwell Associates, February 2012); and
- "Utility Corridor Work Plan (Revision 3), Patchogue Former MGP Site, Patchogue, Suffolk County, New York, Site No. 1-52-182" (Brown and Caldwell Associates, February 2012).

1.1.3 Remedial Investigation Summary

The findings from the assessment and investigation activities into the subsurface conditions and the nature and extent of MGP-related impacts at the Site are presented in the following documents:

- The Preliminary Site Assessment (PSA) as presented in "Preliminary Site Assessment Report Order on Consent D1-0001-99-05, NYSDEC Site No. 1-52-182 Former Patchogue MGP Site, Village of Patchogue, Suffolk County, New York", [Vanasse, Hangen, Brustlin March 2002].
- The Remedial Investigation (RI) as presented in "Final Remedial Investigation Report for the Patchogue Former MGP Site, Patchogue, Suffolk County, New York", (TetraTech EC, Inc., December 2009).
- Pre-Design Investigation (PDI) and Supplemental Pre-Design Investigation (SPDI) as presented in "Focused Feasibility Study, Patchogue Former Manufactured Gas Plant Site, NYSDEC Site No. 1-52-182, Village of Patchogue, Suffolk County, New York" (Brown and Caldwell Associates, May 2011).
- The Limited Field Investigation conducted on January 6, 2012 as presented in "Utility Corridor Work Plan (Revision 3), Patchogue Former MGP Site, Patchogue, Suffolk County, New York, Site No. 1-52-182" (Brown and Caldwell Associates, February 2012).

All of the aforementioned reports are on file with the NYSDEC.

In accordance with the RDWP, a Supplemental Pre-Design Investigation was implemented beginning on April 11, 2012 and concluded on June 20, 2012. The results of the PDI and SPDI activities are discussed in Section 2 of this RDR.

1.1.4 Utility Corridor Activities

In order to implement the full-scale remedy selected in the March 2011 ROD, overhead lines located at the Site need to be relocated from the eastern side of the Site to the western side to allow for overhead clearance of construction equipment and to prevent the undermining of the utility poles during the off-site excavation activities. Per discussions with representatives of the Long Island Power Authority (LIPA), the owner of the overhead lines, the lines that are located along the eastern property line of the Site can be relocated to the western side of the Site. To facilitate the move, a Utility Corridor Work Plan (UCWP) was developed. The document entitled "Utility Corridor Work Plan (Revision 3), Patchogue Former MGP Site, Patchogue, Suffolk County, New York, Site No. 1-52-182" was prepared by Brown and Caldwell Associates and submitted to the NYSDEC on February 8, 2012. The NYSDEC approved the draft UCWP in a letter dated February 9, 2012.

The remedial activities on the western side of the Site were implemented in June 2012 and completed in July 2012 in order to create a "utility corridor" in which the utility poles and overhead lines will be reinstalled prior to the implementation of the remedial activities for the remainder of the Site. National Grid addressed impacted soils identified in the northwestern corner of the Site (in the area of the MW-2 cluster) as well as those that required capping on the western side of the Site. The location of the Utility Corridor is shown on Drawing C-101 (Appendix A).

Documentation of the implementation of the Utility Corridor Work Plan is presented in the "Construction Completion Report, Utility Corridor Work Plan Implementation, Patchogue Former Manufactured Gas Plant Site, NYSDEC Site No. 1-52-182, Village of Patchogue, Suffolk County, New York" (Brown and Caldwell Associates, December 2012).

1.2 Summary of Remedial Design Work Plan

A draft RDWP was developed and submitted to the NYSDEC on August 30, 2011 to detail the activities and procedures proposed to be included in the development of the remedial design for the Site in accordance with the ROD. The NYSDEC approved the draft RDWP in a letter dated December 22, 2011. The document entitled "Remedial Design Work Plan (RDWP), Patchogue Former Manufactured Gas Plant Site, NYSDEC Site No. 1-52-182, Village of Patchogue, Suffolk County, New York" was finalized by Brown and Caldwell Associates and submitted to the NYSDEC on February 24, 2012.

1.3 Remedial Design Report Objectives

The objectives for the remedial design, as presented in the February 2012 RDWP, include the following:

- A summary of the results of the pre-design and supplemental pre-design activities performed in support of the remedial design;
- Presentation of the remedial design for the implementation of the proposed remedial construction activities;
- Descriptions of the proposed methods and procedures that will be used to implement the proposed remedial construction activities;
- Incorporation of the design aspects into a set of biddable plans and Technical Specifications necessary to procure a Remedial Contractor that will implement the proposed remedial construction activities;

- Identification of the project plans (Construction Quality Assurance Project Plan, Health and Safety Plan, Citizens Participation Plan, Maintenance and Protection of Traffic Plan, Storm Water Pollution Prevention Plan, Waste Management Plan) that will be used during the remedial construction activities; and
- A schedule for the implementation of the activities associated with the proposed remedial construction.

1.3.1 Summary of the Remedy

Based on the results of the evaluation detailed in the Focused Feasibility Study report (FFS) as well the public's input into the Proposed Remedial Action Plan (PRAP), as documented in the ROD, the NYSDEC selected a remedy for the Patchogue Former MGP Site. The components of the remedy, as presented in the ROD, are described below:

1. **Remedial Design Program:** A remedial design program will be implemented to provide the details necessary for the design, construction, operation, maintenance, and monitoring of the remedial program. Green remediation principals and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31, Green Remediation. The major green remediation components are as follows:
   - Considering the environmental impacts of treatment technologies and remedy stewardship over the long-term;
   - Reducing direct and indirect greenhouse gas and other emissions;
   - Increasing energy efficiency and minimizing use of non-renewable energy ;
   - Conserving and efficiently managing resources and materials;
   - Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
   - Maximizing habitat value and creating habitat, when possible;
   - Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
   - Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.
2. **On-Site Excavation:** On-site excavation of the following:
   - any existing former MGP structures, debris, and major obstructions, including highly impacted soils in the immediate vicinity of these structures, to allow for excavation and/or treatment of underlying soils and installation of a soil cover; and
   - on-site fill materials to a depth of at least two feet below ground surface (bgs) over the entire Central/Core Area (beyond the limits of the In-Situ Solidification (ISS) area) to allow for installation of a two-foot thick soil cover. The on-site excavations will be backfilled with stockpiled soils and/or imported soil, the top two-feet of which will meet the 6NYCRR 375-6.7(d) restricted-residential criteria for backfill.
3. **Off-Site Excavation:** Off-site excavation (immediately to the east of the main MGP site), to a depth of approximately nine feet bgs to remove visible MGP-related source material and petroleum impacted soils. A demarcation layer will be placed at the bottom of the off-site excavation and the area will be backfilled entirely with material that meets 6NYCRR 375-6.7(d) residential criteria for backfill.
4. **In-Situ Solidification (ISS) of Soil:** In-situ solidification (ISS) of impacted soil will include all areas of MGP-related source material and associated soil, with the deepest targeted treatment depth being 23 feet below grade (bgs.) The soil will be mixed in place with cement and/or other hardening

materials to form an impermeable, solid mass to prevent migration of MGP-related contaminants. The area to be solidified will extend laterally beyond the limits of contamination to encapsulate the impacts. The method of ISS will be determined during the remedial design. Solidified soils will be covered by a sufficient layer of soil to protect them from freeze-thaw cycles. The top two feet of this cover will be soil that meets the restricted-residential requirements for cover material set forth in 6 NYCRR Part 375-6.7(d) which will be placed over a demarcation layer. The ISS treatment process increases the volume of the soil so an additional volume of material sufficient to account for this expansion will be required to be excavated and removed. The materials to be excavated to account for the frost protection layer and volume expansion will target source areas that are accessible and not otherwise excavated. Impacted soil and any excess stabilized soil will be transported to an approved off-site disposal facility. Excavated materials that are not considered source material (e.g. visible MGP tar-impacts) may be stockpiled and evaluated for reuse as backfill on-site. All excavated soils, not suitable for reuse, will be transported and disposed off-site at an approved landfill or treatment facility.

5. **Odor/Dust Control:** On-site material handling (dewatering and/or blending operations) will be performed under a temporary fabric structure, as necessary, to control vapor, odor and dust emissions. Odor suppression materials such as foam will be available on-site at all times. Excavated soils will either be directly loaded into transport trucks, if waste characterization has been performed, or staged on-site for waste characterization. A Community Air Monitoring Plan (CAMP) will be implemented which will include real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area during all ground-intrusive activities at the Site.
6. **Soil Cover:** Installation of a site cover to allow for restricted-residential use of the Site. The Site will be restored to its existing grade. The cover will consist either of structures, such as buildings, pavement, and sidewalks comprising the site development, or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). The soil cover will consist of a minimum of two feet of soil meeting the requirements for cover material set forth in 6 NYCRR Part 375-6.7(d). The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to support vegetation.
7. **Institutional Controls:** Imposition of an institutional control in the form of an environmental easement for the controlled property that:
   a. requires the remedial party or site owner to complete and submit to the NYSDEC a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);
   b. allows the use and development of the controlled property for restricted residential, commercial and industrial uses or as defined by Part 375-1.8(g), though land use is subject to local zoning laws;
   c. restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDEC, the New York State Department of Health (NYSDOH) or the Suffolk County Department of Health Services (SCDHS);
   d. prohibits agriculture or vegetable gardens on the controlled property; and
   e. requires compliance with the NYSDEC approved Site Management Plan.
8. **Site Management Plan:** A Site Management Plan is required which includes the following:
   a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the Site and details the steps and media-specific requirements necessary to allow the following institutional and/or engineering controls to remain in place and effective:

- Institutional Controls: The Environmental Easement discussed in Paragraph 7 above.
- Engineering Controls: The ISS area discussed in Paragraph 4 and the site cover discussed in Paragraph 6 above.

A copy of the Site Management Plan will be provided to the appropriate property owners. This plan will include, but may not be limited to:

i. an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
ii. descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;
iii. a provision to evaluate the potential for soil vapor intrusion should the on-site building become occupied or should any buildings be developed on the site and to implement actions (e.g., mitigation or monitoring) recommended to address exposures related to soil vapor intrusion;
iv. provisions for the management and inspection of the identified engineering controls;
v. maintaining site access controls and NYSDEC notification; and
vi. the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan will include, but may not be limited to:
   i. monitoring of groundwater to assess the performance and effectiveness of the remedy; and
   ii. a schedule of monitoring and frequency of submittals to the NYSDEC.

1.4 Remedial Design Report Organization

This document is organized in the following sections:

Section	Contents
Section 1 – Introduction	This section provides a brief description of the location of the Site, the historical operations performed on the Site, a summary of the approved RDWP, and the remedial action/design objectives for the proposed remedial construction activities.
Section 2 – Pre-Design Investigation Activities	This section of the RDR summarizes the activities implemented to gather information in support of the design of the remedial construction activities.
Section 3 – Remedial Activities	This section details the current design for the remedial construction activities.
Section 4 – Schedule	This section presents a project milestone schedule for the implementation of the selected remedy for the Site.
Section 5 – Identification of Federal, State, and Local Permits and Approvals	This section of the RDR summarizes the permits that will be necessary to implement the proposed remedial construction activities.
Section 6 – Project Implementation and Contractor Selection	This section of the RDR details the procedures to be followed to select a Remedial Contractor to implement the proposed remedial construction activities.
Section 7 – Construction Quality Assurance/Quality Control	This section references the Construction Quality Assurance Project Plan to be utilized to ensure integrity of the data produced as a result of the implementation of the remedial construction activities.
Section 8 – Health and Safety Plan	This section references the health and safety measures to be taken in order to ensure worker and public safety during the implementation of the remedial construction activities.
References	Presents a list of the references cited in the RDR.

Section 2

Pre-Remedial Design Investigation Activities

The following sections detail the pre-remedial design activities that were performed at the Site. The purpose of the pre-remedial design activities was to obtain supplemental site information necessary for the completion of the design of the remedy selected in the ROD. These activities included a groundwater flow modeling study and associated field activities to support the study; an ISS Treatability/Compatibility Study; a supplemental geotechnical evaluation and implementation of a Community Air Monitoring Plan. Also, a soil boring program was conducted prior to implementing the activities to create a utility corridor (see Section 1.1.4). These efforts, and the findings from these activities, are provided in the sections below.

Field activities were conducted in accordance with the approved RDWP and Health and Safety Plan (HASP) for the site.

2.1 Property Access Activities

Pre-remedial design field activities were conducted on both on- and off-site properties, and thus, upon approval of the RDWP, National Grid established access with the owner of the off site property to conduct these activities.

2.2 Utility Clearance

Prior to conducting the various ground intrusive activities described in the sections below, the locations for these activities were marked in the field. Dig Safely New York was contacted to obtain utility clearance. Additionally, the Village of Patchogue and Suffolk County were contacted to obtain clearance for utilities that they maintain (i.e., sewer and water). Available information regarding the location of utilities from National Grid and the off-site property owner was also reviewed.

2.3 Investigation Derived Waste Management

A total of 15 drums of waste were generated from the implementation of the pre-remedial design tasks. Wastes were containerized and temporarily staged on-site in New York State Department of Transportation (NYSDOT)-specification 55-gallon drums prior to the implementation of the UCWP. These wastes were treated and disposed of with the non-hazardous soils excavated from the utility corridor at Bayshore Soil Management, LLC (United States Environmental Protection Agency Identification Number: NJ1225001522) facility in Keasbey, New Jersey.

Additional information regarding the treatment and disposal of the investigation derived waste is documented in the "Construction Completion Report, Utility Corridor Work Plan Implementation, Patchogue Former Manufactured Gas Plant Site, NYSDEC Site No. 1-52-182, Village of Patchogue, Suffolk County, New York" (Brown and Caldwell Associates, December 2012).

2.4 Groundwater Flow Modeling Study

A groundwater flow modeling study was performed as part of the design process to assess the potential of the implementation of the planned ISS to adversely affect local hydrogeological conditions, and to estimate the volume of water that may be generated during dewatering for construction, if required. The objectives of this groundwater flow modeling task are to:

- Develop a groundwater flow model calibrated to the Site groundwater level data for use as a baseline condition;
- Use the model to simulate the groundwater flow and groundwater levels following implementation of the remedial alternative;
- Evaluate the influences of ISS in terms of the change of groundwater flow and groundwater levels relative to the baseline condition; and
- Evaluate the rate and amount of water that may be generated from dewatering during remedial construction activities, if required.

This groundwater flow modeling study, including model development, calibration of the model to existing conditions, simulation of the effects of ISS on groundwater flow and groundwater levels, and simulation of dewatering for construction, are provided in a report in Appendix B. As described in the RDWP, additional field data collection was conducted to support development and calibration of the groundwater flow model. These field activities are described in Section 2.5 below.

2.5 Field Activities to Support Groundwater Flow Modeling Study

The three primary stratigraphic units encountered at the Site, from shallowest to deepest, include fill, alluvial deposits and glacial outwash deposits (i.e., the upper glacial aquifer). To assess if the hydraulic properties vary significantly between these units or within these units, additional data was collected to estimate hydraulic properties of the units and thus facilitate their simulation in the groundwater flow model. The evaluation included: (1) conducting in situ hydraulic conductivity tests (slug tests) on wells and piezometers screened in discrete stratigraphic units; and (2) measuring water levels at well/piezometer couplets where the wells/piezometers are screened in different stratigraphic units (i.e., fill and outwash) at the same location to assess hydraulic head difference between the units (i.e., vertical hydraulic gradient).

Prior to these field activities, there were several existing wells screened discretely in the glacial outwash. None of the existing wells were screened discretely in the fill or alluvial deposits. Accordingly, couplets of temporary piezometers were installed at several locations at the Site. Each couplet included one piezometer screened in the fill and one piezometer screened in the outwash. This permitted slug testing to estimate the horizontal hydraulic conductivity of the individual units as well as water level measurements to assess hydraulic head differences between units. Existing outwash wells were used as part of the couplet where subsurface conditions permitted. As the alluvial deposits are relatively thin and variable, they were not targeted for piezometer installation. Rather, the alluvial deposits were assessed by their soil descriptions, their areal distribution and the vertical hydraulic gradient across them as measured by hydraulic head differences between the units above and below (i.e., fill and outwash units).

Provided below is a detailed description of the field activities conducted in support of the groundwater flow modeling study.

2.5.1 Install and Develop Temporary Piezometers

Seven temporary piezometers were installed at four locations (four couplets) to facilitate collecting water level measurements and estimating hydraulic conductivity in the fill and the outwash. These piezometers were designated PZ-1A, PZ-1B, PZ-2A, PZ-2B, PZ-3A, PZ-3B, and PZ-4A. The construction logs for these piezometers are provided in Appendix C. At one of the four proposed couplets locations, existing well MW-9D is screened discretely in the outwash and thus only one piezometer (PZ-4A), screened in the fill, was needed to provide a piezometer couplet. At the other three locations, two piezometers were installed; one with a screen interval set in the fill, and one with a screen interval set in the outwash. These locations were positioned proximal to previously drilled borings SB-115, SB-121, and SB-128. The locations of the piezometers are shown on Drawing C-103 (Appendix A). The six on-site piezometers on National Grid's property (PZ-1A, PZ-1B, PZ-2A, PZ-2B, PZ-3A, and PZ-3B) were installed between March 21 and March 23, 2012. The one piezometer on the adjacent property (PZ-4A) was installed on May 23, 2012, following receipt of access permission from the property owner.

The soil borings advanced for the purposes of installing the piezometers were drilled using hollow-stem augers and sampled with a two foot long, two-inch outside diameter (O.D.) split- spoon sampler from ground surface to the target depth indicated in Table 3-1 of the RDWP. Drilling and piezometer construction services were provided by Aquifer Drilling and Testing, Inc. (ADT) of Mineola, New York using a CME 1500 drill rig. The soil samples were described in the field to characterize soil type, including grain size, texture, and apparent moisture content. Soil samples were logged in accordance with the Burmister Soil Classification System and classified using the Unified Soil Classification System (USCS). Soils were also field screened for MGP-related impacts, or other impacts, based on appearance, odor and/or organic vapor concentrations measured with a photoionization detector (PID); in particular, the nature, distribution of degree of saturation of non-aqueous phase liquids (NAPL) was described, where encountered. The soil descriptions were used as the basis for determining the presence and thickness of the targeted unit as well as for determining the depth and length of the piezometer screen and filter pack interval.

The piezometers were constructed of two-inch diameter, Schedule 40 PVC casing with 0.020-inch slot PVC screens. The casing and screen were lowered into the borehole such that the screen is positioned within the targeted depth interval. The screen intervals for the piezometers intended to monitor the glacial outwash unit were set sufficiently deep so that the filter pack does not extend upward into the overlying units (e.g., alluvial deposits or fill).

Once the screen and casing were in place, the annular space between the screen and the borehole was filled with filter pack material sized appropriately for the screen slot size. The filter pack material was added until it extended above the top of the screen. If possible given the requirements for screen positioning described above, the filter pack was installed to extend at least two feet above the top of the screen.

A bentonite seal was placed in the annular space above the filter pack. Where the bentonite annular seal was installed at a depth below the water table, pellets of bentonite were used to construct the seal. Where the bentonite seal was positioned above the water table, a pre-hydrated bentonite mixture was used to construct the seal. Where possible, the bentonite seal was constructed to be a minimum of 24-inches thick, except in those cases where a screen was in too close a proximity to the ground surface to allow for this thickness; in these instances (i.e., PZ-1A, PZ-2A, PZ-3A, and PZ-4A), the piezometer construction was modified to provide a functional seal at the ground surface.

The annular space above the bentonite seal was filled with cement-bentonite grout to a depth within a foot or so below ground surface at a position appropriate for subsequent installation of the surface

protective cover or casing. The grout was placed from the bottom of the annular space using the tremie method.

An above-grade surface protective casing or a flush-mounted protective cover (as appropriate for the location) was installed to cover the top of the piezometer casing. The cover or casing was set in place with concrete such that surface water drains away from the piezometer.

A mark or notch was placed at the top of the PVC casing to serve as the reference point for measurements of the water level in piezometer. An expansion plug (plumbers plug) with a vent hole was used to cap the top of the PVC casing.

After a minimum period of 24 hours had passed following piezometer installation to allow for the cement-bentonite grout to set, the piezometers were developed. Piezometer development was conducted using surging and pumping methods. The piezometers were developed until the water produced from the well was visibly clear and free of sediment or until there was no further decrease in turbidity after removal of approximately 10 well volumes of water. Water and sediment produced from development was containerized pending characterization and off-site disposal.

Each of the temporary piezometer locations was surveyed. The survey included location coordinates, ground surface elevation, and top of casing elevation (i.e., a water level reference point elevation). Coordinates were referenced to the State Plane coordinate system for New York using the North American Datum of 1983 (NAD 1983) in units of feet. Elevations were referenced to the North American Vertical Datum of 1988 (NAVD88) in units of feet. The survey was performed by a New York State licensed surveyor from Bertin Engineering of Glen Rock, New Jersey.

As discussed in the RDWP, following completion of the groundwater flow modeling study, the temporary piezometers will be decommissioned. The piezometers will be decommissioned in accordance with procedures described in Section 3.3.2 of the RDWP.

2.5.2 Water Level Measurements

After the temporary piezometers were installed and developed and water levels in the piezometers had returned to static conditions following development, the depth to water was measured in each well and piezometer at the Site. Measurements were made from the surveyed reference point using this point as the zero depth reference. Measurements were made using an electronic water level meter, and measured to the nearest 0.01 foot. The initial round of water level measurements was conducted on July 18, 2012. A second round was conducted on August 28, 2012 as part of the quarterly groundwater level measurements that are conducted for the site groundwater monitoring program. Monitoring wells MW-2S and MW-2D were decommissioned by Aquifer Drilling and Testing Inc. (ADT) on June 4, 2012 as part of the implementation of the UCWP (Brown and Caldwell, February 2012). Each well was decommissioned in accordance with "CP-43: Groundwater Monitoring Well Decommissioning Policy" (NYSDEC, November 2009) by grouting in-place. Additional details about the decommissioning are presented in the document entitled "Construction Completion Report, Utility Corridor Work Plan Implementation, Patchogue Former Manufactured Gas Plant Site, NYSDEC Site No. 1-52-182, Village of Patchogue, Suffolk County, New York" (Brown and Caldwell Associates, December 2012). The water level data from these two rounds are provided in Table 2-1.

Table 2-2 provides the calculated vertical hydraulic gradients between the fill and the underlying outwash deposits at each of the well/piezometer couplets where there is one well or piezometer screened discretely in the fill, and one screened discretely in the outwash. However, a vertical hydraulic gradient could not be calculated for the PZ-4A/MW-9D couplet because access to MW-9D was blocked by a roll-off being used on the adjacent property. The calculated vertical hydraulic gradients between the fill and outwash are very low, indicating that there is no apparent hydraulic separation between these

two deposits. Thus, this supports the conclusion that the fill and outwash are considered as components of the same hyrdrostratigraphic unit, i.e., they are part of the same water-bearing zone.

2.5.3 Slug Test Monitoring Wells and Temporary Piezometers

In-situ hydraulic conductivity tests (i.e., slug tests) were performed on August 2, 2012 on the following piezometers and monitoring wells at the Site: PZ-1A, PZ-1B, PZ-2A, PZ-2B, PZ-3A, PZ-3B, PZ-4A, MW-1, MW-4D, MW-7D, and MW-8D. Per the RDWP, it was planned to also conduct slug tests on MW-2S, MW-2D, and MW-9D; however, MW-2S and MW-2D were decommissioned during construction activities for creating the utility corridor and MW-9D, located on the off-site property, was blocked from access by a large roll-off positioned over the well.

The water-bearing zone beneath the Site is unconfined. Accordingly, rising head slug tests were conducted. The rising head slug tests were performed according to the procedures describe below:

- Prior to inserting equipment into the piezometer or well to conduct a slug test, the static water level was measured to the nearest 0.01 foot with a manually-operated electronic water-level meter.
- A pressure transducer equipped with a data logger for recording water levels were installed in the well/piezometer. The transducer was positioned at a depth below where the bailer (see below) would be lowered to. Depth to water measurements were made with the transducer and manually with an electronic water level meter to confirm that the water level in the well was at static conditions, and that the transducer was functioning.
- A bailer, which was used as the slug, was inserted into the well below the water level. . The water level was measured with the transducer and with the electronic water level meter until the water level returned to static following the introduction of the bailer.
- The bailer was rapidly removed from the well, and simultaneously with its removal, automatic measurement and logging of water level data was initiated. The data logger was set to record data on a logarithmic schedule so that measurements were recorded more frequently in the earlier part of the test, when the water level was changing at the fastest rate.
- Water level measurements with the data logger continued until the water level had returned to static levels, or had recovered by approximately 90 percent.

Following completion of the test, the data was downloaded from the data logger and stored in the electronic project files. The change in water level versus time data were evaluated using analytical techniques developed by Hvorslev (1951), to estimate horizontal hydraulic conductivity (K_h) for the unit adjacent to each well and piezometer. The slug test plots and K_h calculations for each of the wells and piezometers are provided in Appendix D.

Table 2-3 provides a summary of the K_h estimates based on the analysis of the slug test data. The estimates indicate that, in general, the K_h of the fill is about ½-order of magnitude less than the K_h of the outwash. This is likely due to the poorer sorting, and relatively greater percentage of fine-grained material in the fill material relative to the more well sorted outwash deposits. The range of estimated K_h values for the fill and the outwash do overlap somewhat, with the highest K_h estimates in the fill being greater than the lowest K_h estimates for the outwash. These findings, combined with the low vertical hydraulic gradient between the fill and outwash deposits, further support the conclusion that the fill and outwash are components of the same hyrdrostratigraphic unit.

2.6 In-Situ Solidification Treatability/Compatibility Study

In-Situ Solidification (ISS) is part of the selected remedy for the Site. In order to develop a cementitous mixture that will meet the Remedial Action Objectives (RAOs) established in the ROD while maintaining its integrity in the subsurface environment at the Site, a Treatability/Compatibility Study (i.e., Treatability

Study, or TS) was conducted. The Study was performed in accordance with the United States Environmental Protection Agency's (USEPA's) guidance document entitled "Guidance for Conducting Treatability Studies under CERCLA" and dated November 1992. Results of the TS are used to prepare cost estimates and design specifications with regard to the full-scale ISS treatment.

2.6.1 ISS Mix Evaluation Criteria

Throughout the Treatability Study (TS), results were evaluated with respect to two primary quantifiable criteria: the reduction in hydraulic conductivity between the solidified mass and the untreated in-situ soils, and the Unconfined Compressive Strength (UCS) of the solidified mass. A third criterion was the ability of the mix to maintain its integrity and to contain the source material; this criterion was evaluated by qualitative means.

The volumetric expansion expected during the installation was also measured during the TS; however, this was not a direct evaluation criterion. Rather, the volumetric expansion was used to estimate the volume of the spoils that would need to be removed and disposed of during the installation.

The reduction of hydraulic conductivity was used to assess the effectiveness of mixes in reaching the RAO objective of achieving the groundwater quality criteria in the water-bearing zone surrounding the impacted soils. This reflects the mechanism by which the impacted soils act as a source of groundwater impacts. As groundwater flows through the impacted soils, it contacts the source material and becomes contaminated. Upon emerging from the downgradient surface of the source zone, groundwater displays the dissolved-phase concentrations that can potentially migrate and create a zone of exceedances of the water quality criteria. The potential for that is related to the overall mass flux of the dissolved COCs through the downgradient surface of the source zone. This mass flux is proportional to the flow rate of groundwater through the source zone, and the dissolved-phase COC concentration in that groundwater. Reducing the hydraulic conductivity of the source zone material results in the proportional reduction of the groundwater flow through the source zone, and consequently, in the corresponding reduction in the mass flux. This, in turn, reduces the potential extent of the dissolved-phase impacts downgradient of the source. The actual reduction ratio of hydraulic conductivities was not specified for the purpose of this study. Instead, the evolution of the hydraulic conductivity values of the solidified mass throughout the range of reagent addition rates was observed, and the selection was based on achieving the near-asymptotic low value.

The UCS is related to two aspects of the remedy: the constructability of the ISS, and the post-remedy use of the Site. ISS is typically applied using overlapping columns or cells, either by the use of augers or by bucket mixing. Very high UCS values of the mix indicate that achieving the overlap, which requires mixing of new cells partially through cells that have already set, may be difficult. Conversely, low values of UCS may render the solidified mass unsuitable for bearing the loads anticipated during the post-remedy period. Typically, the UCS of approximately 50 to 200 psi is recommended; the actual values may be site-specific (USEPA, 1993a and 1993b). The preliminary range of 50-100 psi was used in the TS based on the ease of construction and the anticipated future use of the Site as commercial property.

In summary, the effective mixes were assumed to be those that displayed the UCS values of 50-100 psi, achieved a near-minimum hydraulic conductivity obtained throughout the study, as well as maintained their integrity and did not release the source material from the solidified mass. The UCS and hydraulic conductivity of the treatment aliquots were obtained from the testing which conformed to the respective ASTM methods identified later in the report; these tests produce quantitative results. The integrity and ability to contain the source material were evaluated using immersion testing; this test is based on a visual examination.

2.6.2 Treatability Study Overview

The TS comprised the following activities:

- Collection of samples of site soils and impacted media from the proposed ISS area;
- Performance of a laboratory study; and
- Analysis of results and recommendations.

The elements of the Study are outlined in the subsequent sections. The final outcome of the TS was the identification of at least one mixture that would achieve the RAOs and could be applied within the subsurface conditions at the Site.

2.6.3 Sample Collection

Three distinct soil types were identified at the Site during previous investigation activities: fill, alluvial deposits, and outwash deposits (see Section 2.5). In all three strata, locations were identified where MGP NAPL and/or tar was observed. The alluvial deposits are generally thin and variable in composition. For the purposes of this Study, the alluvial deposits and underlying outwash deposits have been grouped together as "native" deposits.

The result of the implementation of the ISS will depend on the amount of contaminant mass in the soil and the soil type. As impacts were noted in all three site strata, a conservative approach to develop the Study procedures was taken and samples that include materials from all three strata were collected for the use in the Study. These samples were obtained from areas where significant MGP-related impacts were noted. Using this approach, an ISS mixture was developed that will be effective over the entire range of Site soils and to address the most significant MGP-related impacts.

A review of boring logs and geological cross-sections depicting subsurface conditions at the Site, as presented in the May 2011 FFS, was performed to identify locations for the collection of samples to be used in the Study. As described above, it was noted that two distinguishable soil types generally are present: fill and native deposits. As indicated previously, the native deposits consist of alluvial deposits and outwash; however, the distinction between the two is difficult to establish, as both often display similar characteristics. Based on that, it is not deemed necessary to obtain separate samples of the alluvial deposits and outwash. Two treatability study samples were thus collected; one representative of the fill and one representative of native deposits.

Samples of site soils and impacted media used in the Study were collected immediately adjacent to existing boring locations PASB-29 and SB-118. The approximate locations of the soil borings used to collect these samples are noted on Drawing C-103 (Appendix A). Visual observations of the subsurface conditions at these boring locations PASB-29 and SB-118 identified the presence of significant MGP-related impacts in the fill and alluvial/outwash deposits, respectively. The depth intervals for the MGP impacts were approximately 0 to 5.0 feet bgs at PASB-29, and 5.0 to 20.0 bgs at SB-118. Samples for the Study were collected from these respective depth intervals. During sampling, representative MGP-impacts were encountered in these intervals.

ADT provided the drilling services for the soil sampling. Samples were collected from March 19 and 20, 2012 using a direct-push drilling rig (GeoProbe® 6620 DT) equipped with a four foot long Macrocore® soil sampling tool, although some of the samples from the shallower interval (0 to 5 ft bgs) next to the PASB-29 location were also collected using a post-hole digger. Multiple borings were required to at each location to obtain the volume of material required for the Study (approximately five to 15 gallons from each location). Following completion of drilling, the soil borings were filled to the ground surface with bentonite.

Soil from each sample interval was described in the field to characterize soil type, including grain size, texture, sedimentary structures/features, and apparent moisture content. The soil samples will be logged in accordance with the Burmister soil classification system, and classified using the USCS. Each sample was also field screened for MGP-related impacts, or other impacts, based on appearance, odor and/or organic vapor concentrations measured with a PID; in particular, the nature, distribution of degree of saturation of NAPL was described, where encountered.

The samples from the depth interval targeted for treatability samples were initially in five gallon polyethylene buckets. The samples were mixed inside the buckets to homogenize them to the extent practicable. The samples were then removed from the buckets and placed in 1 gallon sealable polyethylene bags The bags were then labeled to identify the following: sample identification name/number; sample location name; depth interval of sample and type of material (fill or native); date and time of sample collection; site name; and name of sampler. Once filled, the sample bags were placed in a cooler with ice and cooled to approximately 4°C.

A chain-of-custody (COC) form was used to document the sample collection, sample handling, and custody of the samples. The COC form accompanied the samples from the time of collection to the receipt of the sample at the laboratory. The samples were shipped to the laboratory in clean coolers. The samples in the coolers were shipped with ice to maintain a temperature of approximately 4°C. Appropriate clean packing material was used in the cooler to cushion the samples and reduce the potential for breakage. The COC form was placed in the cooler with the samples. Once the coolers were filled, they were closed and a custody seal, signed by the samplers, was placed on the cooler such that the opening of the cooler would break the seal. The samples were shipped to the treatability laboratory at Kemron Environmental Services, Inc., in Atlanta, Georgia via Federal Express overnight delivery.

2.6.4 Laboratory Study

The samples were received by the laboratory, and used to conduct the testing aimed at the identification of the design mix (or mixes). The laboratory study methods are identified, and the testing process is described in this section. Detailed descriptions of the means and methods are provided in the Laboratory Report (Appendix E).

This section focuses on the methodology; it does not include the results, analysis or recommendations, which are addressed separately.

2.6.4.1 Laboratory Study Methods

During the laboratory portion of the TS, untreated soils, as well as potential mixtures of site soil with cementitous grout containing varying amount of other additives were tested for various parameters, such as soil physical characteristics, strength, volumetric expansion, hydraulic conductivity, and compatibility with Site conditions and contaminants. Following is the lists of tests/methods that were utilized during the study.

Analysis	Method
pH	EPA Method 9045C
Moisture Content	ASTM D2216
Particle Size Distribution	ASTM D422/D854
Bulk Density (w/dry density)	ASTM D 2937
Atterberg Limits	ASTM D 4318
Unconfined Compressive Strength	ASTM D 2216
Pocket Penetrometer	NA
Loss on Ignition	ASTM D2947
Hydraulic Conductivity (falling head)	ASTM D 5084
Volumetric Expansion	NA
Immersion Test	NA

2.6.4.2 Sample Receipt and Untreated Material Characterization

Soil samples were received at the laboratory, appropriately logged in and placed into secure storage. Materials from each of the two samples (i.e., native soils and fill) were homogenized using stainless steel mixing instruments and gently mixed with low-energy mixing techniques to ensure a uniform material prior to treatability testing. Potential off-gassing from the samples was managed using standard laboratory health and safety procedures including proper handling of samples by trained personnel, the use of exhaust hoods, etc.

Characterization testing performed on the homogenized samples of untreated soils (native soils and fill) consisted of the following tests: pH, moisture content, particle size distribution, bulk density, Atterberg limits, and loss on ignition.

2.6.4.3 Solidification Treatment

Process Overview

The solidification investigation consisted of two parallel testing programs; one for each of the two material types identified previously – the native soils, and the fill. Testing was conducted on the MGP-impacted soils using a phased approach: preliminary evaluation, optimization evaluation, and repeatability evaluation. Part of the optimization evaluation program, as well as the repeatability testing, are being conducted during the development of this RDR (50-75% Submission). Results of these analyses will be presented in the Final (100%) RDR.

The matrix detailing the tests applied at each stage of the solidification treatment, as well as the cure periods, is presented in Table 2-4.

Preliminary Evaluation

Based on the results of characterization of the untreated soil mixtures, the types of reagents and their approximate addition rates were identified that have been shown to be effective at improving the physical properties of hydraulic conductivity and UCS for soils similar to the site materials:

- Portland cement at addition rates between 5% and 12.5% by wet weight of the sample (% w.w.), and
- Bentonite at addition rates up to 1.5% w.w.

Total of eight mixtures were developed, four using the native soil and four using the fill. The objective of the preliminary evaluation stage was to evaluate a relatively wide range of solidification reagents addition rates. Each mixture was developed by placing an aliquot of untreated soil into a blending chamber. Reagent(s) were added to the untreated soil and blended at a rate of approximately 30 to 40 rotations per minute (rpm) until visually homogeneous, for approximately 60 to 90 seconds.

Immediately following mixture development, unit weight of each mixture was measured and the mixtures were placed into cylindrical molds for curing. Each mixture was allowed to cure for a period of 28 days in a humid environment maintained at a temperature of 18 to 24°C. Upon completion of the curing period, following quantitative tests were applied, using methods indicated previously: pH, moisture content, bulk density, unconfined compressive strength, pocket penetrometer, hydraulic conductivity, and volumetric expansion.

Immersion testing was also performed. The purpose of the immersion test is to evaluate whether there would be a release of free product from the treated materials when in the presence of water. This is typically evident as an oily film or a significant release of odor from the water bath. The immersion test also gives an indication of the long-term integrity of the material. Immersion testing was performed by submerging a 28 day cured specimen into a beaker of deionized (DI) water and swirling continuously for a period of 7 days at approximately 150 rotations per minute (rpm). Throughout that time visual observations regarding the integrity of the treated specimen and the clarity and odor of the DI water were made.

Optimization

Based on the results of preliminary solidification treatment evaluations, mix designs were identified for further optimization. The optimization focused on narrowing the ranges of reagent addition rates that were identified during the preliminary evaluation as most likely to result in the successful mix, based on two primary mix evaluation criteria: the soil strength and the hydraulic conductivity. Analyses were conducted to estimate the volumetric expansion (in order to evaluate the requirements for the disposal of the swell spoils), and to determine the integrity of each mix and its ability to prevent the source material from separating. In addition, the optimization attempted to identify the relative influence of each of the two reagents on these criteria.

Methods used to develop the testing aliquots were the same as those described for the preliminary evaluation stage. However, testing was conducted at either seven and 28-day cure times; or seven, 14 and 28-cure times, depending on the aliquot. The analyses performed during the optimization stage were: pH, moisture content, bulk density, unconfined compressive strength, pocket penetrometer, hydraulic conductivity, volumetric expansion and immersion test.

At the time of the completion of this RDR (50-75% Submission), ten aliquots of the native soils and seven fill aliquots have been tested. The overall ranges of the reagent addition rates were between zero and 1.5% w.w. of bentonite, and between zero and 12.5% w.w. of Portland cement. Additional optimization testing is being conducted to further narrow down the effective reagent addition rates.

Repeatability Evaluation

Several mixtures used during the optimization stage will be re-developed during the repeatability evaluation stage. These mixtures will be re-analyzed in order to investigate the consistency of the results. Three mix designs analyzed during the optimization will be selected for the evaluation of repeatability. They will represent the reagent addition rates determined to result in effective mix properties. Testing methods will be the same as those identified previously for the optimization stage.

2.6.5 Treatability Study Results

This section describes results of the testing conducted during the TS, including testing of the untreated materials, and testing of the treatment aliquots conducted during the preliminary evaluation stage and during of portion of the optimization evaluation stage that has already been completed. As indicated previously, the remainder of the optimization analyses and the entire repeatability stage are currently being conducted; results will be described in the Final Report.

2.6.5.1 Untreated Soil

As indicated previously, two types of Site soils were used during the TS: native soils and fill. Results of the characterization tests conducted on the homogenized untreated samples of these materials are shown in Table 2-5.

Both soils are relatively coarse, with the fraction of sand and gravel of approximately 90-95%. They are non-plastic. Of note is the high organic content of approximately 10-20%, indicating that a significant portion of the samples consisted of the MGP source material. Testing the design mixes of the soils containing the source material is consistent with the intent of the TS, as identified in the Work Plan.

2.6.5.2 Selection of Mixing Agents

The ISS mixture is intended to fulfill a dual function. The treated soil has to be solidified to decrease the permeability, in order to reduce the flow of groundwater, and the strength of the soil needs to fall within an interval where it would be both capable of bearing the anticipated loads and facilitate the overlap of column's during installation. The reagents most commonly used to control these properties are Portland cement, bentonite, and ground granulated blast furnace slag. Although the effects of these reagents may vary, generally the increase in the cement or slag content decreases the hydraulic conductivity and increases the UCS, while the increase in the bentonite content decreases both the conductivity and the UCS.

The composition and properties of slag typically differ depending on the origin; therefore, for the consistency of results with the field application, the TS should be performed with the same materials as those that will be used during construction. Because of that, a source of the material would have to be identified at the very early stage in the project, prior to the TS. Properties of Portland cement are relatively consistent between different manufacturers; therefore, results can be extrapolated from the TS to the full scale application with a significantly greater reliability, regardless of the origin of the reagent. Based on that, Portland cement was selected as the solidifying agent for the TS.

Bentonite was also used during the TS. If significant addition rates of cement turned out to be necessary to achieve low hydraulic conductivity, they may increase the UCS beyond the acceptable limits. Under those conditions, decreasing the UCS with the addition of bentonite may be required.

2.6.5.3 Preliminary Evaluation

The preliminary evaluation was conducted using soil material from homogenized samples of native soils and fill (aliquots designated as "N-" and "F-", respectively), combined with various quantities of Portland cement and bentonite. The main purpose of the preliminary evaluation was to identify the broad range of reagent addition rates that would be able to achieve the approximate value of UCS of 50-100 psi, and to establish the approximate hydraulic conductivity values that could be achieved for the treated Site soils. The secondary objective was to evaluate the expected magnitude of the volumetric expansion, and the influence of each of the two reagents (Portland cement and bentonite) on the properties of the treatment aliquots.

Results are presented in Table 2-6. The UCS data are plotted on Figures 2-1 and 2-2 for the native soils and fill, respectively; while the respective data for hydraulic conductivity are presented in Figures 2-3 and 2-4. The volumetric expansion for the aliquots of native soil and fill is presented on Figures 2-5 and 2-6, respectively. Note that the table and figures also contain data from the later optimization stage; however, data from the preliminary stage are clearly differentiated to indicate the information available at the time.

For both types of soil, the cement addition rates of 10-12.5% w.w. resulted in the UCS values of approximately 300 psi. These values were lowered to slightly above 100 psi when 1.5% w.w. of

bentonite was added. For cement addition rates of 5-7.5% w.w., the UCS of approximately 50-100 psi was obtained; this was lowered to approximately 25 psi with the addition of 1.5% w.w. of bentonite.

The preliminary objective with respect to the UCS is to achieve the UCS of approximately 50-100 psi. Based on the preliminary evaluation results, this value can not be achieved with the 10-12.5% w.w. cement content, even with the relatively high bentonite addition rate of 1.5% w.w. Applying or exceeding the 1.5% w.w. content is not considered advantageous, because of the significant volumetric expansion obtained for the 1.5% w.w. bentonite mixtures. This expansion was approximately 40% for both types of soil. The expansion without the bentonite was approximately 15-20%.

Using the 5-7.5% w.w. cement addition rate, the UCS can be maintained in the range of 50-100 psi without the addition of bentonite. Based on these results, it is anticipated that cement addition rates from approximately that interval, possibly with a minimum amount of bentonite, will create a mix where the objective of creating the solidified mass with the UCS of approximately 50-100 psi can be achieved, and where the volumetric expansion can be minimized.

The hydraulic conductivity for the fill aliquots was on the order of 10^{-7} to 10^{-6} cm/s for the entire range of the cement and bentonite addition rates. For the aliquots of native soils, the range of values on the order of 10^{-7} to 10^{-5} cm/s was obtained. There was no clear trend indicating the separate influences of either cement or bentonite.

Immersion testing was also performed. No sheen was observed on the water surface during the testing. The samples held together well. Minor disintegration on the edges of each of the solidified samples was observed. Observations are summarized in Appendix E.

2.6.5.4 Optimization Evaluation

Results of the preliminary evaluation indicate that the target range of the UCS values can be achieved by the cement addition rates close to the range of 5-7.5% w.w., either by itself or with the addition of small amounts of bentonite. The optimization evaluation was conducted to refine these results. Portland cement addition rates of between 3% w.w. and 8.5% w.w. were used, with the bentonite amounts of zero and 0.5% w.w. In order to thoroughly evaluate the influence of bentonite, the 1.5% w.w. addition rate used during the preliminary evaluation was also applied, even though the 1.5% w.w. bentonite mix was unlikely to be selected for design. Immersion testing was added to the testing program in order to evaluate the integrity of the mixes and their ability to contain the NAPL source material.

Three bentonite-only aliquots were also prepared. Bentonite-only mixes would not be selected for design, as they could not achieve the required UCS (in fact, these mixes collapsed during the UCS testing). However, the information was used to evaluate the separate influences of the cement and bentonite on the volumetric expansion, which was discerned from the preliminary evaluation data.

Results are presented in Table 2-6, and parameter-specific figures identified in the description of the preliminary evaluation testing stage. The summary table and the figures contain all quantitative data (optimization stage and the preliminary evaluation stage). Results of the immersion testing are summarized in Table 2-7. As indicated previously, some optimization-stage analyses are currently being conducted; the results will be presented in the Final Report. The full list of the analyses, including both those that are completed and those where the results are still being developed, is presented in Table 2-4.

The overall trends can be summarized as follows:

- UCS consistently increases with the addition rate of Portland cement, and decreases with the addition rate of bentonite (Figures 2-1 and 2-2).

- Hydraulic conductivity appears to decrease with the Portland cement addition rate up to approximately 5-7.5% w.w. For higher cement contents, the conductivity values appear to stabilize. There is no clear trend related to the bentonite addition rate (Figured 2-3 and 2-4).
- The volumetric expansion is relatively stable across the entire range of Portland cement contents; however, it increases significantly with the successive addition rates of bentonite (Figures 2-5 and 2-6).
- These trends are present in the results obtained for the aliquots of both soil types used in the TS: native soils and fill.
- The qualitative evaluation of the integrity of the mixes and their effectiveness in containing the NAPL source material was conducted through immersion testing. Aliquots of fill containing 3% w.w. Portland cement and one aliquot of native soils with the 5% w.w. cement content displayed some disintegrating, remaining samples maintaining their integrity. No oily sheen was observed with any of the samples. Results are summarized in Table 2-7, details are presented in Appendix E.

Furthermore, the following quantitative observations can be made:

- Testing of aliquots of both the native soils and fill with the cement addition rate of 3% w.w. and for any of the bentonite contents used during the TS indicates UCS values of approximately 10-25 psi. These values are significantly lower than the minimum value of the target interval of 50-100 psi. The 3% w.w. cement mix is not sufficient to achieve the target UCS. The 5% w.w. cement mixes without bentonite produce aliquots with the UCS of between approximately 30 and 60 psi. These values are within the range of the minimum target value of 50 psi. Addition of bentonite lowers the UCS to the range of approximately 10-20 psi, which is not sufficiently close to the target value. The 7.5% w.w. cement mixture (at this point, data are available only for the native soils) can achieve values of approximately 50 psi with the addition of bentonite, results for the cement-only sample indicate the UCS of approximately 100 psi. Results for cement addition rates of 10-12.5% produce UCS strength that is approximately 300 psi for samples without bentonite, and approximately 100-200 psi for bentonite addition rates of up to 1.5% w.w. The UCS properties of the mixes indicate that the 5-7.5% w.w. Portland cement addition rates and the 0-0.5% w.w. bentonite addition rates are most likely to produce mixes with the UCS in the target interval of 50-100 psi.
- Hydraulic conductivity decreases between the Portland cement addition rates of 3% w.w. and 5% w.w. by approximately an order of magnitude. At 5% w.w. of cement, the conductivity reaches approximately $5*10^{-7}$ to $1*10^{-6}$ cm/s in the fill aliquots, and approximately $5*10^{-7}$ to $1*10^{-5}$ cm/s for the native soil aliquots. For higher cement addition rates, the data appears to be relatively scattered, and does not show a consistent decrease. Based on that, it appears that the lowest hydraulic conductivity that can be achieved is between approximately $5*10^{-7}$ to $1*10^{-5}$ cm/s, and can be obtained with the Portland cement content equal to, or greater than, 5% w.w.
- The volumetric expansion is approximately 10-20% for the cement-only aliquots and for the bentonite-only. It increases 20-30% when 0.5% w.w. bentonite is added, and to approximately 30-45% with the bentonite addition rate of 1.5% w.w.

Based on the evaluation of the trends and the quantitative analysis, it appears that the aliquots of approximately 5-7.5% of bentonite can produce the target UCS. The lowest hydraulic conductivity is achieved with the cement content of 5% w.w. or greater. Therefore, the cement addition interval where both the UCS and hydraulic conductivity are optimized is likely to be between 5% and 7.5% w.w. Bentonite, which does not seem to consistently affect the hydraulic conductivity, can be used to adjust the UCS; however, high rates of bentonite addition are not desirable because they significantly increase the volumetric expansion of the solidified mass. Therefore, the optimum mix would contain either no

bentonite, or approximately 0.5% w.w. The integrity of the mixes and their ability to contain NAPL is satisfactory for all aliquots containing 7.5% w.w. or greater cement.

2.6.5.5 Temporal Effects

As shown in Table 2-6, certain properties of the mixes were obtained at different curing times of the treatment aliquots. Depending on the sample, the cure times when tests were performed were either 7 and 28 days; or 7, 14 and 28 days. The discussion of results presented so far focused on the 28-day cure, which is considered to be the most representative of the final mix properties. Testing at shorter cure times was performed as a quality assurance (QA) measure, and to identify potential problems that may occur during construction.

The greatest significance of the temporal changes is for the UCS, as it affects the installation of the ISS columns. The short-term UCS should be either approximately the same as, or lower than, the 28-day UCS; much higher short-term UCS could affect the ability to mix within the already-set areas to overlap the ISS columns. Results indicate that the differences in the properties of the treatment aliquots containing the optimal reagent addition rates (5-7.5% Portland cement and 0-0.5% w.w. bentonite) over the curing time were relatively minor, within the range of approximately 10 psi. This magnitude of the difference would not affect the ability to install the overlapping columns.

The temporal variability in the hydraulic conductivity and swell volume is relatively minor.

2.6.5.6 Evaluation of Dissolved-Phase Impact Following Completion of ISS

The ISS remedy is intended to address the dissolved-phase impacts by reducing the strength of the source. As indicated previously, the source reduction and the subsequent reduction in the dissolved-phase concentrations downgradient of the source are related to the rate of groundwater flow through the source zone, which primarily depends on the hydraulic conductivity of the source-zone soils. Therefore, the reduction in the dissolved-phase impacts can be related to the reduction in the hydraulic conductivity from the undisturbed source-zone soils to the post-ISS solidified mass.

In-situ hydraulic conductivities were obtained from several slug test performed in piezometers installed within the water-bearing zone at the Site (see Section 2.5.3). Six of those piezometers are located within the ISS area: PZ-1A, -2A, -3A, 1B, 2B, and -3B (see Drawing C-103, Appendix A). The range of hydraulic conductivities obtained from tests performed in these piezometers is approximately $3*10^{-3}$ to $3*10^{-2}$ cm/s (Table 2-3). As shown on Figures 2-3 and 2-4, hydraulic conductivities of the ISS treatment aliquots containing approximately 5-7.5% w.w. of Portland cement are approximately three to five orders of magnitude lower. Such reduction in conductivity, and consequently in the strength of the source, will result in a negligible potential for the development of any dissolved-phase impacts downgradient of the ISS area.

2.6.6 Summary and Recommendations

At this stage of the design, a mix containing 7.5% w.w. Portland cement and 0.5% w.w. bentonite is considered to be optimal. It will achieve the UCS values of the solidified mass within the target interval of 50-100 psi, and would result in negligible dissolved-phase concentrations of Site constituents downgradient of the ISS area. This mix will maintain its integrity, and will be effective in preventing the separation of the NAPL source material.

Additional mixes are currently being tested. These mixes are designed to provide a better resolution of results in the 5-8.5% w.w. cement addition range. Results, as well as the final mix recommendation, will be provided in the Final Report.

2.7 Supplemental Geotechnical Investigation

A supplemental geotechnical investigation was conducted to acquire geotechnical data through the installation of soil borings, the collection of soil samples and the performance of various field and laboratory testing to facilitate the design and installation of the ISS work and the excavation shoring systems to support the off-site excavation activities (depth of nine feet bgs).

The Supplemental Geotechnical Investigation included the drilling and sampling of three soil borings in the off-site excavation area. These borings are located near the location of the proposed shoring system that will be required to facilitate the off-site excavation. Three borings were also drilled and sampled in the areas proposed for ISS treatment as depicted in the RDWP. The approximate locations of these six soil borings are depicted on Drawing C-103 (Appendix A). The borings were installed using a CME 1500 drill rig equipped with hollow-stem augers. ADT provided the drilling services for these borings. Following completion of drilling, the soil borings were filled to the ground surface with a cement/bentonite grout.

Soil samples were collected from the borings and analyzed for geotechnical parameters, and the Standard Penetration Testing (SPT) pursuant to ASTM D1586 was conducted as part of sample collection. In order to keep the borehole stabilized and reduce the potential for the overburden sand deposits to run into the inside of the hollow-stem augers prior to split-spoon sampling, a column of water was maintained within the augers, with the top of the column at or above the ground surface.

2.7.1 Soil Borings

A total of six soil borings were drilled and sampled at two areas of the Site: near the perimeter of the off-site excavation area (three borings) and within the areas planned for ISS treatment (three borings).

Excavation Areas

In order to evaluate the subsurface conditions along the alignment of the proposed sheeting/shoring system to be utilized to support the integrity of the excavation sidewalls, three soil borings were drilled and sampled. The three borings, designated GI-4, GI-5, and GI-6, were spaced near the limit of the proposed shoring system to evaluate variations in the composition of the soils comprising the subsurface. The borings were drilled to a depth of approximately 30 feet bgs. The drilling took place on May 24 and May 25, 2012, following receipt of permission from the property owner. The logs for these soil borings are provided in Appendix F.

ISS Area

Three soil borings were drilled on March 23 and March 27, 2012 in the area initially depicted in the RDWP for ISS treatment to evaluate the subsurface conditions in support of the selected installation method. The borings were drilled to a depth corresponding with the deepest anticipated ISS treatment (23 feet bgs). These borings are designated GI-1A, GI-2, and GI-3. Logs for these soil borings are provided in Appendix F. Note that boring GI-3 was drilled in the northwest part of the site where ISS was initially planned. However, this area was remediated via excavation as part of the preparation of a utility corridor, as discussed in Section 1.1.4.

2.7.1.1 Collection of Soil Samples

Continuous SPT sampling was performed in all of the borings drilled near the horizontal alignment of the shoring system for the off-site excavation area as well as within the ISS Area.

2.7.1.2 Sample Analysis (Geotechnical)

To supplement the SPT data and visual descriptions of the samples, representative samples of the soils obtained from the borings drilled along the anticipated alignment of the shoring system were submitted

for laboratory testing for grain size distribution and moisture content. Direct shear and Atterberg limits tests were not conducted as only disturbed granular samples were obtained and were considered to be non- plastic based on visual evaluation.

Inferred field relative densities were estimated based on the SPT blow counts performed as part of the test borings.

Selected representative soil samples obtained from the borings were analyzed by the geotechnical laboratory at Geotesting Express, Inc. for grain size and moisture Content. The results of the geotechnical analyses are provided in Appendix G and are summarized in the table below. The results of the SPT tests are provided on the soil boring logs in Appendix F.

Geotechnical Testing Summary

Boring	Depth (ft)	Moisture Content (%)	Gravel (%)	Sand (%)	Silt & Clay (%)
GI-4	8-10	17	10.0	86.3	3.7
GI-4	20-22	20	9.6	89.5	0.9
GI-5	2-4	40	12.5	69.3	18.2
GI-5	16-18	18	0.3	96.2	3.5
GI-6	8-10	17	17.1	81.3	1.6
GI-6	26-28	20	0.4	97.9	1.7

2.7.2 Summary and Recommendations

The soils in the off-site excavation area consist of 11 to 14 feet of fill overlying native sands. The fill is very loose to medium dense sand with varying amounts of silt and gravel. The native soils are loose to medium dense sand with trace silt and trace to little gravel. Below a depth of 18 feet, the native sand layer is occasionally very dense.

Because the upper fill layer is very loose at some locations, care should be taken to avoid heavy vibration during construction that may cause differential settlements beneath the nearby building. Therefore, it is not recommended that driven sheet-piles be used as a means of excavation support.

2.8 Limited Field Investigation for Utility Corridor Implementation

A draft Utility Corridor Work Plan (UCWP) was submitted to the NYSDEC on November 7, 2011. Based on discussion of comments generated during the NYSDEC's review of the initial November 2011 draft of the UCWP, the following additional investigation activities were requested:

- Drilling and sampling (for descriptive purposes) of two additional soil borings (SB-139 and SB-140) to confirm the western limit of the MGP impacts to be addressed by In-Situ Solidification (ISS) in the central/core area of the Site.
- Drilling and sampling (for descriptive purposes) of two additional soil borings (SB-137 and SB-138) to further evaluate the limits of the excavation in the northwestern corner of the site.

A figure depicting the locations of the proposed borings was provided to NYSDEC in an email dated December 16, 2011; NYSDEC subsequently approved the locations in an email on December 20, 2011. On January 6, 2012, BC and the drilling contractor, ADT, mobilized to the Site to implement the additional soil investigation requested by the NYSDEC.

At each boring, the interval from the ground surface to a depth of three feet bgs was "hand cleared" using a post-hole digger and hand auger as a precaution to reduce the potential of drilling into

subsurface utilities, (in addition to the other measures taken to address potential utilities, as described in Section 2.2). Typically, the soils were saturated with groundwater at a depth of about three feet bgs. The borings were then drilled and sampled via direct-push methods using a track mounted GeoProbe® 6620 DT equipped with a Macrocore® soil sampler. Soil samples were collected using the soil sampler from a depth of approximately three feet bgs to the target depth designated for each location as described below. The soils retrieved during the hand clearing as well as from the soil sampler at each boring location were logged by a BC geologist in accordance with the Burmister Soil Classification System and the USCS. In addition, soil samples were screened in the field using a PID and observations of odors, NAPL/tar, staining and/or sheens were recorded.

Soil borings SB-139 and SB-140 were drilled and sampled at locations west of the central/core area where implementation of ISS is currently planned. These borings were drilled and sampled to a depth of 23 ft bgs, which represents a depth below the deepest NAPL encountered at the site in previous investigations. No visible NAPL was observed in soil samples from these borings. Within the upper 5 feet of soil, black stains with weak to moderate tar odor were observed. Refer to the soil boring logs in Appendix F for further details.

Soil borings SB-137 and SB-138 were drilled and sampled through a concrete slab to a depth of 10 feet bgs. Specks of tacky, hard tar and gravel-sized pieces of brittle tar with a moderate odor were observed in the soils within a very discrete depth interval (4.7 to 5.4 feet bgs) at SB-137. At boring SB-138, a stringy and tacky tar with a faint tar odor was observed within a two-inch interval at a depth of 4.8 feet bgs. No measurable PID readings were noted from the soils retrieved from either of the boring locations.

To further evaluate the lateral extent of the tar noted in SB-137, an additional soil boring, SB-141, was drilled approximately 18 feet to the southeast of SB-137. This boring was drilled and sampled to a depth of 13 feet bgs. Three attempts were made to drill SB-141; the first two encountered drilling refusal at a depth of 0.5 feet bgs. At the location of SB-141, thin bands of black NAPL coated sand grains were observed from 2.6 feet to 3.0 feet bgs. Below 3.0 feet bgs, the soil was noted to be heavily coated with NAPL and exhibited strong tar-like odor. NAPL was observed to extend to a depth of 4.9 feet bgs at SB-141 with tar-like odors decreasing with depth. Beyond a depth of 4.9 feet bgs, to the end of the boring at 13 feet bgs, no NAPL was encountered. Please refer to the boring logs in Appendix F for further details on NAPL observation and soil descriptions.

Following the completion of each boring, the borehole was backfilled with bentonite pellets to the ground surface. Soils with staining, tar odors and NAPL were containerized in a 55-gallon DOT-approved steel drum for off-site disposal. Each soil boring location was surveyed for horizontal location and vertical elevation by a New York State licensed surveyor form Bertin Engineering before the implementation of the UCWP.

The locations of borings SB-137, SB-138, SB-139, SB-140 and SB-141 are depicted on Drawing C-103 (Appendix A). Logs for these soil borings are provided in Appendix F.

This information was used to revise the UCWP. The document entitled “Utility Corridor Work Plan (Revision 3), Patchogue Former MGP Site, Patchogue, Suffolk County, New York, Site No. 1-52-182” was finalized by Brown and Caldwell Associates and submitted to the NYSDEC on February 8, 2012. The NYSDEC approved the draft UCWP in a letter dated February 9, 2012. Implementation of the UCWP occurred during June and July 2012 and has been documented in the “Construction Completion Report, Utility Corridor Work Plan Implementation, Patchogue Former Manufactured Gas Plant Site, NYSDEC Site No. 1-52-182, Village of Patchogue, Suffolk County, New York” (Brown and Caldwell Associates, December 2012).

2.9 Community Air Monitoring

The Community Air Monitoring Plan (CAMP) included in Appendix H of the RDWP and as part of the UCWP was implemented during the pre-remedial design activities to monitor, record, and document air quality

at the Site leaving the work zone(s). The CAMP, in conjunction with the air monitoring requirements of the HASP, included in the RDWP as Appendix I, provide for:

- Establishing background levels of target compounds in ambient air prior to initiation of remedial construction;
- Monitoring and documenting perimeter ambient air levels of target compounds during the implementation of the remedy;
- Providing an early-warning system to prevent the potential exposure to elevated concentrations in off-site areas by responding aggressively to exceedances of short-term action levels, and to prevent concentrations at the perimeter of the Site that would potentially result in a long-term exposure above acceptable risk levels;
- Evaluating ongoing effectiveness of, and the need for additional vapor and/or dust suppression controls and/or alteration of work activities, to reduce airborne compounds to below acceptable risk levels; and,
- Using real-time perimeter monitoring results in conjunction with confirmatory air sampling.

Perimeter monitoring was conducted both downwind as well as upwind of work zones. Air monitoring stations were adjusted, as necessary, based on the location of work activities and wind direction, such that a minimum of one station was located upwind and one station was located downwind of the work zone. The perimeter air monitoring data indicated no exceedances of the action levels for total organic vapors or PM-10 particulates occurred.

During installation of the environmental cap within the utility corridor, there were several occasions when visible dust was observed. Corrective actions were immediately implemented to eliminate the generation of dust and mitigate impacts at the perimeter of the Site. Work continued when dust was no longer observable. No stop work conditions occurred.

The provisions in the CAMP presented in the RDWP and UCWP are considered effective for monitoring the type of activities planned during remedy implementation and will be utilized in the development of a CAMP for this RDR.

Section 3

Remedial Activities

The following sections detail the components of the remedy selected to address the impacts at the Site in accordance with the requirements of the ROD. In general, the work will be implemented in the following sequence of events:

1. Submittals/Preparation of Final RDR (100%)
2. Mobilization
3. Site Preparation Activities
4. Remedial Activities
5. Post-Remedial Action Activities

In addition this section presents a detailed discussion of specific activities that will occur during the implementation of the Remedial Activities as follows:

- Air Monitoring;
- Odor Control and Vapor Management;
- Decontamination;
- Waste Management; and
- Discharge Requirements for Water Disposal.

3.1 Submittals/Preparation of Final RDR (100%)

The Remedial Contractor will be responsible for the preparation of numerous submittals for review and approval by National Grid and/or its duly authorized representative for inclusion in the Final RDR (100%). The submittal schedule is included in the Technical Specifications (Appendix J). The major submittals will include a Construction Management Plan, a Site-Specific Health and Safety Plan, and a Site-Specific Construction Quality Control Project Plan (CQCPP). After submittals have been reviewed and accepted by National Grid, they will be included in the Final RDR and submitted to NYSDEC for review and concurrence.

The Remedial Contractor will be required to prepare a Construction Management Plan (CMP) that will detail the proposed means and methods for achieving the remediation goals in accordance with the Design Drawings (Appendix A) and Technical Specifications (Appendix J). This CMP will be required to be submitted to National Grid for review and acceptance prior to the implementation of the remediation. Within the CMP, the Remedial Contractor will be responsible for detailing the means and methods to complete the remedial construction. The CMP will include a detailed description as well as the proposed sequencing for completing the major remedial activities. Stockpile and staging areas for clean materials and waste materials needed for the remedial construction will be identified. The CMP will also include additional drawings (i.e., temporary excavation shoring, dewatering systems, etc.) prepared by the Remedial Contractor that will supplement the Design Drawings and provide for the necessary surveying for the remediation. As-built drawings of the completed remediation and construction will also be required through the CMP. All engineering drawings developed by the Remedial Contractor will be required to be prepared and stamped by a Professional Engineer, retained by the Remedial Contractor, who is licensed in the State of New York.

Similarly, survey documents will be signed and stamped by a Professional Surveyor, retained by the Remedial Contractor, who is licensed in the State of New York.

In addition to the Design Drawings and Technical Specifications, a HASP has been prepared by BC for use by its employees as Design Engineer during the remedial activities and is included as Appendix I. The Remedial Contractor will be required to provide a Site-Specific Health and Safety Plan (Site-Specific HASP) to coordinate with contractor's means and methods of construction and this plan will be submitted for review by National Grid, their duly appointed representative(s) and the NYSDEC. National Grid will verify that the Site-Specific HASP includes National Grid's site specific requirements as outlined in the HASP included as Appendix I of the RDR. The Contractor shall prepare a site-specific HASP based on the requirements contained in the BC HASP. The Contractor Site-Specific HASP may be more stringent than the BC HASP. The site-specific HASP will detail any revisions and/or updates required by the Remedial Contractor to the approved HASP included with this RDR. The Remedial Contractor's site specific HASP will be required to identify the personnel and their credentials, for the approval of National Grid, that will provide health and safety services. All Remedial Contractor personnel working on the Site will also be required to provide health and safety credentials including OSHA training certificates and medical records.

The Remedial Contractor's site-specific CQCPP will be required to set forth the general framework and specific details of the methods and procedures that will be implemented to demonstrate that construction activities have been performed pursuant to the Contract Documents. The site-specific CQCPP will describe the quality control organization of the Remedial Contractor and the allocation of responsibilities for performing quality control activities.

The Contractor will also be responsible for developing a contingency plan in accordance with the Technical Specifications. The plan will include, at a minimum:

- A Pollution Prevention Plan for all materials brought to the work site that includes methods to address spills, should they occur;
- Emergency vehicle access/egress;
- Procedures for evacuating personnel from the work site;
- A Flood Event Contingency Plan with measures to protect the Site from the effects of a flood; and
- A list of all personnel that may be contacted in case of an emergency.

3.2 Mobilization

The Remedial Contractor will be responsible for mobilizing all necessary personnel, equipment including but not limited to temporary facilities and materials to the Site required for implementation of this RDR.

The temporary facilities will include providing establishing required utilities, equipment staging areas, material staging areas, decontamination areas and pads, and ingress/egress to the Site as further described below in Section 3.3. The proposed locations of these features are shown on Drawing C-108 (Appendix A).

The Remedial Contractor will be responsible for providing temporary utilities at the Site. These utilities include, but are not limited to: electricity; heating and cooling; telephone and facsimile service; internet service; water supply; sanitary facilities and all else required by the Technical Specifications (Appendix J).

3.2.1 Office Trailers

The Remedial Contractor will mobilize office trailers to the Site for the construction activities. Office space will be provided in on-site trailers that will be maintained for the NYSDEC, National Grid, National Grid's Duly Appointed Representative(s), the Design Engineer and the Remedial Contractor. Site logistics will determine the actual number of trailers staged on the site. The office trailers and their contents will comply with requirements of the Technical Specifications (Appendix J) of this RDR.

3.3 Site Preparation

The Site will be prepared, as needed, to facilitate the implementation of the proposed remedial activities. Site preparation activities will include, but will not be limited to, the following:

- Recording existing conditions within the Core/Central Area and adjacent property by photo documentation and surveying;
- Establishment of vibration control points within the existing building located on the adjacent property (off-site excavation area);
- Establishing a secure Site perimeter;
- Establishing stabilized construction entrances and widening ingress/egress gates, if required;
- Establishing/upgrading Site haul roads/truck routes;
- Clearing and grubbing including the removal of vegetation, concrete, and any on-site debris within the limits of the Core/Central Area, as required;
- Establishing equipment and material staging areas;
- Establishing the decontamination area(s);
- Conducting selective demolition, including removal of fences;
- Locating and isolating perimeter utilities, if any;
- Managing, protecting and supporting existing utilities for the adjacent property;
- Establishment of locations for air monitoring;
- Decommissioning of selected groundwater monitoring wells within the Core/Central Area; and
- Establishment of soil erosion and sedimentation controls.

Major activities are further described in the following subsections of the RDR.

3.3.1 Site Security

The existing site perimeter fence will be inspected and maintained during the remedial activities. As needed, the Remedial Contractor will install temporary fencing with gates with locks to secure the Site. The perimeter of the Site will be secured and locked during non-working hours. Perimeter security checks will be performed daily by Brown and Caldwell and conditions will be logged. National Grid will maintain access to the Site at all times by "double locking" the gates.

Twenty-four hour security is not anticipated for this work; however, during site working hours, an employee of the Remedial Contractor will be assigned, as needed, to the main entrance gate to control access to the Site. The employee will be equipped with a two-way radio with phone service to ensure constant contact with Site personnel.

All site workers, subcontractors and site visitors will be required to sign a daily log. A list of persons authorized for site entry will be maintained at the site entrance.

3.3.2 Stabilized Construction Entrance(s)/Exit(s)

Stabilized construction entrances/exits consisting of smoothly graded areas large enough to accommodate equipment and truck traffic will be constructed. The stabilized construction entrances/exits will consist of crushed coarse aggregate stone underlain by non-woven geotextile fabric and will be maintained and redressed while in use. Tires of transport trucks entering/exiting the Site will travel across these stabilized entrances/exits and can be further inspected at these points. A decontamination pad will be in placed along the exit route for the Site. Routes on- and off-site will be routinely monitored for build-up of excessive site soils and dust.

A single ingress/egress point is proposed for the remediation activities and will require a stabilized construction entrance/exit. The ingress/egress point to the Site will be from West Main Street. The proposed ingress/egress location is indicated on Drawing C-108 (Appendix A). The necessary municipal permits, if any, to maintain a construction entrance/exit will be obtained for the duration of the project by the Remedial Contractor. These permits will be obtained by the Remedial Contractor prior to mobilization to the Site.

A Maintenance and Protection of Traffic Plan (MPTP, Appendix K), has been prepared to support the implementation of the remedial activities at the Patchogue Former MGP Site. The MPTP describes the procedures that will be followed to maintain vehicular and pedestrian traffic and preserve the safety of motorists, highway workers, and pedestrians during implementation of the remedial construction.

3.3.3 Clearing and Grubbing

Vegetation and debris will be removed from work areas where remedial activities will occur. Debris, stumps, roots and other vegetation that are generated during clearing operations will be stockpiled, characterized and disposed of off-site at an appropriate disposal facility.

3.3.4 Equipment and Material Staging Areas

Equipment staging areas will be located so as to facilitate equipment ingress and egress and allow for proper sequencing of the remedial construction work. The construction equipment necessary to implement the remedial construction activities will be mobilized to the Site.

Material staging areas will be established for excavated material, debris, clean backfill, and liquid wastes (if generated). Staging areas will be underlain by plastic sheeting with perimeter berms to contain run-on and run-off. Liners beneath the stockpiles as well as plastic sheeting used to cover stockpiles will be of sufficient thickness to minimize rips caused by debris and/or the movement of materials and to be protective from the elements. Damaged or ripped liners/sheeting will be repaired or replaced, as necessary. The staging areas will be physically segregated to prevent cross-contamination or commingling of materials. To the extent feasible, materials intended for off-site transportation and disposal will be staged in areas of the Site that are not proximate to existing off-site roadways in order to minimize the potential for off-site impacts. Staging areas for excavated soils and impacted debris destined for off-site disposal will be principally located in the remaining areas of the Site subject to excavation.

Excavated soils and impacted debris will be covered with plastic to minimize odors as well as the effects of weather. A construction detail for the stockpile area is included on Drawing C-501. Odor suppressing foam will be applied to stockpiles, as necessary, to minimize the potential for odors generated by the impacted soils.

The locations of the staging areas are shown on Drawing C-500 (Appendix A).

3.3.5 Decontamination Area

During the implementation of the remedial construction activities, the Site will be divided into three primary zones: the exclusion zone, the contamination reduction zone, and the support zone. These locations will be identified in the field during the implementation of the remedial activities based on the location of the work zones. The decontamination area will be located within the contamination reduction zone along the exit route and will include the personnel decontamination station and the equipment decontamination pads. Heavy machinery, trucks, equipment and personnel exiting the exclusion zone will be subject to the decontamination procedures. A construction detail for the decontamination pad is included on Drawing C-501 (Appendix A).

The location of the decontamination area is shown on Drawing C-500 (Appendix A).

3.3.6 Monitoring Well Decommissioning

Protection of the existing groundwater monitoring wells within the Central/Core area would be difficult and impractical. These monitoring wells, depicted on Drawing C-109 (Appendix A) will be decommissioned prior to excavation and ISS activities. The well will be decommissioned in accordance with "CP-43: Groundwater Monitoring Well Decommissioning Policy" (NYSDEC, November 2009) by grouting in-place. To decommission the groundwater monitoring well, a tremie pipe will be lowered to the bottom of the well and cement-bentonite grout pumped through the tremie pipe so that the well is grouted from the bottom to the top. Water displaced from the well during decommissioning will be contained for proper disposal. The grout level will be monitored, and if it settles substantially, additional grout will be added to raise the grout level. Following completion of the grouting, the above-grade protective casing or flush-mounted protective cover will be removed, along with any portion of the polyvinyl chloride (PVC) casing that is above grade. The area where the protective cover/casing was removed will be backfilled with clean soil to grade.

Over-drilling and extraction rather than grouting in place will not be used at the Site for well decommissioning. The guidance document, "CP-43: Groundwater Monitoring Well Decommissioning Policy" (NYSDEC, November 2009), permits grouting in place as long as the well does not penetrate a confining layer and the well is intact. The wells at the Site do not penetrate a confining layer and the wells are in intact (i.e., the wells are sealed above the sand pack). Over-drilling, well extraction and borehole sealing is required only if decommissioning an overburden well that penetrates a confining layer.

Monitoring wells located outside of the ISS/excavation that are to remain will be protected by either wooden fences/barricades, orange construction fencing and/or applicable signage. Site personnel will be made aware of these areas in the daily safety discussions.

3.3.7 Soil Erosion and Sediment Control

Prior to commencement of the remedial activities, temporary soil erosion and sediment control (SESC) measures will be installed. The elements of the proposed SESC measures will be designed and installed in accordance with the New York State Standards and Specifications for Erosion and Sediment Control. In addition, remedial activities will be implemented so as to minimize erosion and silting and the potential for fugitive odor and dust emissions.

SESC measures will be employed utilizing Best Management Practices (BMPs) including silt fencing, hay bale dikes, storm drain inlet protection, stabilized construction entrances/exits and dust control measures. At a minimum, silt fence/hay bale dikes will be installed to delineate the limit of the remedial work area (installed on the down slope side) and around the perimeter of any stockpile areas. The SESC measures will be installed as shown on Drawing C-500 (Appendix A) and in strategic locations based on

visual observation of flow patterns and the topography of work areas to control sediment entrained storm water from existing and entering work areas. Details for each type of SESC measure are presented on Drawing C-501 (Appendix A).

During remedial construction, SESC measures will be inspected and maintained on a daily basis and following precipitation events. Inspection and maintenance activities will be documented in the field logs. Accumulated sediment will be removed from the erosion and sediment controls, as needed. Sediment that originates from the remedial work areas will be added to the stockpile(s) for off-site disposal. Sediment will be removed from behind the silt fence and hay bales when it accumulates to a depth greater than 0.5 feet deep behind the barrier.

3.3.7.1 Storm Water Pollution Prevention Plan

A Storm Water Pollution Prevention Plan (SWPPP), included as Appendix L of this RDR, has been prepared to support the implementation of the remedial construction activities. During the implementation of the remedial actions, storm water management practices will be implemented to control potential impacts (i.e., erosion and sediment loading) to Site-related storm water runoff and achieve the following objectives:

- minimize potential erosion of existing soil/sediments within active work areas;
- minimize the potential for the conveyance of sediment-laden storm water beyond the project work limits; and
- minimize accumulation of water within active work areas.

After a rain event, the water table at the Site may become elevated and result in localized flooding that will require management in accordance with the SWPPP.

3.4 Remedial Activities

The remedial activities will include the following:

- Selective Demolition;
- Dewatering and On-Site Water Treatment;
- Installation of Temporary Shoring;
- Excavation;
- In-Situ Solidification
- Backfilling and Compaction;
- Construction of Environmental Cap; and
- Site Restoration.

These activities are further described below.

3.4.1 Selective Demolition

Remnants of former structures (i.e., concrete pads), if encountered, will be demolished utilizing a hoe ram, hydraulic hammer or equivalent attachment mounted on an excavator, backhoe or other conventional excavation equipment. After demolition, the debris will be prepared and decontaminated, as necessary, to meet the acceptance criteria of the selected disposal or recycling facility. Preparation will consist of demolishing the structural materials into pieces that are manageable and meet facility acceptance criteria. Decontamination of concrete debris will consist of pressure washing using a high pressure, low volume power washer. In addition, physical/mechanical agitation (scraping with hand tools) of soil adhered to debris may be utilized to minimize wastewater generation. Generated decontamination fluids will be containerized on-site where it will be characterized for off-site disposal.

3.4.2 Dewatering and On-Site Water Treatment

Based on the targeted depth of the excavations and the depth to water at the Site and vicinity (within three feet of the surface), dewatering will be required for the installation of the shoring protection system and during excavation of the off-site area. A conceptual-level estimate of the dewatering flow rates has been performed as part of the design process detailed in this RDR. The estimate was based on the preliminary concept of the dewatering system that involves pumping groundwater from wells or well points installed along the perimeter of the excavation areas. This layout was developed based on the typical dimensions of a single excavation cell (approximately 20 feet by 20 feet). The aquifer properties (e.g., thicknesses and transmissivities of the water-bearing zones) were assumed based on results of the hydrogeologic investigation described in Section 2.5 of this RDR. Conceptually, it was assumed that the excavation will proceed in the form of advancing cells where soils in one cell will be excavated, the excavation will be backfilled, and the work will proceed to the next area. The detailed design of the dewatering system and of the implementation of the excavation will be submitted to the NYSDEC.

The extraction rates will be used to size the water treatment and disposal system required to manage the groundwater produced during dewatering and other water generating activities to be conducted during the implementation of the remedial activities (i.e., decontamination activities). The sizing of such a system depends predominantly on the peak flow rate that will be developed during the dewatering operation. Therefore, for the purpose of the preliminary design, the peak dewatering rates were estimated. The design peak rate was assumed to be the average rate developed during the first day of the dewatering operations where extracted water is generated both as a result of the flow from the hydraulic boundaries and from the storage within the cone of depression. The corresponding peak extraction rates were estimated to be between approximately 150 gpm and 325 gpm.

The conceptual treatment train for managing of the extracted groundwater and other remedial wastewater consists of equalization, oil/water separation, filtration, and granulated activated carbon. A process flow diagram of the proposed system is depicted n Drawing C-400 (Appendix A). A detailed treatment system design will be provided in the Final RDR (100%) based on the sequencing of the implementation of the remedial activities and the effluent limitations established in the SPDES Equivalency Permit being prepared by the NYSDEC.

3.4.3 Installation of Temporary Shoring

Excavation in the off-site area shall be conducted in a manner to protect the integrity of the existing building and any other related structures or features. This building is a not owned by National Grid and currently supports an active business which prepares store fronts and thus maintains equipment which is sensitive to vibrations. An appropriate excavation stabilization methodology (i.e., sloping or shoring) will be employed so that this building and associated features will not be impacted.

Initial evaluations of the applicability of using sheetpiles as a means of temporary shoring indicate that the panels would need to be driven to a depth substantially deeper than the depth of the excavation. Due to the increased depth compounded by the high blow count sands, the resulting vibrations and the likelihood of damage caused by sheetpile driving near the building, installation of sheetpiling near the building has been deemed impractical.

The ICON Shoring System (ICON) has been determined to be a more appropriate option as a means of temporary shoring. The ICON shoring system has reduced vibratory impacts on the building. Based upon initial discussions with ICON representatives, the shoring system must be maintained a minimum of eight (8) feet away from the building. In addition, the water level within the excavation area must be drawn down and maintained at five (5) feet bgs. A conceptual layout of the ICON Shoring System using 20 feet by 20 feet excavation cells has been provided on Drawing C-200 (Appendix A).

The Remedial Contractor may propose the use of other types of excavation support as long as the method protects the integrity of the existing building and has minimal impacts on the existing operations. Mechanical means of excavation support shall be designed, signed and sealed by a Professional Engineer licensed in the State of New York. This design will be reviewed by National Grid prior to implementation. Any alternative excavation support methods will be submitted to National Grid for review and approval.

For the ISS area, sloping of excavation sidewalls will be used as the primary excavation support approach.

3.4.4 Excavation

In accordance with the requirements of the ROD, the excavation or remediation of impacted soils will be conducted to a depth corresponding with of NAPL/tar impacted soils in the area. The limits and depth of the NAPL/tar impacted soils is based on information obtained during the historical investigation activities. Based on the observations of NAPL/tar during the installation of the investigation borings, the depth of NAPL/tar impacted soils ranges from four (4) feet bgs to 23 feet bgs on-site and the maximum depth of NAPL/tar impacted soils is nine (9) feet bgs off-site. The horizontal limits of the areas targeted for excavation or remediation are shown on Drawing C-200 (Appendix A).

Excavated soils will be visually inspected for impacts. Impacted soil above the existing groundwater table will be directly loaded and transported to the material staging area. Impacted soils generated below the groundwater table will initially be placed in a stockpile in a temporary staging area constructed near the edge of the excavation. This temporary staging area will be sloped towards the excavation. Entrained water will be allowed to gravity drain back into the excavation. The gravity drained excavated saturated soils may also be mixed with excavated unsaturated soils or amending materials to reduce moisture content while located within the temporary staging area. Amending of the soil will be for the purposes of improving handling characteristics and for meeting disposal facility acceptance criteria. The amended soil will then be placed in the material staging area pending characterization and off-site disposal.

3.4.4.1 Off-Site Excavation

The horizontal limits of the off-site area for excavation are depicted on Drawing C-200 (Appendix A). The excavation will be to a depth of nine (9) feet bgs. As described above, the excavation is adjacent to a building which supports an active business which maintains equipment sensitive to vibrations thus the ICON Shoring System will be employed. The excavation will be broken into 20 feet by 20 feet cells which will be dewatered to a depth of five (5) feet bgs so that the ICON Shoring System can be installed to the required final depth of nine (9) feet bgs. Dewatering is as described above. This shoring system will be maintained a minimum of eight (8) feet away from the building. Excavation cells will be moved and the sizes modified as needed to allow for the removal of NAPL/tar impacted soils in this area.

Paved surfaces beyond the off-site excavation area will be protected during implementation of the remedial action. Areas of existing pavement that require repair will be repaved. Pavement removed as part of the implementation will be replaced.

3.4.4.2 On-Site Excavation

Based on the observations of NAPL/tar during the installation of the investigation borings, the on-Site area containing NAPL/tar impacted soils was broken into six sub-areas based on the depth of observed NAPL/tar impacted soils as depicted on Drawing C-200 (Appendix A). Of these six (6) areas, a single area, approximately 40 feet long by 20 feet wide, located along the west-southwest portion of the on-Site remedial area is anticipated to be excavated. The depth of NAPL/tar impacted soils in this area is four

(4) feet bgs. The excavation of this area will occur after the ISS of the remaining five (5) areas. This area will not be dewatered during the excavation.

After completion of the ISS, the ISS will be excavated to approximately four (4) feet bgs to facilitate installation of the environmental cap and freeze/thaw concerns regarding the stabilized materials.

As depicted on Drawing C-200 (Appendix A), two feet bgs will be removed from areas subjected to fill materials in order to facilitate installation of the environmental cap.

3.4.4.3 Former MGP Structures

Removal of former MGP-related structures will be performed within the ISS and excavation areas if encountered. Structures identified during remedial action implementation will be fully removed even if it extends beyond the limits of the remedial action, as shown on Drawing C-200 (Appendix A). Any structure that may be encountered during the remedial action implementation will be removed in its entirety.

3.4.5 In-Situ Solidification

In-Situ Solidification (ISS) performed as part of the Site remedy will involve mixing of treatment agents with the NAPL/tar impacted soils within the Central/Core area. The desired changes to the impacted soil include:

- Decreasing the hydraulic conductivity of impacted soils; and
- Achieving soil strength compatible with the anticipated Site use.

ISS is specified in the ROD as the element of the remedy that will address the source of the NAPL/Tar impacts. Per the ROD, ISS shall be implemented within the volume of the Central/Core Area where MGP-related NAPL/tar and associated soil is located. The ISS area is based on the location of MGP-related NAPL/tar and associated soil plus an approximate five-foot buffer zone outside of this line. The ISS area is depicted on Drawing C-200(Appendix A). The depths and the area of the ISS application were selected based on the observations of intervals of NAPL saturation encountered during the drilling and sampling of soil borings, results of soil sample analyses from these borings (concentrations of MGP-related constituents above SCOs associated with NAPL occurrence), and observations of NAPL in monitoring wells. Accordingly, ISS will be performed from the ground surface to the deepest NAPL horizon encountered. The depth to which NAPL intervals were encountered varies throughout the targeted treatment area; the deepest that NAPL was encountered in the soil was 23 feet bgs. The volume of subsurface soil that will be treated using ISS is estimated to be 6,800 cubic yards (cy). Corresponding calculations are presented in Appendix B.

A Treatability Study is currently being performed to identify the design mix (see Section 2.6). A pilot study will be conducted prior to the full-scale implementation. Verification sampling will be performed during the pilot study and after the completion of the ISS to confirm that the mix has achieved the above-mentioned objectives. The overall effectiveness of the ISS portion of the remedy will be verified by sampling of groundwater to confirm that the appropriate groundwater quality standards are being achieved.

Site Specific ISS Performance Standards

Based on results of the TS, remedial objectives, and geotechnical considerations, the site-specific performance standards were developed for ISS and are as follows:

- Achieving an UCS of 30 to 150 psi, with the arithmetic average of all verification samples equal to, or greater than, 50 psi; and
- Achieving a geometric mean from all hydraulic conductivity tests equal to, or less than, $1x10^{-6}$ cm/sec, with the maximum value of $1x10^{-5}$ cm/sec.

Verification sampling is described later in this section.

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- Achieving a geometric mean from all hydraulic conductivity tests equal to, or less than, $1x10^{-6}$ cm/sec, with the maximum value of $1x10^{-5}$ cm/sec.

Verification sampling is described later in this section.

ISS Treatability Study

A Treatability Study is currently being performed to identify the design mix, or mixes. Preliminary results indicate that a mix containing 7.5% w.w. Portland cement and 0.5% w.w. bentonite would be able to achieve the performance objectives (Section 2.6). Additional mixes are being tested. Overall results, as well as the final mix recommendation, will be provided in the Final Report.

ISS Pilot Study

As required by the ROD, a pilot-scale study will be performed prior to the implementation of the ISS. Since the ISS area is relatively small, it was determined that a separate mobilization for the study is not warranted, and that the pilot study would be conducted as part of the mobilization for the full-scale ISS

as the initial stage of the ISS implementation. The pilot study will consist of approximately three to five ISS columns for each mix design (various Portland cement and bentonite ratios) considered for use during the full-scale implementation, based on results of the Treatability Study, in order to document that each can achieve the performance standards. The pilot study will be conducted within the ISS treatment area. The columns will be installed in a manner that if the performance testing results from the columns completed during pilot study do not meet the ISS performance standards, those columns can be surrounded by additional columns that meet the performance standards during full-scale implementation. Full-scale ISS will not commence until after the pilot study is completed and satisfactory results are obtained that support a mix design capable of achieving the performance standards.

ISS Spoils Management

As part of the implementation of the ISS, soils are generated and disposed of off site. The total volume of the spoils is based on the amount of swell of the treated soil column generated as a result of the ISS, and the need to accommodate the surface cover above the top of the solidified mass. At the Site, the top of the solidified mass will be four feet below the finished grade. Based on the preliminary results of the TS, the swell amount is expected to be within the 20-30% range; the estimate will be finalized following the completion of the TS. Based on that, the volumetric quantity of spoils will be estimated, and will be presented in the Final Report.

The waste management for ISS spoils will be as follows:

- ISS spoils will be removed from the ISS area. The contractor will be required to take precautions to avoid the spoils solidifying into unmanageably large blocks;
- Waste characterization samples will be collected before the ISS spoils set up. Samples will be cured and conveyed to the laboratory. Sampling and analysis of waste characterization samples will be conducted in accordance with procedures identified in the Technical Specifications (Appendix J).
- After receiving the final waste characterization results and obtaining approval from the disposal facility, the waste materials will be transported to a permitted non-hazardous treatment, storage, or disposal (TSD) facility.

Verification Sampling

To document that the ISS achieves the established performance standards, verification sampling will be conducted during the ISS pilot study and during full-scale implementation. Samples will be collected from the ISS mass immediately after the mixing of reagents into the subsurface and before the ISS column cures. Sampling frequency will consist of the following:

- During the pilot study, samples will be collected from each ISS column as well as the overlap between columns. Samples will be collected at several discrete depths from each sampling location.
- During full-scale implementation, a primary sample and a secondary sample will be collected from a discrete depth from two ISS columns, based on the following frequency:
  - One pair of samples (primary and secondary) per 1,000 cubic yards of stabilized soil;
  - One pair of samples (primary and secondary) per day (minimum); and
  - One pair of samples (primary and secondary) if visual observations of the stabilized soil note significant changes to the solidified/stabilized material.

Approximately 4 cylinders will be made from each sample in order to have samples for possible retesting at later curing periods.

The primary sample will be cured for seven days and submitted to the laboratory where they will be tested for hydraulic conductivity and UCS. Sampling and analysis of ISS performance samples will be conducted in accordance with procedures identified in the project specifications (Appendix J).

Results will be compared to the project-specific hydraulic conductivity and UCS performance standards. If results do not comply with the performance standards, corrective actions will be taken which may include:

- Analysis of additional cylinders formed from the same sample and/or from the secondary samples obtained from the same batch of stabilized soil to determine if the result from the failing sample is anomalous and isolated;
- Modification to the mix design;
- Installing new columns to surround the column(s) represented by the failing sample; and
- Re-working (e.g., re-mixing) the column(s) represented by the failing sample, if possible.

3.4.7 Backfilling and Compaction

Backfill must meet the requirements of 6 NYCRR 375-6.7(d) and meet the following criteria in accordance with Division of Environmental Remediation, Technical Guidance for Site Investigation and Remediation (DER-10):

- Comply with Remedial Action Objectives;
- Be free of extraneous debris or solid waste;
- Be recognizable soil or other unregulated material as set forth in 6 NYCRR Part 360 and materials for which DEC has issued a beneficial use determination;
- Not exceed the allowable constituent levels for imported fill or soil; and
- Be tested as described below.

Sampling is required for all imported soil for use as backfill or cover material and must be approved by NYSDEC in advance. Characterization samples of the material will be a minimum of one sample analyzed from every new source (virgin mine/pit or material sources other than a virgin mine/pit) and the sampling frequency will be determined in accordance with Table 5.4(e)10 presented below:

Table 5.4(e)10
Recommended Number of Soil Samples for Soil Imported To or Exported From a Site

Contaminant	VOCs	SVOCs, Inorganics & PCBs/Pesticides	
Soil Quantity (cubic yards)	Discrete Samples	Composite	Discrete Samples/Composite
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
➢ 1000	Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER		

Documentation of the source of fill must be provided to National Grid for approval of the source of the material before it is used on the site, which should include:

- The name of the person providing the documentation and relationship to the source of the fill;
- The location where the fill was obtained;
- Identification of any state or local approvals as a fill source; and
- If no prior approval is available for the source, a brief history of the use of the property which is the source of the fill.

Bills of lading will be provided to Nation Grid for inclusion into the Final Engineering Report (FER) to document that the fill delivered was from a NYSDEC-approved source(s).

3.4.7.1 Backfill Materials

Backfill Within the Groundwater Table

Within the groundwater table, the clean fill will be a coarse aggregate with a New York State Department of Transportation (NYSDOT) Standard Specifications for Coarse Aggregate size designation Type 1 (or approved equal). This NYSDOT designation includes the following gradation:

Sieve Size	Percent Passing
1 inch	100%
½ inch	90% - 100%
¼ inch	0% - 15%

Backfill Above the Groundwater Table

Above the groundwater table to within six inches of the surface, the clean fill will be a well graded sandy soil consisting of clean naturally occurring or blended soil and aggregate mix conforming to the following gradation (or approved equal):

Sieve Size	Percent Passing
2 inch	100%
¾ inch	70% - 100%
No. 4	30% - 80%
No. 50	10% - 35%
No. 200	5% - 12%

Soil Surface Fill

For installation of the soil cap, surface fill placed from the ground surface to six-inches below grade will be the sandy soil (non-compacted) as specified for the backfill above the groundwater table and will be seeded.

Surface Fill – Stone

For installation of the stone cap, surface fill placed from the ground surface to six-inches below grade will be a coarse stone with a NYSDOT Standard Specifications for Coarse Aggregate size designation Type 2 (or approved equivalent). This NYSDOT designation includes the following gradation:

Sieve Size	Percent Passing
1 ½ inch	100%
1 inch	90% - 100%
½ inch	0% - 15%

3.4.7.2 Off-Site Backfilling

Based on the anticipated groundwater table of three (3) feet bgs, backfilling off Site in the 9-foot excavation area will be as follows:

- from the ground surface to three feet below grade will be well graded sandy soil;
- a geotextile; and
- from three feet below grade to nine feet below grade will be NYSDOT Standard Specifications for Coarse Aggregate size designation Type 1 (or approved equal).

A geotextile fabric (Mirafi 140N or equivalent) shall be placed between the two types of backfill material to minimize the downward migration of fines from the upper backfill material into the coarser backfill material.

In the event that the groundwater table is higher than anticipated, backfill from the groundwater table downward may be modified to consist entirely of NYSDOT Standard Specifications for Coarse Aggregate size designation Type 1. In this case, no geotextile will be required.

Backfill placed within the off-site excavation will be placed in 10-inch lifts and compacted to 95% of the maximum in-place density.

Asphalt removed from the excavation area will be replaced in accordance with Technical Specification (Appendix J).

3.4.7.3 On-Site Backfilling

Backfilling on Site is anticipated to occur only within the four (4) foot excavation area (located along the west-southwest portion of the on-Site remedial area). The top two feet will be treated with the environmental cap as described below on Section 3.4.7. Based on the anticipated groundwater table of three (3) feet bgs, the backfill in this area will be as follows:

- from the ground surface to two feet below grade will be the environmental cap;
- from two feet below grade to three feet below grade will be well graded sandy soil;
- a geotextile; and
- from three feet below grade to four feet below grade will be NYSDOT Standard Specifications for Coarse Aggregate size designation Type 1 (or approved equal).

A geotextile fabric (Mirafi 140N or equivalent) shall be placed between the two types of backfill material to minimize the downward migration of fines from the upper backfill material into the coarser backfill material.

In the event that the groundwater table is higher than anticipated, backfill from two feet bgs downward may be modified to consist entirely of NYSDOT Standard Specifications for Coarse Aggregate size designation Type 1. In this case, the geotextile will be placed at two feet bgs, below the environmental cap regardless of the environmental cap selected.

Within the water table, backfill will be placed in loose layers and tamped in-place using excavation equipment. Above the groundwater table, all backfill will be placed in 12-inch thick lifts and mechanically compacted.

3.4.8 Construction of Environmental Cap

The environmental cap will consist of either a two-foot thick soil cover or a two-foot thick course stone cover. The selection of the environmental cap type will be dependent on the Site conditions and in particular, the height of the groundwater table at the time of installation.

In accordance with DER-10, a demarcation layer will be installed below the environmental cap and on top of the native soils.

Within the water table, backfill will be placed in loose layers and tamped in-place using excavation equipment. Above the groundwater table, all backfill will be placed in 12-inch thick lifts and mechanically compacted.

3.4.8.1 Soil Cover

Based on the anticipated groundwater table of three (3) feet bgs but not less than two (2) feet bgs, the soil cover will be constructed as follows:

- vegetation
- Two feet of well graded sandy soil; and
- A demarcation layer.

3.4.8.2 Coarse Stone Cover

The coarse stone environmental cap will be installed when the groundwater table is less than two (2) feet bgs. The course stone cover will be constructed of:

- from the ground surface to six-inches below grade will be a coarse stone with a NYSDOT Standard Specifications for Coarse Aggregate size designation Type 2 (or approved equivalent);
- 18 inches of NYSDOT Standard Specifications for Coarse Aggregate size designation Type 1 (or approved equal); and
- A demarcation layer.

3.4.9 Site Restoration

Site restoration activities will consist of establishing the environmental cap over the Utility Corridor, re-establishing chain-link fencing (if needed), removing soil erosion and sediment control measures, and general clean-up activities.

3.5 Post-Remedial Action Activities

As per the requirements of NYSDEC DER-10, Chapter 5, Section 5.8, the implementation of the remedy proposed in the ROD and described in this RDR will be documented in a Final Engineering Report (FER). The FER will be certified by a Professional Engineer licensed in the State of New York and will include, but not be limited to, the following:

- Description of the remedy as constructed pursuant to the approved remedial design;
- Description of problems encountered during construction and a discussion of their resolution;
- Listing of the waste streams, quantities of materials disposed off-site and the facilities used for disposal;
- Boundaries of property subject to be subject to an environmental easement and/or other institutional controls;
- Restoration activities;
- Tables and figures depicting pre- and post-remediation data;
- A summary of costs;
- As-built drawings;
- Identification of applicable engineering and institutional controls;

- Bills of Lading; and
- Site Management Plan.

3.5.1 Environmental Easement/Site Management Plan/Operations, Maintenance, and Monitoring (OM & M) Plan

3.5.1.1 Environmental Easement

An Environmental Easement (EE), an institutional control (IC), will be established on the various parcels encompassing the Site due to the fact that environmental media impacted by concentrations of contaminants in excess of applicable regulatory standards will remain in-place after the completion of the remedial activities. The EE will serve to:

- Limit the future use and development of the property to commercial and industrial use;
- Require compliance with the Site Management Plan;
- Restrict the use of groundwater as a source of potable or process water without necessary treatment as determined by the NYSDOH; and
- Require the property owner to complete and submit a periodic certification of the institutional and engineering controls to the NYSDEC.

3.5.1.2 Site Management Plan

Following the completion of the remedial construction activities, a detailed post-remediation Site Management Plan (SMP) will be submitted to the NYSDEC for review and approval. This SMP will detail the proposed initial and continuing monitoring and maintenance activities for the Site. The SMP will be developed to:

- Address residually contaminated soils that may be excavated from the Site during future redevelopment. The plan would require soil characterization and, where applicable, disposal/reuse in accordance with NYSDEC regulations;
- Provide for the operation and maintenance of the components of the remedy; and
- Identify any use restrictions to on-site development or groundwater use.

3.5.1.3 Operations, Maintenance and Monitoring Plan

An Operations, Maintenance and Monitoring (OM&M) Plan will be included as part of the SMP. The OM&M Plan will detail the operations and maintenance of the physical components of the remedy (i.e., the stream bank, cover, NAPL recovery, etc.). The OM&M Plan will be prepared in accordance with Section 6.2.3 of NYSDEC DER-10; and include, but not be limited to, the following tasks:

- Periodic passive recovery of NAPL from NAPL recovery wells installed as part of the remedial activities;
- Continued evaluation of the potential for vapor intrusion for any buildings developed on the Site, including a provision for mitigation of any identified impacts;
- Monitoring of the stream bank restoration, groundwater and sediment quality;
- Identification of use restrictions on the Site and adjacent properties; and
- Continued operation and maintenance of the components of the remedy.

3.6 Air Monitoring

Air monitoring will be performed during the implementation of the remedial actions to protect the health and safety of site workers and to confirm that air impacts from site-related activities are not migrating off-site. The monitoring program will include monitoring for vapor, odors, and dust.

3.6.1 Vapors

Vapors will be monitored during the construction activities in accordance with the CAMP and the HASP. The CAMP and HASP are included as Appendices H and I, respectively of this RDR.

Real-time air monitoring devices will be used to analyze airborne contaminant concentrations within the exclusion zone or when tasks being conducted or exposure conditions change (whichever air monitoring frequency is less). If elevated concentrations are indicated, the monitoring frequency will be increased, as appropriate, and suitable mitigation measures will be taken in accordance with the CAMP (Appendix H).and the HASP (Appendix I).

3.6.2 Odors

In the event that objectionable odors are detected, temporary controls will be implemented. Odors will also be controlled by sequencing excavation in a manner that will result in minimizing areas of open excavation. Odors will be mitigated, if necessary, by placing a layer of non-odorous soils or plastic sheeting over the excavation area or stockpile (overnight and off-hours). In addition, foam application equipment and an adequate supply of odor reducing foaming agent will be on Site and available for application to the excavation area or stockpiles, as needed. Further, Biosolve may be sprayed during excavation and waste handling and management activities.

3.6.3 Dust

Dust and air quality will be monitored during the construction activities in accordance with the CAMP and the HASP included as Appendices H and I, respectively to this RDR.

Dust control measures will be implemented, as necessary, to control airborne dust during implementation. The Remedial Contractor will be required to proactively implement dust suppression measures during construction activities which include, but are not limited to:

- Wetting equipment and excavation faces during excavation activities and structures or hard surfaces during demolition with water or amended water solutions;
- Spraying water or amended water on buckets during excavation and loading/unloading;
- Spraying water or amended water on un-paved construction access roads and removal of dust from paved access roads (e.g., street sweeper);
- Limiting the area of disturbed ground surface;
- Covering stockpiles when active loading or unloading is not being performed;
- Hauling earthen materials and waste materials in properly tarped or watertight containers; and
- Covering disturbed areas (e.g., with geotextile fabric) when active excavation is not occurring to minimize dust generation.

The dust control measures identified above include applicable BMPs for dust control, as defined in the USEPA's Dust Control BMP guidelines.

The contractor will be required to provide and maintain a supply of water and appropriate equipment (e.g., hoses, misters) in the event that it is necessary to control dust generation. In addition, the

contractor will be required to contain excess water and control runoff. Excess water will be managed in accordance with applicable regulations.

3.6.3.1 Work Zone Air Monitoring

Work Zone Air Monitoring will be performed in compliance with the HASP included in Appendix I of this RDR. Real-time air monitoring devices will be used to analyze airborne contaminant concentrations approximately every 15 minutes in the workers' breathing zones while workers are in the designated Exclusion Zone, or when task or exposure conditions change (whichever air monitoring frequency is less). If elevated concentrations are indicated, the monitoring frequency will be increased, as appropriate.

Background concentrations will be determined at the beginning of each work shift by collecting several instrument readings upwind of the scheduled activities. Alternatively, background levels can be determined by collecting readings from a nearby (upwind) area that can reasonably be considered unaffected by Site activities.

Real-time measurements will be made as near as feasible to the breathing zone of the workers with the greatest exposure potential in each active work area. Real-time measurements may cease being collected when sufficient historical data is generated to warrant its cessation. Air monitoring will be reinstated if potential exposure conditions change.

Air monitoring equipment will be calibrated daily with the results being recorded for project files. The results of air monitoring will be recorded on an Air Monitoring Form and will be retained in the project files following completion of field activities. A copy of the Air Monitoring Form is located in the HASP.

3.6.3.2 Community Air Monitoring

A CAMP has been developed and is included in Appendix H of this RDR. The CAMP has been developed in accordance with the requirements of the New York State Department of Health (NYSDOH) "Generic Community Air Monitoring Plan, Revision 1, June 2000" guidelines and the requirements of "Fugitive Dust and Particulate Monitoring" guidelines as presented in Appendix 1A and Appendix 1B, respectively, of the NYSDEC, Final DER-10, "Technical Requirements for Site Remediation", dated May 2010. The CAMP serves to provide specific procedures for measuring, documenting, and responding to potential airborne contaminants during the remedial construction activities. The CAMP will be implemented to reduce risk of potential exposure of site contaminants to neighboring residents.

The CAMP is designed to:

- Provide monitoring, Action Levels, and contingency procedures to prevent exposure of site workers and nearby residents to potential volatile contaminants; and
- Provide a contingency plan that prevents significant airborne contaminant release from the Site.

During the implementation of remedial construction activities, work zone and fence line perimeter air monitoring will be conducted using a combination of real-time continuous air monitoring at fixed locations and walk around perimeter and work zone monitoring using hand-held instruments.

A Contingency Plan with defined, specific response actions will be implemented if 75% of the Action Level for any contaminant is exceeded. The response actions, potentially including work stoppage, will prevent or significantly reduce the migration of airborne contaminants from the Site.

3.7 Odor Control/Vapor Management

Odor control and vapor management technologies and processes have been evaluated to mitigate or eliminate potential odors during the remedial construction activities. A contingency plan is included as part of the CAMP. The purpose of the contingency plan is to identify potential control measures that may be implemented in response to elevated levels of target compounds or odor. In general, a tiered warning

Action Limit and response action will be implemented during the air monitoring program. Tiered warning Action Limits are defined as:

- **Action Limit 1 (Green)** – Normal or ambient air conditions where all target concentrations are less than 50% of the NYSDOH Generic CAMP Action Limit.
- **Action Limit 2 (Yellow)** – Concentration of at least one target is equal to or greater than 50% of the Action Limit, but less than 75% of the NYSDOH Generic CAMP Action Limit.
- **Action Limit 3 (Orange)** – Concentration of at least one target is equal to or greater than 75% of the Action Limit, but less than the NYSDOH Generic CAMP Action Limit.
- **Action Limit 4 (Red)** – Concentration of at least one target is greater than the NYSDOH Generic CAMP Action Limit.

The contingency plan will rely on real-time data generated from the fixed-station monitoring locations. These data sources will be evaluated together in order to make appropriate decisions concerning Site conditions and potential control measures.

3.8 Decontamination

During the implementation of the remedial construction activities, the Site will be divided into three primary zones: the exclusion zone, the contamination reduction zone, and the support zone. These locations will be identified in the field during the implementation of the remedial activities based on the current work area(s). Equipment and personnel decontamination will take place within the contaminant reduction zone at dedicated decontamination stations/pads. Heavy machinery, trucks, equipment and personnel exiting the exclusion zone will be subject to the following decontamination procedures.

3.8.1 Equipment Decontamination

Decontamination activities will include the removal of contaminated soil, debris and other miscellaneous materials from all construction equipment and tools utilized within the exclusion zone using a combination of high-pressure water sprays, low pressure hoses and detergent washing. In addition, physical/mechanical agitation (brushing/scraping with hand tools) of soil may be utilized to minimize wastewater generation.

The decontamination pad(s) will be constructed to adequately facilitate decontamination of the largest mobile construction equipment and to withstand the anticipated traffic loads throughout the duration of the project. The decontamination pad(s) will be an area with a bermed perimeter lined with crushed stone and underlain by a geotextile layer and two plastic liners. The decontamination pad(s) will be constructed to meet the following requirements:

- The area facilitating the decontamination pad(s) will be modified as needed to accommodate the pad(s). Large rocks, stones and other obstructions will be removed from the prepared subgrade to prevent damage to the overlying decontamination pad containment system;
- Berms will be installed along both sides of the decontamination pad;
- The pad area and berms will be covered with a thin layer of sand or stone dust;
- The pad area and berms will then be lined with two layers of 40 mil. HDPE sheeting (thick enough to withstand daily use) and a non-woven geotextile and covered with crushed stone in a manner that allows rinsate water to freely drain and collect in a sump for removal and disposal;
- The 40 mil HDPE geomembrane layers will be installed in one continuous piece and the geotextile layers will be overlapped a minimum of 12 inches;
- An eight-inch layer of three-quarter inch clean stone will be placed on top of the two geosynthetic layers. Wood planks or mats may be placed on top of the eight-inch stone layer to provide a stable traveling surface for vehicle wheels and tracks;

- The pad area(s) will be graded for easy entrance and exit to vehicles and equipment;
- The pad(s) will be able to hold a minimum of four inches of standing water at the shallowest point within the containment. It will be sized sufficiently to prevent splashing and spraying from decontamination activities from contacting the surrounding unprotected surfaces;
- The decontamination pad will be graded to a sump to allow decontamination rinse water to be captured and transferred to the temporary on-site plant for treatment and discharge to the an on-Site wastewater treatment system. Collected rinse water will be managed in accordance with the requirements of the Technical Specifications (treated on-site and discharged to the Patchogue River under a NYSDEC-approved SPDES Equivalency Permit);
- In the event that the size of the pad is limited by site constraints, a curtain or 10-mil sheeting will be constructed around the pad to eliminate the possibility of wash water and/or sediment leaving the decontamination area;
- The pad(s) shall be kept empty and protected from rainwater when not in use;
- Material that does not infiltrate into the spaces between the crushed stone will be manually consolidated and transferred to a disposal vehicle;
- Residual soil or waste materials generated during decontamination will be collected and managed with the excavated impacted soils; and
- Upon completion of the remedial activities, the components of the decontamination pads (i.e., sand or stone dust, HDPE geomembrane layers, the non-woven geotextile and the clean stone) will be managed as contaminated materials. These materials will be characterized and disposed of at an off-site facility permitted to accept the various types of waste.

3.9 Waste Management

Waste materials intended for off-site transportation and disposal will be staged in areas of the Site that are not proximate to existing off-site roadways in order to minimize the potential for off-site impacts. All staging of excavated soil and impacted debris will be performed on staging areas that are underlain by plastic sheeting with perimeter berms to contain run-on and run-off. Excavated soils and impacted debris will be covered with plastic to minimize impacts from odors as well as the effects of weather. Odor suppressing foam will be applied to stockpiles, as necessary, to minimize the potential for impacts from odors generated by the impacted soils.

3.9.1.1 Transportation

During the implementation of remedial construction activities, the Remedial Contractor will coordinate and manage transportation and disposal of generated wastes to National Grid-approved disposal facilities. The anticipated wastes to be generated during the remedial construction work consist of soil, wastewater, construction debris, miscellaneous debris and PPE. All wastes designated for off-site disposal will be transported in vehicles that will be lined and covered with solid covers with safety latches on the gates to prevent spills and/or releases to the environment. All transporters will be reviewed for permitting requirements and licensing.

All wastes designated for off-site disposal will be transported to solid, liquid, and hazardous waste treatment/disposal facilities that have been approved by National Grid. All disposal facilities have been reviewed for permitting and licensing requirements, licenses and regulatory enforcement status. National Grid will be identified as the generator of all solid wastes transported from the Site. A Manifest and/or Bill of Lading corresponding to each shipment of solid waste will be completed and a representative of National Grid will sign the waste documents.

3.9.1.2 Waste Management Plan

A Waste Management Plan (WMP), included as Appendix N to this RDR, has been prepared to describe the characterization, handling, treatment/disposal, and re-use requirements for the waste streams anticipated to be generated during the work.

Debris

Personal protective equipment and miscellaneous debris will be generated at the Site. These materials will be placed in DOT approved 55-gallon drums or similar containers during the work, and will be removed from the Site, as soon as is practicable. Construction debris such as industrial piping and structural materials will be segregated, decontaminated and prepared as necessary, and placed within roll-off containers for off-site disposal.

Soils

Removed soils are not expected to be classified as hazardous waste for disposal during the implementation of remedial construction activities. Soils removed from excavation areas destined for off-site disposal will be either characterized in-situ prior to excavation activities or from samples obtained from stockpiled soils once removed. The Remedial Contractor will be responsible to coordinate with off-site disposal facilities, approved by National Grid, to profile soils per their requirements of the individual facilities.

Wastewater

Wastewater is anticipated to be generated during remedial activities from dewatering efforts, decontamination activities, subsurface structure/pipe removal, and decontamination efforts. These wastewaters may be potentially contaminated with chemical constituents from on-site sources. Wastewaters from these sources will be treated on-site via a temporary treatment system and subsequently discharged to the Patchogue River under a NYSDEC SPDES Equivalency Permit. The proposed treatment system will most likely include an equalization tank, oil/water separator, bag filtration unit, liquid phase granulated activated carbon units in series, and an effluent holding tank.

When approval of a SPDES Equivalency Permit is received, the dewatering system and treatment system will be designed in order to meet the established discharge requirements.

3.10 Discharge Requirements for Water Disposal

BC has evaluated the discharge of treated water to the Patchogue River under a NYSDEC SPDES Equivalency Permit. BC used the groundwater analytical data from groundwater samples collected the during SPDI activities to assess the quality of the water that would be produced from dewatering efforts. BC will prepare a groundwater analytical data summary table to summarize these results and submitted it, along with a proposed treatment train for a temporary on-Site wastewater treatment system, to the NYSDEC.

Section 4

Schedule

The project schedule for the remedial design and construction is presented below. This schedule tracks the remedial design tasks from preparation of this RDR through implementation of the remedial construction activities.

Milestone	Milestone Date
50 – 75% Remedial Design Report	
Submit Draft 50 – 75% RDR to NYSDEC	December 27, 2012
NYSDEC Review of Draft 50 – 75% RDR	December 28, 2012 – January 28, 2013
Respond to NYSDEC Comments	January 29, 2013– February 25, 2013
Submit Response to Comments to NYSDEC	February 26, 2013
NYSDEC Review of Written Response to Comments	February 27, 2013 – March 26, 2013
NYSDEC Approval of 50 – 75% RDR	March 27, 2013
Contractor Procurement	
Prepare RFP and Bid Documents	February 12, 2013 – March 25, 2013
National Grid Procures Remedial Contractor	March 26, 2013 to April 8, 2013
Bidding Period	April 9, 2013 – May 6, 2013
Bid Review and Contractor Selection	May7, 2013 – May 20, 2013
Contract Award	May 21, 2013
95% Remedial Design Report	
Submit Draft 95% RDR to NYSDEC	October 22, 2013
NYSDEC Review of Draft 95% RDR	October 23, 2013 – November 19, 2013
100 % Remedial Design Report	
Submit Draft 100% RDR to NYSDEC	January 17, 2014
NYSDEC Review of Draft 100% RDR	January 20, 2014 – February 14, 2014
Respond to NYSDEC Comments and Finalize 100% RDR	February 17, 2014 – February 28, 2014
Submit Response to Comments and Final 100% RDR to NYSDEC	March 3, 2014
NYSDEC Review of Written Response to Comments and 100% RDR	March 4, 2014 – March 17, 2014
NYSDEC Approval of 100% RDR	March 18, 2014
Remedy Implementation	
Mobilization to the Field	April 16, 2014

Section 5

Identification of Federal, State, and Local Permits and Approvals

This section describes the federal, state and local permits required for implementation of the remedial construction described in this RDR. In addition, it discusses the agreements that will be necessary to access properties that are not owned by National Grid.

5.1 Property Access Agreements

National Grid currently owns the Site subject to these remedial activities.

The off-site excavation area subject to these remedial activities is owned and/or operated by outside entities. As described in Section 2.1, National Grid has previously established access agreements with the affected land owner to conduct the investigation and pre-design activities. National Grid will establish access agreements to all affected properties and properties required to complete the remedial construction described herein.

5.1.1 Citizens Participation Plan

Citizen participation is an integral component of remedial programs in New York State. Input from affected or interested individuals and organizations on the remedial program helps ensure outcomes that account for both technical and human concerns for protecting public health and the environment. A project-specific plan is a mechanism to inform and involve community residents, public and private leaders, and other stakeholders. Therefore, a Citizens Participation Plan (CPP), included as Appendix O to this RDR, has been prepared to document the planned project-specific public outreach activities and resources organized for the remedial program associated with the Patchogue Former MGP site.

The primary purpose of the CPP is to outline a variety of communication methods that, based on applicable New York State law and NYSDEC regulations and guidance, provide for constructive communication of program activities between the stakeholders and other interested parties. The CPP includes methods intended to inform interested parties of program developments, elicit responses and public involvement, and provide a central point of contact for inquiries regarding the remedial program for the Patchogue Former MGP Site. The CPP presents the planned communication and outreach activities, describes how interested individuals and groups can participate in the remedial program, and provides a variety of reference materials to facilitate gaining access to project-specific information and management personnel.

5.2 Federal, State, and Local Permits

5.2.1 Federal Permits

Due to the close proximity of the Site to the Patchogue River, an evaluation of regulations related to flood plains has been performed. According to Part II, Chapter 210 (Flood Damage Prevention), Article V, section 210-14 C(2), on streams with a regulatory floodway, as shown on the Flood Boundary and Floodway Map or the Flood Insurance Rate Map adopted in § 210-6, no new construction, substantial

improvements or other development in the floodway (including fill) shall be permitted unless a technical evaluation by a licensed professional engineer shows that such an encroachment shall not result in any increase in flood levels during occurrence of the base flood. The remedial activities have been designed such that no additional fill will be added to the Site and the excavation areas will be returned to pre-remedial grades thus there is no loss of flood plain area and an increase in flood levels during occurrence of the base flood would not be anticipated.

Other federal permits are not required for the pre-remedial design or remedy implementation described in this RDR. Should other permits be required, they will be obtained as necessary. The Remedial Contractor will be responsible to conduct all remedial activities in accordance with the substantive requirements of the federal regulations.

5.2.2 State Permits

Since the activities at the Site are being performed under Order on Consent A2-0552-0606 signed by KeySpan (d.b.a., National Grid) and the NYSDEC on March 4 2007, state permits will generally not be required unless dewatering activities are deemed necessary to complete the remedial activities. If dewatering activities are required, then a State Pollutant Discharge Elimination System (SPDES) permit will be necessary for discharge of the water to the Patchogue River.

In accordance with 6 NYCRR 375-1, NYSDEC-issued permits are not required for any other activities associated with pre-remedial design or remedy implementation. Rather, the remedial measures are evaluated and implemented based on the substantive elements of the applicable and relevant and appropriate state environmental laws and regulations.

5.2.3 Local Permits

As per 6 NYCRR 375-1.7c, no permits, consents, approvals or other authorizations are required under any local zoning, land use or other regulatory program. However, consultation with local officials and other stakeholders will occur prior to completion of the final design.

Although permits may not be required to be obtained, the project will be discussed with the local regulators to ensure a seamless implementation. The Remedial Contractor will be responsible to conduct all remedial activities in accordance with the substantive requirements of the local regulations. Construction activities will have to be performed with applicable Patchogue codes and regulations including the development of trucking routes, consistency with noise ordinances and observation of potential road or street closures that may be necessary for work conducted adjacent to West Main Street.

Section 6

Project Implementation and Contractor Selection

6.1 Construction Implementation

The remedial construction activities will be performed in accordance with the Contract Documents and applicable permits and substantive permit requirements as described in this RDR (50-75% Submission). The Design Drawings (Appendix A) and the Technical Specifications (Appendix J) included provide for a performance-based construction. The Remedial Contractor will assist in further defining the technical specifications provided as well as provide the means and methods to achieve the performance criteria of the specifications. National Grid plans to retain one Remedial Contractor who will be responsible for the required remedial construction.

Final Design Drawings and Technical Specifications as well as the NYSDEC approved Final (100%) RDR will govern the implementation of the remedial activities.

6.2 Contractor Selection

National Grid will select the Remedial Contractor in accordance with its corporate policies and procedures. It is anticipated that the selection process will be performed via a Request for Proposal (RFP) containing this RDR, the Design Drawings, the Technical Specifications and National Grid's contracting information.

An RFP package that provides sufficient background, technical and contractual information for the selected group of Remedial Contractors to submit an appropriate technical and cost proposal will be prepared and issued to qualified Contractors. The RFP will request the submittal of a technical and cost proposal. Evaluation criteria will be prepared for review of the proposals and a scoring matrix developed to objectively rank the submitted proposals. During the RFP process, questions from contractors on the RFP will be addressed through National Grid and Brown and Caldwell. National Grid may seek to clarify contractor proposals through questions. The selection of a Remedial Contractor will be based on the evaluation criteria and the responses to questions.

Following selection of the Remedial Contractor, National Grid will negotiate a contract. The remedial contractor will then collaborate with Brown and Caldwell to develop the Final RDR (100%). Submittals will be reviewed and accepted by National Grid and incorporated into the Final RDR (100%). The Final RDR (100%) will be submitted to NYSDEC for review and approval. A Notice to Proceed will then be issued to the Remedial Contractor and a pre-construction meeting will be scheduled.

6.3 Contractor Design Submittal

The Remedial Contractor will be responsible for the preparation of numerous submittals for review by National Grid and incorporation into the Final RDR (100%). The major submittals will include a Construction Management Plan, a Site-specific HASP and a Site-Specific Construction Quality Control Project Plan.

Within the CMP, the Remedial Contractor will be responsible for detailing the means and methods to complete the required remedial construction. The CMP will include a detailed description as well as the proposed sequencing for completing the major remedial activities. The CMP will also include additional drawings that will supplement the Design Drawings contained in the RDR. As-built drawings of the completed remediation and construction will also be required through the CMP. All engineering drawings prepared by the Remedial Contractor for temporary construction related use (i.e., temporary earth retention systems, dewatering systems, dewatering treatment system) will be required to be prepared and stamped by a Professional Engineer, retained by the Remedial Contactor, who is licensed in the State of New York. Similarly, survey documents will be signed and stamped by a Professional Surveyor, retained by the Remedial Contractor, who is licensed in the State of New York.

The HASP included as Appendix I to this RDR is for use by National Grid, Brown and Caldwell and the Construction Manager. The Contractor will be required to prepare a site-specific HASP. The Remedial Contractor's site-specific HASP will detail the activity-specific hazards associated with the implementation of the remedial activities (i.e. excavation and ISS). The Remedial Contractor's site-specific HASP will be required to identify the personnel that will provide health and safety services and their credentials. All Remedial Contractor personnel working on the Site will also be required to provide health and safety credentials including OSHA training certificates and medical records.

In accordance with Section 3.6.3.2, National Grid plans to utilize a standard community air monitoring plan during the construction activities, pursuant to NYSDEC DER-10, to monitor for dust and VOC emissions.

The Remedial Contractor's site-specific CQCPP will be required to set forth the general framework and specific details of the methods and procedures that will be implemented to demonstrate that construction activities have been performed pursuant to the RDR and the Contract Documents. The site-specific CQCPP will describe the quality organization of the Remedial Contractor and the allocations of responsibilities for performing the CQC activities.

Section 7

Construction Quality Assurance/Quality Control

A Construction Quality Assurance Project Plan (CQAPP) has been developed to address quality assurance (QA) issues and to ensure the integrity of analytical data obtained during all remedial activities to be performed at the Site. The CQAPP is included in Appendix M of this RDR. The CQAPP sets forth general methods and procedures that will be implemented to demonstrate that the remedial construction activities will be performed pursuant to the RDR.

As there will be numerous construction materials to be used during the remedial construction, the quality and suitability of these materials will need to be monitored on a continuous basis. For this purpose, the Remedial Contractor will prepare a site-specific Construction Quality Control Project Plan (CQCPP). Once approved by National Grid, the CQCPP will become part of the CMP and be forwarded to the NYSDEC for review and approval.

Section 8

Health and Safety Plan

A Health and Safety Plan (HASP) has been prepared by BC to address National Grid's, their duly appointed representative(s) and the Design Engineer's worker health and safety during the implementation of planned remedial construction activities described in this RDR. A copy of the HASP is included in Appendix I.

The Remedial Contractor will be required to provide a Site-Specific HASP to detail the Contractor's health and safety procedures to protect site workers during implementation of the remedial construction. This HASP will be prepared in accordance with all applicable requirements of the Occupational Safety and Health Administration (OSHA) and comply with 1910.120 and 1910.126. The Contractor's site-specific HASP must be signed and certified by a Certified Industrial Hygienist (CIH). The Remedial Contractor's site-specific HASP will be required to identify the personnel and their credentials, for the review by National Grid, that will provide health and safety services. All Remedial Contractor personnel working on the Site will also be required to provide health and safety credentials including OSHA training certificates and medical records. Once reviewed by National Grid, the HASP will become part of the CMP and be forwarded to the NYSDEC for review and approval.

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Tables

TABLE 2-1
WATER LEVEL DATA - JULY 2012 AND AUGUST 2012
PATCHOGUE FORMER MANUFACTURED GAS PLANT SITE
VILLAGE OF PATCHOGUE, SUFFOLK COUNTY, NEW YORK

		7/18/2012			8/28/2012		
Well ID	Top of Casing Elevation (Re-surveyed 8/28/12) (ft., NAVD)	Depth to Water (ft., BTOC)	Water Elevation (ft., NAVD)	Remarks	Depth to Water (ft., BTOC)	Water Elevation (ft., NAVD)	Remarks
MW-1	11.47	5.85	5.62		5.64	5.83	
MW-2S	Removed	NA	NA		NA	NA	
MW-2D	Removed	NA	NA		NA	NA	
MW-3	5.56	2.50	3.06		2.30	3.26	
MW-4S	7.97	5.08	2.89		4.98	2.99	
MW-4D	7.79	4.85	2.94		4.72	3.07	
MW-5	8.13	4.16	3.97		3.98	4.15	
MW-6	5.01	0.05	4.96		3.01	2.00	Depth to water measurement is anomalously low compared to previous measurements.
MW-7S	8.45	4.54	3.91		4.31	4.14	
MW-7D	8.31	4.36	3.95		4.16	4.15	
MW-8S	5.08	0.94	4.14		0.80	4.28	
MW-8D	4.98	0.80	4.18		6.30	-1.32	Depth to water measurement is anomalously low compared to previous measurements.
MW-9S	4.47	NM	NM	Located on adjacent property. Access to well obstructed by a storage container.	NM	NM	Located on adjacent property. Access to well obstructed by a storage container.
MW-9D	4.66	NM	NM	Located on adjacent property. Access to well obstructed by a storage container.	NM	NM	Located on adjacent property. Access to well obstructed by a storage container.
SG-1	5.23	4.03	1.20		4.06	1.17	
SG-2	5.16	3.83	1.33		3.84	1.32	
PZ-1A	8.05	3.72	4.33		3.71	4.34	
PZ-1B	8.91	4.6	4.31		4.38	4.53	
PZ-2A	8.77	4.5	4.27		4.25	4.52	
PZ-2B	8.29	3.98	4.31		3.76	4.53	
PZ-3A	8.78	5.07	3.71		4.75	4.03	
PZ-3B	8.90	5.22	3.68		5.03	3.87	
PZ-4B	4.79	1.77	3.02		1.57	3.22	

Notes:
NAVD - North American Vertical Datum
BGS - Below Ground Surface
BTOC - Below Top of Casing
NM - Not Measured

TABLE 2-2
VERTICAL HYDRAULIC GRADIENTS
PATCHOGUE FORMER MANUFACTURED GAS PLANT SITE
VILLAGE OF PATCHOGUE, SUFFOLK COUNTY, NEW YORK

	Ground Surface Elevation (ft., NAVD)(a)	Top of Casing (TOC) Elevation (ft., NAVD)	Depth to Mid-Point of Screen (ft., BGS)(b)	Elevation Mid-Point of Screen (ft., NAVD)	Depth to Water 7/18/2012 (ft, below TOC)	Water Elevation 7/18/2012 (ft., NAVD)	Vertical Hydraulic Gradient (c) 7/18/2012	Depth to Water 8/28/2012 (ft, below TOC)	Water Elevation 8/28/2012 (ft., NAVD)	Vertical Hydraulic Gradient 8/28/2012
PZ-1A	6.3	8.05	5	1.3	3.72	4.33	0.001	3.71	4.34	-0.013
PZ-1B	5.9	8.91	16.6	-10.7	4.60	4.31		4.38	4.53	
PZ-2A	5.8	8.77	3.5	2.3	4.50	4.27	-0.003	4.25	4.52	-0.001
PZ-2B	5.3	8.29	12.5	-7.2	3.98	4.31		3.76	4.53	
PZ-3A	5.0	8.78	4.5	0.5	5.07	3.71	0.002	4.75	4.03	0.011
PZ-3B	5.0	8.90	15.5	-10.5	5.22	3.68		5.03	3.87	
PZ-4A	5.0	4.79	4	1	1.77	3.02	NA	1.57	3.22	NA
MW-9D	4.78	4.66	22.5	-17.72	NM (d)	NA (e)		NM	NA	

Notes:
(a) NAVD - North American Vertical Datum, 1988
(b) BGS - Belog ground surface
(c) Vertical hydraulic gradients (i_v) were calculated assuming that groundwater elevation in the deeper piezometer/well at a couplet is represenative of the mid-point depth of the well screen, and that the groundwater elevation in the shallower well at a couplet is represenative of th water table. Positive values indicate a downward i_v; negative values indicate an upward i_v.
(d) NM - Not measured. Access to well obstructed.
(e) NA - Not available

TABLE 2-3
IN-SITU HYDRAULIC CONDUCTIVITY TEST RESULTS
PATCHOGUE FORMER MANUFACTURED GAS PLANT SITE
VILLAGE OF PATCHOGUE, SUFFOLK COUNTY, NEW YORK

Location	Test Date		Horizontal Hydraulic Conductivity Estimate (K_h) (a) (cm/sec)
Fill			
PZ-1A	7/18/2012		2.3E-02
PZ-2A	7/18/2012		4.4E-03
PZ-3A	7/19/2012		8.5E-03
PZ-4A	7/19/2012		3.1E-03
		Geometric Mean	*7.1E-03*
		Maximum	*2.3E-02*
		Minimum	*3.1E-03*
Outwash Deposits			
PZ-1B	7/18/2012		5.2E-02
PZ-2B	7/18/2012		3.7E-02
PZ-3B	7/19/2012		2.6E-02
MW-1	7/18/2012		9.8E-03
MW-4D	7/19/2012		6.2E-02
MW-7D	7/19/2012		5.7E-02
MW-8D	7/19/2012		6.2E-02
		Geometric Mean	*3.8E-02*
		Maximum	*6.2E-02*
		Minimum	*9.8E-03*

Notes:
(a) Estimate from in situ hydrualic conductivity test (i.e., slug test) using Hvorslev (1951) analysis.

TABLE 2-4
TREATABILITY STUDY TESTING MATRIX
PATCHOGUE FORMER MANUFACTURED GAS PLANT SITE
VILLAGE OF PATCHOGUE, SUFFOLK COUNTY, NEW YORK

Evaluation Stage	Aliquot ID	Material Tested	Reagent Addition Rate		Cure Times (days) when Tests were Performed					
			Portland Cement [% w.w.]	Bentonite [% w.w.]	UCS[1]	Volumetric Expansion	Hydraulic Conductivity[1]	Immersion	pH	Pocket Penetrometer
Preliminary Evaluation	N-01	Native Soils	7.5	0	28	28	28		28	1, 7
	N-02	Native Soils	12.5	0	28	28	28		28	1, 7
	N-03	Native Soils	7.5	1.5	28	28	28		28	1, 7
	N-04	Native Soils	12.5	1.5	28	28	28		28	1, 7
	F-01	Fill	5	0	28	28	28		28	1, 7
	F-02	Fill	10	0	28	28	28		28	1, 7
	F-03	Fill	5	1.5	28	28	28		28	1, 7
	F-04	Fill	10	1.5	28	28	28		28	1, 7
Optimization Evaluation[2]	N-05	Native Soils[3]	0	0.5		7, 28			28	
	N-06	Native Soils[3]	0	1.5		7, 28			28	
	N-07	Native Soils	12.5	0.5	7, 14, 28	7, 14, 28	14, 28	28	14, 28	2, 5, 7
	N-08	Native Soils	7.5	0.5	7, 14, 28	7, 14, 28	14, 28	28	14, 28	2, 5, 7
	N-09	Native Soils	5	0	7, 14, 28	7, 14, 28	14, 28	28	14, 28	2, 5, 7
	N-10	Native Soils	5	0.5	7, 14, 28	7, 14, 28	14, 28	28	14, 28	2, 5, 7
	N-11	Native Soils	5	1.5	7, 14, 28	7, 14, 28	14, 28	28	14, 28	2, 5, 7
	N-12	Native Soils	3	0	7, 14, 28	7, 14, 28	14, 28	28	14, 28	2, 5, 7
	N-13	Native Soils	3	0.5	7, 14, 28	7, 14, 28	14, 28	28	14, 28	2, 5, 7
	N-14	Native Soils	3	1.5	7, 14, 28	7, 14, 28	14, 28	28	14, 28	2, 5, 7
	N-A	Native Soils	6.5	0	7, 28	7, 28	28	28	14, 28	2, 5, 7
	N-B	Native Soils	6.5	0.5	7, 28	7, 28	28	28	14, 28	2, 5, 7
	N-C	Native Soils	6.5	1.5	7, 28	7, 28	28	28	14, 28	2, 5, 7
	N-D	Native Soils	8.5	0	7, 28	7, 28	28	28	14, 28	2, 5, 7
	N-E	Native Soils	8.5	0.5	7, 28	7, 28	28	28	14, 28	2, 5, 7
	N-F	Native Soils	8.5	1.5	7, 28	7, 28	28	28	14, 28	2, 5, 7
	F-05	Fill[3]	0	0.5		7, 28			28	
	F-06	Fill[3]	0	1.5		7, 28			28	
	F-07	Fill	10	0.5	7, 14, 28	7, 14, 28	14, 28	28	14, 28	2, 5, 7
	F-08	Fill	5	0.5	7, 14, 28	7, 14, 28	14, 28	28	14, 28	2, 5, 7
	F-09	Fill	3	0	7, 14, 28	7, 14, 28	14, 28	28	14, 28	2, 5, 7
	F-10	Fill	3	0.5	7, 14, 28	7, 14, 28	14, 28	28	14, 28	2, 5, 7
	F-11	Fill	3	1.5	7, 14, 28	7, 14, 28	14, 28	28	14, 28	2, 5, 7
	N-A	Native Soils	6.5	0	7, 28	7, 28	28	28	14, 28	2, 5, 7
	N-B	Native Soils	6.5	0.5	7, 28	7, 28	28	28	14, 28	2, 5, 7
	N-C	Native Soils	6.5	1.5	7, 28	7, 28	28	28	14, 28	2, 5, 7
	N-D	Native Soils	7.5	0	7, 28	7, 28	28	28	14, 28	2, 5, 7
	N-E	Native Soils	7.5	0.5	7, 28	7, 28	28	28	14, 28	2, 5, 7
	N-F	Native Soils	7.5	1.5	7, 28	7, 28	28	28	14, 28	2, 5, 7
	N-G	Native Soils	8.5	0	7, 28	7, 28	28	28	14, 28	2, 5, 7
	N-H	Native Soils	8.5	0.5	7, 28	7, 28	28	28	14, 28	2, 5, 7
	N-I	Native Soils	8.5	1.5	7, 28	7, 28	28	28	14, 28	2, 5, 7
Repeatability Evaluation[4]	R-1	TBD	TBD	TBD	TBD	7, 28	28	28	14, 28	2, 5, 7
	R-2	TBD	TBD	TBD	TBD	7, 28	28	28	14, 28	2, 5, 7
	R-2	TBD	TBD	TBD	TBD	7, 28	28	28	14, 28	2, 5, 7

Notes:
1. Includes moisture content, dry density and bulk density.
2. Some optimization analyses are being currently performed, they will be included in the Final Report.
3. Bentonite-only aliquots (i.e., without cement) collapsed during the UCS testing; consequently, only volumetric expansion test was performed on those aliquots.
4. Repeatability analyses are being currently performed, they will be included in the Final Report.
Shaded areas indicate that the test are currently being conducted. Sample IDs will be established for the Final Report.
TBD - To Be Determined

TABLE 2-5
TREATABILITY STUDY TESTING RESULTS - UNTREATED SOIL
PATCHOGUE FORMER MANUFACTURED GAS PLANT SITE
VILLAGE OF PATCHOGUE, SUFFOLK COUNTY, NEW YORK

Testing Parameter	Test Method	Unit	Sample	
			Native Soil	Fill
Moisture Content	ASTM D2216			
ASTM Moisture Content		%	15.21	17.09
Percent Solids		%	86.80	85.41
Bulk Unit Weight	ASTM D7263	pcf	116.8	115.0
Atterberg Limits	ASTM D4318			
Liquid Limit		LL	NV	NV
Plastic Limit		PL	NP	NP
Plasticity Index		PI	NP	NP
Loss on Ignition	ASTM D2974	%		
Moisture Content		%	30	17
Ash Content		%	78.2	91.5
Organic Matter		%	21.8	8.5
Particle Size Distribution	ASTM D422/D854			
Gravel		%	4.4	12.3
Sand		%	92.7	79.4
Silt		%	0.4	4.8
Clay		%	2.5	3.5
pH	EPA 9045	s.u.	7.47	9.51
Sample Description	USCS (D2487)		Black poorly graded sand	Very dark brown poorly graded sand with silt
Sample Classification	USCS (D2487)		SP	SP-SM

Notes:
% - Percent
NP - Not Plastic
NV - Non-Viscous
pcf - pounds per cubic foot
s.u. - Standard Unit
Sample descriptions based on the Unified Classification System.

TABLE 2-6
TREATABILITY STUDY TESTING RESULTS - TREATMENT ALIQUOTS
PATCHOGUE FORMER MANUFACTURED GAS PLANT SITE
VILLAGE OF PATCHOGUE, SUFFOLK COUNTY, NEW YORK

Kemron Sample Number	BC Sample ID	Untreated Material Type	Reagent Addition % by Wet Soil wt.		Water Addition % By Reagent wt.	Cure Days	pH	Volumetric Expansion (%)	Unconfined Compressive Strength				Pocket Penetrometer (tons/ft^2)			Hydraulic Conductivity (K) (cm/sec)			
			Portland Cement	Bentonite					Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	UCS (lb/in^2)	2 Day (1 Day for N-01 to N-04)	5 Day	7 Day	Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	K (cm/sec)
0427-001	N-01	Native	7.5	0.0	50	28	11.43	10.30	21.5	120.5	99.2	98.7	1.3		>4.5	21.9	124.0	101.8	5.9E-06
0427-002	N-02	Native	12.5	0.0	50	28	11.83	15.40	21.7	126.9	104.3	250.5	>4.5		>4.5	21.3	127.0	104.5	3.0E-07
0427-003	N-03	Native	7.5	1.5	140	28	11.24	39.20	30.9	108.3	82.7	26.0	1.3		>4.5	30.9	109.0	83.2	4.3E-07
0427-004	N-04	Native	12.5	1.5	110	28	11.77	44.70	30.4	111.6	85.6	91.4	>4.5		>4.5	28.7	112.0	87.2	2.6E-06
0427-009	N-05[1]	Native	0.0	0.5	730	7		9.38											
						28	7.49	10.42											
0427-010	N-06[1]	Native	0.0	1.5	533	7		23.96											
						28	7.60	20.83											
0427-011A	N-07	Native	12.5	0.5	81.3	7		34.69	23.1	116.4	94.6	100.4	4.3	>4.5	>4.5				
						14	11.99	36.08	21.7	119.0	97.8	118.7				25.1	120.0	95.9	1.4E-06
						28	12.09	31.04	22.5	117.6	95.9	186.4				25.3	121.0	96.6	1.1E-06
0427-012A	N-08	Native	7.5	0.5	116.4	7		29.79	23.4	115.6	93.6	19.9	2.3	4.5	4.5				
						14	11.63	30.42	21.6	118.0	97.0	49.2				25.8	115.7	92.0	5.1E-06
						28	12.11	25.73	23.8	118.0	95.3	52.1				26.3	119.6	94.7	6.9E-06
0427-013A	N-09	Native	5.0	0.0	100.0	7		19.48	18.2	120.4	101.9	30.4	4.3	4.5	4.5				
						14	11.88	19.90	17.0	121.4	103.7	43.6				20.9	123.9	102.5	2.4E-05
						28	12.02	15.83	20.8	120.9	100.1	30.7				20.0	124.4	103.7	1.8E-05
0427-014A	N-10	Native	5.0	0.5	133.8	7		28.85	24.1	117.2	94.4	14.9	2.0	2.8	3.0				
						14	12.00	31.77	21.9	115.5	94.8	21.0				28.6	128.5	100.0	2.0E-05
						28	12.07	21.67	21.9	116.3	95.4	17.7				25.7	120.3	95.7	6.7E-06
0427-015A	N-11	Native	5.0	1.5	231.9	7		42.60	34.8	109.6	81.3	10.3	0.8	1.0	1.3				
						14	12.02	42.40	33.5	112.7	84.5	15.5				44.4	114.5	79.2	5.1E-06
						28	11.95	30.94	34.6	111.0	82.5	11.5				32.9	112.9	85.0	2.0E-06
0427-016A	N-12	Native	3.0	0.0	166.7	7		15.52	18.9	120.7	101.6	9.8	1.3	3.5	4.0				
						14	11.93	18.44	21.8	118.5	97.3	15.2				21.1	125.2	103.5	3.1E-05
						28	11.98	14.27	18.0	120.3	101.9	6.0				21.7	121.8	100.0	8.7E-05
0427-017A	N-13	Native	3.0	0.5	181.6	7		28.44	23.6	113.6	91.9	6.6	0.8	1.5	2.0				
						14	11.92	30.31	22.9	113.6	92.5	12.0				25.9	117.4	93.2	2.0E-05
						28	12.08	22.40	23.3	112.3	91.0	8.9				24.5	117.1	94.1	1.6E-05
0427-018A	N-14	Native	3.0	1.5	274.6	7		43.85	29.7	108.4	83.6	5.7	0.0	0.8	1.0				
						14	12.14	46.04	29.7	109.6	84.6	6.0				25.3	111.7	89.2	5.6E-06
						28	12.01	37.92	30.9	104.8	80.1	5.7				29.9	108.8	83.7	5.5E-06
0427-005	F-01	Fill	5.0	0.0	50	28	11.25	14.60	18.2	117.9	99.7	56.1	>4.5		>4.5	17.1	117.0	100.2	3.1E-07
0427-006	F-02	Fill	10.0	0.0	50	28	11.16	19.10	19.0	123.8	104.0	310.1	>4.5		>4.5	19.0	122.0	102.5	3.3E-07
0427-007	F-03	Fill	5.0	1.5	185	28	10.66	42.90	25.9	100.1	79.5	21.1	0.3		2.8	23.6	103.0	83.0	2.5E-07
0427-008	F-04	Fill	10.0	1.5	125	28	11.04	43.30	25.4	108.0	86.1	110.2	3.3		>4.5	25.4	107.0	85.4	1.9E-07

TABLE 2-6
TREATABILITY STUDY TESTING RESULTS - TREATMENT ALIQUOTS
PATCHOGUE FORMER MANUFACTURED GAS PLANT SITE
VILLAGE OF PATCHOGUE, SUFFOLK COUNTY, NEW YORK

Kemron Sample Number	BC Sample ID	Untreated Material Type	Reagent Addition % by Wet Soil wt.		Water Addition % By Reagent wt.	Cure Days	pH	Volumetric Expansion (%)	Unconfined Compressive Strength				Pocket Penetrometer (tons/ft^2)			Hydraulic Conductivity (K) (cm/sec)			
			Portland Cement	Bentonite					Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	UCS (lb/in^2)	2 Day (1 Day for N-01 to N-04)	5 Day	7 Day	Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	K (cm/sec)
0427-019	F-05[1]	Fill	0.0	0.5	730	7		6.19											
						28	9.54	8.25											
0427-020	F-06[1]	Fill	0.0	1.5	533	7		15.46											
						28	9.93	14.43											
0427-021A	F-07	Fill	10.0	0.5	93.9	7		34.54	21.8	118.0	96.8	103.0	>4.5	>4.5	>4.5				
						14	12.22	37.01	21.0	115.8	95.7	177.3				21.1	117.8	97.3	4.9E-07
						28	12.22	30.10	19.5	115.1	96.3	149.0				21.2	117.4	96.9	3.2E-07
0427-022A	F-08	Fill	5.0	0.5	136.4	7		32.58	21.7	116.9	96.0	30.5	>4.5	>4.5	>4.5				
						14	12.12	34.23	21.7	113.3	93.1	33.6				22.4	115.1	94.0	7.0E-06
						28	12.00	24.95	19.7	114.4	95.6	23.1				20.2	117.0	97.3	1.1E-06
0427-023A	F-09	Fill	3.0	0.0	147.6	7		16.39	20.9	117.3	97.0	21.5	4.0	4.5	4.5				
						14	11.95	18.97	17.5	120.4	102.4	24.7				22.4	117.1	95.7	1.4E-05
						28	11.84	14.43	17.7	121.8	103.6	28.2				20.7	119.9	99.3	4.3E-06
0427-024A	F-10	Fill	3.0	0.5	185.7	7		24.12	22.2	110.8	90.6	11.9	2.5	3.5	4.5				
						14	11.93	24.64	19.2	115.6	97.0	11.7				22.3	114.1	93.3	3.9E-06
						28	12.08	21.24	18.8	111.3	93.7	9.6				21.9	113.0	92.7	2.0E-06
0427-025A	F-11	Fill	3.0	1.5	277.8	7		39.28	26.5	114.4	88.1	9.9	1.0	2.8	3.0				
						14	12.00	43.81	25.5	109.6	87.3	10.4				29.6	108.7	83.8	4.2E-06
						28	11.91	36.80	23.5	109.5	88.7	10.0				26.2	113.0	89.5	2.9E-06

Notes:
1. Bentonite-only aliquots (i.e., without cement) collapsed during the UCS testing; consequently, only volumetric expansion test was performed on those aliquots.

TABLE 2-7
TREATABILITY STUDY TESTING RESULTS - IMMERSION TEST OBSERVATIONS
PATCHOGUE FORMER MANUFACTURED GAS PLANT SITE
VILLAGE OF PATCHOGUE, SUFFOLK COUNTY, NEW YORK

KEMRON Sample Number	BC Sample ID	Reagent Addition			7-Day Observations after 14-Day Cure	7-Day Observations after 28-Day Cure
		Portland Cement (% wet soil wt)	Bentonite (% wet soil wt)	Water (% reagent weight)		
0427-001	N-01	7.5%	0.0%	50.0%	Preliminary stage - 14-day cure immersion test was not performed.	~Water color gray (day 1 to 7) ~Top of water color light gray (day 1 to 7) ~Light to medium odor similar to creosote and heavy naphthalene (day 1 & 2) ~Moderate odor similar to creosote and heavy naphthalene (day 4 to 7)
0427-002	N-02	12.5%	0.0%	50.0%	Preliminary stage - 14-day cure immersion test was not performed.	~Water color turn gray (day 1 to 7) ~Top of water color light gray (1 to 7 day) ~Light to medium odor similar to creosote and heavy naphthalene (day 1 to 2) ~Moderate odor similar to creosote and heavy naphthalene day 4) ~Light odor similar to creosote and heavy naphthalene (day 5 & 6) ~Light to moderate odor similar to creosote and heavy naphthalene (day 7)
0427-003	N-03	7.5%	1.5%	140.0%	Preliminary stage - 14-day cure immersion test was not performed.	~Water color turn gray (day 1 to 7) ~Water top color light gray (day 1 to 7) ~Light to medium odor similar to creosote and heavy naphthalene (day 1 to 2) ~Light odor similar to creosote and heavy naphthalene (4 day) ~Light to moderate odor similar to creosote and heavy naphthalene (day 5 to 7)
0427-004	N-04	12.5%	1.5%	110.0%	Preliminary stage - 14-day cure immersion test was not performed.	~Water color turn gray (day 1 to 5) ~Water color turn light gray (day 6 & 7) ~Top of water color light gray(day 1 to 7) ~Light to medium odor similar to creosote and heavy naphthalene (day 1 to 4) ~Light to moderate odor similar to creosote and heavy naphthalene (day 5 & 6) ~Light odor similar to creosote and heavy naphthalene (day 7)
0427-005	F-01	5.0%	0.0%	50.0%	Preliminary stage - 14-day cure immersion test was not performed.	~Water color turn gray(day 1 to 4) ~Water color turn light gray(day 5 to 7) ~Top of water color very pale brown (day 1) ~Top of water color very light brownish gray (day 2 & 4) ~Top of water color turn light gray(day 5 to 7) ~Light odor similar to creosote and heavy naphthalene (day 1 & 2) ~Light creosote naphthalene odor with a hint of toluene? lighter hydrocarbons? (day 4 to 7)
0427-006	F-02	10.0%	0.0%	50.0%	Preliminary stage - 14-day cure immersion test was not performed.	~Water color turn gray (day 1 to 7) ~Top of water color light gray (day 1 to 7) ~Light odor similar to creosote and heavy naphthalene (day 1 to 4) ~Light to moderate odor similar to creosote and heavy naphthalene (day 5 to 7)
0427-007	F-03	5.0%	1.5%	185.0%	Preliminary stage - 14-day cure immersion test was not performed.	~Water color turn gray (day 1 & 2) ~Water color turn yellow (day 4 to 7) ~Top of water color light gray (day 1 to 7) ~Light to medium odor similar to creosote and heavy naphthalene (day 1 & 2) ~Light creosote naphthalene odor with a hint of toluene? lighter hydrocarbons? (day 4 & 5) ~Moderate creosote naphthalene odor with a hint of toluene? lighter hydrocarbons? (day 6 & 7)

TABLE 2-7
TREATABILITY STUDY TESTING RESULTS - IMMERSION TEST OBSERVATIONS
PATCHOGUE FORMER MANUFACTURED GAS PLANT SITE
VILLAGE OF PATCHOGUE, SUFFOLK COUNTY, NEW YORK

KEMRON Sample Number	BC Sample ID	Reagent Addition			7-Day Observations after 14-Day Cure	7-Day Observations after 28-Day Cure
		Portland Cement (% wet soil wt)	Bentonite (% wet soil wt)	Water (% reagent weight)		
0427-008	F-04	10.0%	1.5%	125.0%	Preliminary stage - 14-day cure immersion test was not performed.	~Water color turn gray (day 1 to 7) ~Top of water color light gray (day 1 to 7) ~Medium odor similar to creosote and heavy naphthalene (day 1 & 2) ~Light creosote naphthalene odor with a hint of toluene? lighter hydrocarbons? (day 4 to 6) ~Moderate creosote naphthalene odor with a hint of toluene? lighter hydrocarbons? (day 7)
0427-011A	N-07	12.50%	0.50%	81.30%	~Water color clear (day 1) ~Water color white (day 2 to 7) ~Top of water color light gray (day 1 to 7) ~White particles at bottom of beaker (day 1 to 7) ~Moderate concrete, light naphthalene odor (day 1) ~Strong concrete, mild naphthalene odor (day 2 to 4) ~Strong concrete, faint naphthalene odor (day 6 to 7)	~Water color very pale brown (day 1) ~Water color white (day 2 to 7)) ~Top of water color light gray (day 1 to 5) ~Top of water color white with light gray circle in the middle (day 6 to 7) ~Particles at bottom of beaker (day 1 to 7) ~Mild concrete odor (day 1) ~Mild concrete, faint naphthalene odor (day 2) ~Moderate concrete, faint naphthalene odor (day 3) ~Strong concrete, mild naphthalene odor (day 5 to 7) ~No oily sheen observed (day 1 to 7)
0427-012A	N-08	7.50%	0.50%	116.40%	~Water color very pale brown (day 1) ~Water color white (day 2 to 7) ~Top of water color light gray (day 1 to 7) ~Particles at bottom of beaker (day 1) ~White particles at bottom of beaker (day 2 to 7) ~Strong concrete, moderate naphthalene odor (day 1) ~Strong concrete, mild naphthalene odor (day 2 to 7)	~Water color clear (day 1 to 2) ~Water color very pale brown (day 3 to 7) ~Top of water color light gray (day 1 to5) ~Top of water color very pale brown with light gray circle in the middle (day 6 to 7) ~Particles at bottom of beaker (day 1 to 7) ~Sample is beginning to disintegrate (day 2) ~Sample is continuing to disintegrate (day 3 to 7) ~Mild concrete odor (day 1 to 2) ~Mild concrete, mild naphthalene odor (day 3) ~Moderate concrete, mild naphthalene odor (day 5) ~Strong concrete, moderate naphthalene (day 6 to 7) ~No oily sheen observed (day 1 to 7)
0427-013A	N-09	5.00%	0.00%	100.00%	~Water color clear (day 1) ~Water color very pale brown (day 2 to 7) ~Top of water color light gray (day 1 to 7) ~Particles at bottom of beaker (day 1 to 7) ~Light concrete, light naphthalene odor (day 1) ~Strong concrete, light naphthalene odor (day 2 to 7)	~Water color clear (day 1 to 2) ~Water color very pale brown (day 3 to 7) ~Top of water color light gray (day 1 to 5) ~Top of water color very pale brown with light gray circle in middle (day 6 to 7) ~Particles at bottom of beaker (day 1 to 7) ~Light concrete, light naphthalene odor (day 1 to 3) ~Moderate concrete, light naphthalene (day 5) ~Strong concrete, moderate naphthalene (day 6 to 7) ~No oily sheen observed (day 1 to 7)
0427-014A	N-10	5.00%	0.50%	133.80%	~Water color clear (day 1 to 3) ~Water color very pale brown (day 4 to 7) ~Top of water color light gray (day 1 to 7) ~Particles at bottom of beaker (day 2 to 7) ~Light concrete, light naphthalene odor (day 1) ~Mild concrete, mild naphthalene odor (day 2) ~Moderate concrete, mild naphthalene odor (day 3) ~Moderate concrete, moderate naphthalene odor (day 4 to 7)	~Water color clear (day 1 to 2) ~Water color very pale brown (day 3 to 7) ~Top of water color light gray (day 1 to 5) ~Top of water color very pale brown with light gray circle in middle (day 6 to 7) ~Particles at bottom of beaker (day 1 to 7) ~Light concrete, light naphthalene odor (day 1) ~Light concrete, moderate naphthalene odor (day 2 to 6) ~Strong concrete, moderate naphthalene odor (day 7) ~No oily sheen observed (day 1 to 7)

TABLE 2-7
TREATABILITY STUDY TESTING RESULTS - IMMERSION TEST OBSERVATIONS
PATCHOGUE FORMER MANUFACTURED GAS PLANT SITE
VILLAGE OF PATCHOGUE, SUFFOLK COUNTY, NEW YORK

KEMRON Sample Number	BC Sample ID	Reagent Addition			7-Day Observations after 14-Day Cure	7-Day Observations after 28-Day Cure
		Portland Cement (% wet soil wt)	Bentonite (% wet soil wt)	Water (% reagent weight)		
0427-015A	N-11	5.00%	1.50%	231.90%	~Water color clear (day 1)	~Water color clear (day 1 to 2)
					~Water color very pale brown (day 2 to 7)	~Water color very pale brown (day 3 to 7)
					~Top of water color light gray (day 1 to 7)	~Top of water color light gray (day 1 to 5)
					~Particles at bottom of beaker (day 1 to 7)	~Top of water color very pale brown with light gray
					~Strong concrete, moderate naphthalene	circle in middle (day 6 to 7)
					odor (day 1 to 3)	~Particles at bottom of beaker (day 1 to 7)
					~Strong concrete, light naphthalene	~Sample is beginning to disintegrate (day 3)
					odor (day 4 to 7)	~Sample is continuing to disintegrate (day 5 to 7)
						~Moderate concrete, light naphthalene odor (day 1 to 7)
						~No oily sheen observed (day 1 to 7)
0427-016A	N-12	3.00%	0.00%	166.70%	~Water color light brownish gray (day 1)	~Water color clear (day 1 to 2)
					~Water color very pale brown (day 2 to 7)	~Water color very pale brown (day 3 to 7)
					~Top of water color light gray (day 1 to 7)	~Top of water color light gray (day 1 to 5)
					~Particles at bottom of beaker (day 1 to 7)	~Top of water color very pale brown with light gray
					~Moderate concrete, moderate naphthalene	circle in middle (day 6 to 7)
					odor (day 1 to 3)	~Particles at bottom of beaker (day 1 to 7)
					~Moderate concrete, faint naphthalene	~Mild concrete, mild naphthalene odor (day 1)
					odor (day 4)	~Moderate concrete, mild naphthalene (day 2 to 6)
					~Strong concrete, faint naphthalene odor (day 6)	~Moderate concrete, strong naphthalene (day 7)
					~Strong concrete, light naphthalene odor (day 7)	~No oily sheen observed (day 1 to 7)
0427-017A	N-13	3.00%	0.50%	181.60%	~Water color clear (day 1)	~Water color very pale brown (day 1 to 7)
					~Water color very pale brown (day 2 to 7)	~Top of water color light gray with light gray
					~Top of water color light gray (day 1 to 7)	circle in middle (day 1, 3 to 7)
					~Particles at bottom of beaker (day 1 to 7)	~Top of water color light gray (day 2)
					~Light concrete, light naphthalene odor (day 1)	~Particles at bottom of beaker (day 1 to 7)
					~Mild concrete, light naphthalene odor (day 2 to 4)	~Mild concrete, mild naphthalene odor (day 1 to 3)
					~Moderate concrete, light naphthalene (day 6)	~Moderate concrete, moderate naphthalene (day 5 to 7)
					~Moderate concrete, moderate naphthalene (day 7)	
0427-018A	N-14	3.00%	1.50%	274.60%	~Water color clear (day 1)	~Water color very pale brown (day 1 to 7)
					~Water color very pale brown (day 2 to 7)	~Top of water color light gray (day 1 to 2)
					~Top of water color light gray (day 1 to 7)	~Top of water color very pale brown with light gray
					~Particles at bottom of beaker (day 1 to 7)	circle in middle (day 3 to 7)
					~Strong concrete, moderate naphthalene	~Particles at bottom of beaker (day 1 to 7)
					odor (day 1 to 4)	~Mild concrete, mild naphthalene odor (day 1 to 3)
					~Strong concrete, light naphthalene (day 6 to 7)	~Moderate concrete, mild naphthalene (day 5)
						~Strong concrete, mild naphthalene (day 6 to 7)
						~No oily sheen observed (day 1 to 7)
0427-021A	F-07	10.00%	0.50%	93.90%	~Water color clear (day 1 to 3)	~Water color clear (day 1 to 2)
					~Water color very pale brown (day 4)	~Water color white (day 3 to 7)
					~Water color white (day 6 to 7)	~Top of water color light gray (day 1 & 3)
					~Top of water color light gray (day 1 to 7)	~top of water color clear with light gray circle in
					~White particles at bottom of beaker 9day 4 to 7)	middle (day 2)
					~Moderate concrete, moderate naphthalene	~Top of water color white with light gray circle
					odor (day 1 to 6)	in middle (day 5 to 7)
					~Moderate concrete, strong naphthalene (day 7)	~Moderate concrete odor (day 1 to 2)
						~Moderate concrete, mild menthol odor (day 3)
						~Moderate concrete, moderate naphthalene
						odor (day 5 to 7)
						~No oily sheen observed (day 1 to 7)

TABLE 2-7
TREATABILITY STUDY TESTING RESULTS - IMMERSION TEST OBSERVATIONS
PATCHOGUE FORMER MANUFACTURED GAS PLANT SITE
VILLAGE OF PATCHOGUE, SUFFOLK COUNTY, NEW YORK

KEMRON Sample Number	BC Sample ID	Reagent Addition			7-Day Observations after 14-Day Cure	7-Day Observations after 28-Day Cure
		Portland Cement (% wet soil wt)	Bentonite (% wet soil wt)	Water (% reagent weight)		
0427-022A	F-08	5.00%	0.50%	136.40%	~Water color clear (day 1 to 3)	~Water color clear (day 1 to 2)
					~Water color very pale brown (day 4 to	~Water color very pale brown (day 3 to 7)
					~Top of water color light gray (day 1 to 7)	~Top of water color clear with light gray circle in
					~Moderate concrete, moderate naphthalene	middle (day 1 to 2)
					odor (day 1 to 6)	~Top of water color light gray (day 3 to 5)
					~Strong concrete, strong naphthalene odor (day 7)	~Top of water color very pale brown with light gray
						circle in middle (day 6 to 7)
						~Moderate concrete odor (day 1 to 2)
						~Moderate concrete, faint menthol odor (day 3)
						~Moderate concrete, light menthol odor (day 5 to 7)
						~No oily sheen observed (day 1 to 7)
0427-023A	F-09	3.00%	0.00%	147.60%	~Water color very pale brown (day 1 to 7)	~Water color clear (day 1 to 3)
					~Top of water color light gray (day 1 to 7)	~Water color very pale brown (day 5 to 7)
					~Moderate concrete, faint naphthalene	~Top of water color clear with light gray circle in
					odor (day 1 to 4)	middle (day 1 to 2)
					~Moderate concrete, light naphthalene odor (day 7)	~Top of water color light gray (day 3 to 5)
					~Moderate concrete, strong naphthalene odor (day 7)	~Top of water color very pale brown with light gray
						circle in middle (day 6 to 7)
						~Particles at bottom of beaker (day 3 to 7)
						~Sample is beginning to disintegrate (day 2)
						~Sample is continuing to disintegrate (day 3 to 7)
						~Moderate concrete odor (day 1)
						~Moderate concrete, light naphthalene odor (day 2 to 6)
						~Moderate concrete, moderate naphthalene (day 7)
						~No oily sheen observed (day 1 to 7)
0427-024A	F-10	3.00%	0.50%	185.70%	~Water color very pale brown (day 1 to 7)	~Water color clear (day 1 to 2)
					~Top of water color light gray (day 1 to 7)	~Water color very pale brown (day 3)
					~Moderate concrete, faint naphthalene	~Water color white (day 5 to 7)
					odor (day 1 to 4)	~Top of water color light gray (day 1 to 5)
					~Moderate concrete, light naphthalene odor (day 6)	~Top of water color white with light gray circle
					~Moderate concrete, strong naphthalene odor (day 7)	in middle (day 6 to 7)
						~Particles at bottom of beaker (day 3 to 7)
						~Sample is beginning to disintegrate on one side (day 1)
						~Sample is continuing to disintegrate (day 2 to 7)
						~Moderate concrete odor (day 1)
						~Moderate concrete, light naphthalene odor (day 2 to 5)
						~Strong concrete, light naphthalene (day 6)
						~Strong concrete, strong naphthalene odor (day 7)
						~No oily sheen observed (day 1 to 7)
0427-025A	F-11	3.00%	1.50%	277.80%	~Water color very pale brown (day 1 to 7)	~Water color clear (day 1 to 3)
					~Top of water color light gray (day 1 to 7)	~Water color very pale brown (day 5 to 7)
					~Strong concrete, moderate naphthalene	~Top of water color light gray (day 1 to 3)
					odor (day 1 to 6)	~Top of water color very pale brown (day 5)
					~Strong concrete, strong naphthalene odor (day 7)	~Top of water color very pale brown with light gray
						circle in middle (day 6 to 7)
						~Particles at bottom of beaker (day 3 to 7)
						~Sample is beginning to disintegrate on one side (day 2)
						~Sample is continuing to disintegrate (day 3 to 7)
						~Small bubble formed on side (day 3)
						~Moderate concrete odor (day 1)
						~Moderate concrete, light naphthalene odor (day 2 to 5)
						~Moderate concrete, moderate naphthalene (day 6 to 7)
						~No oily sheen observed (day 1 to 7)

Figures

Figure 2-1
Aliquots of Native Soils
UCS as a Function of Cement and Bentonite Content

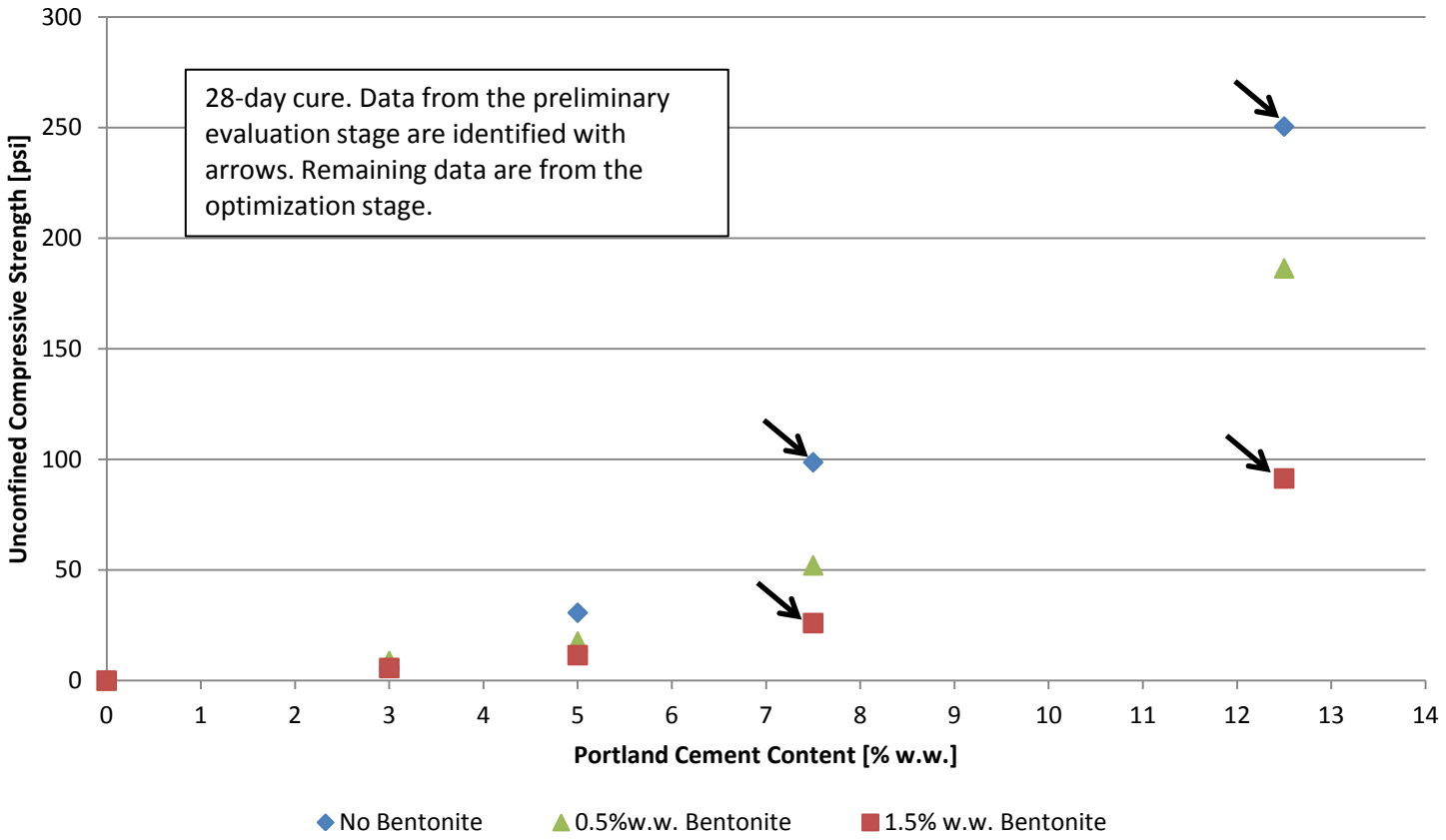


Figure 2-2
Aliquots of Fill
UCS as a Function of Cement and Bentonite Content

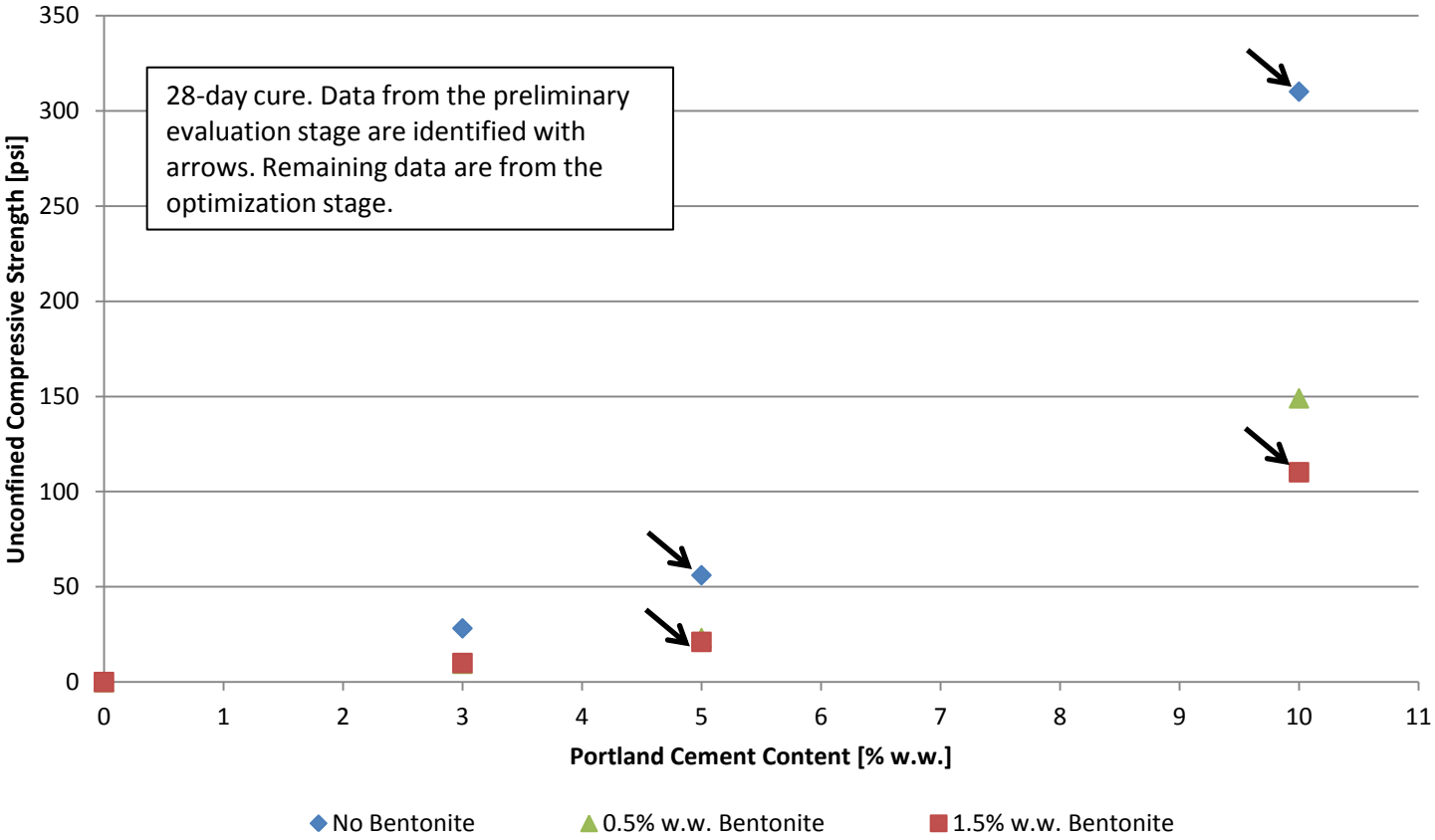


Figure 2-3
Aliquots of Native Soils
Hydraulic Conductivity as a Function of Cement and Bentonite Content

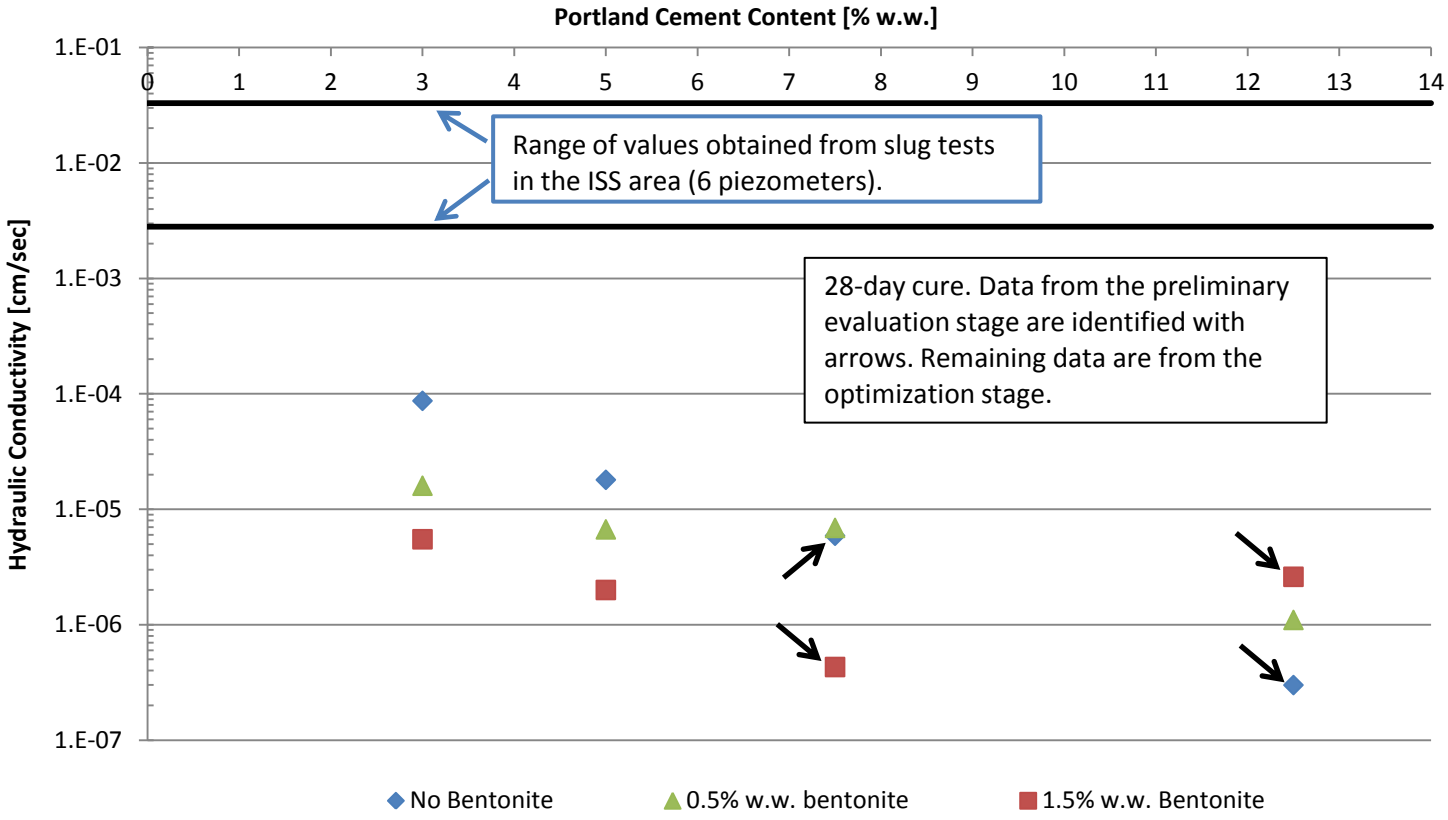


Figure 2-4
Aliquots of Fill
Hydraulic Conductivity as a Function of Cement and Bentonite Content

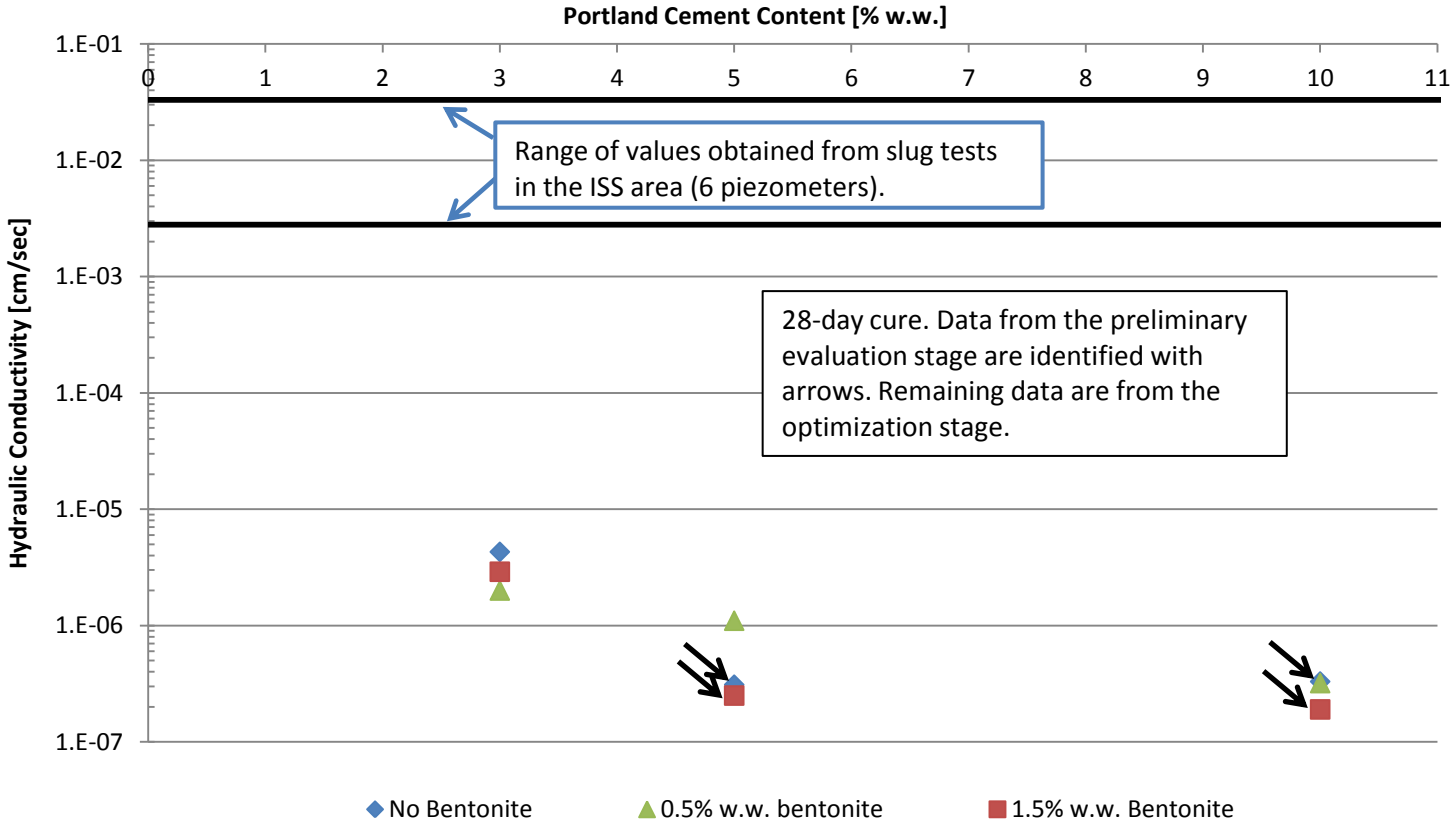


Figure 2-5
Aliquots of Native Soils
Volumetric Expansion as a Function of Cement and Bentonite Content

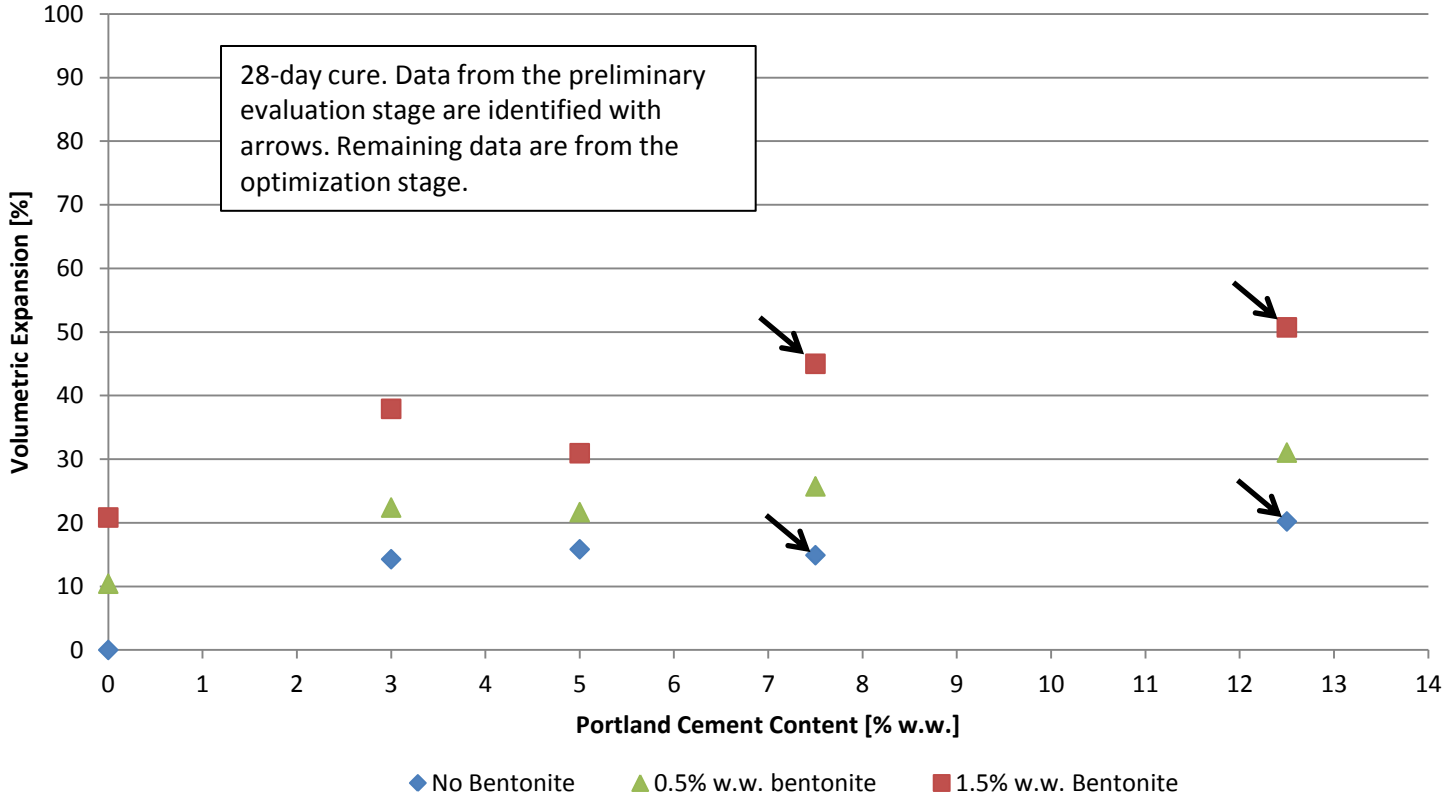
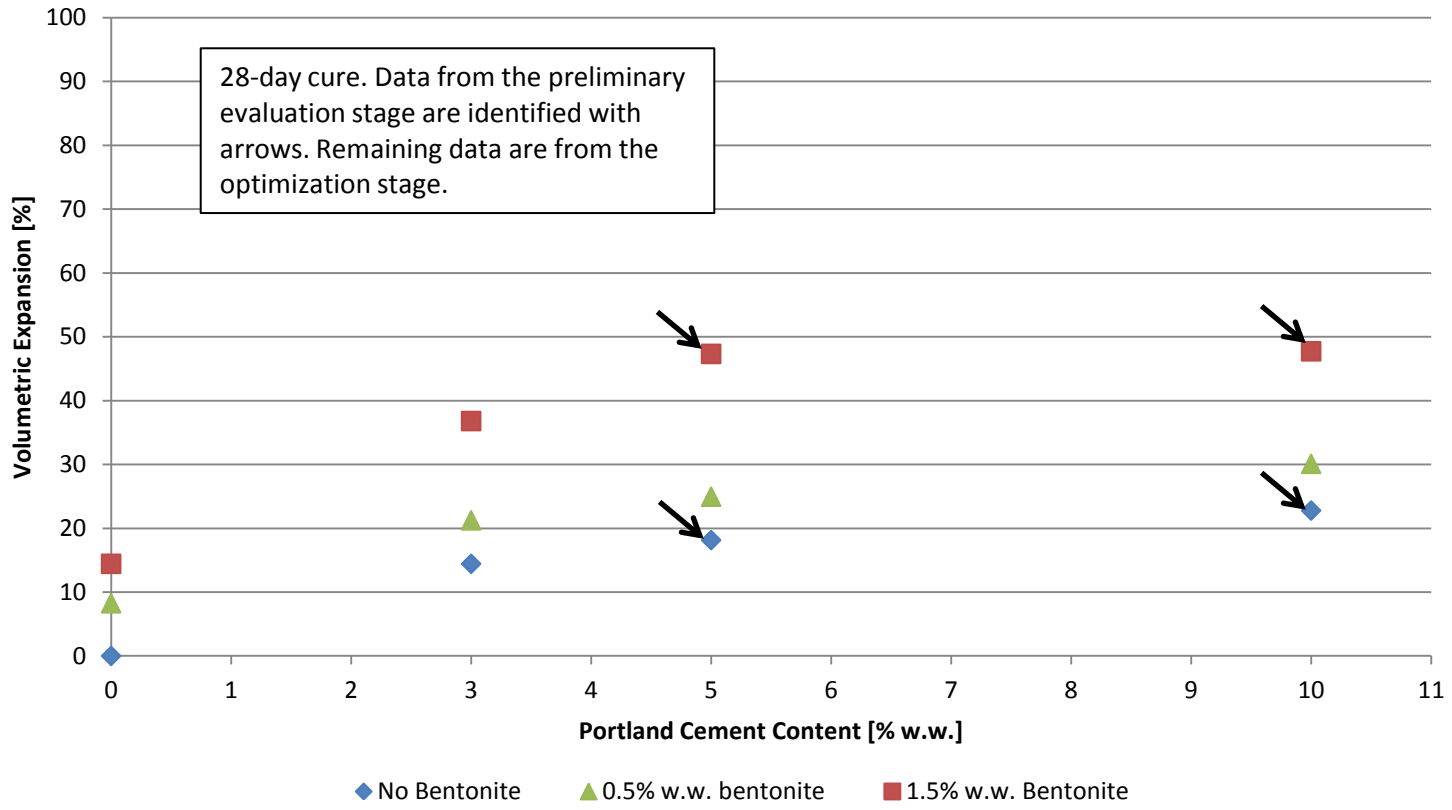


Figure 2-6
Aliquots of Fill
Volumetric Expansion as a Function of Cement and Bentonite Content



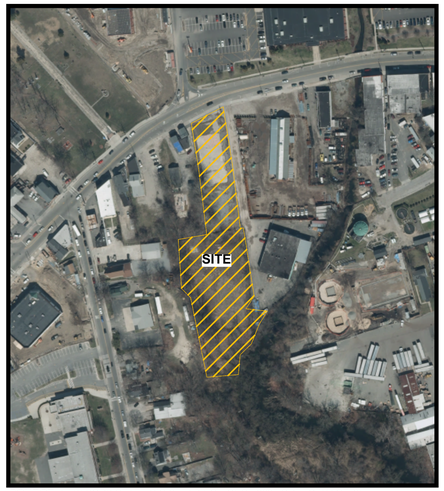
Appendix A: Design Drawings

(Bound Separately)

REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)
PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

LIST OF DRAWINGS

SHEET	TITLE
G-000	COVER SHEET
C-101	EXISTING SITE CONDITIONS
C-102	HISTORICAL STRUCTURE LOCATIONS
C-103	HISTORICAL INVESTIGATION LOCATION PLAN
C-104	NAPL/TAR OBSERVATIONS
C-105	BTEX AND PAH CONCENTRATIONS IN SOIL ABOVE UNRESTRICTED USE (DEEPEST OCCURRENCE)
C-106	GEOLOGICAL CROSS SECTIONS (A, B AND C)
C-107	WATER TABLE CONTOUR MAP
C-108	REMEDIAL ACTION PLAN
C-109	WELL DECOMMISSIONING PLAN
C-200	REMEDIAL ACTION PLAN ENLARGEMENTS
C-201	EXCAVATION SUPPORT AND DEWATERING DETAILS
C-300	SITE RESTORATION PLAN AND DETAILS
C-400	ON-SITE TREATMENT SYSTEM PROCESS FLOW DIAGRAM
C-500	SOIL EROSION AND SEDIMENT CONTROL PLAN
C-501	SOIL EROSION AND SEDIMENT CONTROL DETAILS AND NOTES

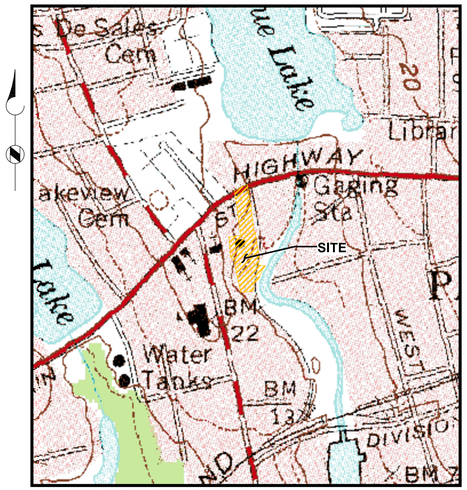


SOURCE: NEW YORK STATE GIS CLEARING HOUSE 2007 ORTHO IMAGERY

VICINITY MAP

0 200 400

SCALE IN FEET



SOURCE: U.S.G.S. QUADRANGLE

LOCATION MAP

0 500 1000

SCALE IN FEET

PREPARED FOR:

NATIONAL GRID

175 EAST OLD COUNTRY ROAD
HICKSVILLE NY 11801

PREPARED BY:

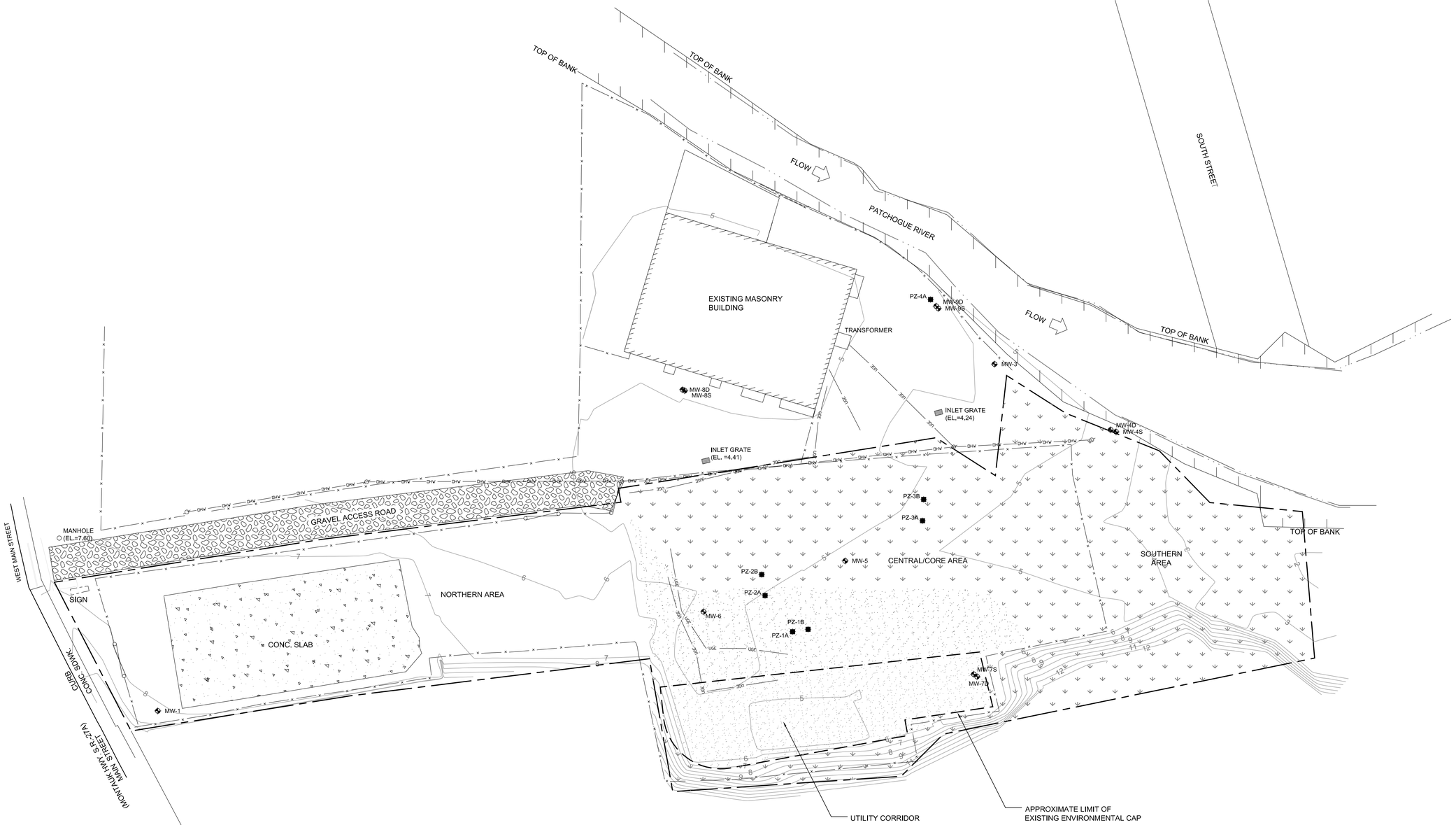
BROWN AND CALDWELL ASSOCIATES

2 PARK WAY, SUITE 2A
UPPER SADDLE RIVER, N.J. 07458

NOVEMBER 2012

DRAFT

0 30 60
SCALE IN FEET



LEGEND:

- PROPERTY LINE
- FENCE
- 10 TOPOGRAPHIC CONTOUR
- UGE UGE UNDERGROUND ELECTRIC
- OHW OHW OHW OVERHEAD ELECTRIC WIRE
- SURFACE WATER BOUNDARY
- UTILITY POLE
- CONCRETE
- GRAVEL ROAD
- GRAVEL COVER
- VEGETATIVE COVER
- MW-1 MONITORING WELL LOCATION
- PZ-3B PIEZOMETER LOCATION

NOTES:

1. THE UTILITIES SHOWN SHALL BE CONSIDERED APPROXIMATE. THE LOCATION OF UTILITIES MAY DIFFER FROM THAT SHOWN AND ADDITIONAL UTILITIES MAY BE PRESENT ON-SITE.
2. THE LOCATION OF UTILITIES SHALL BE VERIFIED PRIOR TO INTRUSIVE ACTIVITIES. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING AND COORDINATING WITH NEW YORK CITY ONE CALL CENTER & LONG ISLAND AT 1-800-272-4480.

DRAFT

Brown AND Caldwell
BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH (PROJECT MANAGER) DATE:
APPROVED: JEFF CAPUTI (BROWN AND CALDWELL) DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: PP
DRAWN: RJ
CHECKED: KB
CHECKED:
APPROVED: JC

EXTERNAL REFERENCE FILES
Titleblock-22x34.dwg
Basemap.dwg
Topo.dwg
Samples.dwg

JEFFREY R. CAPUTI
PROFESSIONAL ENGINEER
N.Y. LICENSE NO.082196-1
DATE

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

NATIONAL GRID

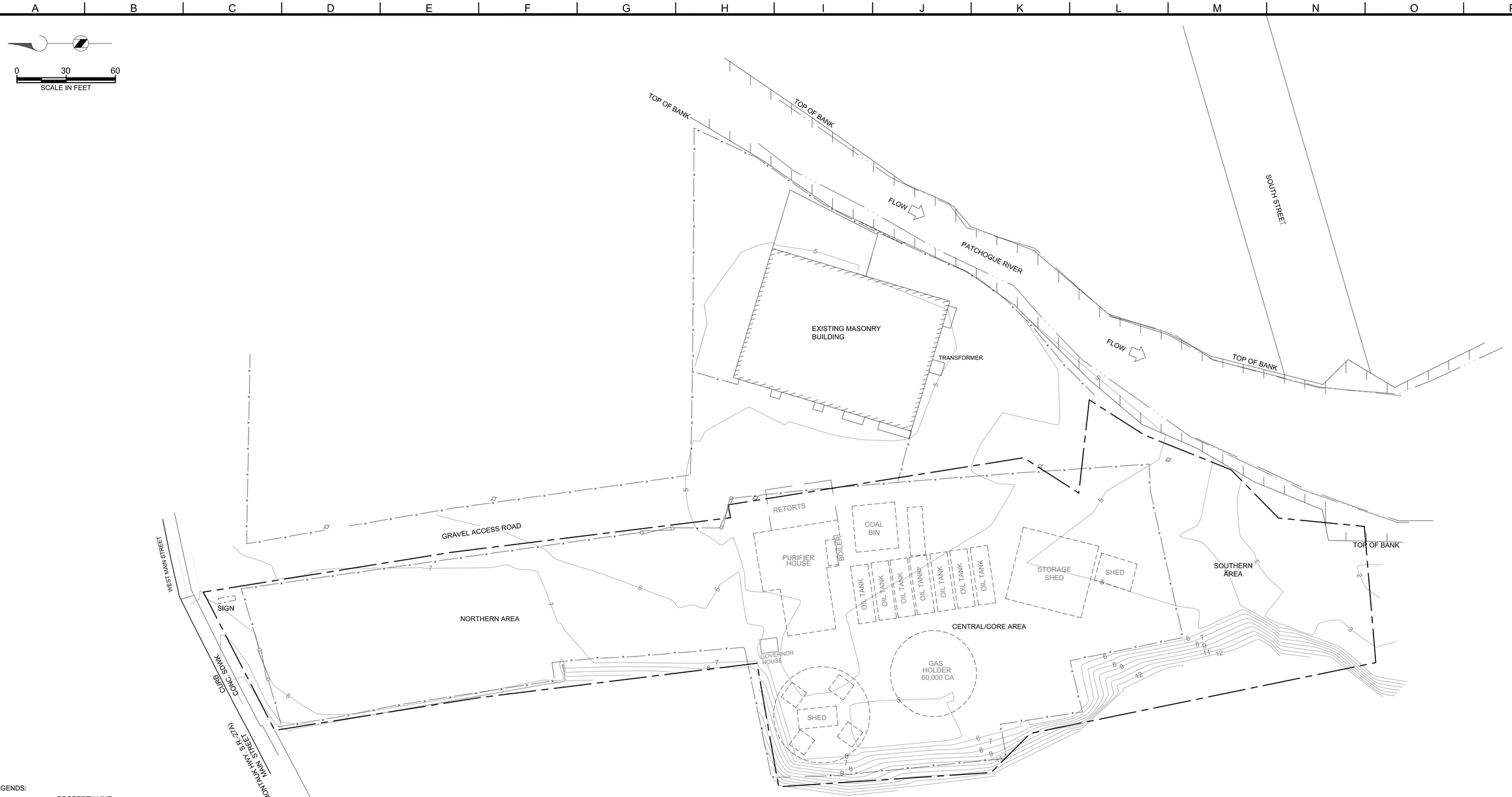
PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)

EXISTING SITE CONDITIONS

FILENAME 142128-C-101.dwg
BC PROJECT NUMBER 142128
CLIENT PROJECT NUMBER -
DRAWING NUMBER C-101
SHEET NUMBER OF

AMetheth
Nov 30, 2012 - 1:59pm
P:\National_Grid\Patchogue\142128_Patchogue_UCWP_RDWP_Implement\50%-75%_Remedial_Design_Report\CAD\02-SHEET\C-CIVIL\142128-C-101.dwg



LEGENDS:

- PROPERTY LINE
- FENCE
- 10 TOPOGRAPHIC CONTOUR
- UTILITY POLE
- FORMER STRUCTURE

NOTES:

1. BASE MAP INFORMATION OBTAINED FROM TETRA TECH EC, INC. DRAWING ENTITLED "CONCEPTUAL SITE MODEL", DATED DECEMBER 17, 2008.

DRAFT

Brown AND Caldwell

BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH (PROJECT MANAGER) DATE:

APPROVED: JEFF CAPUTI (BROWN AND CALDWELL) DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: PP
DRAWN: RJ
CHECKED: KB
CHECKED:
APPROVED: JC

EXTERNAL REFERENCE FILES
Titleblock-22x34.dwg
Basemap.dwg
Topo.dwg

JEFFREY R. CAPUTI
PROFESSIONAL ENGINEER
N.Y. LICENSE NO.082196-1
DATE

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

NATIONAL GRID

PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)

HISTORICAL STRUCTURE LOCATIONS

FILENAME 142128-C-102.dwg
BC PROJECT NUMBER 142128
CLIENT PROJECT NUMBER -
DRAWING NUMBER C-102
SHEET NUMBER OF

Nov 30, 2012 - 11:45am AMetboth
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LEGENDS:

- PROPERTY LINE
- FENCE
- 10 TOPOGRAPHIC CONTOUR
- SURFACE WATER BOUNDARY
- UTILITY POLE
- CONCRETE SLAB
- TEST TRENCH SAMPLE LOCATION
- PSA SURFACE SAMPLE LOCATION
- PSA SUBSURFACE SAMPLE LOCATION
- RI SOIL BORING LOCATION
- RI SOIL VAPOR SAMPLE LOCATION
- RI SHALLOW MONITORING WELL LOCATION
- RI DEEP MONITORING WELL LOCATION
- PDI DISCRETE-DEPTH GROUNDWATER SAMPLE LOCATION
- PDI STAFF GUAGE LOCATION
- PDI SOIL BORING LOCATION
- PIEZOMETER LOCATION
- GEOTECHNICAL SOIL BORING LOCATION

NOTES:

1. BASE MAP INFORMATION OBTAINED FROM TETRA TECH EC, INC. DRAWING ENTITLED "CONCEPTUAL SITE MODEL", DATED DECEMBER 17, 2008.

DRAFT

Brown AND Caldwell

BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH (PROJECT MANAGER) DATE:

APPROVED: JEFF CAPUTI (BROWN AND CALDWELL) DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: PP
DRAWN: RJ
CHECKED: KB
CHECKED:
APPROVED: JC

EXTERNAL REFERENCE FILES
Titleblock-22x34.dwg
Basemap.dwg
Topo.dwg
Sample-Location.dwg

JEFFREY R. CAPUTI
PROFESSIONAL ENGINEER
N.Y. LICENSE NO.082196-1
DATE

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

NATIONAL GRID

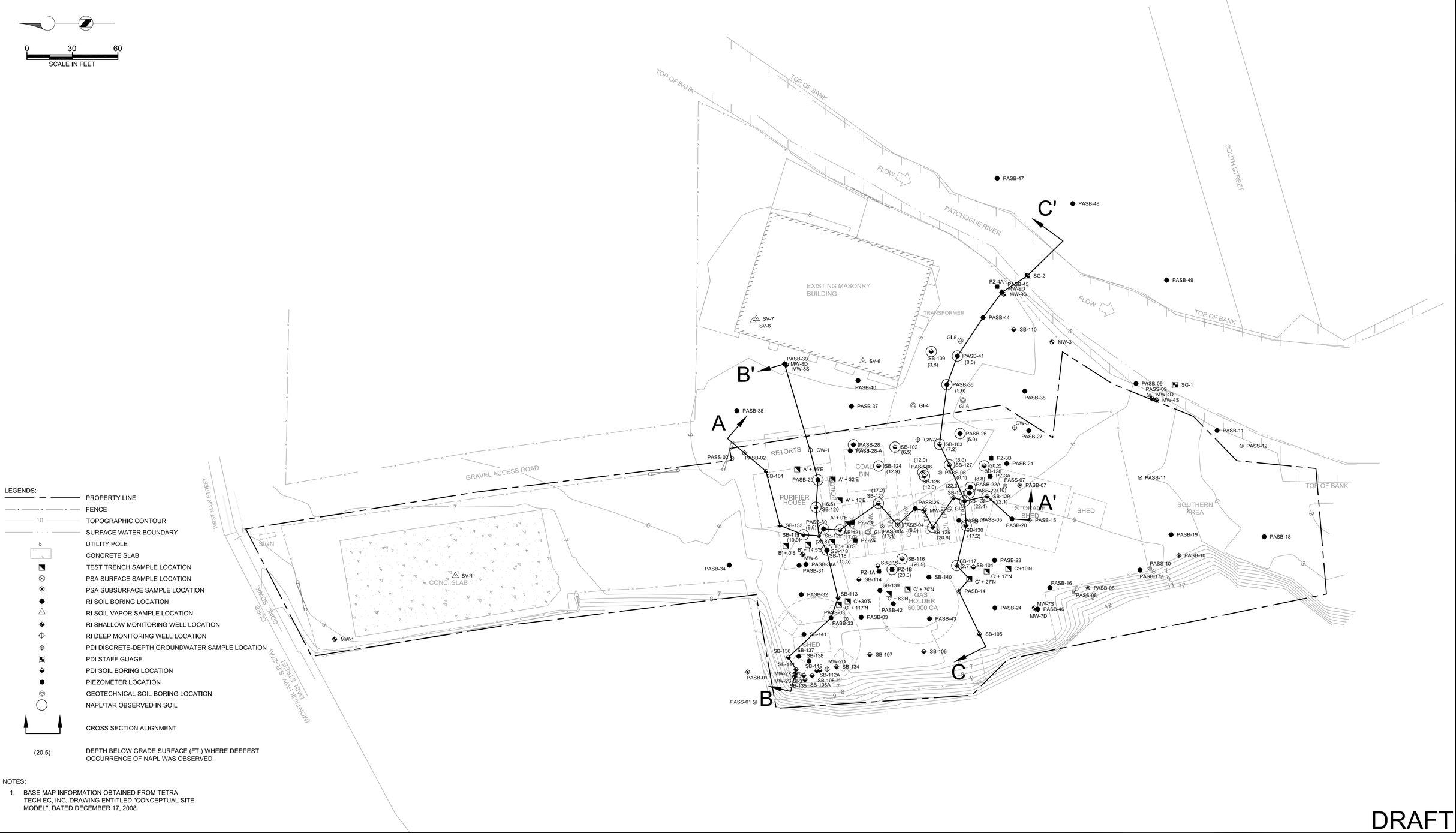
PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)

HISTORICAL INVESTIGATION LOCATION PLAN

FILENAME: 142128-C-103.dwg
BC PROJECT NUMBER: 142128
CLIENT PROJECT NUMBER: -
DRAWING NUMBER: C-103
SHEET NUMBER OF

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AMerboth
Nov 30, 2012 - 12:57pm



LEGENDS:

- PROPERTY LINE
- FENCE
- 10 TOPOGRAPHIC CONTOUR
- SURFACE WATER BOUNDARY
- UTILITY POLE
- CONCRETE SLAB
- TEST TRENCH SAMPLE LOCATION
- PSA SURFACE SAMPLE LOCATION
- PSA SUBSURFACE SAMPLE LOCATION
- RI SOIL BORING LOCATION
- RI SOIL VAPOR SAMPLE LOCATION
- RI SHALLOW MONITORING WELL LOCATION
- RI DEEP MONITORING WELL LOCATION
- PDI DISCRETE-DEPTH GROUNDWATER SAMPLE LOCATION
- PDI STAFF GUAGE
- PDI SOIL BORING LOCATION
- PIEZOMETER LOCATION
- GEOTECHNICAL SOIL BORING LOCATION
- NAPL/TAR OBSERVED IN SOIL
- CROSS SECTION ALIGNMENT
- (20.5) DEPTH BELOW GRADE SURFACE (FT.) WHERE DEEPEST OCCURRENCE OF NAPL WAS OBSERVED

NOTES:

1. BASE MAP INFORMATION OBTAINED FROM TETRA TECH EC, INC. DRAWING ENTITLED "CONCEPTUAL SITE MODEL", DATED DECEMBER 17, 2008.

DRAFT

Brown AND Caldwell

BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH PROJECT MANAGER DATE:

APPROVED: JEFF CAPUTI BROWN AND CALDWELL DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: PP
DRAWN: RJ
CHECKED: KB
CHECKED:
APPROVED: JC

EXTERNAL REFERENCE FILES
Titleblock-22x34.dwg
Basemap.dwg
Topo.dwg
Sample-Location.dwg

JEFFREY R. CAPUTI
PROFESSIONAL ENGINEER
N.Y. LICENSE NO.082196-1
DATE

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

NATIONAL GRID

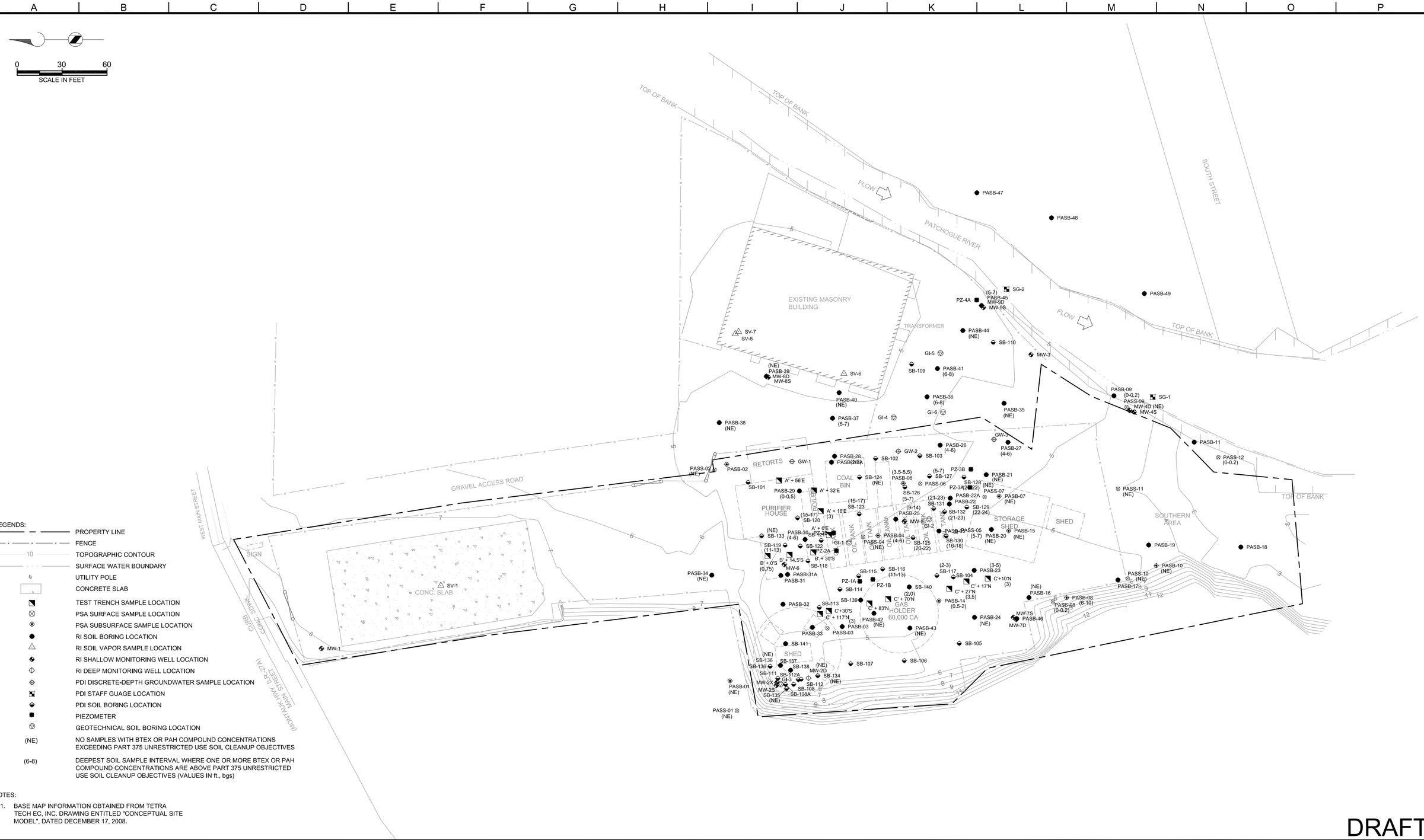
PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)

NAPL/TAR OBSERVATIONS

FILENAME 142128-C-104.dwg
BC PROJECT NUMBER 142128
CLIENT PROJECT NUMBER -
DRAWING NUMBER C-104
SHEET NUMBER OF

AMerbath
Nov 30, 2012 - 3:47pm
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LEGENDS:

- PROPERTY LINE
- FENCE
- 10 TOPOGRAPHIC CONTOUR
- SURFACE WATER BOUNDARY
- UTILITY POLE
- CONCRETE SLAB
- TEST TRENCH SAMPLE LOCATION
- PSA SURFACE SAMPLE LOCATION
- PSA SUBSURFACE SAMPLE LOCATION
- RI SOIL BORING LOCATION
- RI SOIL VAPOR SAMPLE LOCATION
- RI SHALLOW MONITORING WELL LOCATION
- RI DEEP MONITORING WELL LOCATION
- PDI DISCRETE-DEPTH GROUNDWATER SAMPLE LOCATION
- PDI STAFF GUAGE LOCATION
- PDI SOIL BORING LOCATION
- PIEZOMETER
- GEOTECHNICAL SOIL BORING LOCATION
- (NE) NO SAMPLES WITH BTEX OR PAH COMPOUND CONCENTRATIONS EXCEEDING PART 375 UNRESTRICTED USE SOIL CLEANUP OBJECTIVES
- (6-8) DEEPEST SOIL SAMPLE INTERVAL WHERE ONE OR MORE BTEX OR PAH COMPOUND CONCENTRATIONS ARE ABOVE PART 375 UNRESTRICTED USE SOIL CLEANUP OBJECTIVES (VALUES IN ft., bgs)

NOTES:

1. BASE MAP INFORMATION OBTAINED FROM TETRA TECH EC, INC. DRAWING ENTITLED "CONCEPTUAL SITE MODEL", DATED DECEMBER 17, 2008.

DRAFT

Brown AND Caldwell

BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH (PROJECT MANAGER) DATE:

APPROVED: JEFF CAPUTI (BROWN AND CALDWELL) DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: PP
DRAWN: RJ
CHECKED: KB
CHECKED:
APPROVED: JC

EXTERNAL REFERENCE FILES: Titleblock-22x34.dwg, Basemap.dwg, Topo.dwg, Sample-Location.dwg

JEFFREY R. CAPUTI
PROFESSIONAL ENGINEER
N.Y. LICENSE NO.082196-1
DATE

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

NATIONAL GRID

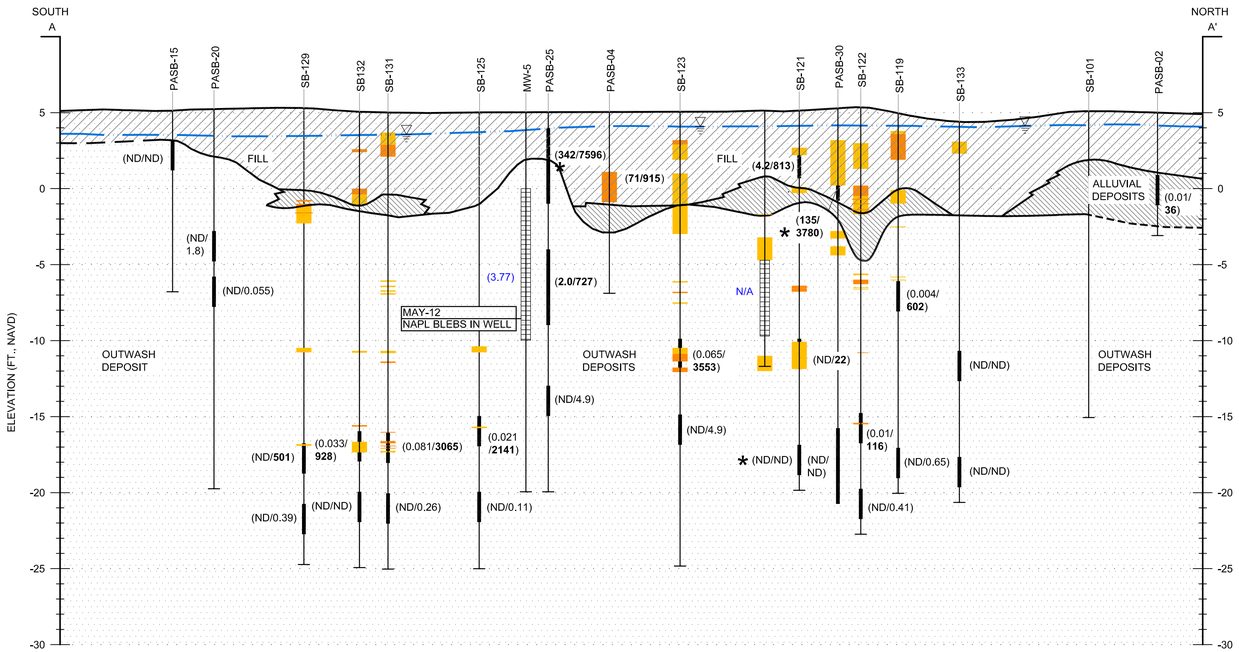
PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

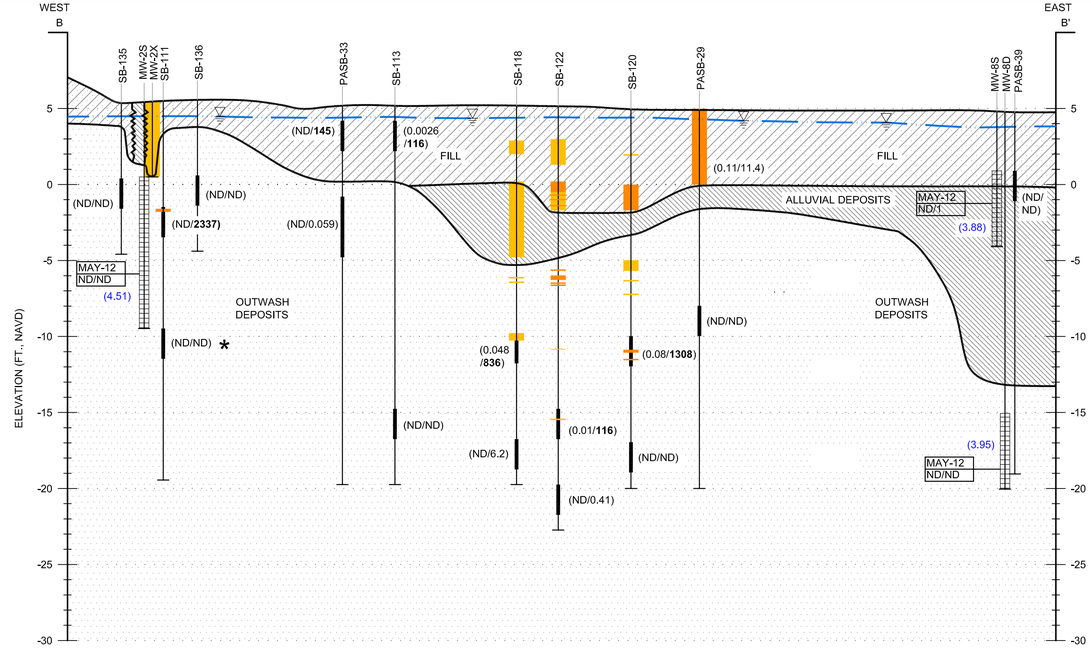
REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)

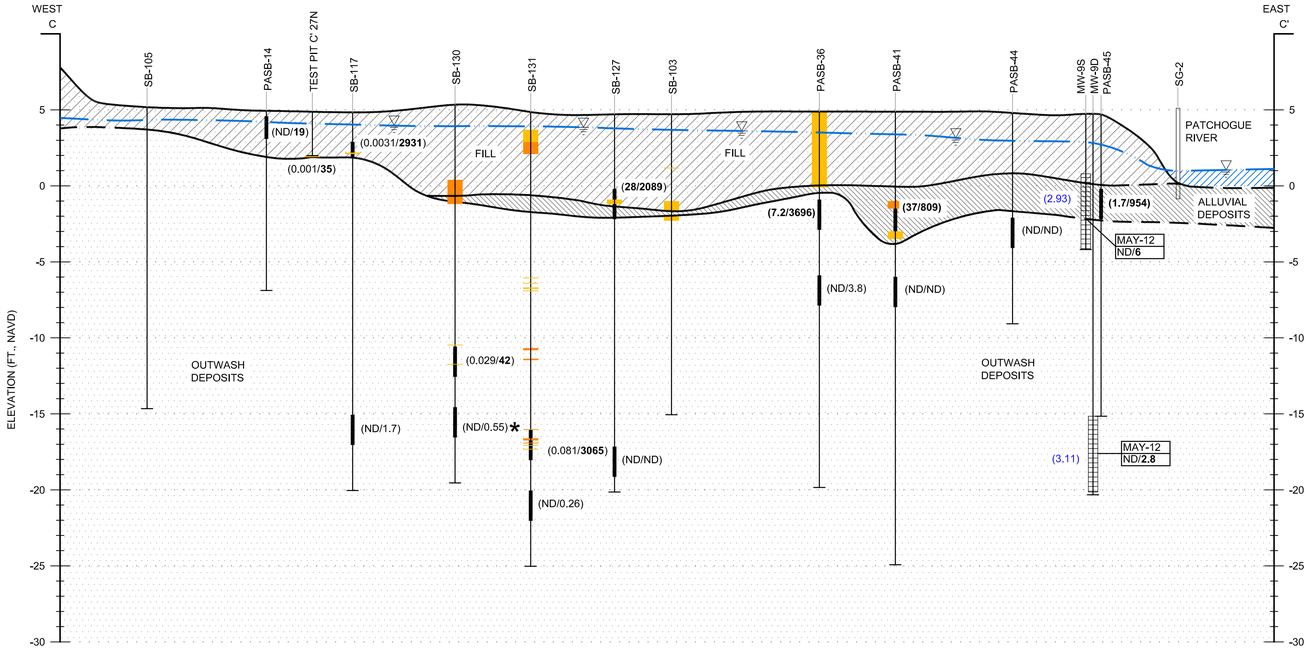
BTEX AND PAH CONCENTRATION IN SOIL ABOVE UNRESTRICTED USE (DEEPEST OCCURRENCE)

FILENAME: 142128-C-105.dwg
BC PROJECT NUMBER: 142128
CLIENT PROJECT NUMBER: -
DRAWING NUMBER: C-105
SHEET NUMBER OF

Nov 30, 2012 - 1:30pm AMerbath
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LEGEND:

- MW-7S — MONITORING WELL / SOIL BORING IDENTIFICATION AND APPROXIMATE LOCATION
- GENERALIZED GROUND SURFACE
- WELL SCREEN INTERVAL
- MAY-12 ND/14 — TOTAL BTEX/TOTAL PAHS IN GROUNDWATER. VALUES REPORTED IN MICROGRAMS PER LITER (ug/L) FROM MAY 2012 SAMPLES. BOLD VALUE INDICATES ONE OR MORE CONSTITUENT CONCENTRATIONS ABOVE CLASS GA CRITERIA.
- INTERVAL/DISCRETE DEPTH WHERE NAPL/TAR OBSERVED IN SOIL. COLOR OF SYMBOL INDICATES DEGREE OF SATURATION. (DARK ORANGE = HIGH, LIGHT ORANGE = LOW)
- (ND/3.8) — TOTAL BTEX/TOTAL PAH (mg/kg) CONCENTRATION WITHIN SAMPLE INTERVAL. BOLD VALUE INDICATES ONE OR MORE CONSTITUENT CONCENTRATIONS ABOVE PART 375 UNRESTRICTED SOIL CLEANUP OBJECTIVES.
- TOTAL DEPTH OF BOREHOLE
- FILL
- ALLUVIAL DEPOSITS
- OUTWASH DEPOSITS
- WATER TABLE (5/23/12)
- (3.05) — GROUNDWATER ELEVATION IN (FT., NAVD) (5/23/12)

ABBREVIATIONS:

BTEX	BENZENE, TOLUENE, ETHYLBENZENE AND XYLENE ISOMERS
PAH	POLYCYCLIC AROMATIC HYDROCARBONS
ND	NOT DETECTED
*	HIGHEST TOTAL BTEX OR TOTAL PAH VALUE LISTED FROM ORIGINAL AND DUPLICATE SAMPLE

0 40 80
SCALE IN FEET

DRAFT

Brown AND Caldwell
BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH (PROJECT MANAGER) DATE:
APPROVED: JEFF CAPUTI (BROWN AND CALDWELL) DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: PP
DRAWN: RJ
CHECKED: KB
CHECKED:
APPROVED: JC

EXTERNAL REFERENCE FILES: Titleblock-22x34.dwg

JEFFREY R. CAPUTI
PROFESSIONAL ENGINEER
N.Y. LICENSE NO.082196-1
DATE

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

NATIONAL GRID

PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)

GEOLOGICAL CROSS SECTIONS A, B, AND C

FILENAME 142128-C-106.dwg
BC PROJECT NUMBER 142128
CLIENT PROJECT NUMBER -
DRAWING NUMBER C-106
SHEET NUMBER OF

HPSC2075.tif
Nov 30, 2012 - 2:06pm RJames
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0 30 60
SCALE IN FEET

TOP OF BANK
FLOW
PATCHOGUE RIVER
SOUTH STREET
EXISTING MASONRY BUILDING
TRANSFORMER
SG-2 (1.31)
MW-9S (2.93)
MW-3 (2.92)
MW-8S (3.99)
INLET GRATE (EL.=4.24)
INLET GRATE (EL.=4.41)
SG-1 (1.12)
MW-4S (2.63)
GRAVEL ACCESS ROAD
MANHOLE (EL.=7.60)
WEST MAIN STREET
SIGN
CONC. SLAB
CURB
CONC. SDWK.
MW-5 (3.77)
SOUTHERN AREA
MW-6 (SEE NOTE 2)
MW-7S (3.68)
MW-1 (5.38)
MW-2S (4.51)
(MONTAUK HWY, S.R. 27A) MAIN STREET

LEGEND:

4	WATER TABLE CONTOUR (FT, NAVD) DASHED WHERE INFERRED
	GENERALIZED DIRECTION OF GROUNDWATER FLOW
	MONITORING WELL
	STAFF GAUGE
(4.38)	GROUNDWATER ELEVATION (FT, NAVD)

NOTES:
1. WATER TABLE ELEVATIONS BASED ON MEASUREMENTS TAKEN ON MAY 23, 2012.
2. WATER LEVEL MEASUREMENT AT MW-6 WAS ANOMALOUSLY LOW BASED ON PRIOR AND SUBSEQUENT MEASUREMENTS AND THUS WAS NOT USED IN CONTOURING.

DRAFT

Brown AND Caldwell
BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH (PROJECT MANAGER) DATE:
APPROVED: JEFF CAPUTI (BROWN AND CALDWELL) DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: PP
DRAWN: RJ
CHECKED: KB
CHECKED:
APPROVED: JC

EXTERNAL REFERENCE FILES
Titleblock-22x34.dwg
Basemap.dwg
Topo.dwg

JEFFREY R. CAPUTI
PROFESSIONAL ENGINEER
N.Y. LICENSE NO.082196-1
DATE

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

NATIONAL GRID

PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

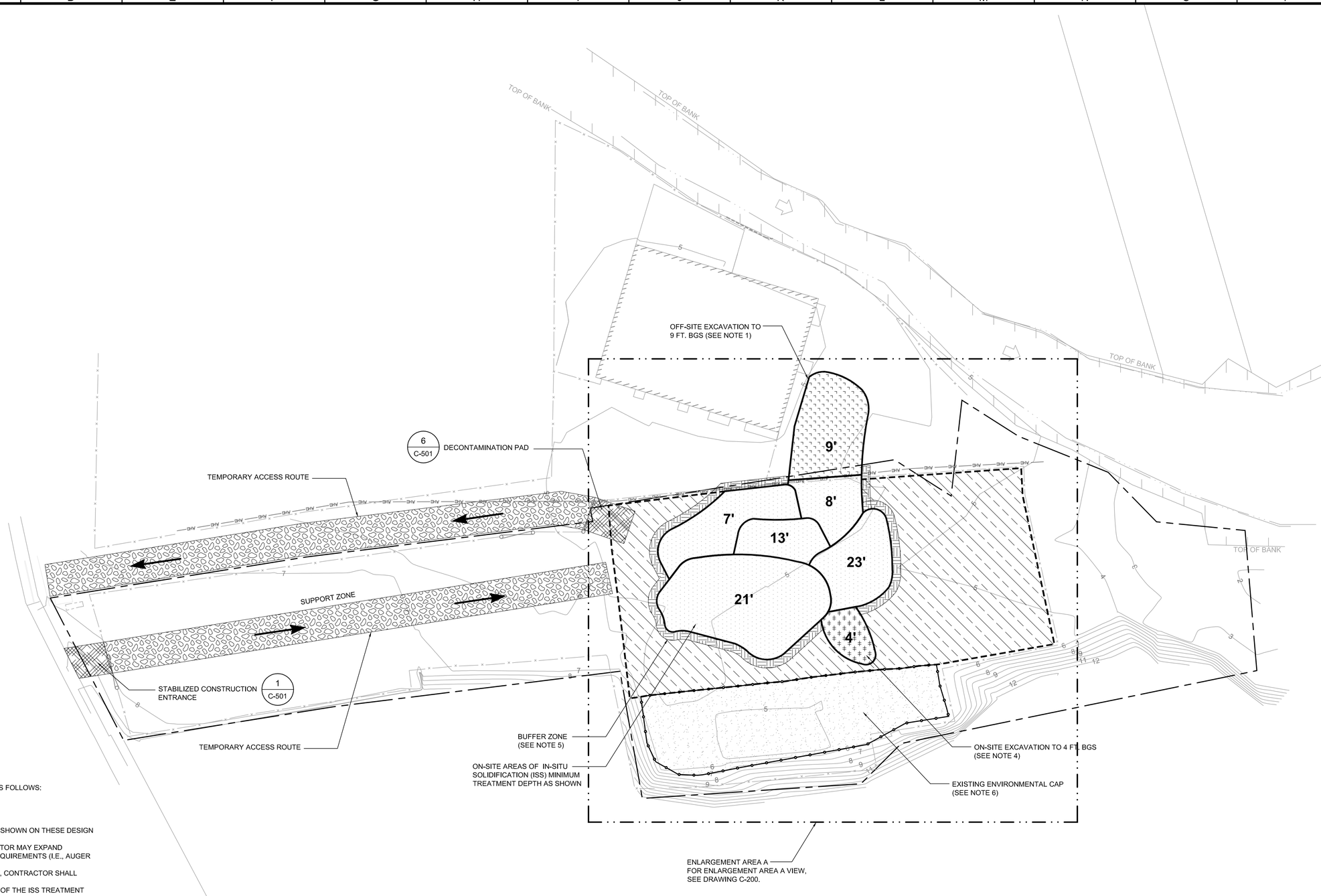
REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)

WATER TABLE CONTOUR MAP

FILENAME 142128-C-107.dwg
BC PROJECT NUMBER 142128
CLIENT PROJECT NUMBER -
DRAWING NUMBER C-107
SHEET NUMBER OF

Nov 30, 2012 - 1:02pm AMelbath
P:\National_Grid\Patchogue\142128_Patchogue_UCWP_RDWP_Implement\50%-75%_Remedial_Design_Report\CADD\2-SHEETS\C-CIVIL\142128-C-107.dwg

0 30 60
SCALE IN FEET



LEGENDS:

- PROPERTY LINE
- FENCE
- 10 TOPOGRAPHIC CONTOUR
- SURFACE WATER BOUNDARY
- 2 FT. EXCAVATION AND ENVIRONMENTAL CAP INSTALLATION AREA
- OFF-SITE EXCAVATION AREA
- ON-SITE EXCAVATION AREA
- ISS TREATMENT AREAS
- BUFFER ZONE
- EXISTING GRAVEL COVER
- 2 FT. EXCAVATION AND ENVIRONMENTAL CAP INSTALLATION (PREVIOUSLY COMPLETED)
- **21'** DEPTH FROM GRADE OF SOIL TREATMENT ZONE

NOTES:

1. CONTRACTOR SHALL CONDUCT REMEDIAL ACTIVITIES IN SEQUENCE AS FOLLOWS:
   A. OFF-SITE EXCAVATION AND RESTORATION
   B. ISS IN DESIGNATED AREAS
   C. ON-SITE EXCAVATION AND BACKFILL
   D. ON-SITE 2-FT EXCAVATION AND CAP INSTALLATION
2. CONSTRUCTION ACTIVITIES SHALL BE LIMITED TO THE LIMIT OF WORK SHOWN ON THESE DESIGN DRAWINGS UNLESS OTHERWISE APPROVED BY NATIONAL GRID.
3. ISS DELINEATION DENOTES MINIMUM AREA TO BE TREATED. CONTRACTOR MAY EXPAND TREATMENT AREA TO ACCOMMODATE ISS TREATMENT TECHNIQUE REQUIREMENTS (I.E., AUGER GRID LAYOUT).
4. SINCE REQUIRED SOIL TREATMENT DEPTH FOR THIS AREA IS 4 FT BGS, CONTRACTOR SHALL EXCAVATE THIS AREA.
5. CONTRACTOR SHALL TREAT A 5 FT BUFFER ZONE BEYOND THE LIMITS OF THE ISS TREATMENT AREA.
6. EXISTING ENVIRONMENTAL CAP PREVIOUSLY INSTALLED SHALL REMAIN. CONTRACTOR SHALL NOT DISTURB THIS CAP.
7. REFER TO DRAWING C-200 FOR OFF-SITE EXCAVATION LAYOUT.

DRAFT

Brown AND Caldwell
BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH (PROJECT MANAGER) DATE:
APPROVED: JEFF CAPUTI (BROWN AND CALDWELL) DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: PP
DRAWN: RJ
CHECKED: KB
CHECKED:
APPROVED: JC

EXTERNAL REFERENCE FILES
Titleblock-22x34.dwg
Basemap.dwg
Topo.dwg
Sample-Location.dwg

JEFFREY R. CAPUTI
PROFESSIONAL ENGINEER
N.Y. LICENSE NO.082196-1
DATE

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

NATIONAL GRID

PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)

REMEDIAL ACTION PLAN

FILENAME: 142128-C-108.dwg
BC PROJECT NUMBER: 142128
CLIENT PROJECT NUMBER: -
DRAWING NUMBER: C-108
SHEET NUMBER: OF

Nov 30, 2012 - 1:03pm AMedvin
P:\National_Grid\Patchogue\142128_Patchogue_UCVP_RDWP_Implement\50%-75%_Remedial_Design_Report\CADD\2-SHEETS\C-CIVIL\142128-C-108.dwg

0 30 60
SCALE IN FEET

TOP OF BANK
TOP OF BANK
FLOW
PATCHOGUE RIVER
FLOW
TOP OF BANK
SOUTH STREET
EXISTING MASONRY BUILDING
TRANSFORMER
PZ-4A
MW-9D
MW-9S
MW-3
MW-8D
MW-8S
INLET GRATE (EL.=4.24)
MW-4D
MW-4S
INLET GRATE (EL.=4.41)
PZ-3B
PZ-3A
TOP OF BANK
SOUTHERN AREA
GRAVEL ACCESS ROAD
MANHOLE (EL.=7.60)
WEST MAIN STREET
SIGN
CONC. SLAB
CURB
CONC. SLAB
(MONTAUK HWY. S.R.-27A)
MAIN STREET
MW-1
PZ-2B
PZ-2A
MW-5
MW-6
PZ-1B
PZ-1A
MW-7S
MW-7D

LEGEND:

- PROPERTY LINE
- FENCE
- 10 TOPOGRAPHIC CONTOUR
- SURFACE WATER BOUNDARY
- MONITORING WELL TO REMAIN
- PIEZOMETER TO REMAIN
- MONITORING WELL TO BE DECOMMISSIONED
- PIEZOMETER TO BE DECOMMISSIONED

NOTES:
1. BASE MAP INFORMATION OBTAINED FROM TETRA TECH EC, INC. DRAWING ENTITLED "CONCEPTUAL SITE MODEL", DATED DECEMBER 17, 2008
2. MONITORING WELLS/ PIEZOMETERS SHALL BE DECOMMISSIONED IN ACCORDANCE WITH SPECIFICATION SECTION 02 61 00.

DRAFT

Brown AND Caldwell
BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH PROJECT MANAGER DATE:
APPROVED: JEFF CAPUTI BROWN AND CALDWELL DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: PP
DRAWN: RJ
CHECKED: KB
CHECKED:
APPROVED: JC

EXTERNAL REFERENCE FILES
Titleblock-22x34.dwg
Basemap.dwg
Topo.dwg
Sample-Location.dwg

JEFFREY R. CAPUTI
PROFESSIONAL ENGINEER
N.Y. LICENSE NO.082196-1
DATE

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

NATIONAL GRID

PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

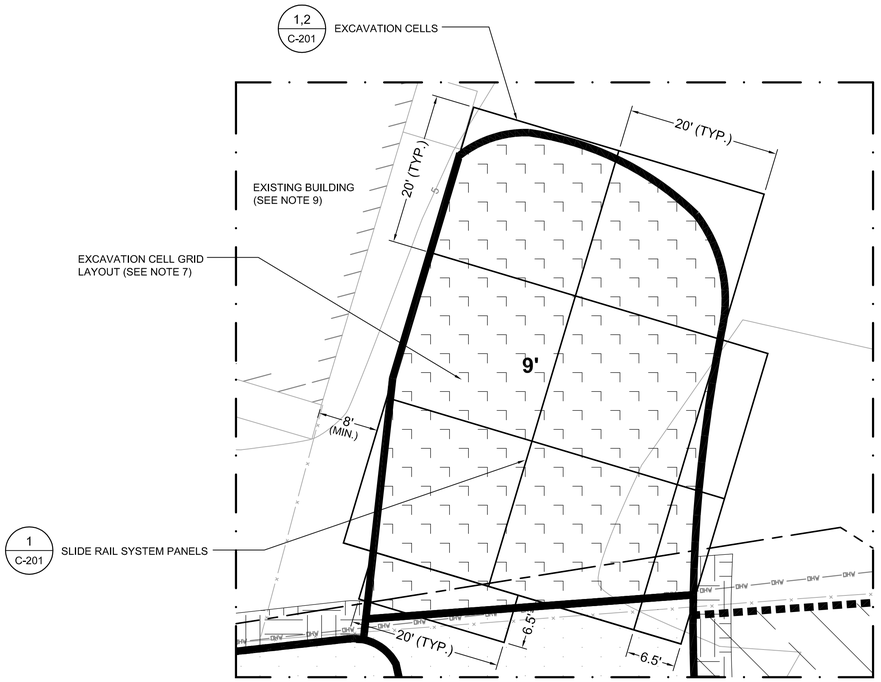
REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)

WELL DECOMMISSIONING PLAN

FILENAME 142128-C-109.dwg
BC PROJECT NUMBER 142128
CLIENT PROJECT NUMBER -
DRAWING NUMBER C-109
SHEET NUMBER OF

AMerboth
Nov 30, 2012 - 1:03pm
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0 60 120
SCALE IN FEET



ENLARGEMENT AREA VIEW B
SCALE: 1" = 10'



ENLARGEMENT AREA VIEW A
(SEE DRAWING C-108 FOR ENLARGEMENT AREA A LOCATION)
SCALE: 1" = 20'

LEGENDS:

- PROPERTY LINE
- FENCE
- 10 TOPOGRAPHIC CONTOUR
- SURFACE WATER BOUNDARY
- 2 FT. EXCAVATION AND ENVIRONMENTAL CAP INSTALLATION AREA
- OFF-SITE EXCAVATION AREA
- ON-SITE EXCAVATION AREAS
- ISS TREATMENT AREAS
- BUFFER ZONE
- 2 FT. EXCAVATION AND ENVIRONMENTAL CAP INSTALLATION (PREVIOUSLY COMPLETED)
- 21' DEPTH FROM GRADE OF SOIL TREATMENT ZONE

NOTES:

1. CONTRACTOR SHALL CONDUCT REMEDIAL ACTIVITIES IN SEQUENCE AS FOLLOWS:
   A. OFF-SITE EXCAVATION AND RESTORATION
   B. ISS IN DESIGNATED AREAS
   C. ON-SITE EXCAVATION AND BACKFILL
   D. ON-SITE 2-FT EXCAVATION AND CAP INSTALLATION
2. CONSTRUCTION ACTIVITIES SHALL BE LIMITED TO THE LIMIT OF WORK SHOWN ON THESE DESIGN DRAWINGS UNLESS OTHERWISE APPROVED BY NATIONAL GRID.
3. ISS DELINEATION DENOTES MINIMUM AREA TO BE TREATED. CONTRACTOR MAY EXPAND TREATMENT AREA TO ACCOMMODATE ISS TREATMENT TECHNIQUE REQUIREMENTS (I.E., AUGER GRID LAYOUT).
4. CONTRACTOR SHALL EXCAVATE THIS AREA TO A DEPTH OF 4 FT. BGS.
5. CONTRACTOR SHALL TREAT A 5 FT BUFFER ZONE BEYOND THE LIMITS OF THE ISS TREATMENT AREA.
6. EXISTING ENVIRONMENTAL CAP PREVIOUSLY INSTALLED SHALL REMAIN AND CONTRACTOR SHALL NOT DISTURB THIS CAP.
7. DRAWING SHOWS TYPICAL EXCAVATION CELL GRID LAYOUT. CONTRACTOR MAY PROPOSE ALTERNATE LAYOUT.
8. REFER TO DRAWING C-201 FOR DEWATERING AND EXCAVATION SUPPORT SYSTEM DETAILS.
9. CONTRACTOR SHALL NOT CAUSE DAMAGE TO EXISTING BUILDING. PANELS SHALL BE INSTALLED A MINIMUM OF 8 FT. FROM SIDE OF BUILDING.

DRAFT

Brown AND Caldwell
BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH (PROJECT MANAGER) DATE:
APPROVED: JEFF CAPUTI (BROWN AND CALDWELL) DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: PP
DRAWN: RJ
CHECKED: KB
CHECKED:
APPROVED: JC

EXTERNAL REFERENCE FILES
Titleblock-22x34.dwg
Basemap.dwg
Topo.dwg
Sample-Location.dwg

JEFFREY R. CAPUTI
PROFESSIONAL ENGINEER
N.Y. LICENSE NO.082196-1
DATE

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

NATIONAL GRID

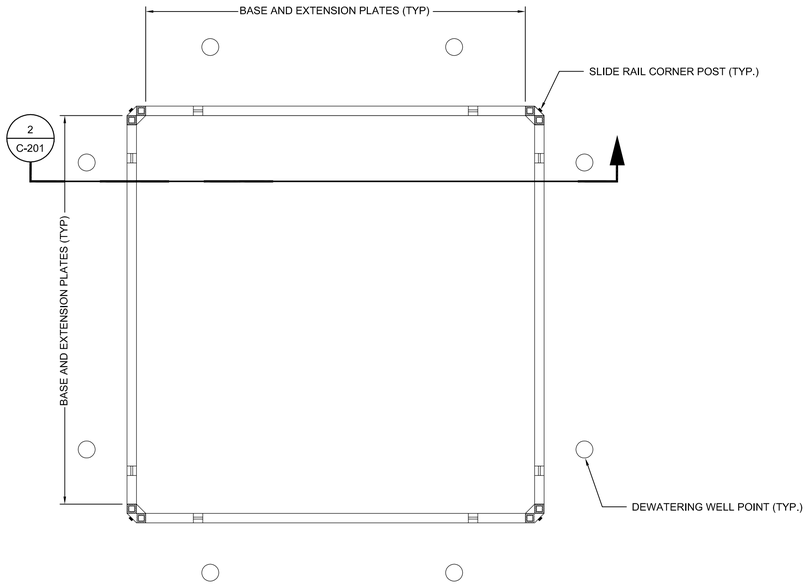
PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)

REMEDIAL ACTION PLAN ENLARGEMENT

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CLIENT PROJECT NUMBER	-
DRAWING NUMBER	C-200
SHEET NUMBER	OF

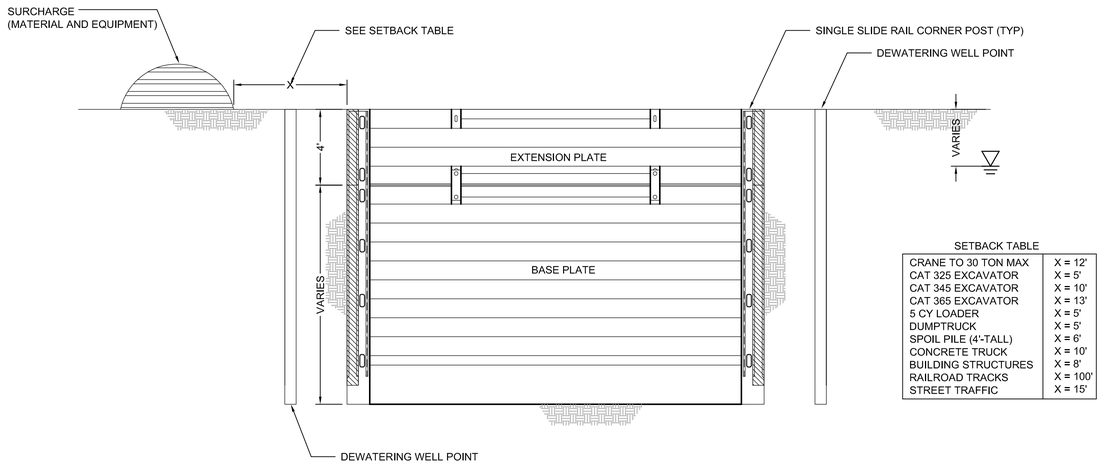
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PLAN VIEW

DETAIL 1 / C-201

SCALE: N.T.S.



SETBACK TABLE

CRANE TO 30 TON MAX	X = 12'
CAT 325 EXCAVATOR	X = 5'
CAT 345 EXCAVATOR	X = 10'
CAT 365 EXCAVATOR	X = 13'
5 CY LOADER	X = 5'
DUMPTRUCK	X = 5'
SPOIL PILE (4'-TALL)	X = 6'
CONCRETE TRUCK	X = 10'
BUILDING STRUCTURES	X = 8'
RAILROAD TRACKS	X = 100'
STREET TRAFFIC	X = 15'

CROSS - SECTION

DETAIL 2 / C-201

SCALE: N.T.S.

NOTES:

1. EXCAVATION SUPPORT SHALL CONSIST OF ICON SLIDE RAIL SYSTEM OR APPROVED EQUAL.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR DEWATERING EXCAVATION CELLS TO LOWER THE GROUNDWATER TO A DEPTH OF 5 FEET BELOW GROUND SURFACE PRIOR TO EXCAVATION TO ALLOW FOR INSTALLATION OF SLIDE RAIN SYSTEM.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PUMPS AND/OR WELL POINTS TO SUFFICIENTLY LOWER GROUNDWATER WITHIN THE EXCAVATION CELL TO SPECIFIED LEVELS.
4. DEWATERING SYSTEM SHALL BE INSTALLED BY AN APPROVED SUBCONTRACTOR WITH A MINIMUM OF 5 YEARS EXPERIENCE WITH SIMILAR PROJECTS ON LONG ISLAND.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE WATER LEVEL WITHIN THE EXCAVATION CELL HIGHER THAN THE GROUNDWATER LEVEL OUTSIDE THE CELL TO PREVENT HEAVING AT THE BOTTOM OF THE EXCAVATION CELL.
6. CONTRACTOR TO PROVIDE DEWATERING SYSTEM TO LOWER WATER TABLE TO A DEPTH OF 5 FEET BGS. SYSTEM TO INCLUDE ALL EQUIPMENT NECESSARY (WELL POINTS, PIPING, PUMPS, ETC). WATER TO BE TREATED IN TEMPORARY DEWATERING SYSTEM AND DISCHARGED TO THE PATCHOGUE RIVER.
7. CONTRACTOR TO PROVIDE TEMPORARY SYSTEM TO TREAT IMPACTED GROUNDWATER PRIOR TO DISCHARGE TO THE PATCHOGUE RIVER UNDER THE AUTHORIZED NYSDES SPDES PERMIT. REFER TO SHEET C-400.

DRAFT

Brown AND Caldwell

BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH (PROJECT MANAGER) DATE:

APPROVED: JEFF CAPUTI (BROWN AND CALDWELL) DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: PP
DRAWN: RJ
CHECKED: KB
CHECKED:
APPROVED: JC

EXTERNAL REFERENCE FILES
Titleblock-22x34.dwg

JEFFREY R. CAPUTI
PROFESSIONAL ENGINEER
N.Y. LICENSE NO.082196-1
DATE

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

NATIONAL GRID

PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

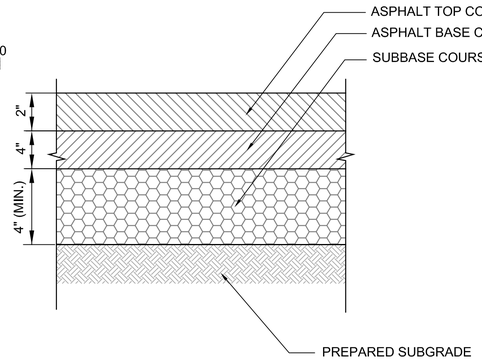
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EXCAVATION SUPPORT AND DEWATERING DETAILS

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SHEET NUMBER: OF

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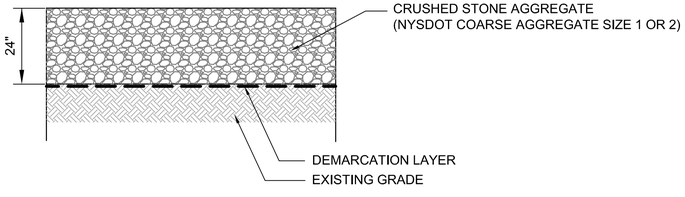
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SCALE IN FEET



ASPHALT PAVEMENT COVER DETAIL

DETAIL 1 / C-300

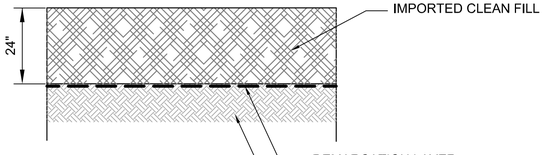
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CRUSHED STONE DETAIL

DETAIL 2 / C-300

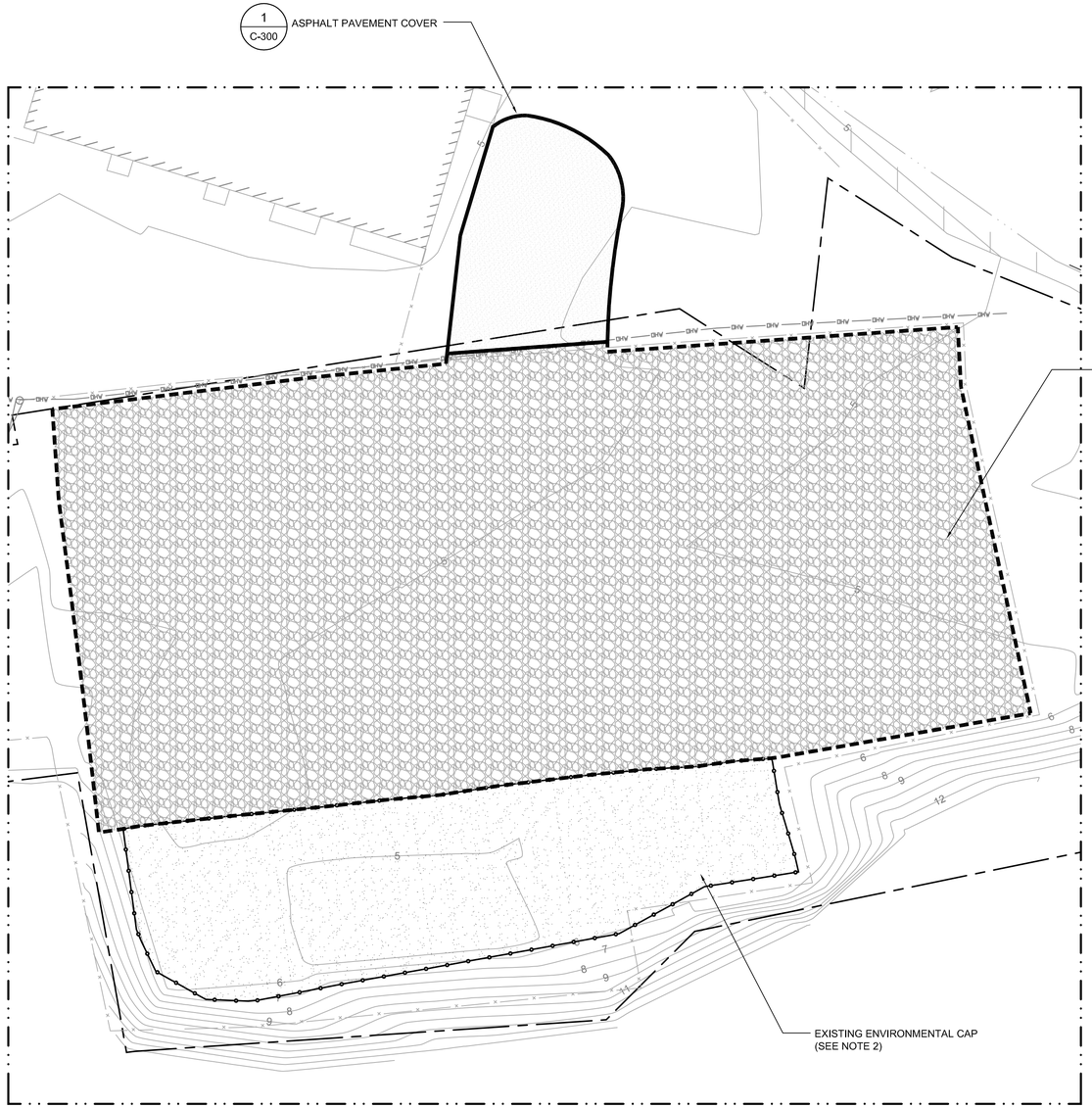
NOT TO SCALE



SOIL COVER DETAIL

DETAIL 3 / C-300

NOT TO SCALE



LEGEND:

- PROPERTY LINE
- FENCE
- 10 TOPOGRAPHIC CONTOUR
- SURFACE WATER BOUNDARY
- 2 FT. EXCAVATION AND ENVIRONMENTAL CAP INSTALLATION (PREVIOUSLY COMPLETED)
- GRAVEL COVER
- CRUSHED STONE OR SOIL COVER
- ASPHALT PAVEMENT COVER

NOTES:

1. CONTRACTOR SHALL CONDUCT REMEDIAL ACTIVITIES IN SEQUENCE AS FOLLOWS:
   A. OFF-SITE EXCAVATION AND RESTORATION
   B. ISS IN DESIGNATED AREAS
   C. ON-SITE EXCAVATION AND BACKFILL
   D. ON-SITE 2-FT EXCAVATION AND CAP INSTALLATION
2. EXISTING ENVIRONMENTAL CAP PREVIOUSLY INSTALLED SHALL REMAIN. CONTRACTOR SHALL NOT DISTURB THIS CAP.
3. CONTRACTOR SHALL INSTALL SITE COVER IN ACCORDANCE WITH SPECIFICATION SECTION 31 50 00.

DRAFT

Brown AND Caldwell

BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH, PROJECT MANAGER DATE:

APPROVED: JEFF CAPUTI, BROWN AND CALDWELL DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: PP
DRAWN: RJ
CHECKED: KB
CHECKED:
APPROVED: JC

EXTERNAL REFERENCE FILES
Titleblock-22x34.dwg
Basemap.dwg
Topo.dwg
Sample-Location.dwg

JEFFREY R. CAPUTI
PROFESSIONAL ENGINEER
N.Y. LICENSE NO.082196-1
DATE

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

NATIONAL GRID

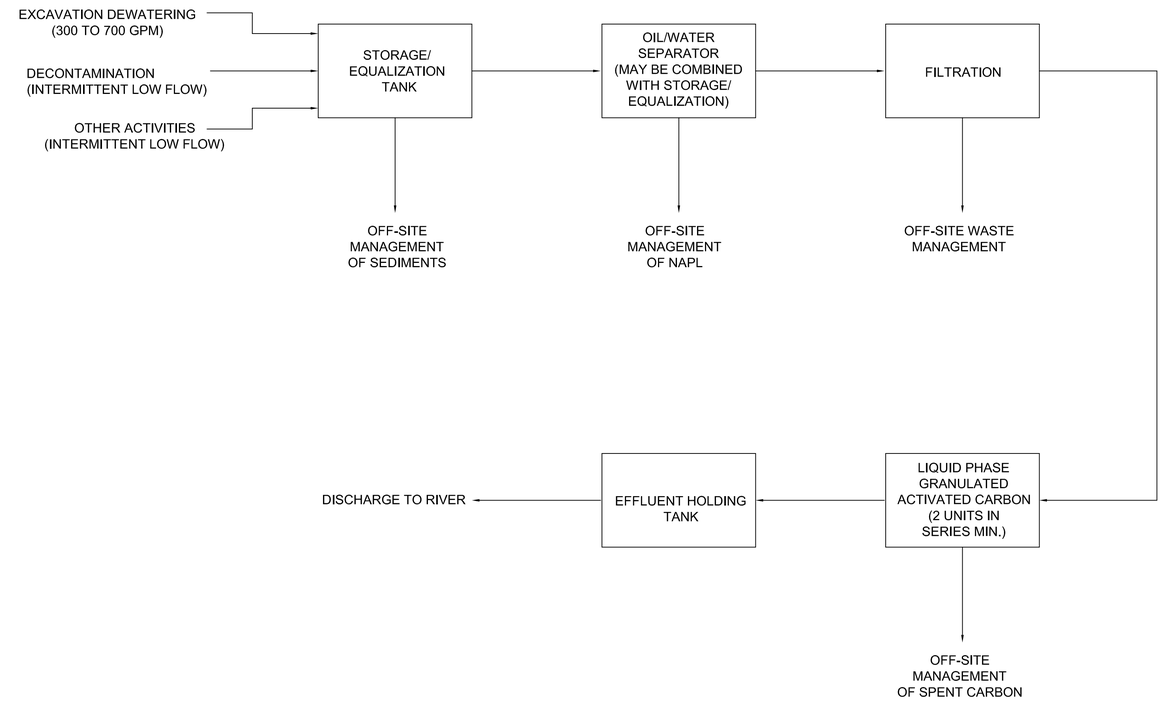
PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)

SITE RESTORATION PLAN AND DETAILS

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CLIENT PROJECT NUMBER: -
DRAWING NUMBER: C-300
SHEET NUMBER: OF

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DRAFT

Brown AND Caldwell

BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH (PROJECT MANAGER) DATE:
APPROVED: JEFF CAPUTI (BROWN AND CALDWELL) DATE:

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EXTERNAL REFERENCE FILES
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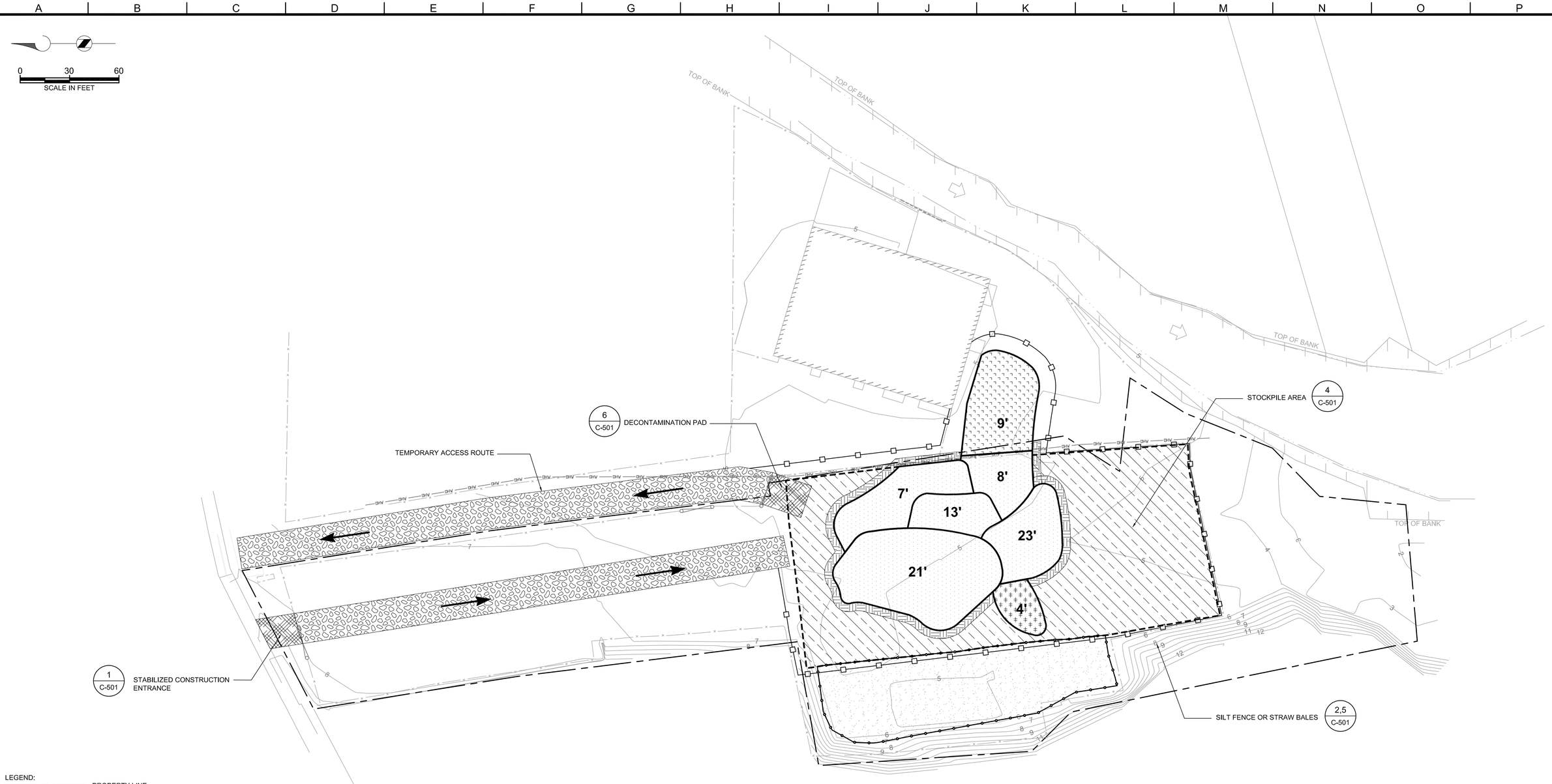
PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)

ON-SITE TREATMENT SYSTEM PROCESS FLOW PLAN

FILENAME
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BC PROJECT NUMBER
142128
CLIENT PROJECT NUMBER
-
DRAWING NUMBER
C-400
SHEET NUMBER
OF

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LEGEND:

- PROPERTY LINE
- FENCE
- TOPOGRAPHIC CONTOUR
- SURFACE WATER BOUNDARY
- SILT FENCE OR STRAW BALES

NOTES:

1. CONTRACTOR SHALL INSTALL SOIL EROSION AND SEDIMENT CONTROL MEASURES PRIOR TO THE START OF INTRUSIVE ACTIVITIES IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS AND THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROLS.

DRAFT

Brown AND Caldwell

BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH, PROJECT MANAGER DATE:

APPROVED: JEFF CAPUTI, BROWN AND CALDWELL DATE:

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DESIGNED: PP
DRAWN: RJ
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CHECKED:
APPROVED: JC

EXTERNAL REFERENCE FILES
Titleblock-22x34.dwg
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JEFFREY R. CAPUTI
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N.Y. LICENSE NO.082196-1
DATE

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

NATIONAL GRID

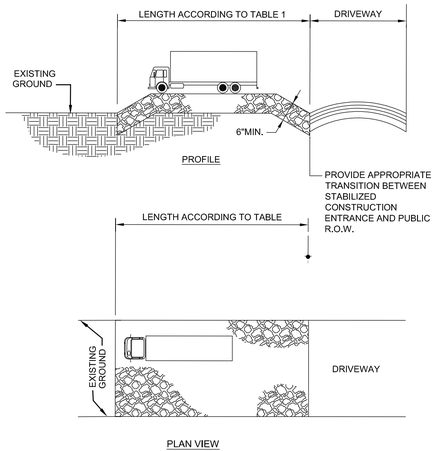
PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)

SOIL EROSION AND SEDIMENT CONTROL PLAN

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DRAWING NUMBER: C-500
SHEET NUMBER: OF

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* NOTE:
INDIVIDUAL LOT ACCESS POINTS MAY REQUIRE STABILIZATION. THICKNESS SHOWN IS FOR STONE CONSTRUCTION ENTRANCES ONLY (TYP.).

DESIGN CRITERIA:

1. STONE SIZE - NYSDOT SIZE DESIGNATION #3 USE CLEAN CRUSHED ANGULAR STONE. CRUSHED CONCRETE OF SIMILAR SIZE MAY BE SUBSTITUTED BUT WILL REQUIRE MORE FREQUENT UPGRADING AND MAINTENANCE.
2. THICKNESS-NOT LESS THAN SIX (6) INCHES.
3. GEOTEXTILE - NYSDOT STRENGTH CLASS I
4. WIDTH-NOT LESS THAN FULL WIDTH OF POINTS OF INGRESS OR EGRESS.
5. LENGTH-50 FEET MINIMUM WHERE THE SOILS ARE COURSE GRAINED (SANDS OR GRAVEL) OR 100 FEET MINIMUM WHERE SOILS ARE FINE GRAINED (CLAYS OR SILTS), EXCEPT WHERE TRAVELED LENGTH IS LESS THAN 50 OR 100 FEET RESPECTIVELY, THESE LENGTHS MAY BE INCREASED WHERE FIELD CONDITIONS DICTATE. STORMWATER FROM UP-SLOPE AREAS SHALL BE DIVERTED AWAY FROM WHERE DIVERSION IS NOT POSSIBLE. THE LENGTH OF THE STABILIZED PAD BE AS SHOWN IN TABLE BELOW. WHERE THE SLOPE OF THE ACCESS ROAD EXCEEDS 5%, OR FOR USE AT POORLY DRAINED LOCATIONS, SUBSURFACE DRAINAGE GRAVEL FILTER OR GEOTEXTILE SHALL BE INSTALLED BEFORE INSTALLING THE STABILIZED CONSTRUCTION ENTRANCE.

TABLE 1
LENGTHS OF CONSTRUCTION EXITS ON SLOPING ROADBEDS

	LENGTH OF STONE AREA REQUIRED	
PERCENT SLOPE OF ROADWAY	COARSE GRAINED SOILS	FINE GRAINED SOILS
0 TO 2%	50 ft.	100 ft.
2 TO 5%	100 ft.	200 ft.
> 5%	ENTIRE SURFACE STABILIZED WITH FABC BASE COURSE	

MAINTENANCE:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO ROADWAYS. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDITIONAL LENGTH AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO ROADWAYS (PUBLIC OR PRIVATE) OR OTHER IMPERVIOUS SURFACES MUST BE REMOVED IMMEDIATELY.
2. USE WHERE ACCUMULATION OF DUST/SEDIMENT IS INADEQUATELY CLEANED OR REMOVED BY CONVENTIONAL METHODS, A POWER BROOM OR STREET SWEEPER WILL BE REQUIRED TO CLEAN PAVED OR IMPERVIOUS SURFACES. ALL OTHER ACCESS POINTS WHICH ARE NOT STABILIZED SHALL BE BLOCKED OFF.

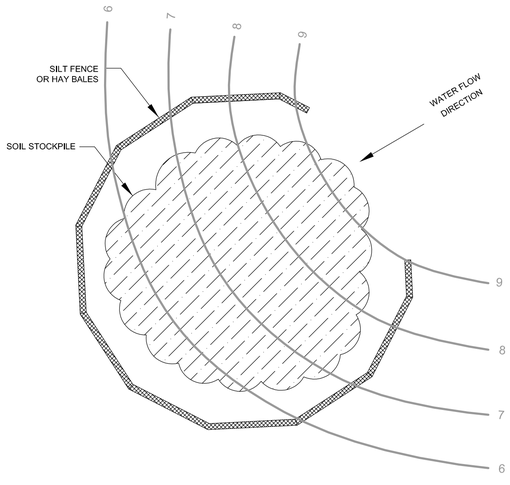
STABILIZED CONSTRUCTION ACCESS

DETAIL 1 / C-501

N.T.S.

SOIL EROSION AND SEDIMENT CONTROL NOTES :

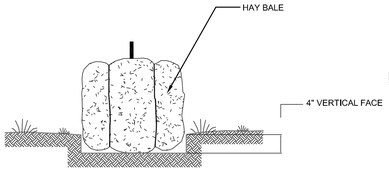
1. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES ARE TO BE INSTALLED PRIOR TO ANY MAJOR SOIL DISTURBANCE OR IN THEIR PROPER SEQUENCE AND MAINTAINED UNTIL PERMANENT PROTECTION IS ESTABLISHED.
2. ANY DISTURBED AREAS (INCLUDING SOIL STOCKPILES) THAT WILL BE LEFT EXPOSED FOR MORE THAN THIRTY (30) DAYS AND NOT SUBJECT TO CONSTRUCTION TRAFFIC, WILL IMMEDIATELY RECEIVE TEMPORARY SEEDING. IF THE SEASON PREVENTS THE ESTABLISHMENT OF A TEMPORARY COVER, THE DISTURBED AREAS WILL BE MULCHED WITH STRAW, OR EQUIVALENT MATERIAL, AT A RATE OF TWO (2) TONS PER ACRE OR IN ACCORDANCE STATE AND LOCAL STANDARDS. THE SEED MIXTURE SHALL BE MEET THE NYSSESC SEED MIX #6 FOR "STANDARDS AND SPECIFICATIONS FOR PERMANENT CRITICAL AREA PLANTING."
3. ALL WORK TO BE DONE IN ACCORDANCE WITH NEW YORK STATE STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROLS.
4. ANY CHANGES TO THE SOIL EROSION AND SEDIMENT CONTROL PLANS SHALL REQUIRE APPROPRIATE APPROVALS BY NATIONAL GRID, THE REVISED PLANS MUST MEET THE CURRENT NEW YORK STATE STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROLS.
5. ALL SOIL WASHED, DROPPED, SPILLED, OR TRACKED OUTSIDE THE LIMIT OF DISTURBANCE OR ONTO PUBLIC RIGHT-OF-WAYS SHALL BE REMOVED IMMEDIATELY.



EROSION CONTROL AT STOCKPILE AREA

DETAIL 4 / C-501

N.T.S.

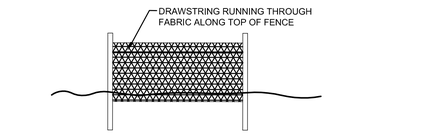


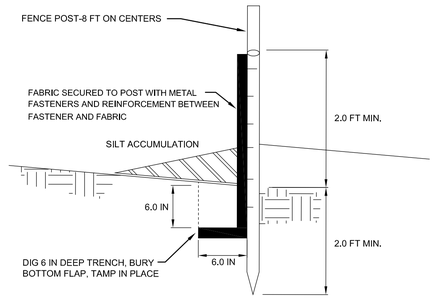
FRONT VIEW

HAY BALE DETAILS

DETAIL 5 / C-501

N.T.S.





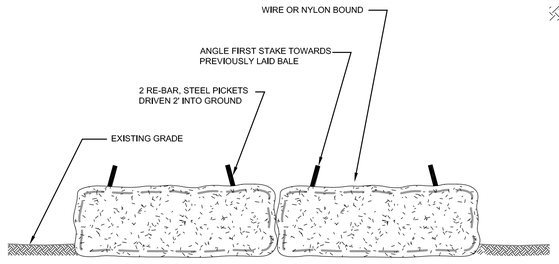
SILT FENCE CONSTRUCTION AND INSTALLATION DETAIL

DETAIL 2 / C-501

N.T.S.

CONSTRUCTION SPECIFICATIONS

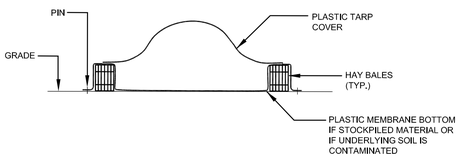
1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICTED UNITS SHALLL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.



SIDE VIEW

CONSTRUCTION SPECIFICATIONS

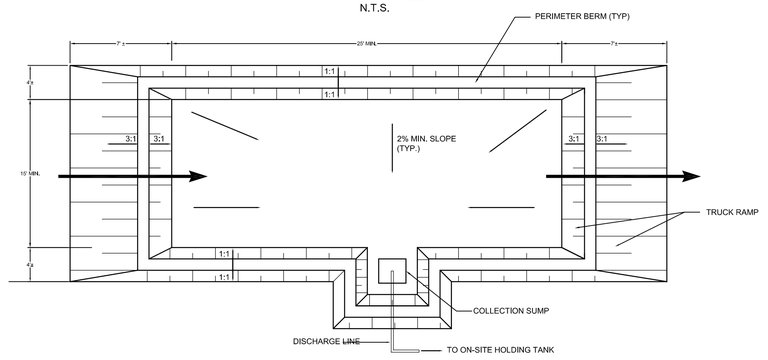
1. BALES SHALL BE PLACED AT THE TOE OF A SLOPE OR ON THE CONTOUR AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF (4) INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR RE-BARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARDS THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER, STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLACK OR IMPEDE STORM FLOW OR DRAINAGE.



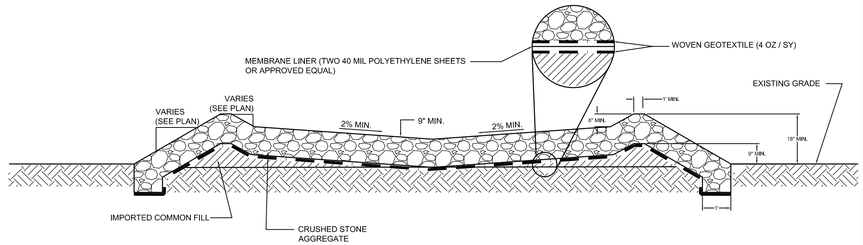
TYPICAL SOIL STOCKPILE AREA CROSS-SECTION

DETAIL 3 / C-501

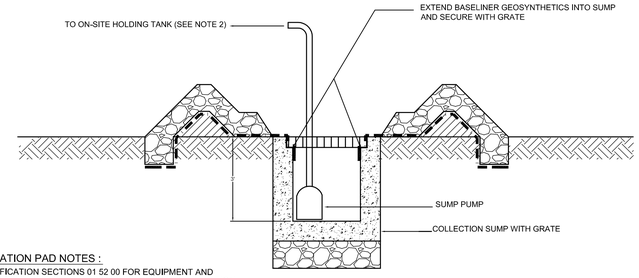
N.T.S.



PLAN



PROFILE



SUMP PROFILE

DECONTAMINATION PAD NOTES :

1. REFER TO SPECIFICATION SECTIONS 01 52 00 FOR EQUIPMENT AND MATERIAL DECONTAMINATION, INCLUDING MATERIAL AND INSTALLATION REQUIREMENTS FOR THE DECONTAMINATION PAD.
2. WATER COLLECTED FROM THE COLLECTION SUMP SHALL BE MANAGED IN ACCORDANCE WITH SPECIFICATION SECTION 31 70 00.

DECONTAMINATION PAD

DETAIL 6 / C-501

N.T.S.

DRAFT

BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

SUBMITTED: KEITH BOGATCH, PROJECT MANAGER DATE:
APPROVED: JEFF CAPUTI, BROWN AND CALDWELL DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: PP
DRAWN: RJ
CHECKED: KB
CHECKED:
APPROVED: JC

EXTERNAL REFERENCE FILES
Titleblock-22x34.dwg

JEFFREY R. CAPUTI
PROFESSIONAL ENGINEER
N.Y. LICENSE NO.082196-1
DATE

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

NATIONAL GRID

PATCHOGUE FORMER MGP SITE
234 WEST MAIN STREET
VILLAGE OF PATCHOGUE, NEW YORK

REMEDIAL DESIGN DRAWINGS (50-75% SUBMISSION)

SOIL EROSION DETAILS AND NOTES

FILENAME 142128-C-501.dwg
BC PROJECT NUMBER 142128
CLIENT PROJECT NUMBER -
DRAWING NUMBER C-501
SHEET NUMBER OF

Nov 30, 2012 - 1:11pm AMerboth
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Appendix B: Groundwater Flow Modeling Report

DRAFT

Groundwater Model Report
Patchogue (West Main Street) Former Manufactured Gas Plant (MGP) Site

Prepared for
National Grid
175 East Old Country Road
Hicksville, New York 11801

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This is a draft and is not intended to be a final representation of the work done or recommendations made by Brown and Caldwell. It should not be relied upon; consult the final report.

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Table of Contents

List of Figures ii
List of Abbreviations iii
1. Introduction 1-1
2. Conceptual Hydrogeologic Model 2-1
   2.1 Regional Setting 2-1
   2.2 Groundwater Occurrence and Flow 2-1
3. Groundwater Flow Model 3-1
   3.1 Model Construction 3-1
      3.1.1 Model Domain 3-2
      3.1.2 Boundary Conditions 3-2
      3.1.3 Hydrogeologic Properties 3-3
   3.2 Model Calibration 3-4
   3.3 Model Sensitivity 3-4
   3.4 Assessment of Remedy Components 3-5
      3.4.1 Simulation of ISS Implementation 3-5
      3.4.2 Transient Dewatering Simulations 3-6
4. Conclusions 4-1
5. Limitations 5-1
References REF-1

List of Figures

Figure 3-1. Model Domain
Figure 3-2. Model Grid
Figure 3-3. Model Domain in Cross-Section
Figure 3-4. Model Recharge Values
Figure 3-5. Modeled Boundary Conditions
Figure 3-6. Calibration Plot and Statistics
Figure 3-7. Calibrated Groundwater Head Equipotential Contours, Layer 2
Figure 3-8. Calibrated Groundwater Head Equipotential Contours, Cross-Section
Figure 3-9. ISS Groundwater Head Equipotential Contours, Layer 2
Figure 3-10. Simulated Dewatering for Installation of Slide Rail System, 5 Ft Drawdown
Figure 3-11. Simulated Dewatering for Installation of Slide Rail System, 2.5 Ft Drawdown

List of Abbreviations

MGP	Manufactured Gas Plant
ISS	In-Situ Solidification
ft	feet
msl	mean sea level
bgs	below ground surface
MODFLOW	Modular Three-dimensional Finite Difference Groundwater Flow Model
DEM	Digital Elevation Model
MRLC	Multi-Resolution Land Characterization Consortium
NJDEP	New Jersey Department of Environmental Protection
NJGS	New Jersey Geologic Survey
In/yr	inch per year
cm/sec	centimeter per second
GPM	gallons per minute
USGS	United States Geological Survey

Section 1

Introduction

A groundwater flow modeling study was conducted as part of the remedial design efforts for the Patchogue Former Manufactured Gas Plant (MGP) Site. The former MGP Site is located in the Village of Patchogue, Suffolk County, New York, on West Main Street (also known as Montauk Highway and County Road 85) south of Great Patchogue Lake and north of Patchogue Bay. The purpose of the groundwater modeling study was to:

- Simulate the groundwater flow beneath the Site
- Assess the degree to which implementation of in situ solidification (ISS) of the subsurface material, and the corresponding decrease in hydraulic conductivity of this material, effects groundwater flow and groundwater elevations; and
- Assess the rate and duration of dewatering that may be required during for excavations for soil removal in the off-site area directly east of the Site.

This report documents the groundwater modeling study. Section 1 is the introduction to the report. Section 2 provides a description of the conceptual hydrogeologic model for the Site, which was the basis of the model construction. Section 3 describes the details of the construction and calibration of the model, and the sensitivity analysis that was conducted on the calibrated model. Also included in Section 3 is a description of the simulations that were conducted to assess the components of the remedy. Section 4 provides the conclusions from the study. Section 5 the limitations of the model.

Section 2

Conceptual Hydrogeologic Model

2.1 Regional Setting

The Site is located in southern central Long Island along the west shore of the Patchogue River, which flows from Great Patchogue Lake north of the Site to the Patchogue Bay section of the Great South Bay of Long Island. The outflow of Great Patchogue Lake flows through a system of culverts and engineered channels beneath Holbrook Road and West Main Street before entering its stream channel, approximately 300 ft east of the northeastern corner of the Site. The Patchogue River enters a tidal inlet of Patchogue Bay approximately one quarter mile south-southeast of the Site.

Site Stratigraphy

The Site is generally flat with an elevation less than five feet above mean sea level (msl). A layer of fill, consisting of sand, silt, gravel and debris, covers the Central/Core area of the Site. The fill varies in thickness but is typically approximately two to five feet thick. Beneath the fill is a layer of alluvial deposits which are likely floodplain sediments associated with the Patchogue River. These deposits consist of layers of sands, silts, clays and organic material, including peat deposits. Much of the sand in the alluvial deposits is likely derived from the underlying sand unit and locally the alluvial deposits can be similar in character to this underlying unit. The alluvial deposits are generally thin and are locally discontinuous. Underlying the alluvial deposits is a unit of sand with varying amounts of gravel. This unit is likely glacial outwash deposits deposited during the Pleistocene Epoch. The sand unit extends to a depth of at least 30 feet below ground surface (bgs), which was the depth of the deepest borings drilled during the site investigation activities. Based on regional information, a unit referred to as the Gardiners Clay underlies the outwash deposits. It is estimated that this unit is approximately 100 to 200 feet below grade on the vicinity of the Site (Weiss, 1954).

2.2 Groundwater Occurrence and Flow

The water table is shallow at the Site, occurring within the fill at depths typically ranging from between less than one foot to about five ft bgs. Groundwater flow is toward the south-southeast direction and discharges to the Patchogue River. The calculated vertical hydraulic gradients between the fill and outwash are very low, indicating that there is no apparent hydraulic separation between these two deposits. Thus, this supports the conclusion that the fill and outwash are considered as components of the same hydrostratigraphic unit, i.e., they are part of the same water-bearing zone.

Where it is saturated with groundwater, the glacial outwash unit described above is referred to regionally as the “Upper Glacial Aquifer”. On-site groundwater is not utilized as a drinking water source. The Village of Patchogue is serviced by a public, municipal water source. The Village of Patchogue’s Department of Public Works indicated that the installation of private water wells is prohibited.

Section 3

Groundwater Flow Model

This section of the report documents the development of the groundwater flow model and its use for the assessment of components of the selected remedy. Discussed below are the following topics:

- Model construction;
- Calibration of the model to current Site conditions;
- A sensitivity analysis to assess uncertainty in the model results; and
- Model simulations to assess components of the remedy, specifically implementation of ISS of subsurface materials, and possible dewatering requirements for soil excavation.

3.1 Model Construction

The Modular Three-dimensional Finite Difference Groundwater Flow Model (MODFLOW) was selected for the groundwater flow simulation. This modeling code was developed by the United States Geological Survey (McDonald and Harbaugh, 1988) in the early 1980's based on theoretical flow behavior defined by Darcy's Law. The MODFLOW code is well proven and is accepted by industry and by regulatory agencies for application to porous media flow systems, and remains today as the de facto standard code for groundwater modeling. The specific version of MODFLOW used was MODFLOW 2000, and the graphical user interface used to input the model components into the model was Groundwater Vistas 6 from Environmental Simulations, Inc.

Site data, including in situ hydraulic conductivity test (slug test) results, characteristics of subsurface deposits described in borings, and water elevation data collected from the monitoring wells, were used to construct and calibrate the model. These data and information are available in the following documents:

- Section 2 of this Remedial Design Report;
- "Remedial Design Work Plan, Patchogue Former Manufactured Gas Plant Site, NYSDEC Site No. 1-52-182, Village of Patchogue, Suffolk County, New York (Brown and Caldwell, February 2012);
- "Focused Feasibility Study, Patchogue Former Manufactured Gas Plant (MGP) Site, NYSDEC Site No. 1-52-182, Village of Patchogue, Suffolk County, New York" (Brown and Caldwell Associates, May 2011);
- "Final Remedial Investigation Report for the Patchogue Former MGP Site, Patchogue, Suffolk County, New York", (TetraTech EC, Inc., December 2009); and
- "Preliminary Site Assessment Report Order on Consent D1-0001-99-05, NYSDEC Site No. 1-52-182 Former Patchogue MGP Site, Village of Patchogue, Suffolk County, New York", (Vanasse, Hangen, Brustlin [VHB] March 2002).

Also incorporated into the development of the model were publicly available regional data, where available, such as the USGS Digital Elevation Model (DEM) data to provide regional surface topography and characteristics of the adjacent Patchogue River and nearby Great Patchogue Lake. Also utilized were the National Hydrography Dataset (maintained by USGS) and the National Land Cover Database (maintained by the Multi-Resolution Land Characterization [MRLC] consortium).

3.1.1 Model Domain

The model domain (Figure 3-1) consists of a grid of 129 columns and 218 rows that includes the active model area that is approximately 1.94 square miles in extent. The Site is located near the center of the grid. The columns and rows vary in dimensions with the smaller sizes (as small as 12.5 feet by 12.5 feet) coincident with the area of the Site to provide a higher model resolution within the area of interest (Figure 3-2). The eastern edge of the model is bounded by the presumed hydrogeologic divide associated with the topographic divide between the Patchogue River and its associated tidal inlet and Swan Lake and its associated tidal inlet to the east. The western edge of the model domain is bounded by West Lake, along with the outlet of West Lake to Patchogue Bay and the upgradient streams that flow to it. The southern edge of the model is formed by Patchogue Bay itself. The Northern model boundary is comprised of a combination of tributary ponds and streams that feed into Great Patchogue Lake as well as arbitrary connections to the adjacent boundaries to the east and west.

The surface elevations of the model outside of the Site were derived from the USGS Digital Elevation Model while Site survey data was utilized to determine the surface elevations on the Site itself. These values were interpolated using the kriging method to create a continuous surface that was imported to the top of the uppermost model layer using utilities in the modeling software. The model was constructed with six layers (Figure 3-3). These layers were incorporated into the model to represent significant depths for the selected remedial measures that were to be evaluated with the model. Two hydrostratigraphic layers were simulated within the model: Fill materials were represented with Layer 1 and the glacial outwash deposits were represented using the underlying 5 layers (Layers 2 through 6). The alluvial deposits that locally occur between the Fill and the outwash deposits, as described in Section 2.2, were not represented in a separate model layer because they are thin and discontinuous and often have properties similar to the overlying and underlying deposits. Further, as discussed in Section 2.3, there is no apparent hydraulic separation between overlying Fill and the underlying outwash deposits. So, although the Fill and outwash have somewhat different hydraulic conductivities, they are considered as components of the same water-bearing zone, and the intervening alluvial deposits, where present, do not provide hydraulic separation between the Fill and the outwash. The thicknesses of the model layers were set to constant values so that all simulated remedial measures would be represented at consistent depths below grade. The bottom of the model was assigned a depth of 150 ft below surface grade based on an estimate to the top of the Gardiners Clay unit which underlies the glacial outwash deposits (i.e., the “Upper Glacial Aquifer”) in the vicinity of the Site (see Section 2.2).

3.1.2 Boundary Conditions

Boundary conditions are simulations of natural and artificial features, such as lakes, streams, drains, extractions wells, surficial recharge, etc., that control water entering and leaving the model domain. The boundary conditions for this particular model are described below.

Inflow of Water. The flow of water into the model was simulated by applying a surface recharge boundary to the topmost layer of the model. Rather than apply a singular recharge value to the model, surface recharge was varied based on land use. Four different recharge values were used; the spatial configuration of the recharge zones was determined by overlaying the National Land Cover Database maps for the area over the model domain.

The table below presents recharge values that were assigned to the land use types occurring within the model domain. During construction of the model, initial estimates of recharge were based on professional judgment through the assessment of land use and land surface characteristics, consistent with the approach in “A Method for Evaluating Ground-Water-Recharge Areas in New Jersey” (NJDEP/NJGS, 1993). Adjustments were then made to these values (as presented below) during model calibration to improve the match with site-specific conditions measured at the Site.

Table 3-1. Modeled Recharge Values	
Land Use	Recharge (inches/year)
Surface Water Bodies	0.00
Commercial and Services	6.00
Residential	7.20
Forested Land	12.00

The distribution of recharge over the model domain is presented on Figure 3-4. The total annual incident precipitation in the area of the model is approximately 46 inches. It was assumed that all surface water bodies, including streams, rivers, lakes and wetlands are primarily locations of groundwater discharge and, as a result, no recharge was assigned to these areas. Commercial and service industry properties were assigned a recharge value of 6.0 in/yr, consistent with a high percentage of impervious surface areas such as asphalt pavement and building structures with storm-water management systems. Residential areas were assigned a recharge value of 7.2 in/yr, consistent with a generally higher proportion of relatively permeable land surface areas such as grassy areas compared to commercial properties. The model domain also includes a small area of forested land which was assigned a recharge rate of 12 in/yr consistent with a fully vegetated area.

Outflow of Water. Two types of boundary conditions were applied to the model to account for the outflow of water from the model: river boundaries and constant head boundaries. River boundaries were included to represent the Patchogue River adjacent to the Site as well as numerous small streams found within and along the edges of the model boundary. Constant head boundaries were used to represent larger still bodies of water such as Great Patchogue Lake and Patchogue Bay as well as several smaller ponds located along the edges of the model domain (Figure 3-5).

The constant head boundaries representing Great Patchogue Lake, Patchogue Bay and the smaller ponds within the model boundary were set to constant elevations estimated from topographic maps and the USGS digital elevation model. Great Patchogue Lake was set to a constant elevation of 9 ft above mean sea level. Patchogue Bay was set to mean sea level to represent an average bay elevation over the tidal cycle.

The river boundaries that were used to model the Patchogue River were assigned elevations by a combination of data from stream gauges and estimates from topographic data. Adjacent to the Site the river elevations were determined using the measured elevations at the stream gauges SG-1 and SG-2 in July 2012. Downstream from the Site a linear gradient was used to gradually reduce the stream stage to mean sea level as it enters the inlet of Patchogue Bay. Numerous other small streams were simulated along the western and northern edges of the model domain were simulated using river boundary cells with stage elevations estimated by using a linear gradient between the elevations of the constant head boundaries at either end of the stream, or from topographic elevation data when no constant head boundary was located upstream of the stream.

3.1.3 Hydrogeologic Properties

Horizontal hydraulic conductivity values used in the for the Fill and outwash were based on results from the slug testing of wells or piezometers screened discretely in either the Fill or in the outwash (see Table 2-3 in Section 2 of the Remedial Design report). A horizontal hydraulic conductivity of 0.00714 cm/sec was used to represent the Fill materials modeled in Layer 1; this value is the geometric mean of the estimates from the slug tests conducted on the piezometers screened in the Fill. A horizontal hydraulic conductivity of 0.0377 cm/sec was used to represent the outwash deposits in Layers 2 through 6; this value is the geometric mean of the estimates from the slug tests conducted on wells and piezometers screened in the outwash. The vertical hydraulic conductivity was estimated by

multiplying the horizontal hydraulic conductivity in each unit by a factor of 0.3; this anisotropy in hydraulic conductivity is primarily due to the layering of the deposits. Thus, the vertical hydraulic conductivity values used in the model for the Fill and the outwash deposits were 0.00238 and 0.0126 cm/sec, respectively.

3.2 Model Calibration

The groundwater flow model was calibrated under steady state conditions by comparing model-calculated groundwater levels to monitoring well and stream gauge levels measured in July 2012 from the Site. To obtain the best-fit correlation between model-calculated water levels and measured water levels, the hydraulic conductivity of the units, the recharge values and the bed conductance of the river cells representing the Patchogue River were subjected to adjustments; these adjustments were made within the range of values expected for the type of deposit or land cover.

A plot comparing the measured (observed) groundwater head elevations to model-calculated groundwater heads, as well as statistics to evaluate the degree to which the model values match the observed values are provided in Figure 3-6. These statistics indicate that model-calculated groundwater elevations in the final calibrated model match well to actual groundwater and stream gauge elevation measurements obtained in July, 2012. This comparison yields a high correlation coefficient of 0.962, a mean absolute error of 0.23 feet, and a normalized root mean square error (RMS) of 6.9%, all considered indicators of a reasonable match between modeled and observed values.

The calibrated groundwater head equipotential contours for Layer 2 (4 to 9 ft below ground surface) are displayed in Figure 3-7. Figure 3-8 provides a head equipotential cross-section along the eastern edge of the Site from Great Patchogue Lake to Patchogue River where the river meanders toward the southwest directly south of the Site.

3.3 Model Sensitivity

To determine the degree of uncertainty associated with the calibrated model, a sensitivity analysis was performed by varying the hydraulic conductivity values (both horizontal and vertical) in the model by factors of 0.1 through 10. The recharge zone values were also varied by factors of 0.2, 0.5, 2, and 5 to gauge the model's sensitivity to variations in recharge. Full order of magnitude variations in recharge were not evaluated since values of recharge typically vary over a smaller range than the ranges of hydraulic conductivities. Recharge values for forested land were not included due to their small footprint and the distance of the forested land from the Site (see Figure 3-4). For each variation of the model, the resulting normalized root mean squared error is presented in the table below. The calibrated model has a normalized root mean squared error of 6.9% and is represented by the center "1" multiplier column. A value higher than 6.9% would represent a condition with overall higher error between the observed and modeled groundwater elevations than in the calibrated model, while a value smaller than 6.9% would represent a condition with less overall error than the calibrated model.

Table 3-2. Sensitivity Analysis – Normalized Root Mean Squared Error (%)

	Multiplier						
Variable	0.1	0.2	0.5	1	2	5	10
Horizontal Hydraulic Conductivity - Fill	6.6%	6.7%	6.8%	6.9%	7.2%	7.9%	8.9%
Vertical Hydraulic Conductivity – Fill	16.5%	10.8%	6.9%	6.9%	7.7%	8.5%	8.8%

Table 3-2. Sensitivity Analysis – Normalized Root Mean Squared Error (%)							
	Multiplier						
Variable	0.1	0.2	0.5	1	2	5	10
Horizontal Hydraulic Conductivity – Glacial Outwash	21.8%	18.0%	10.8%	6.9%	9.4%	16.8%	22.4%
Vertical Hydraulic Conductivity – Glacial Outwash	7.8%	7.8%	7.4%	6.9%	6.9%	7.7%	8.6%
Residential Area Recharge	--	6.9%	6.9%	6.9%	7.0%	7.1%	--
Commercial Area Recharge	--	6.9%	6.9%	6.9%	7.0%	7.5%	--

These statistics indicate that the groundwater model is most sensitive to horizontal hydraulic conductivity variations within the glacial outwash deposits, and to variations in the vertical hydraulic conductivity of the fill deposits. The sensitivity to horizontal hydraulic conductivity in the glacial outwash deposits is expected given the predominately horizontal flow direction observed at the Site through this unit. The analysis indicated that the model is not highly sensitive to variations in recharge. This is likely due to the proximity of Great Patchogue Lake and the Patchogue River to the Site; the gradient between these two features is the principal controlling mechanism for groundwater flow across the Site. Increases in recharge raise the overall groundwater heads across the Site resulting in moderate sensitivity to increases in these values, but the overriding gradient between the two nearby surface water bodies places an effective "floor" on how low head values on the Site can fall with reductions in recharge, thus limiting sensitivity of the model to decreases in recharge values. While some variations produced statistically slightly better results than the calibrated model, such as decreases in the horizontal hydraulic conductivity of the Fill, these variations were judged to be outside the reasonable range of values for these deposits given the hydraulic conductivity testing that has been performed at the Site.

3.4 Assessment of Remedy Components

3.4.1 Simulation of ISS Implementation

Provided below is a discussion of the modifications that were made to the calibrated model to simulate implementation of in-site solidification (ISS) treatment in the subsurface, followed by the results of the simulation.

Model Modifications. To simulate the effects of the ISS treatment on groundwater heads (i.e., elevations) and groundwater flow, the volume (area and depths) of the subsurface to be treated using ISS was simulated into the model. The ISS depth intervals depicted in Figure 2-1 of the Remedial Design Work Plan (Brown and Caldwell, February 2012) were consolidated into two depth zones. The areas where ISS is planned to be conducted to total depths of 7, 8 and 13 ft were combined to be a single area where ISS would be simulated to a total depth of 13 ft below grade. The areas where ISS is planned to be conducted to 21 and 23 ft were combined into a single area where ISS would be conducted to 23 ft below ground surface. The hydraulic conductivities within the two areas and their respective depth intervals were modified to a value of 1 x 10^{-6} cm/sec. The hydraulic conductivities in the cells in Layer 1, which extends from 0-4 ft below ground surface, were not modified from those in the calibrated model.

In this 0-4 ft depth interval, the material treated using ISS will be removed and replaced with clean fill which is anticipated to have a hydraulic conductivity similar to the existing fill. Following these model modifications, the updated model was run under steady-state conditions using the output of the calibrated base model as the starting head conditions in order to simulate groundwater flow conditions following implementation of ISS. The results of this simulation are provided below.

Simulation Results. The model simulations indicate that implementation of ISS as described results in only minor changes in head (i.e., water table elevations) at the Site relative to existing conditions. The relatively high hydraulic conductivity of the material above, below and surrounding the ISS treated materials minimize the resulting changes in groundwater heads. Particle tracking conducted using the MODPATH software package indicates that despite a lack of significant head changes, groundwater flow directions are altered significantly by the presence of the ISS treated material. Particles deflect around the ISS treated area, with most flowing laterally around the treated area. Several particles tracked also flowed above or below the treated area. Representative groundwater equipotential contours (for Layer 2, positioned 4 to 9 ft bgs), and example particle traces for the simulations that include the ISS treated volume are included in Figure 3-9.

3.4.2 Transient Dewatering Simulations

For the off-site area directly east of the Site where excavation of impacted soils is planned, consideration is being given to the use of a slide-rail shoring system. To initiate installation of this system, the upper five feet below ground surface must be unsaturated, i.e., the water table must be at or deeper than five feet bgs. The typical water table is estimated to be at a depth of approximately 2.5 feet bgs in the area planned for excavation. Thus, the water table in the area would need to be lowered by approximately 2.5 feet via dewatering in order to initiate the installation of the slide-rail shoring system. However, it is possible that at times the water table may be closer to the ground surface. In this case, the water table may need to be lowered by up to 5 feet to initiate installation of the slide-rail shoring system. For the evaluation, it was assumed that the overall area would be excavated in 25 ft by 25 ft area increments. Provided below is a discussion of the modifications that were made to the calibrated model to simulate dewatering to allow installation of the slide-rail shoring system to be initiated, followed by the results of the dewatering simulations.

Model Modifications. To evaluate the amount of dewatering required to achieve the specified water level drawdown in each 25 ft by 25 ft area increment of the excavation, the calibrated groundwater model was modified to run as a short term transient simulation. The modified model utilized the head values that were calculated from the calibrated model as an initial condition. Four constant flux boundaries were then included in the model in Layer 4, which is positioned from 13-23 ft bgs to simulate the function of dewatering wells. The actual specifics on the configuration and number of dewatering wells (e.g., multiple small diameter well points, several larger diameter wells, etc) were not required for this analysis. This depth interval was chosen to provide a sufficient saturated thickness such that the constant flux model cells would not be dewatered during the simulation.

Simulation Results. For the scenario to achieve five feet of drawdown in each 25 ft by 25 ft excavation increment, each of the four constant flux boundaries was set to remove ~80.5 gallons per minute (GPM) from the model for a combined rate of ~322 GPM. This rate was maintained for a period of 24 hours with the required 5 ft of drawdown in the center of the 25 by 25 ft area being achieved at ~24 hours after pumping begins. Once the 5 ft of drawdown is achieved the pumping rate at each of the constant flux boundaries must be maintained at ~75.3 GPM (total pumping rate of ~301.3 GPM) to prevent heads from rising within the designated area. It is important to note that this is a non-unique solution and similar results may be achieved by extracting groundwater at a higher rate for a shorter initial drawdown period, or at a lower rate for a longer initial drawdown period. In the case described above the simulated dewatering removed approximately 463,680 gallons in the initial 24 hour period and an additional

~433,872 gallons for each full day thereafter. Cessation of pumping results in rapid water level recovery with ~90% recovery expected in the first 24 hours. A plot of the expected groundwater elevations in a simulated well in the center of the dewatered area is included in Figure 3-10.

Simulations indicate that establishing 2.5 feet of drawdown in each 25 ft by 25 ft excavation increment requires a total combined pumping rate of 172.5 GPM for the initial 24 hours. Following the initial 24 hours a combined pumping rate of 157.9 GPM is required to maintain 2.5 ft of drawdown. In this case the simulated dewatering wells remove approximately 248,353 gallons in the initial 24 hour period and an additional ~227,408 Gallons each full day thereafter. A plot of the expected groundwater elevations in a simulated well in the center of the dewatered area in the 2.5 ft drawdown scenario is included in Figure 3-11.

Section 4

Conclusions

The following conclusions were made based on the groundwater flow modeling study:

- Implementation of ISS treatment of subsurface materials as planned should result in only very minor changes in head (i.e., water table elevations) at the Site relative to existing conditions. The relatively high hydraulic conductivity of the material above, below and surrounding the ISS treated materials minimizes the resulting changes in groundwater heads.
- Despite a lack of significant head changes, groundwater flow directions are altered substantially by the presence of the ISS treated material relative to existing conditions. Groundwater flow paths are expected to deflect around the ISS treated volume, with most flowing laterally around the treated area, and some flowing above or below the treated area.
- Assuming that the excavation to remove soil in the off-site area adjacent to the Site would be conducted in 25ft by 25ft area increments, the estimated rate and duration of dewatering to provide for the necessary 5 feet of unsaturated soil to allow for the initiation of the installation of the slide-rail shoring system being considered are as follows:
  - If the water table is positioned at approximately 2.5 ft below grade, an initial pumping rate of approximately 173 GPM is required for the first 24 hours to achieve the 2.5 feet of water level drawdown, and once established, a pumping rate of 158 GPM is required to maintain this level of drawdown.

    If the water table is positioned at approximately the ground surface (i.e.,0 ft below grade), an initial pumping rate of approximately 322 GPM is required for the first 24 hours to achieve the 5 feet of water level drawdown, and once established, a pumping rate of 301GPM is required to maintain this level of drawdown.

  It is important to note that this is a non-unique solution and similar results may be achieved by extracting groundwater at a higher rate for a shorter initial drawdown period, or at a lower rate for a longer initial drawdown period

Section 5

Limitations

This groundwater model, like all others, cannot simulate groundwater behavior with absolute certainty, but rather provides an estimate of flow behavior based on the current understanding of subsurface conditions at the Site. Missing information, or data gaps, is addressed to the extent possible using assumptions that are based on general geologic principles, regional geologic data where available and ascertainable, or information generated from studies performed in like settings that are documented in the scientific literature. The use of these non-direct sources of data creates a level of uncertainty, as conditions may be different from those assumed. Sensitivity analyses have been performed in an attempt to quantify uncertainties. However, despite all efforts to reduce or quantify uncertainty, subsurface conditions may nonetheless exist that are not predictable and which could result in groundwater behave that is significantly different than that simulated by the groundwater model.

References

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Brown and Caldwell, May 2011. "Focused Feasibility Study, Patchogue Former Manufactured Gas Plant (MGP) Site, NYSDEC Site No. 1-52-182, Village of Patchogue, Suffolk County, New York".

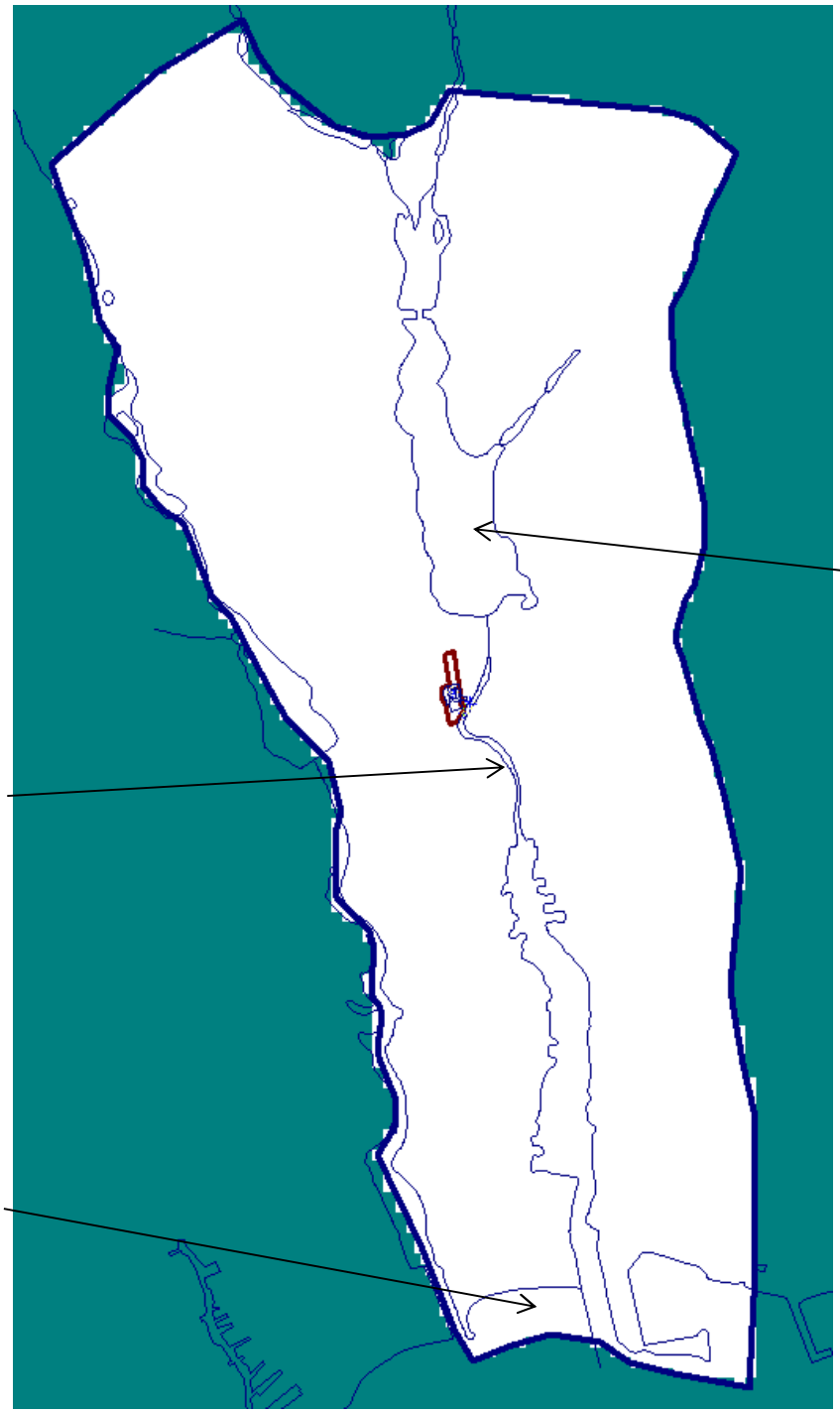
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Figures



Inactive Cell

Property Outline

Model Domain Boundary

Surface Water Feature

Great Patchogue Lake

Patchogue River

Patchogue Bay

Approximate Scale 0 1000 2000 FT

Figure 3-1

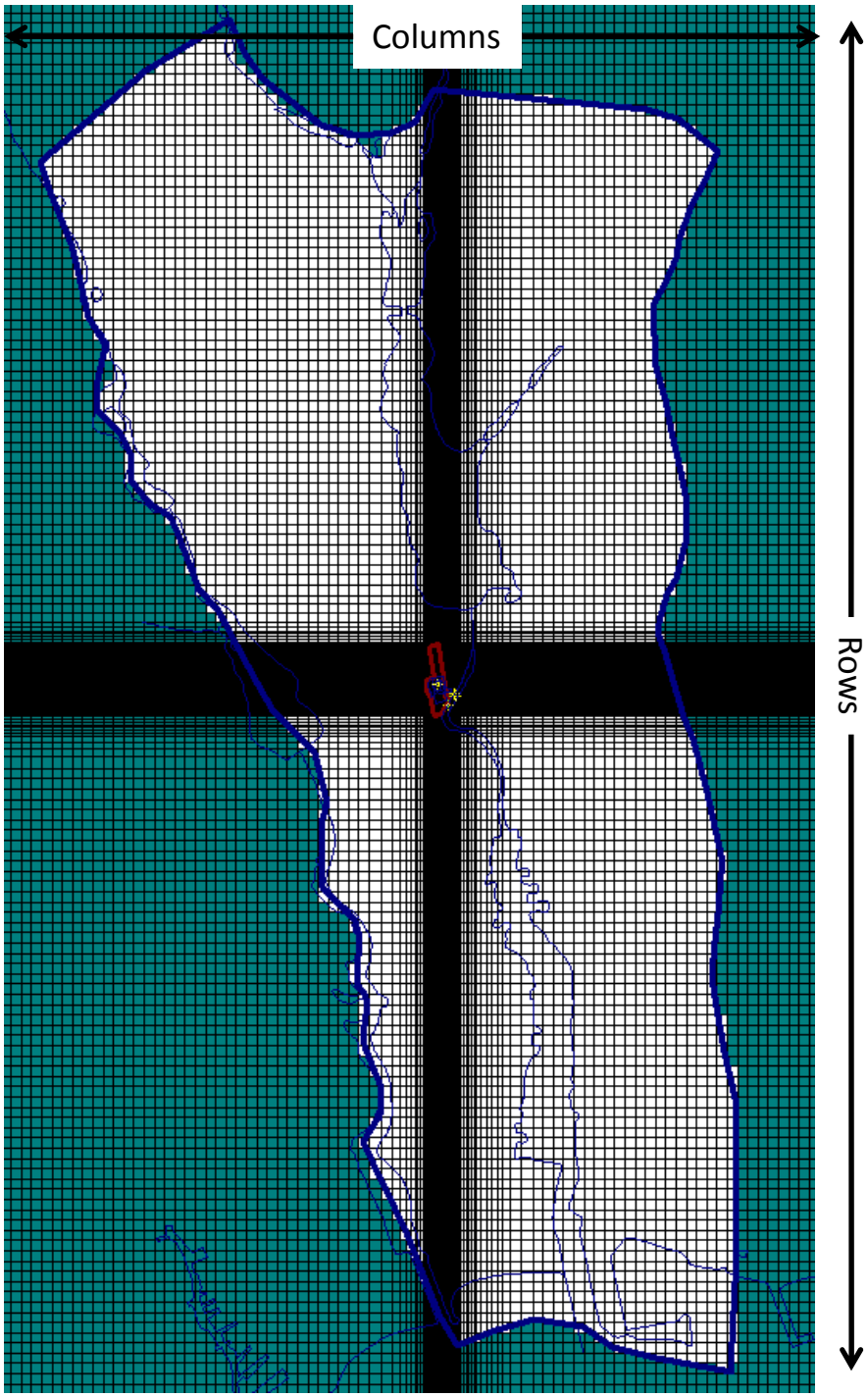
MODEL DOMAIN

NATIONAL GRID
PATCHOGUE FORMER MGP SITE
PATCHOGUE, NEW YORK

Date: 11/21/2012

Project Number: 142128

Brown AND Caldwell
Allendale, New Jersey



Inactive Cell

Model Gridlines

Property Outline

Model Domain Boundary

Surface Water Feature

Approximate Scale 0 1000 2000 FT

Figure 3-2

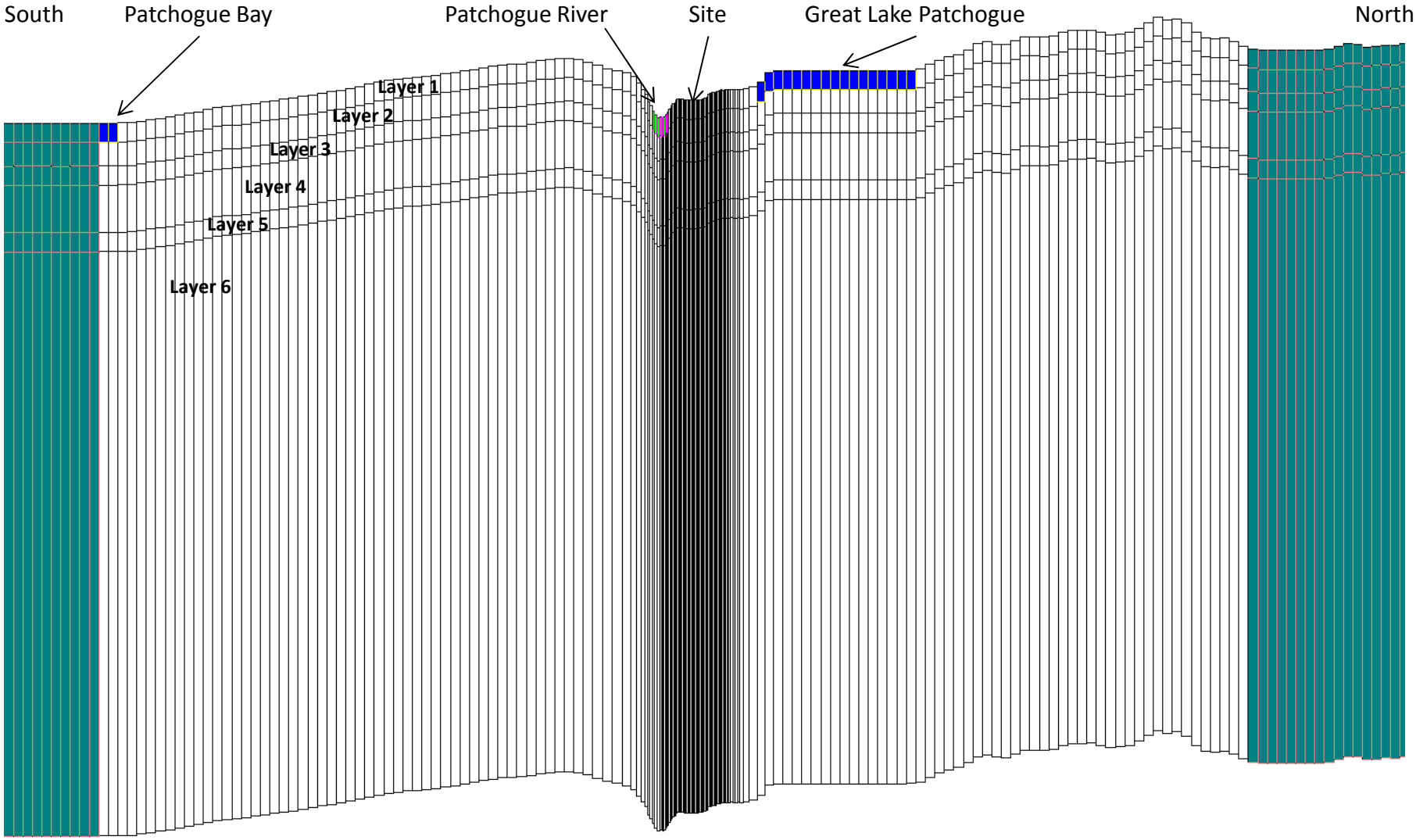
MODEL GRID

NATIONAL GRID
PATCHOGUE FORMER MGP SITE
PATCHOGUE, NEW YORK

Date
11/21/2012

Project Number
142128

Brown AND Caldwell
Allendale, New Jersey



Inactive Cell

Constant Head Boundary

Model Gridlines

River Boundary

Note: Cross-Section taken from Column 66 of the Groundwater Model
50 x Vertical Exaggeration

Figure 3-3

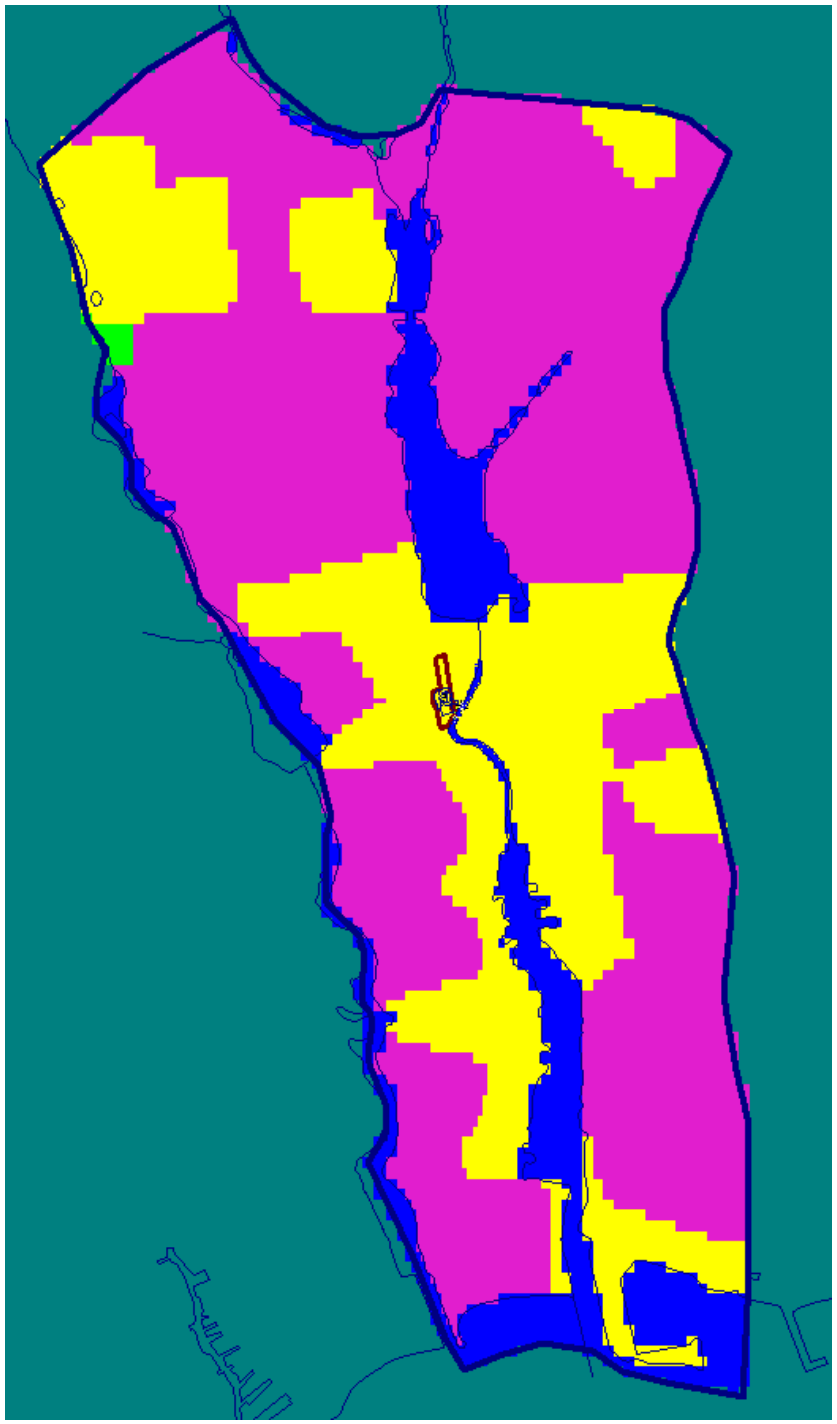
MODEL DOMAIN IN CROSS-SECTION

NATIONAL GRID
PATCHOGUE FORMER MGP SITE
PATCHOGUE, NEW YORK

Date: 11/21/2012

Project Number: 142128

Brown AND Caldwell
Allendale, New Jersey



Inactive Cell

Model Domain Boundary

Surface Water Body
0.00 in/yr

Commercial and Services
6.00 in/yr

Residential
7.20 in/yr

Forested Land
12.00 in/yr

Approximate Scale 0 1000 2000 FT

Figure 3-4

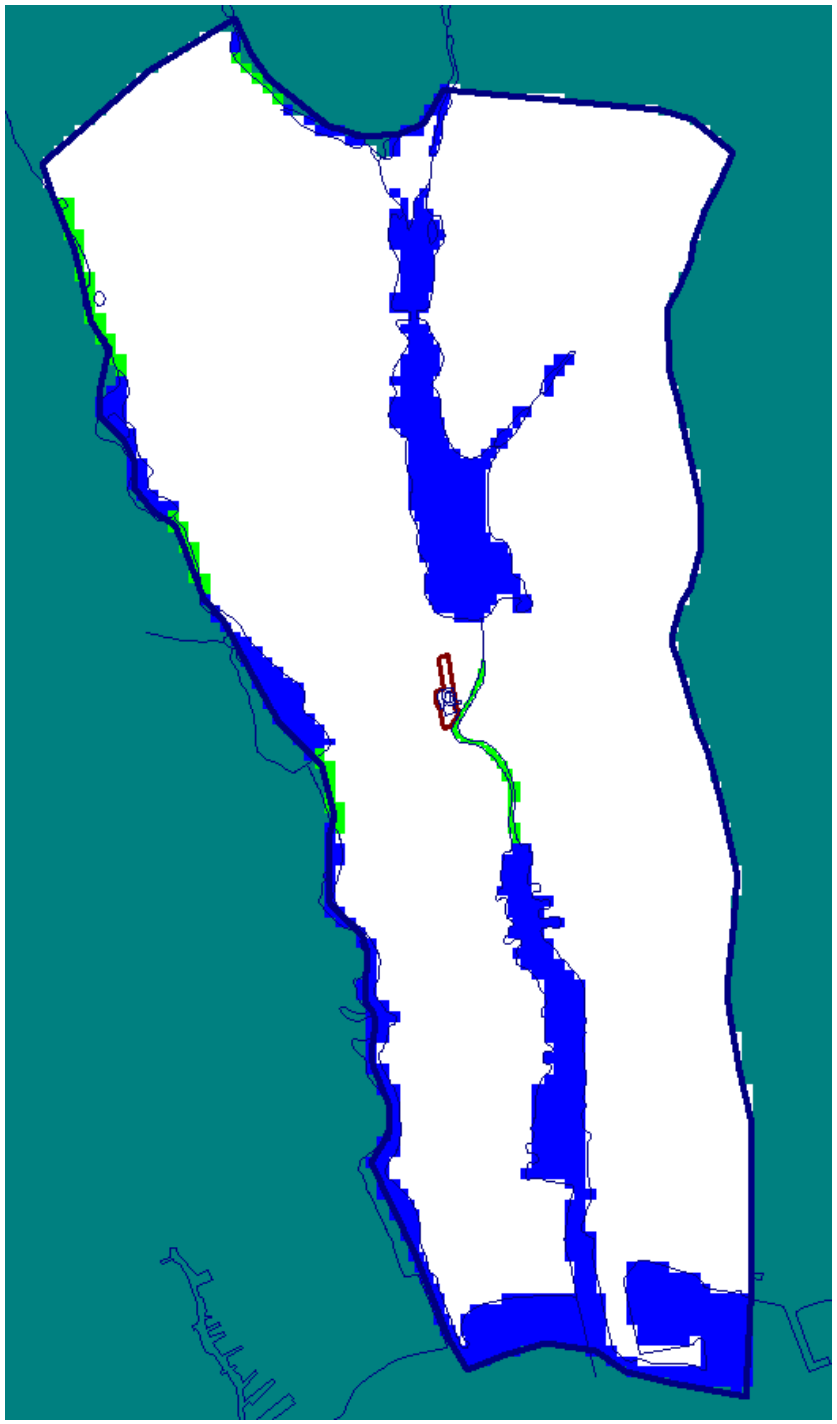
MODEL RECHARGE VALUES

NATIONAL GRID
PATCHOGUE FORMER MGP SITE
PATCHOGUE, NEW YORK

Date
11/21/2012

Project Number
142128

Brown AND Caldwell
Allendale, New Jersey



Inactive Cell

Constant Head Boundary

River Boundary

Property Outline

Model Domain Boundary

Note: Constant Head and River Boundaries are only positioned in model layer 1. Inactive cells are in the same positions in all 6 model layers

Approximate Scale 0 1000 2000 FT

Figure 3-5

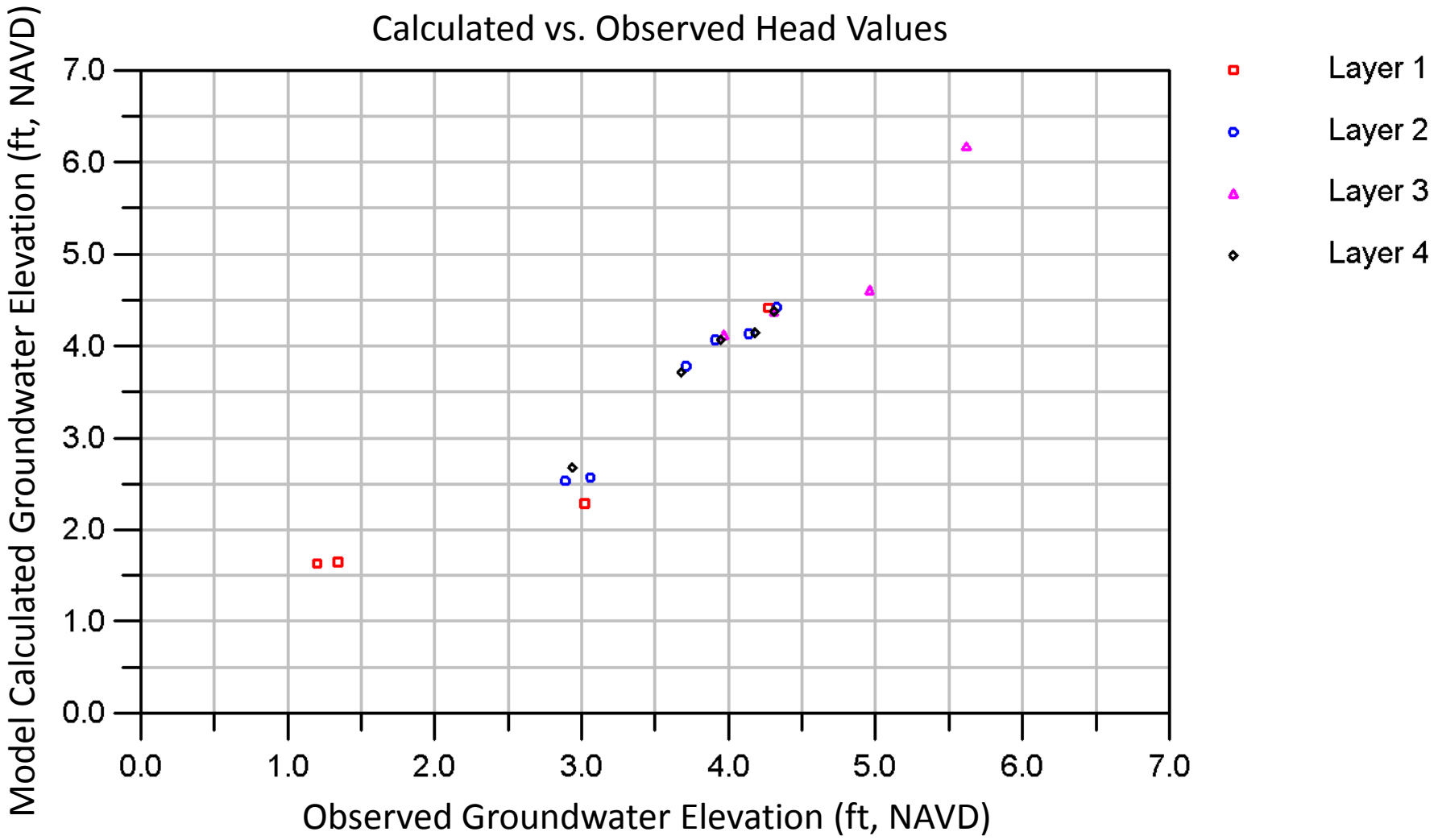
LAYER 1 BOUNDARY CONDITIONS

NATIONAL GRID
PATCHOGUE FORMER MGP SITE
PATCHOGUE, NEW YORK

Date: 11/21/2012

Project Number: 142148

Brown AND Caldwell
Allendale, New Jersey



Absolute Residual Mean	0.23 ft
Residual Sum of Squares	1.78 ft^2
Maximum Absolute Residual	0.73 ft
Normalized Root Mean Squared Error	6.9 %
Correlation Coefficient	0.962

Note: Observed groundwater elevations measured in July 2012

Figure 3-6

CALIBRATION PLOT AND STATISTICS

NATIONAL GRID
PATCHOGUE FORMER MGP SITE
PATCHOGUE, NEW YORK

Date: 11/21/2012

Project Number: 142128

Brown AND Caldwell
Allendale, New Jersey

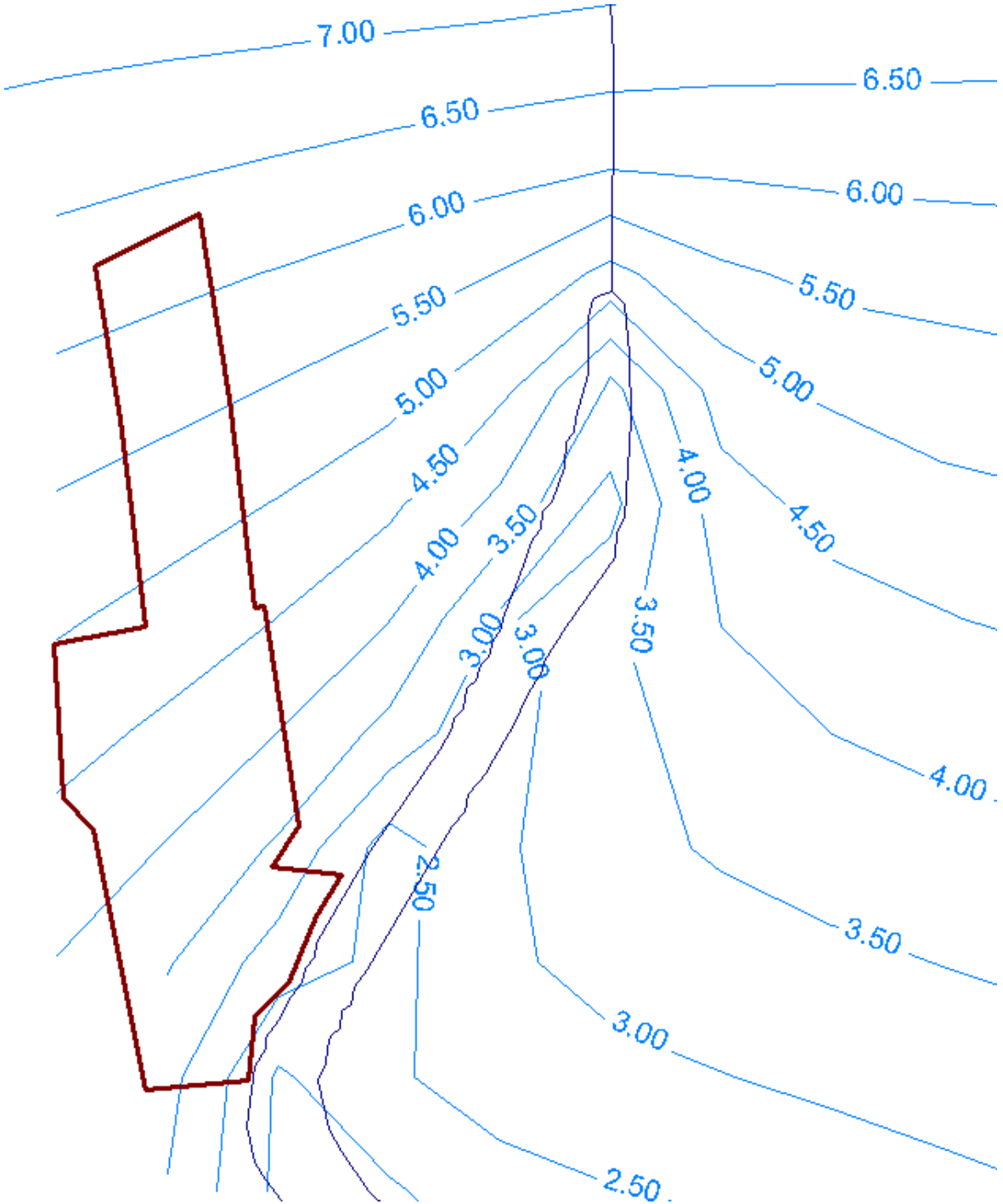


Figure 3-7

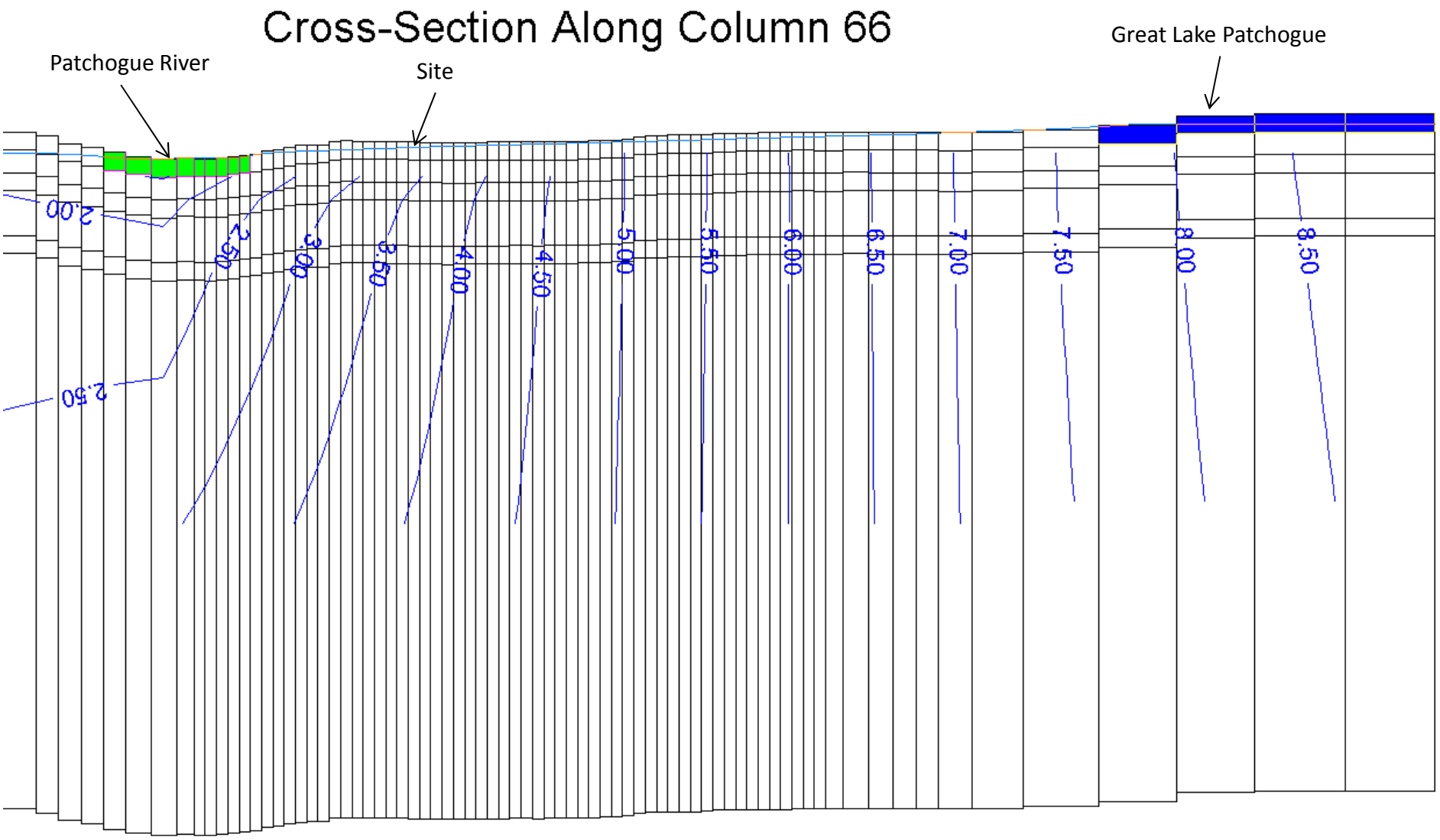
CALIBRATED MODEL (EXISTING CONDITIONS) GROUNDWATER ELEVATION CONTOURS, LAYER 2

NATIONAL GRID
PATCHOGUE FORMER MGP SITE
PATCHOGUE, NEW YORK

Date: 11/21/2012

Project Number: 142128

Brown AND Caldwell
Allendale, New Jersey



2.0 Groundwater Elevation Contour (ft. NAVD)

River Boundary

Constant Head Boundary

Note: Cross-Section taken from Column 66 of the Groundwater Model
5 x Vertical Exaggeration

Figure 3-8
CALIBRATED MODEL (EXISTING CONDITIONS)
MODEL CROSS-SECTION WITH
EQUIPOTENTIAL CONTOURS

NATIONAL GRID
PATCHOGUE FORMER MGP SITE
PATCHOGUE, NEW YORK

Date: 11/21/2012

Project Number: 142128

Brown AND Caldwell
Allendale, New Jersey

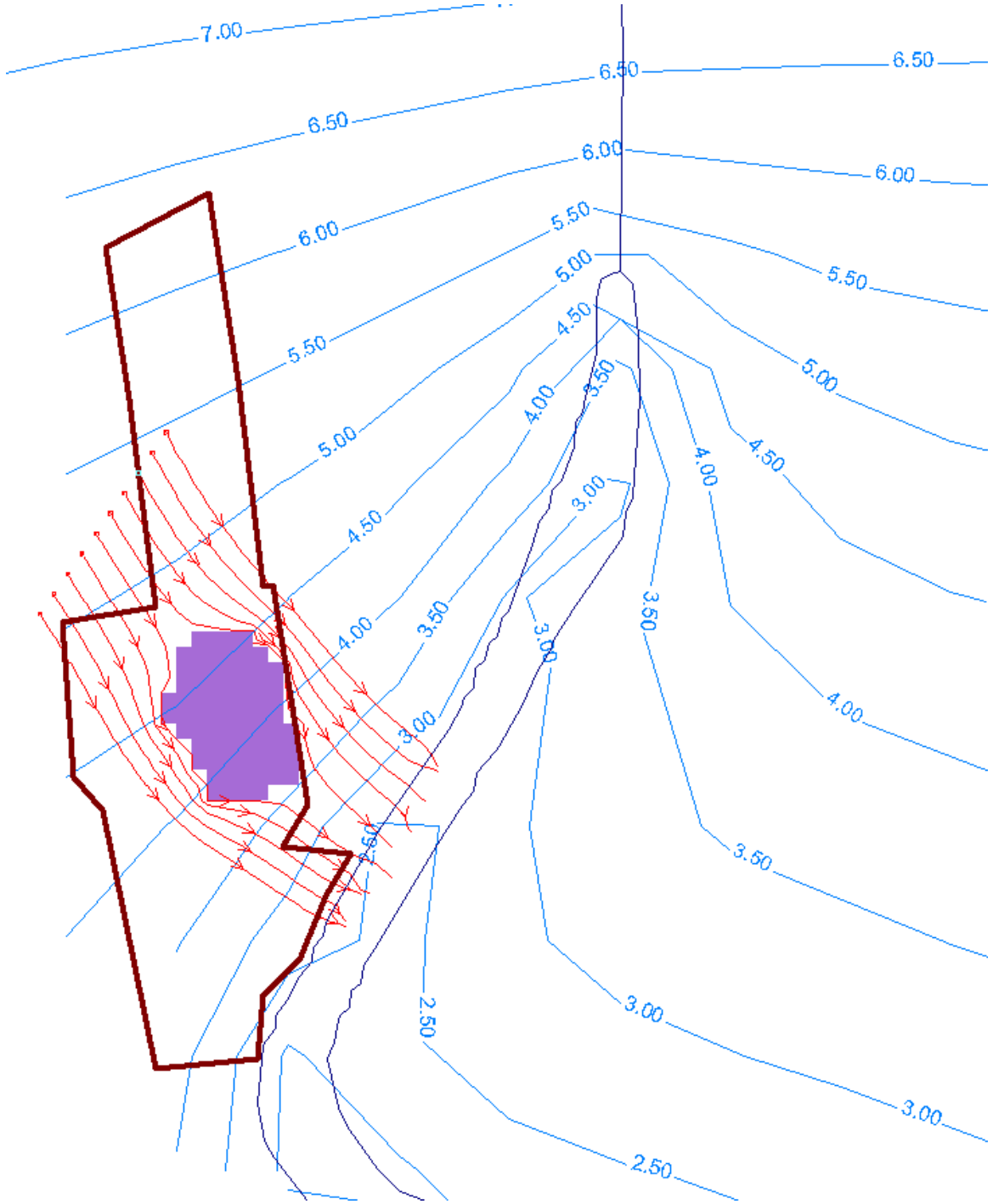


Figure 3-9

MODEL WITH ISS SIMULATION; GROUNDWATER ELEVATION CONTOURS AND FLOW PATHS, LAYER 2

NATIONAL GRID
PATCHOGUE FORMER MGP SITE
PATCHOGUE, NEW YORK

Date: 11/21/2012

Project Number: 142128

Brown AND Caldwell
Allendale, New Jersey

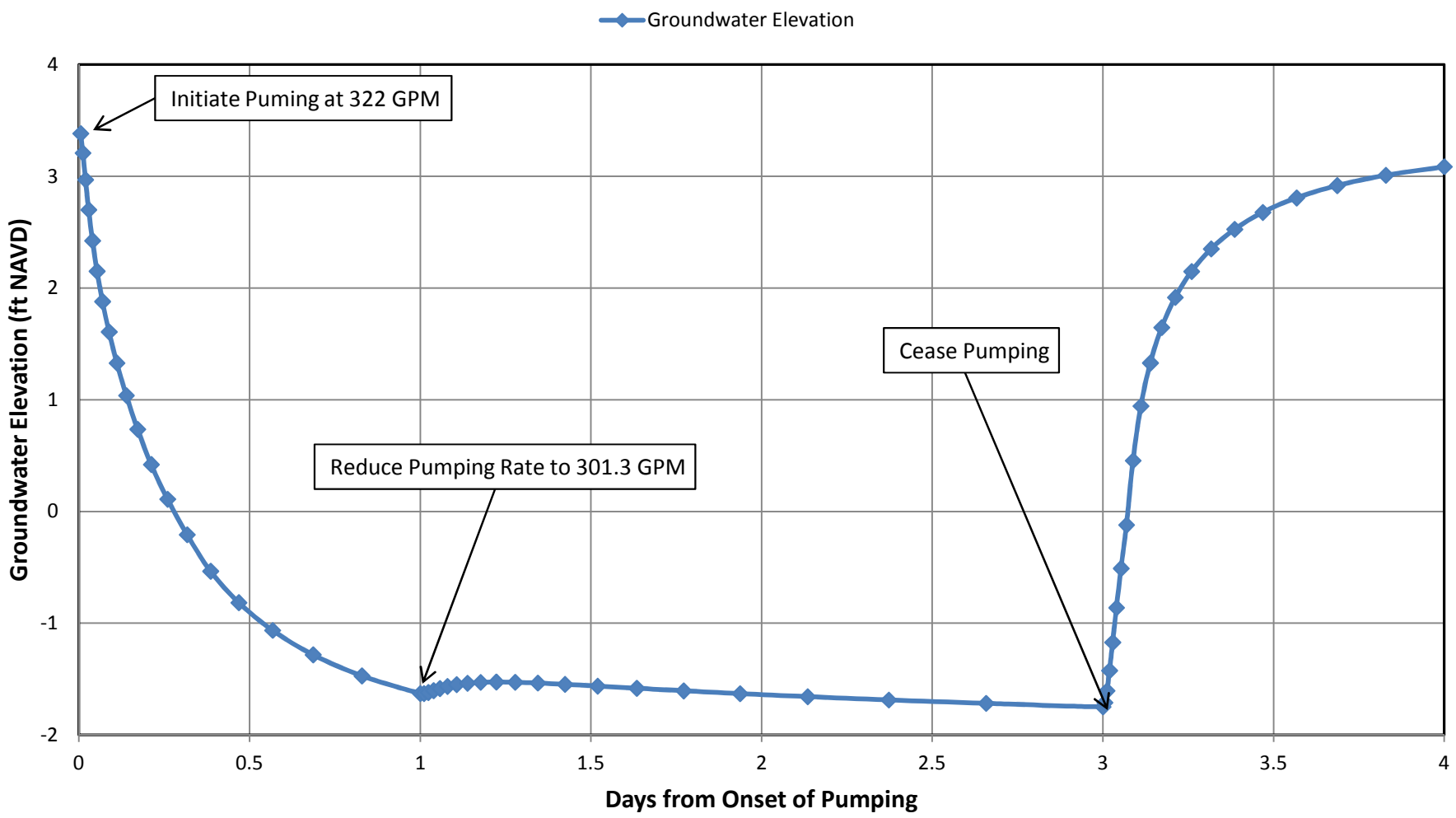


Figure 3-10

SIMULATED DEWATERING FOR INSTALLATION OF SLIDE RAIL SYSTEM – 5 FOOT DRAWDOWN

NATIONAL GRID
PATCHOGUE FORMER MGP SITE
PATCHOGUE, NEW YORK

Date: 11/21/2012

Project Number: 142128

Brown AND Caldwell
Allendale, New Jersey

Groundwater Elevation in Dewatering Area

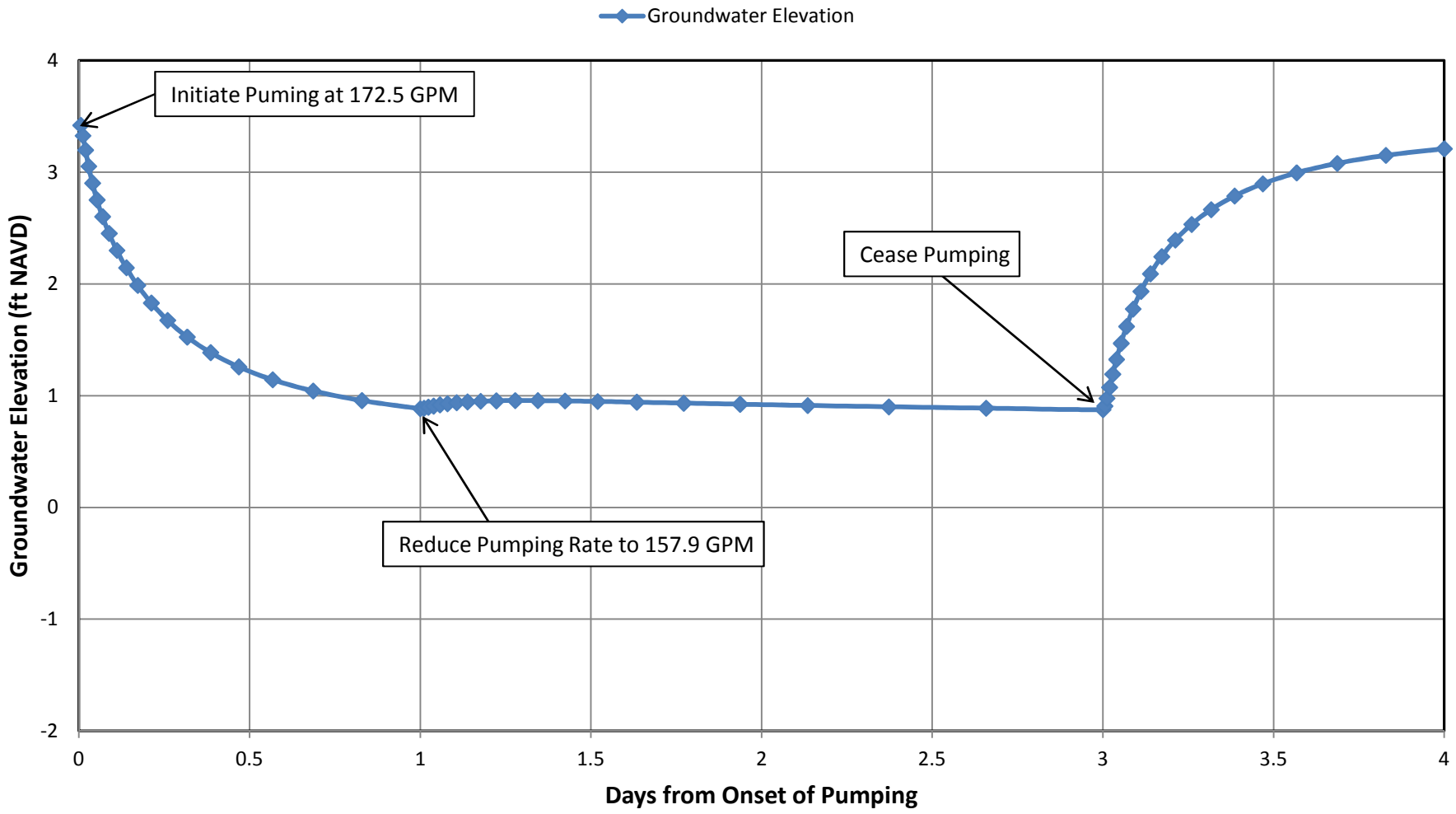


Figure 3-11

SIMULATED DEWATERING FOR INSTALLATION OF SLIDE RAIL SYSTEM – 2.5 FOOT DRAWDOWN

NATIONAL GRID
PATCHOGUE FORMER MGP SITE
PATCHOGUE, NEW YORK

Date: 11/21/2012

Project Number: 142128

Brown AND Caldwell
Allendale, New Jersey

Appendix C: Piezometer Construction Logs

WELL LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:**	**Well No.** **PZ-1A** **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
N. Batarags/Allendale, NJ	RLO	8"	2" PVC	0.020"	8.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Split Spoon	Development Method:
3/21/12 - 3/21/12	ADT	Hammer Type: 140lb Auto	Surge and Pump

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255177.4 ft.
Shawn Miller	HSA	CME 1500	Vert Datum: NAVD88	Northing: 219314.6 ft.
			Ground Surface Elev: 6.3 ft.	TOC Elev: 8.1 ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int / Recovery / Lithology / Well (Stick Up)	ppm Readings (ppm)	Remarks
		SM	**FILL**	2-5-15-12			75.0	
	5	SC	Brown mf SAND, some Organics, little Silt. Pulverized concrete.					0.9-2' BGS: Moderate to strong odor.
		SW	Black mf SAND and mf GRAVEL (cinders & slag). Saturated w/ water @ 2.7'.	8-9-7-4			0.4	*0-1.5' BGS: Cement-bentonite grout*
		SM	Black mf SAND, trace Silt.					*1.5-2' BGS: Bentonite Plug*
		SM	Black mf SAND, some Silt.	6-5-6-6				*2-7.5' BGS: Filter pack (#1 Filpro Sand)*
5		MH	No Recovery.					*2.5-7.5' BGS: PVC Screen (0.020" Slot)*
	0	SP	Dark brown mfc SAND, trace Gravel (rounded granite and granite flakes).	7-9-11-15			0.0	

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WELL LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:**	**Well No.** **PZ-1B** **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
N. Batarags/Allendale, NJ	RLO	8"	2" PVC	0.020"	20.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Split Spoon	Development Method:
3/21/12 - 3/21/12	ADT	Hammer Type: 140lb Auto	Surge and Pump

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255178.7 ft.
Shawn Miller	HSA	CME 1500	Vert Datum: NAVD88	Northing: 219305.9 ft.
			Ground Surface Elev: 5.9 ft.	TOC Elev: 8.9 ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int / Recovery / Lithology / Well (Stick Up)	ppm Readings (ppm)	Remarks
	5	SW	**FILL**	19-10-10-5			0.0	
		SP	Brown-black mfc SAND, some Organics (roots, grass).					
		SM	Pulverized red-brown concrete.	2-4-3-7			0.0	
		SP	Reddish-black mf SAND, trace (-) Gravel. Pieces of red brick present. Mosit @ 1.7'.					
		GP	Black mf SAND, little Silt, trace Organics.	14-8-3-4				
5		SP	Saturated w/ water @ 3'.					
	0		Black c SAND and f Gravel (cinders and brick present).					*0-10' BGS: Cement-bentonite grout*
		SW		1-1-5-7			0.0	
		GP	Black mf SAND trace Gravel, trace (-) Silt. No recovery.					
		SW	**OUTWASH DEPOSITS**	17-12-8-11			0.0	
		GW	Brown mfc SAND, little (-) mf Gravel. Tan mfc SAND, little (+) Gravel (rounded qtz).					
10		SW		10-5-3-3			0.0	
	-5	GW	Brown mfc SAND, some Gravel (rounded qtz).					*10-12' BGS: Bentonite Plug*
		SP	Tan-orange mf SAND, trace (-) Gravel.	1-2-4-4			0.0	
		SP	Tan-grey mf SAND, trace (-) Gravel.					
				2-2-2-3			0.0	
15								*12-19' BGS: Filter pack (#1 Filpro Sand)*
	-10							
		SP	Tan-grey-beige mf SAND, trace Gravel. @ 17.1' BGS shell present w/ iron staining.	3-4-6-7			0.0	*14-19' BGS: PVC Screen (0.020" Slot)*
		SP	Tan-grey-beige mf SAND, little Gravel.	3-2-4-5			0.0	
		GP						
20								

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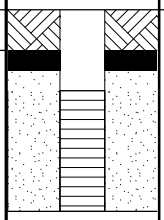
WELL LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:**	**Well No.** **PZ-2A** **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
N. Batarags/Allendale, NJ	RLO	8"	2" PVC	0.020"	5.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: No Sampling	Development Method:
3/22/12 - 3/22/12	ADT	Hammer Type: 140lb Auto	Surge and Pump

Driller:	Drilling Method:	Drilling Equipment:		
Shawn Miller	HSA	CME 1500	**Horiz Datum/Proj:** NYS Plane NAD83 **Vert Datum:** NAVD88 **Ground Surface Elev:** 5.8 ft.	**Easting:** 1255197.8 ft. **Northing:** 219330.2 ft. **TOC Elev:** 8.8 ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int	Graphic Log: Recovery	Graphic Log: Lithology	Graphic Log: Well	ppm Readings (ppm)	Remarks
5	5		Refer to PZ-2B boring log for description of soil.								*0-1' BGS: Cement-bentonite grout.* *1-1.5' BGS: Bentonite seal.* *1.5-5' BGS: Filter pack.* *2-5' BGS: PVC Screen (0.020" Slot)*

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WELL LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:**	**Well No.** **PZ-2B** **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
N. Batarags/Allendale, NJ	RLO	8"	2" PVC	0.020"	18.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Split Spoon	Development Method:
3/22/12 - 3/22/12	ADT	Hammer Type: 140lb Auto	Surge and Pump

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255209.7 ft.
Shawn Miller	HSA	CME 1500	Vert Datum: NAVD88	Northing: 219332.1 ft.
			Ground Surface Elev: 5.3 ft.	TOC Elev: 8.3 ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int / Recovery / Lithology / Well	ppm Readings (ppm)	Remarks
		SP	**FILL** Brown mf SAND, little Organics (roots, grass), trace (-) Gravel. Specs of red brick present.	16-16-9-10			0.0	
		SP GP SW		4-6-4-5			0.1	*0-6' BGS: Cement bentonite grout.*
		SM	Pulverized concrete. Black mf SAND, some Gravel (cinders). Moist.					2.9-3.4' BGS: Slight tar-like odor.
		SP		2-3-2-1			72.1	4-4.3' BGS: Slight tar-like odor.
5	0	OH	Grey-beige mfc SAND, trace (-) Gravel (rounded qtz). Saturated w/ water @ 2.0'.					4.6-6' BGS: Black staining on some grains. Tar-like odor. Oily sheen on water.
		SW	**ALLUVIAL DEPOSITS**	1-1-3-3			7.0	*6-8' BGS: Bentonite seal.*
		SP SM	Grey-beige mfc SAND, little Silt, trace Organics, trace (-) Gravel (rounded qtz).					7' BGS: NAPL on surface of wood.
		SP	Color change to beige-tan @ 3.4'.	1-5-4-6			67.0	8-8.5' BGS: Black staining. Oily sheen on water.
		SW GP	Brown-biege mf SAND, trace Gravel. Brown ORGANICS, little mf SAND.					8.5-10' BGS: Black staining. Moderate odor. NAPL coating on large grains.
10	-5		Brown-beige mfc SAND.	3-3-3-5			7.0	*8-15' BGS: Filter pack.*
		SP	Brown-beige mf SAND, trace (-) Organics (1" thick pcs of wood).					*10-15' BGS: PVC Screen (0.020" Slot)*
			OUTWASH DEPOSITS	8-7-5-5			27.1	12-12.9' BGS: Oily sheen on grains and water. Tar-like odor.
			Black mf SAND, little Silt.					14-16' BGS: Slight odor. Slight staining.
		SW	Brown-beige mf SAND.					16-18' BGS: Black NAPL flecs w/ tacky, tar-like texture. Leaves residue on gloves. No odor.
		GP	Brown mfc SAND, some (-) Gravel.	7-3-3-4			13.0	
		SP	Brown-beige mf SAND. Mica flecs present.					
15	-10	GW	Brown-tan mfc SAND, some (-) Gravel.					
		SW	Brown-tan mc SAND and mfc GRAVEL (rounded qtz). Tan-orange mfc SAND.	5-9-6-7			1.1	

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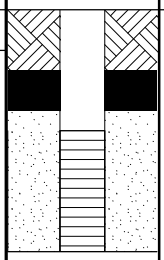
WELL LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:**	**Well No.** **PZ-3A** **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
N. Batarags/Allendale, NJ	RLO	8"	2" PVC	0.020"	6.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: No Sampling	Development Method:
3/23/12 - 3/23/12	ADT	Hammer Type: 140lb Auto	Surge and Pump

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255240.1 ft.
Shawn Miller	HSA	CME 1500	Vert Datum: NAVD88	Northing: 219241.1 ft.
			Ground Surface Elev: 5.0 ft.	TOC Elev: 8.8 ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int	Graphic Log: Recovery	Graphic Log: Lithology	Graphic Log: Well	ppm Readings (ppm)	Remarks
5	0		Refer to PZ-3B boring log for description of soil.								*0-1.5' BGS: Cement bentonite grout.* *1.5-2.5' BGS: Bentonite seal.* *2.5-6' BGS: Filter pack.* *3-6' BGS: PVC Screen (0.020" Slot)*

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WELL LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:**	**Well No.** **PZ-3B** **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
N. Batarags/Allendale, NJ	RLO	8"	2" PVC	0.020"	20.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Split Spoon	Development Method:
3/22/12 - 3/22/12	ADT	Hammer Type: 140lb Auto	Surge and Pump

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255252.2 ft.
Shawn Miller	HSA	CME 1500	Vert Datum: NAVD88	Northing: 219240.4 ft.
			Ground Surface Elev: 5.0 ft.	TOC Elev: 8.9 ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int	Graphic Log: Recovery	Graphic Log: Lithology	Graphic Log: Well	ppm Readings (ppm)	Remarks
		SP GP SP	**FILL** Dark brown mf SAND, little Gravel, little Organics, little (-) Silt.	16-8-5-7						0.0	
		GP	Crushed/pulverized concrete.	7-5-5-4						0.0	*0-9' BGS: Cement bentonite grout.*
		SP GP	Black fm SAND, some Gravel (red brick), little (-) Silt. Moist.								
5	0	SP GP	Grey-beige mc SAND, some m Gravel (angular).	2-2-2-2						0.0	4-6' BGS: Slight tar-like odor.
		SP GP	Black fmc SAND, little (+) m Gravel. Wet.								
		U SW	Wood. Grey-black mc SAND, little m Gravel (cinders). Wet to saturated. Saturated w/ water @ 4.0'.	1-2-4-8						35.0	6-6.8' BGS: Black staining on grains. Sheen on spoon. Black/reddish-brown NAPL blebs (sand sized).
		SP SW	**OUTWASH DEPOSITS** Brown-beige mfc SAND.	3-5-5-4						19.5	6.8' BGS: 1/2" NAPL lens across core. 8-8.6' BGS: Strong odor. Heavy, oily sheen on water in spoon.
10	-5	GW SW GP	Grey-beige mf SAND, trace (-) mf Gravel (rounded qtz). Grey-beige mfc SAND and mfc GRAVEL.	3-6-4-3						2.6	8.6-10' BGS: Heavy NAPL staining on largest grains. Strong odor. *9-11' BGS: Bentonite seal.*
		SW GP	Grey-brown mfc SAND, some f Gravel. Tan-brown mfc SAND, some f Gravel (rounded qtz)	5-5-5-4						4.5	10-10.1' BGS: Sheen on grains. 10.1' BGS: 1/2" Tacky/thick NAPL lens across core.
15	-10	SW	Tan-orange mfc SAND.	13-5-6-4						3.0	10.7-12' BGS: Strong tar-like odor. *11-18' BGS: Filter pack.*
		SW	Tan-orange mfc SAND, trace (-) Gravel (rounded).	10-5-7-6						4.7	14.8' BGS: Thin NAPL lens across core. *13-18' BGS: PVC Screen (0.020" Slot)*
		SW	Tan-orange mfc SAND.	4-5-6-4						9.1	18-20' BGS: Slight tar-like odor.
20	-15										

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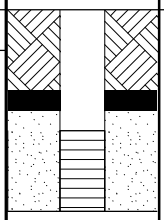
WELL LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:**	**Well No.** **PZ-4A** **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
N. Batarags/Allendale, NJ	RLO	8"	2" PVC	0.020"	5.0 ft.

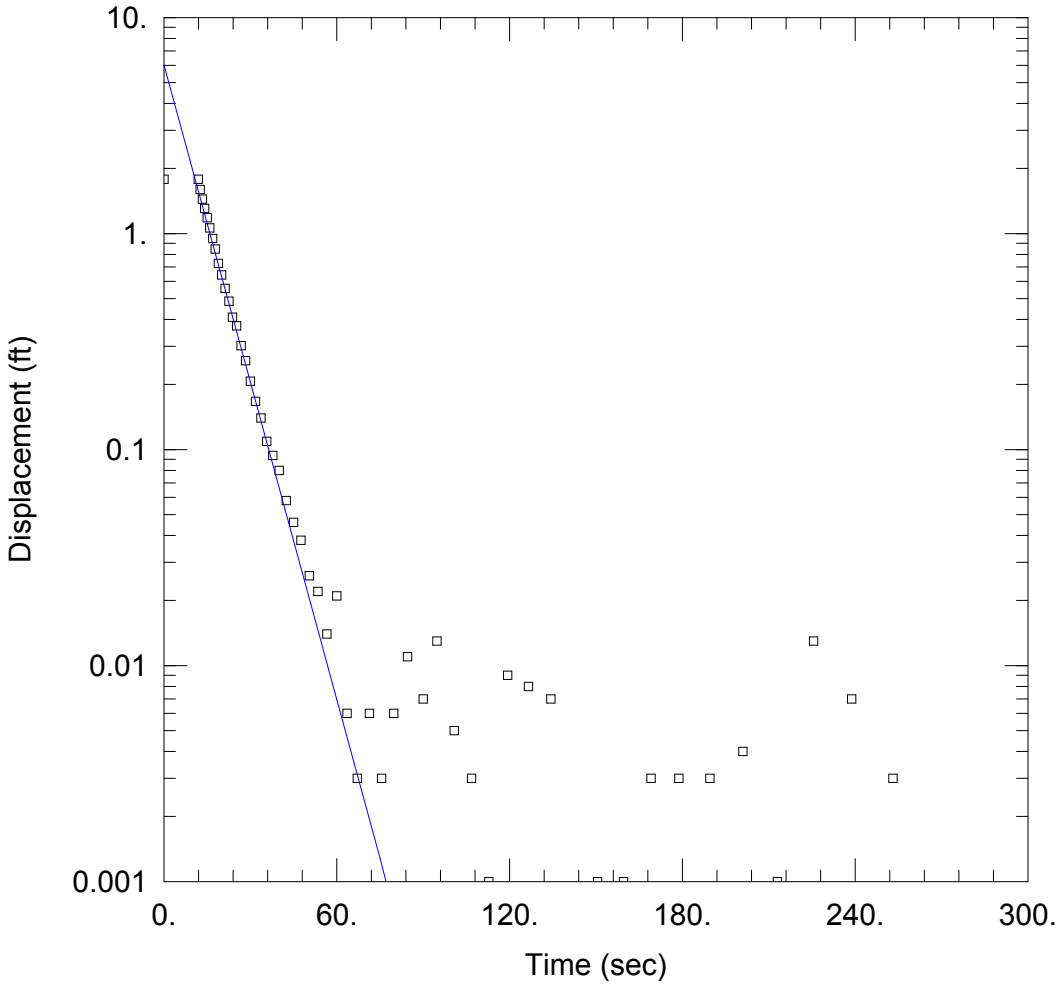
Start/Finish Date	Drilling Contractor:	Sampling: No Sampling	Development Method:
5/23/12 - 5/23/12	ADT	Hammer Type: 140lb Auto	Surge and Pump

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255365.3 ft.
Chris Miglione	HSA	CME 1500	Vert Datum: NAVD88	Northing: 219236.5 ft.
			Ground Surface Elev: 5.0 ft.	TOC Elev: 4.8 ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int	Graphic Log: Recovery	Graphic Log: Lithology	Graphic Log: Well (Traffic Rated Vault Box)	ppm Readings (ppm)	Remarks
5	0		Refer to PASB-45 / MW-4D boring log soil description.								*0-2' BGS: Concrete well vault (flush mount).* *2-2.5' BGS: Bentonite seal.* *2.5-5' BGS: Filter pack.* *3-5' BGS: PVC Screen (0.020" Slot)*

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Appendix D: Slug Test Plots and K_h Calculations



WELL TEST ANALYSIS

Data Set: P:\National_Grid\Patchogue\Slug_Testing\AQT\MW-1.aqt
Date: 10/18/12 Time: 12:07:23

PROJECT INFORMATION

Company: Brown and Caldwell
Client: National Grid Patchogue
Test Well: MW-1
Test Date: 07/18/2012

AQUIFER DATA

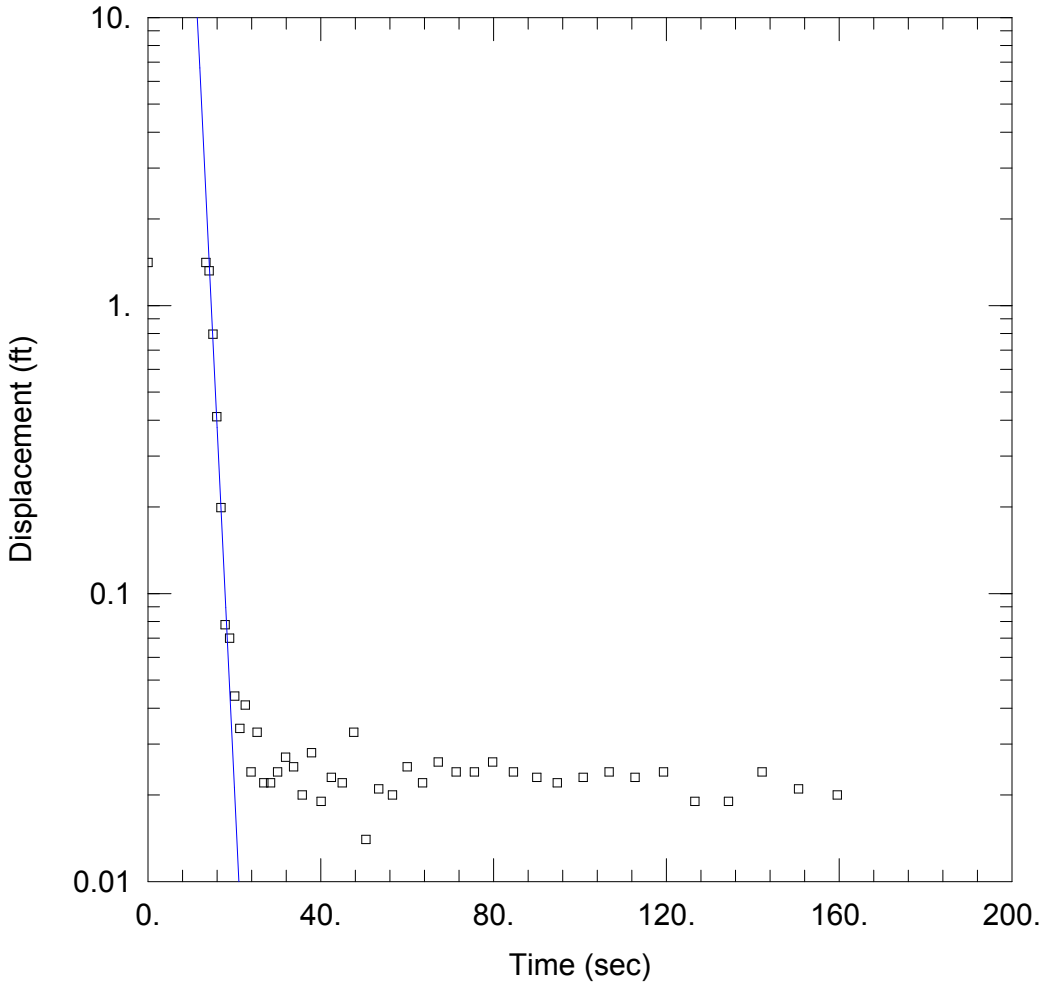
Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1)

Initial Displacement: 1.78 ft
Total Well Penetration Depth: 9.09 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 9.09 ft
Screen Length: 5. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.009764 cm/sec
y0 = 6.028 ft



WELL TEST ANALYSIS

Data Set: P:\National_Grid\Patchogue\Slug_Testing\AQT\MW-4D.aqt
Date: 10/18/12 Time: 11:44:02

PROJECT INFORMATION

Company: Brown and Caldwell
Client: National Grid Patchogue
Test Well: MW-4D
Test Date: 07/19/2012

AQUIFER DATA

Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 1.

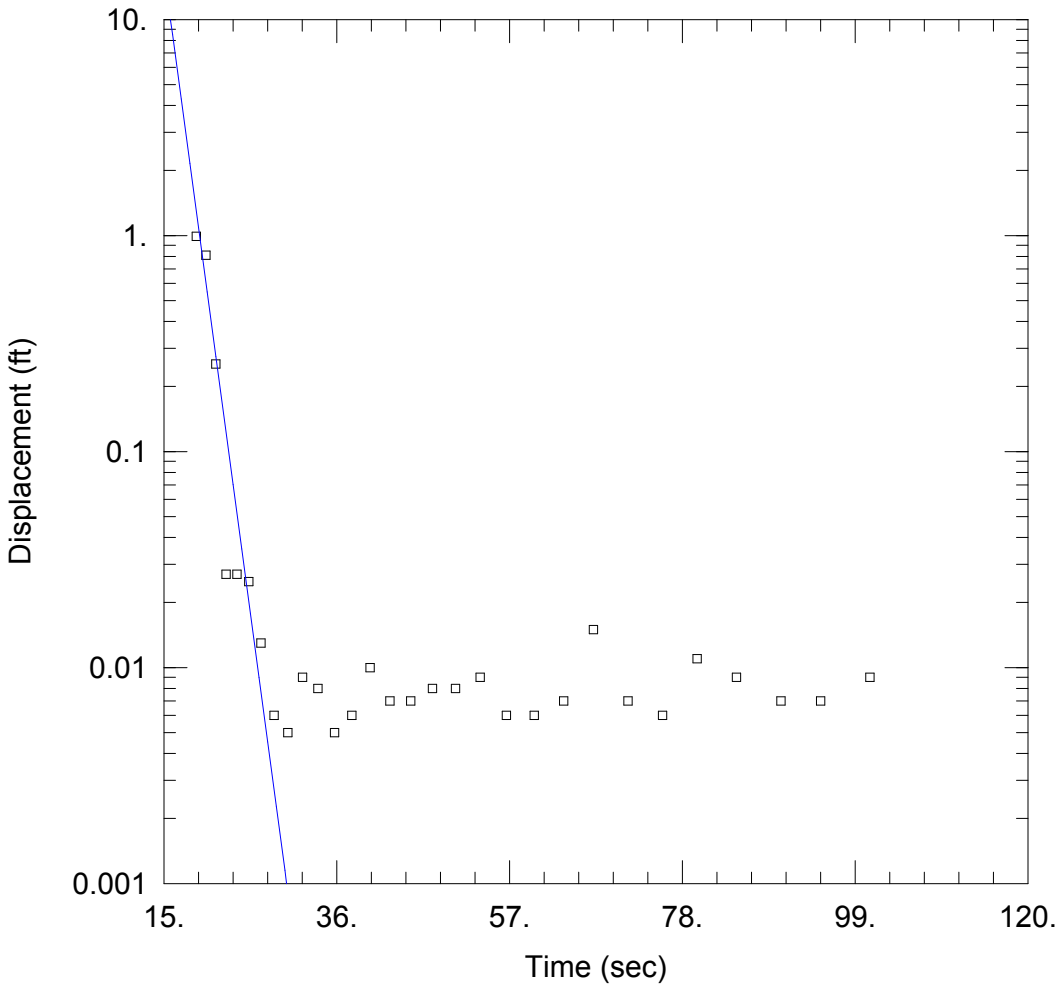
WELL DATA (MW-4D)

Initial Displacement: 1.412 ft
Total Well Penetration Depth: 21.89 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 21.89 ft
Screen Length: 5. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 0.06227 cm/sec y0 = 3.732E+4 ft



WELL TEST ANALYSIS

Data Set: P:\National_Grid\Patchogue\Slug_Testing\AQT\MW-7D.aqt
Date: 10/18/12 Time: 12:21:27

PROJECT INFORMATION

Company: Brown and Caldwell
Client: National Grid Patchogue
Test Well: MW-7D_2
Test Date: 07/19/2012

AQUIFER DATA

Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 1.

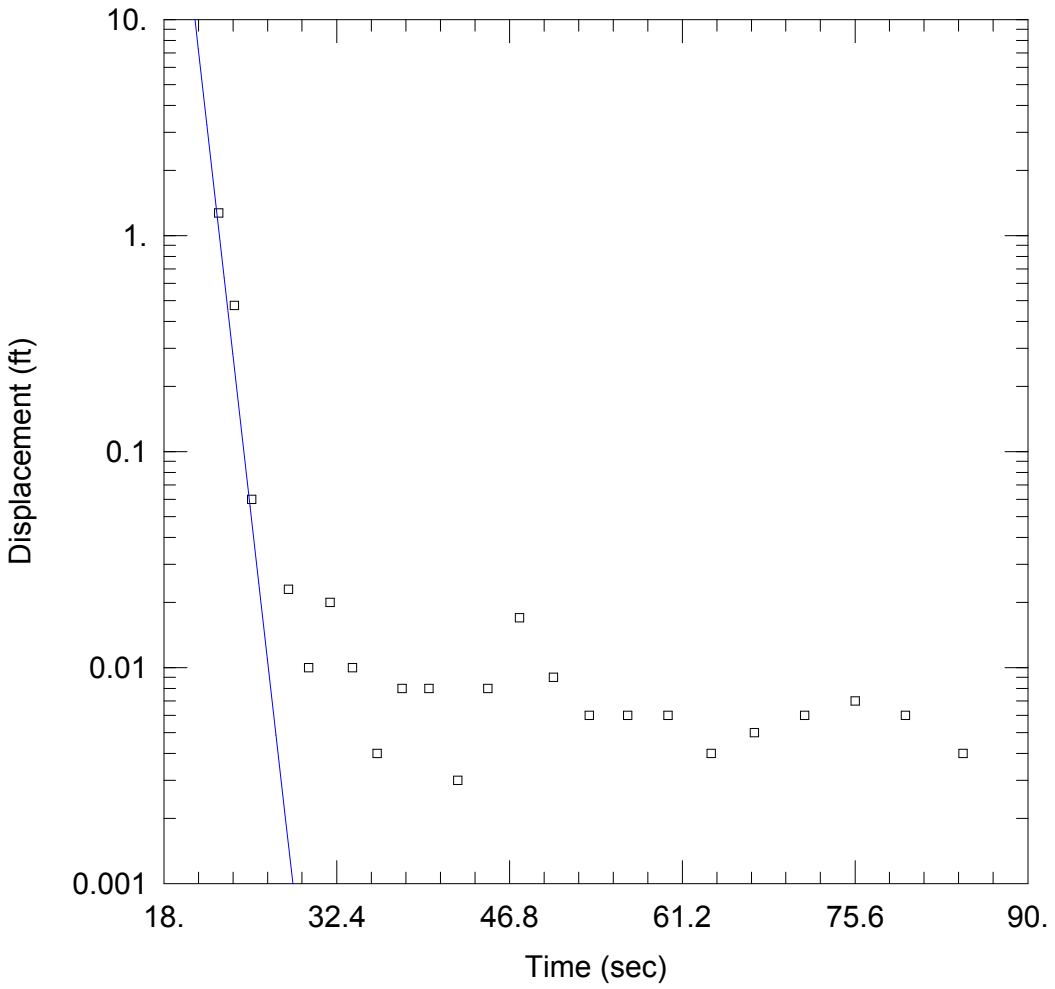
WELL DATA (MW-7D)

Initial Displacement: 0.99 ft
Total Well Penetration Depth: 23.51 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 23.51 ft
Screen Length: 5. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 0.05651 cm/sec y0 = 3.002E+5 ft



WELL TEST ANALYSIS

Data Set: P:\National_Grid\Patchogue\Slug_Testing\AQT\MW-7D_2DUP.aqt
Date: 10/18/12 Time: 12:05:02

PROJECT INFORMATION

Company: Brown and Caldwell
Client: National Grid Patchogue
Test Well: MW-7D_2
Test Date: 07/19/2012

AQUIFER DATA

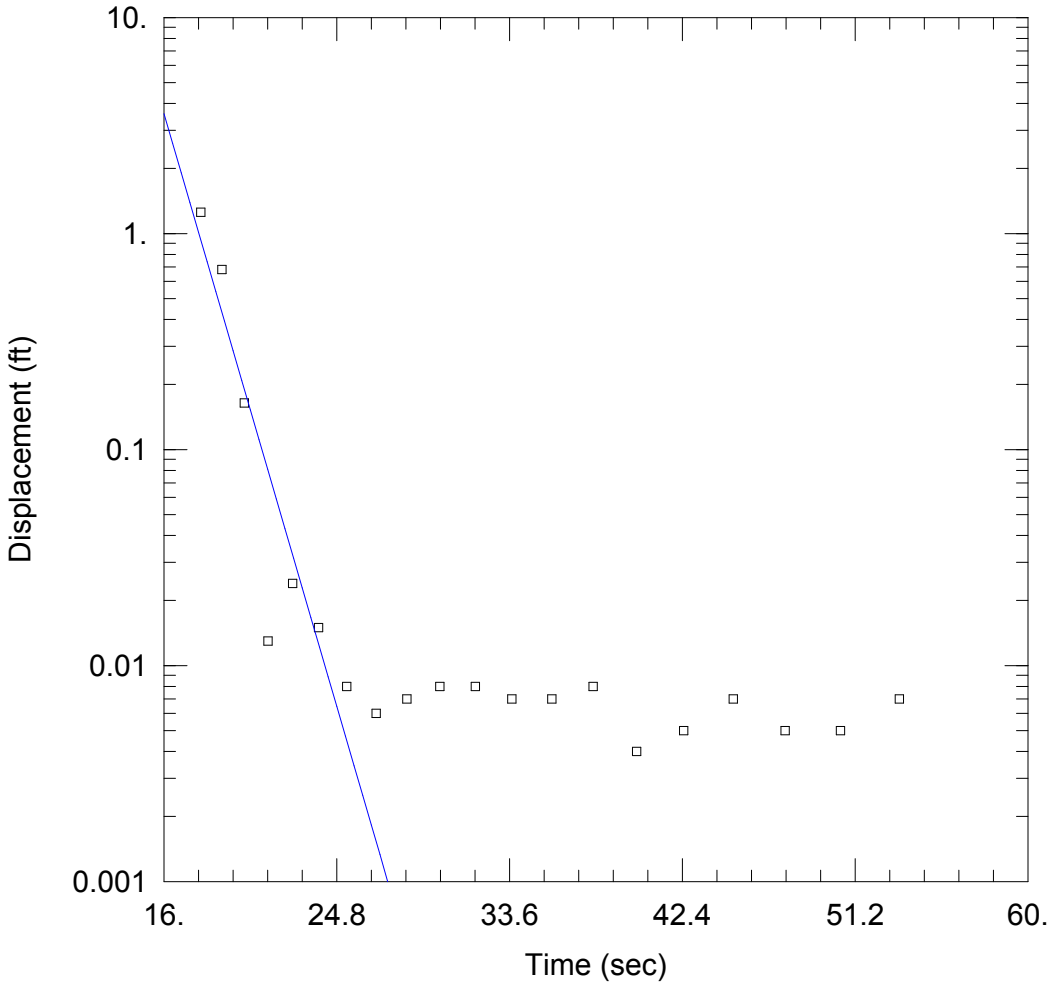
Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-7D_2DUP)

Initial Displacement: 1.272 ft
Total Well Penetration Depth: 23.51 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 23.51 ft
Screen Length: 5. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.09782 cm/sec
y0 = 1.278E+11 ft



WELL TEST ANALYSIS

Data Set: P:\National_Grid\Patchogue\Slug_Testing\AQT\MW-8D.aqt
Date: 10/18/12 Time: 12:14:43

PROJECT INFORMATION

Company: Brown and Caldwell
Client: National Grid Patchogue
Test Well: MW-8D_2
Test Date: 07/19/2012

AQUIFER DATA

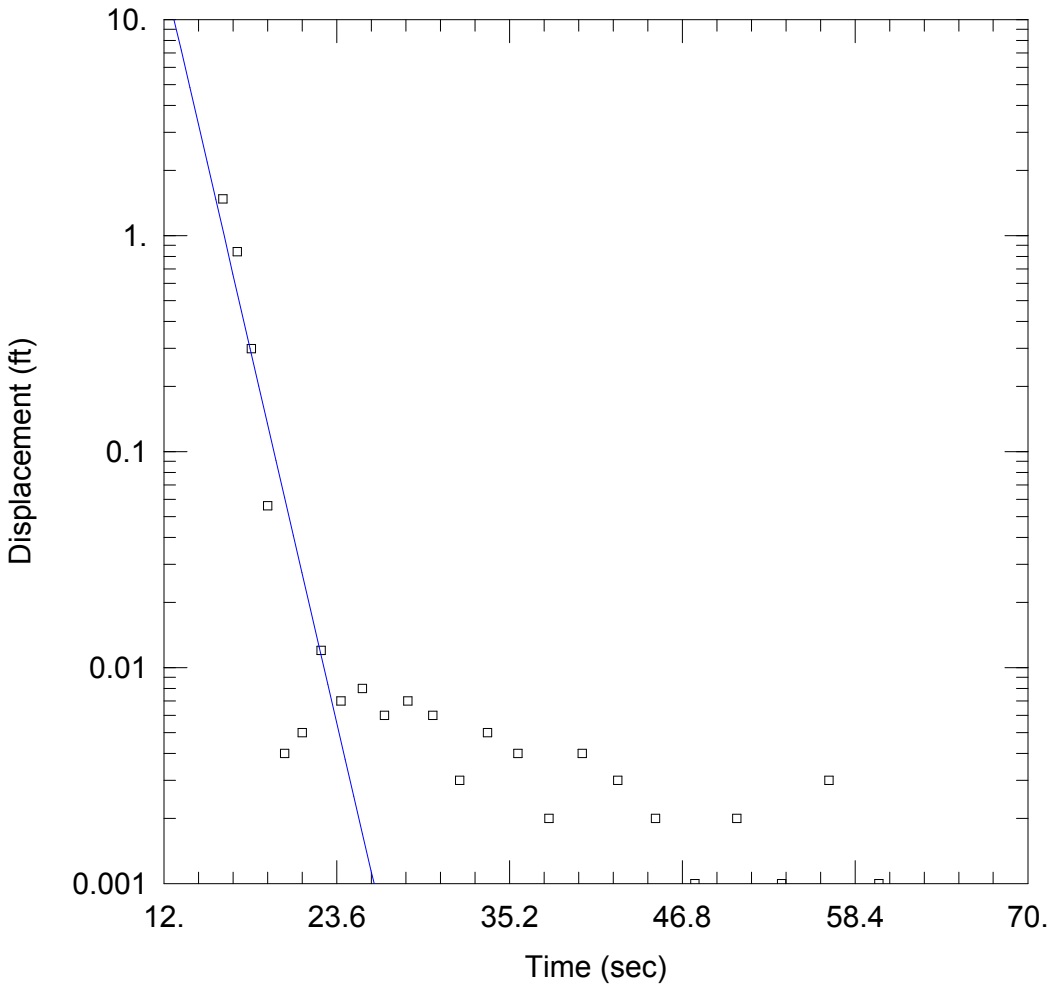
Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-8D)

Initial Displacement: 1.255 ft
Total Well Penetration Depth: 24.14 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 24.14 ft
Screen Length: 5. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.06219 cm/sec
y0 = 3.5E+5 ft



WELL TEST ANALYSIS

Data Set: P:\National_Grid\Patchogue\Slug_Testing\AQT\MW-8D_2DUP.aqt
Date: 10/18/12 Time: 12:17:42

PROJECT INFORMATION

Company: Brown and Caldwell
Client: National Grid Patchogue
Test Well: MW-8D_2
Test Date: 07/19/2012

AQUIFER DATA

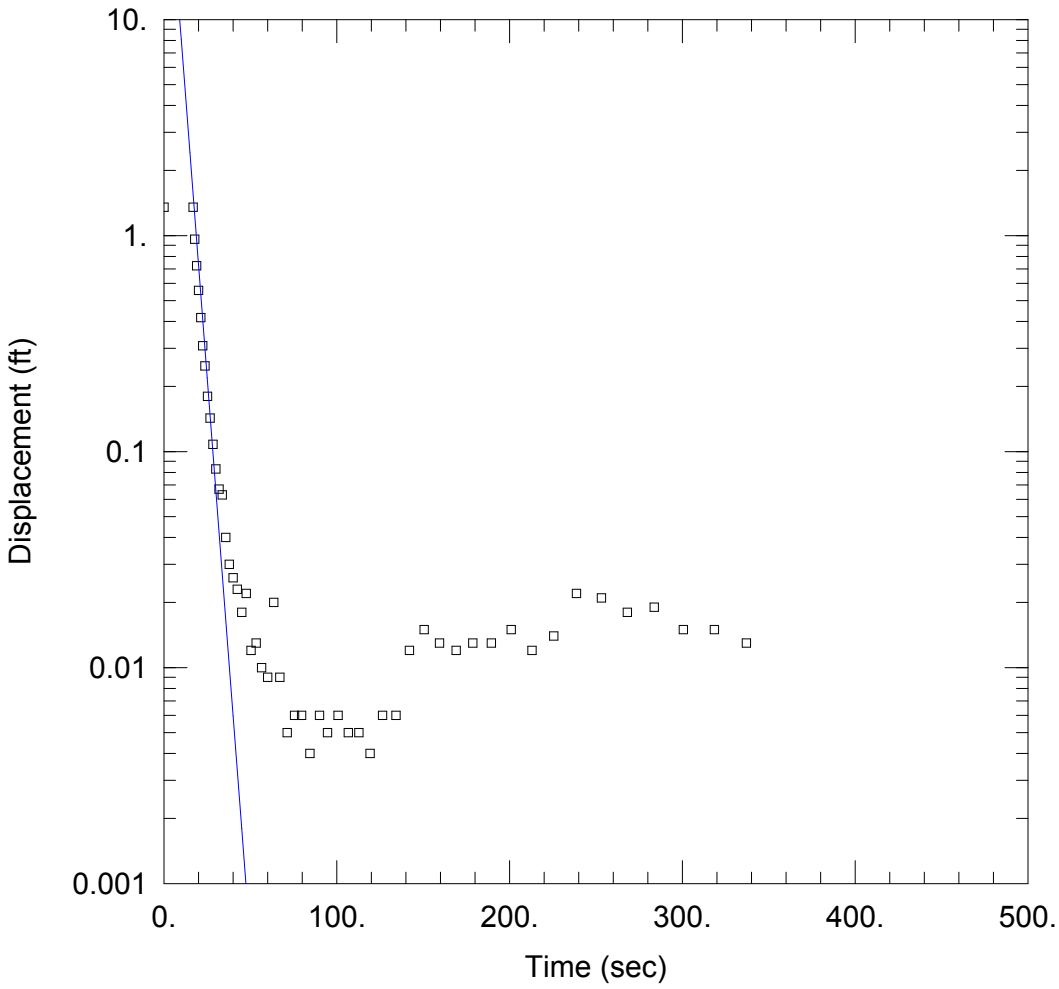
Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-8D_2DUP)

Initial Displacement: 1.479 ft
Total Well Penetration Depth: 24.14 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 24.14 ft
Screen Length: 5. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.0594 cm/sec
y0 = 5.996E+4 ft



WELL TEST ANALYSIS

Data Set: P:\National_Grid\Patchogue\Slug_Testing\AQT\PZ-1A.aqt
Date: 10/19/12 Time: 13:30:42

PROJECT INFORMATION

Company: Brown and Caldwell
Client: National Grid Patchogue
Test Well: PZ-1A
Test Date: 07/18/2012

AQUIFER DATA

Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 1.

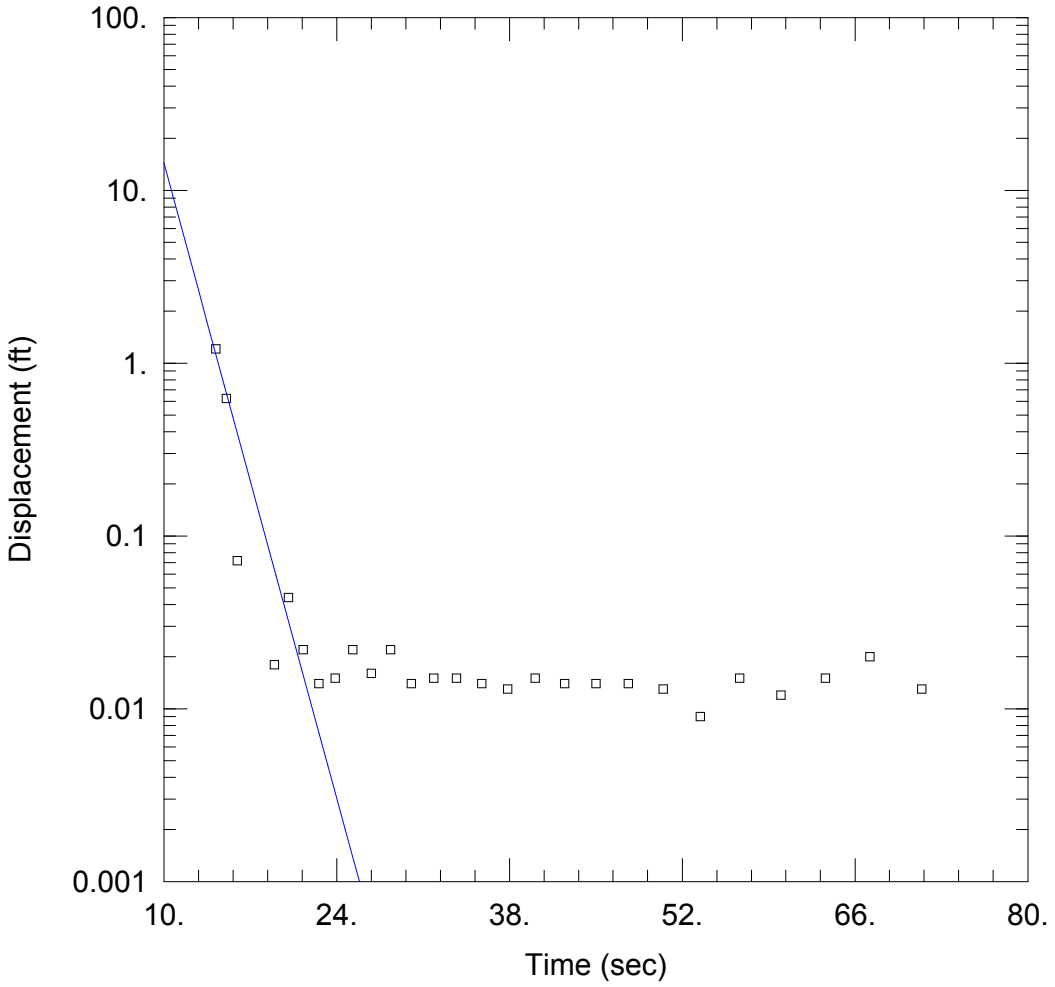
WELL DATA (PZ-1A)

Initial Displacement: 1.351 ft
Total Well Penetration Depth: 4.5 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 4.5 ft
Screen Length: 4.5 ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 0.02254 cm/sec y0 = 89.49 ft



WELL TEST ANALYSIS

Data Set: P:\National_Grid\Patchogue\Slug_Testing\AQT\PZ-1B.aqt
Date: 10/18/12 Time: 12:09:45

PROJECT INFORMATION

Company: Brown and Caldwell
Client: National Grid Patchogue
Test Well: PZ-1B
Test Date: 07/18/2012

AQUIFER DATA

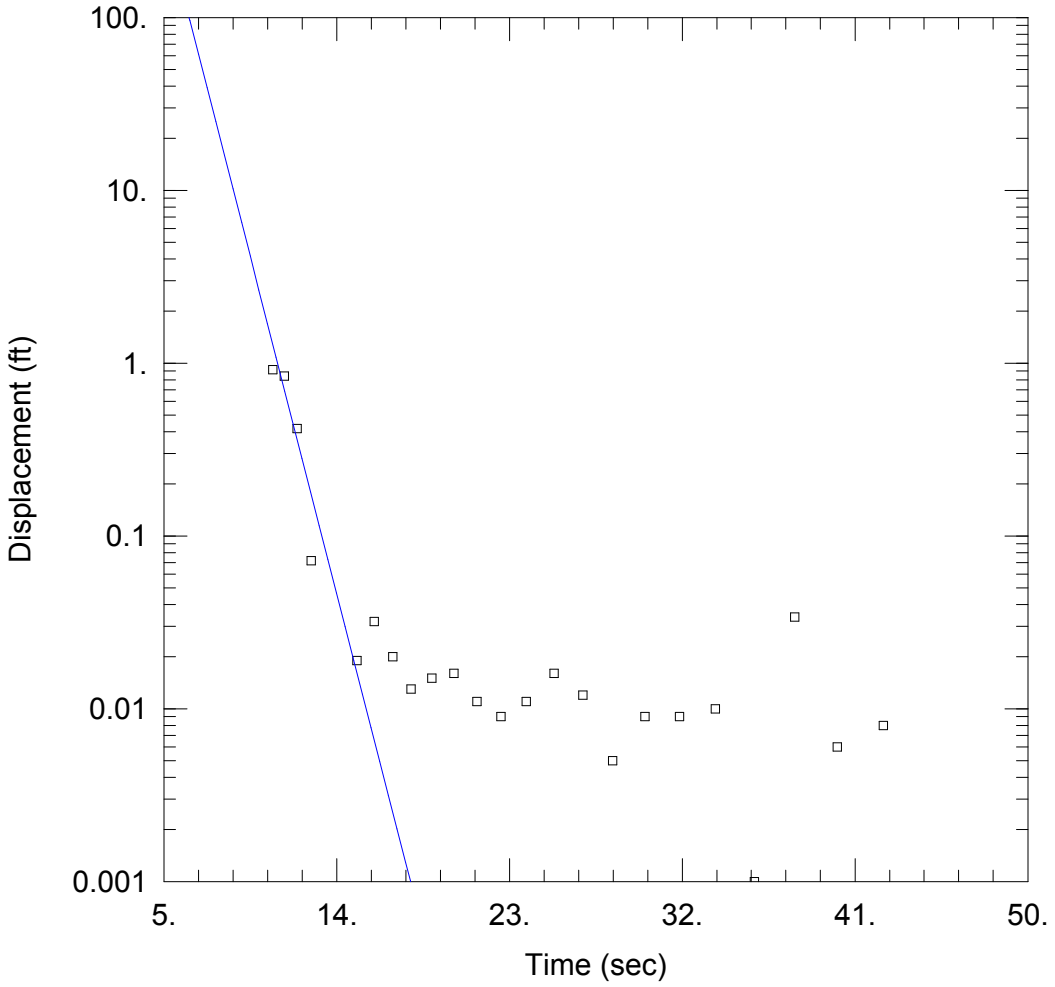
Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-1B)

Initial Displacement: 1.211 ft
Total Well Penetration Depth: 17.68 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 17.68 ft
Screen Length: 5. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.05228 cm/sec
y0 = 6013.9 ft



WELL TEST ANALYSIS

Data Set: P:\National_Grid\Patchogue\Slug_Testing\AQT\PZ-1B_2DUP.aqt
Date: 10/18/12 Time: 12:11:57

PROJECT INFORMATION

Company: Brown and Caldwell
Client: National Grid Patchogue
Test Well: PZ-1B
Test Date: 07/18/2012

AQUIFER DATA

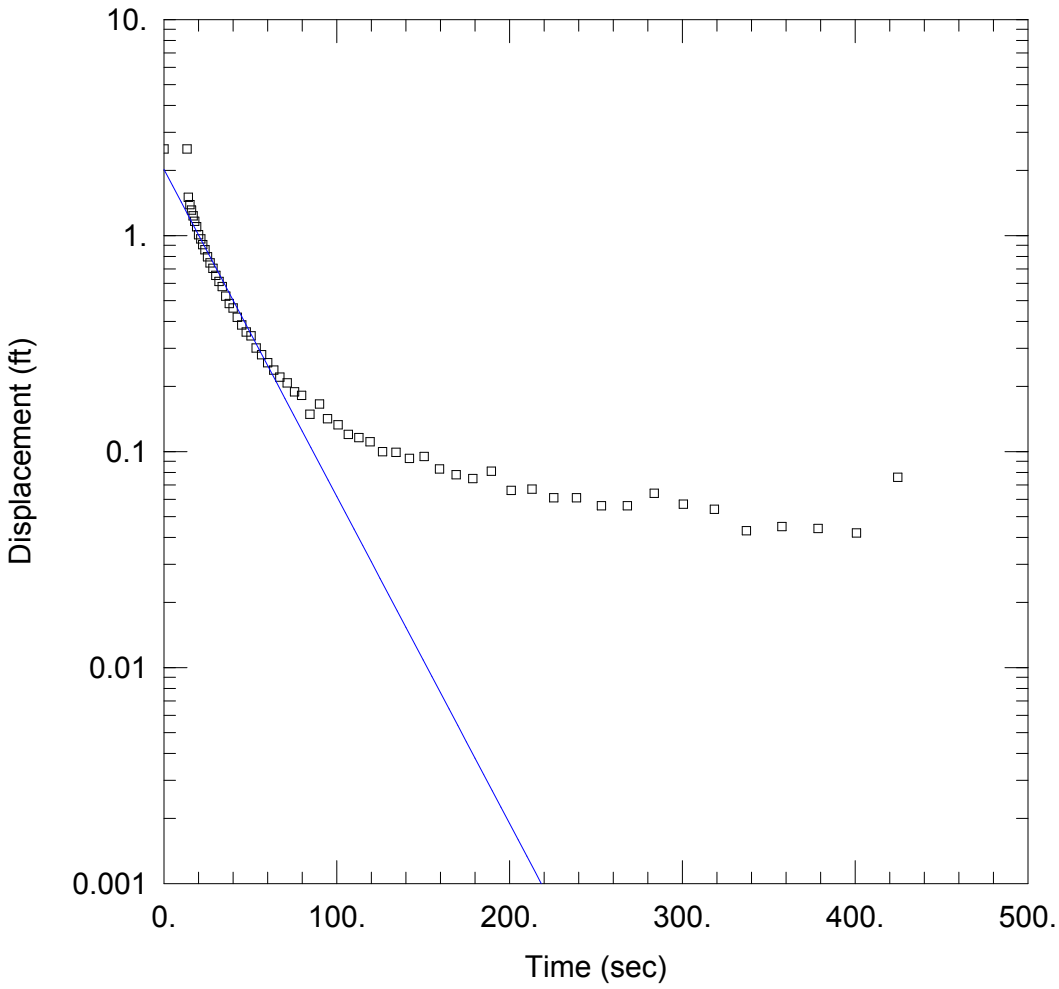
Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-1B_2DUP)

Initial Displacement: 0.916 ft
Total Well Penetration Depth: 17.68 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 17.68 ft
Screen Length: 5. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.08639 cm/sec
y0 = 5.418E+4 ft



WELL TEST ANALYSIS

Data Set: P:\National_Grid\Patchogue\Slug_Testing\AQT\PZ-2A.aqt
Date: 10/18/12 Time: 12:02:25

PROJECT INFORMATION

Company: Brown and Caldwell
Client: National Grid Patchogue
Test Well: PZ-2A
Test Date: 07/18/2012

AQUIFER DATA

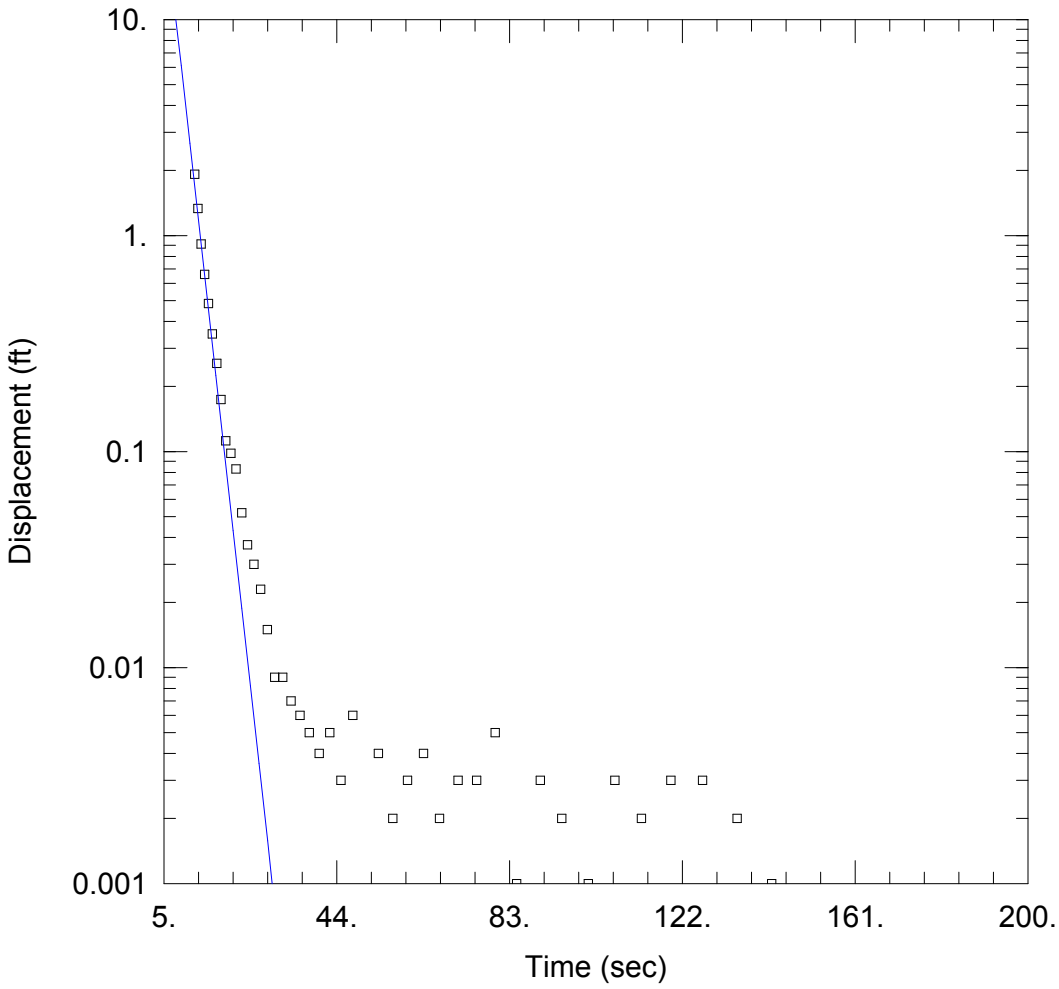
Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-2A)

Initial Displacement: 2.518 ft
Total Well Penetration Depth: 3.37 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 3.37 ft
Screen Length: 3. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.004405 cm/sec
y0 = 2.021 ft



WELL TEST ANALYSIS

Data Set: P:\National_Grid\Patchogue\Slug_Testing\AQT\PZ-2B.aqt
Date: 10/18/12 Time: 12:24:49

PROJECT INFORMATION

Company: Brown and Caldwell
Client: National Grid Patchogue
Test Well: PZ-2B
Test Date: 07/18/2012

AQUIFER DATA

Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 1.

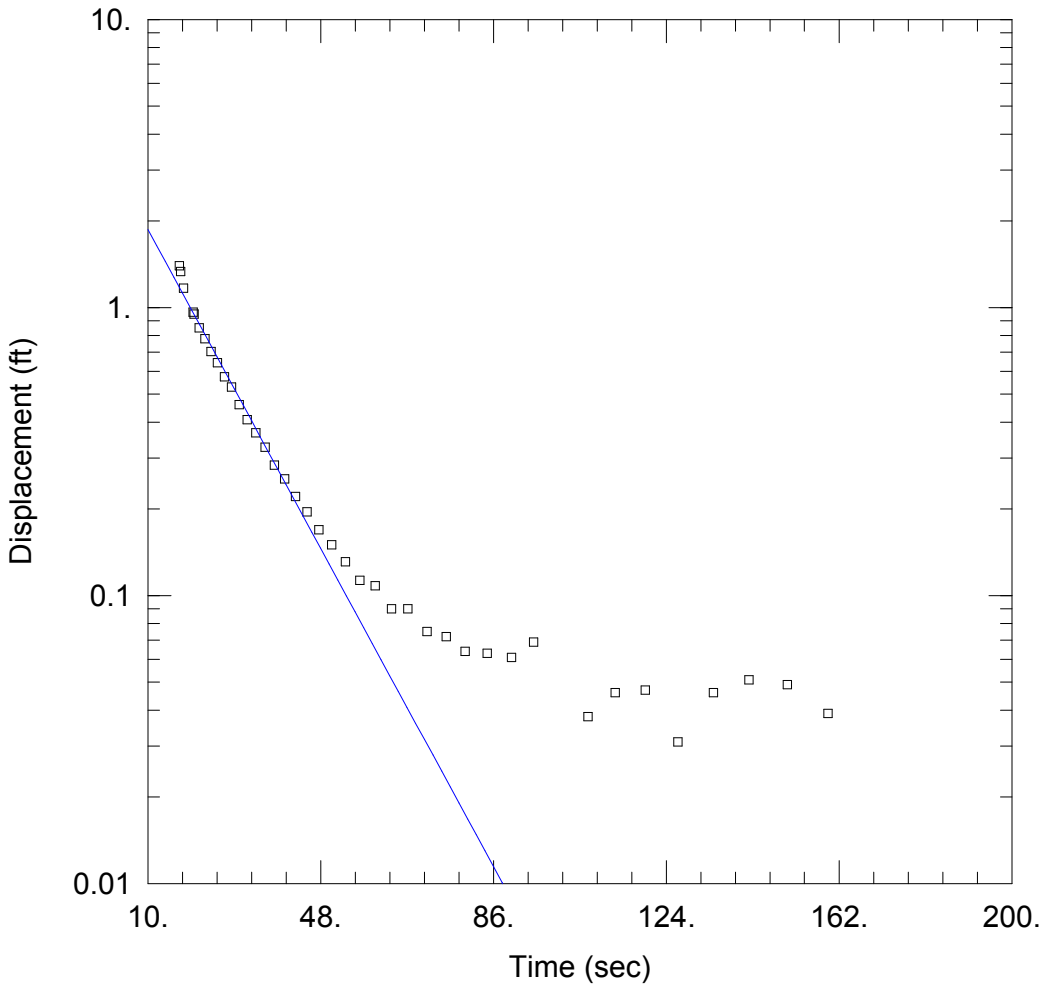
WELL DATA (PZ-2B)

Initial Displacement: 1.924 ft
Total Well Penetration Depth: 13.93 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 13.93 ft
Screen Length: 5. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 0.0367 cm/sec y0 = 266.1 ft



WELL TEST ANALYSIS

Data Set: P:\National_Grid\Patchogue\Slug_Testing\AQT\PZ-3A.aqt
Date: 10/18/12 Time: 11:58:11

PROJECT INFORMATION

Company: Brown and Caldwell
Client: National Grid Patchogue
Test Well: PZ-3A
Test Date: 07/19/2012

AQUIFER DATA

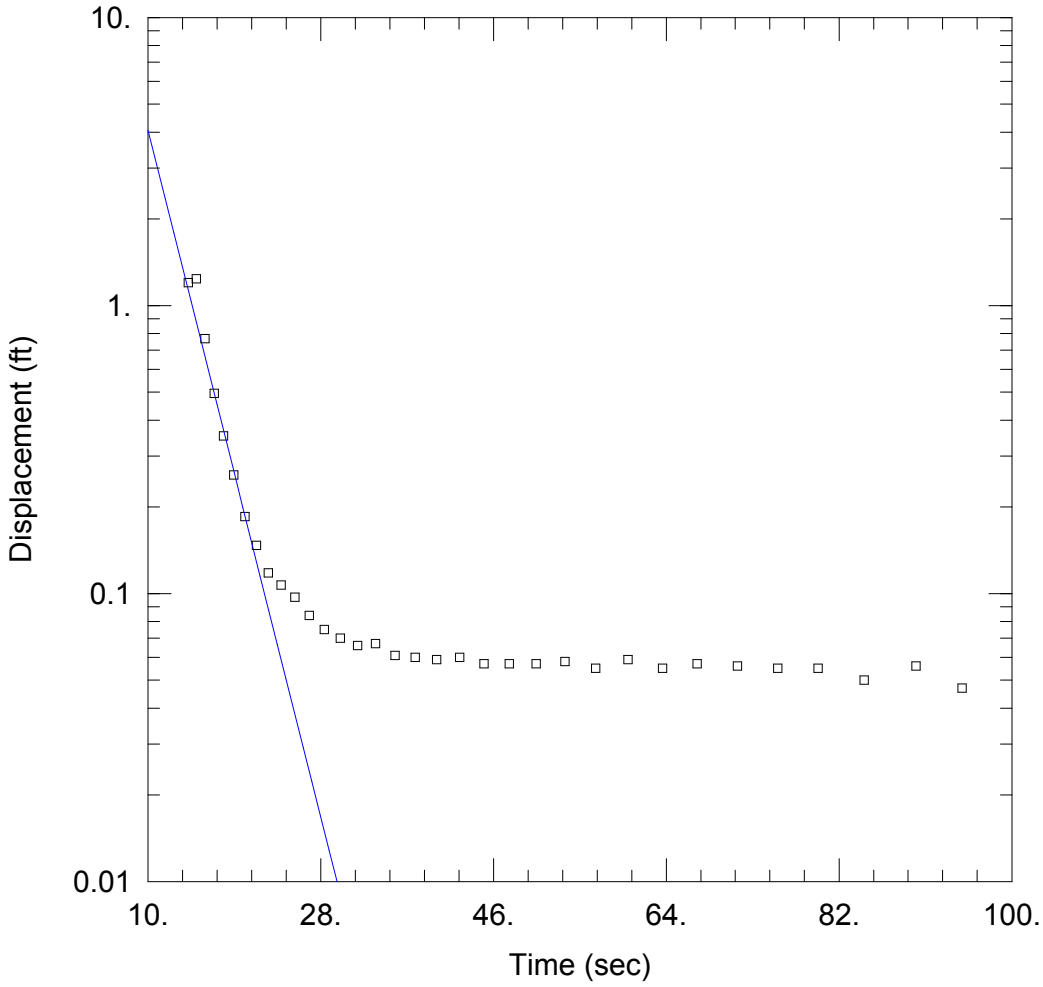
Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-3A)

Initial Displacement: 1.398 ft
Total Well Penetration Depth: 3.97 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 3.97 ft
Screen Length: 3. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.008469 cm/sec
y0 = 3.646 ft



WELL TEST ANALYSIS

Data Set: P:\National_Grid\Patchogue\Slug_Testing\AQT\PZ-3B.aqt
Date: 10/18/12 Time: 11:25:10

PROJECT INFORMATION

Company: Brown and Caldwell
Client: National Grid Patchogue
Test Well: PZ-3B
Test Date: 07/19/2012

AQUIFER DATA

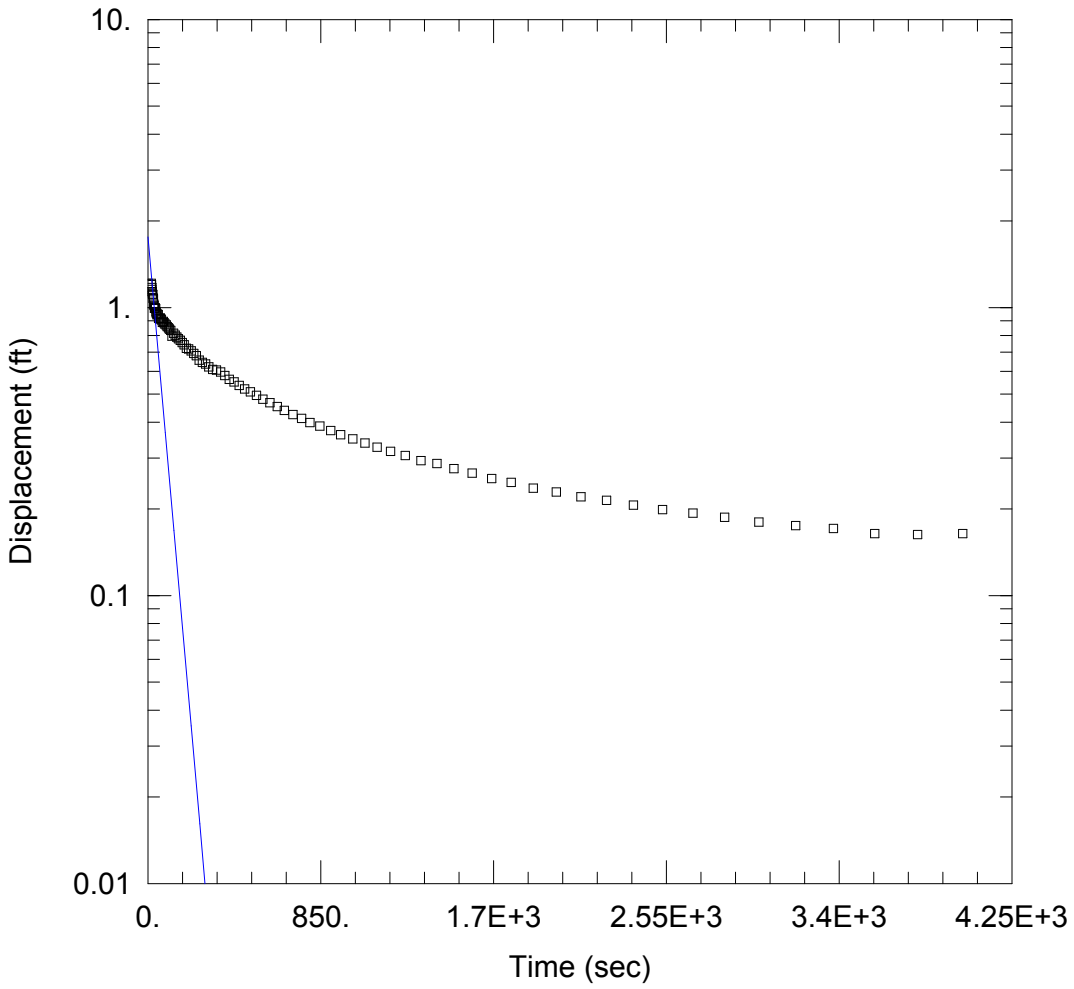
Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-3B)

Initial Displacement: 1.239 ft
Total Well Penetration Depth: 15.82 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 15.82 ft
Screen Length: 5. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.02638 cm/sec
y0 = 85.43 ft



WELL TEST ANALYSIS

Data Set: P:\National_Grid\Patchogue\Slug_Testing\AQT\PZ-4A.aqt
Date: 10/18/12 Time: 11:38:35

PROJECT INFORMATION

Company: Brown and Caldwell
Client: National Grid Patchogue
Test Well: PZ-4A
Test Date: 07/19/2012

AQUIFER DATA

Saturated Thickness: 150. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (PZ-4B)

Initial Displacement: 1.212 ft
Total Well Penetration Depth: 2.92 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 2.92 ft
Screen Length: 2. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.003093 cm/sec
y0 = 1.757 ft

Appendix E: ISS Treatability Study Laboratory Report (CD-ROM)

PATCHOGUE MGP SITE
TREATABILITY STUDY INTERIM REPORT

KEMRON Project Number: SE0427 Rev 1

November 29, 2012

Prepared for:

BROWN AND CALDWELL

Prepared by:

KEMRON ENVIRONMENTAL SERVICES

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Reviewed By:

Tommy A. Jordan, P.G.
Program Manager

Table of Contents

1.0 INTRODUCTION 1
2.0 MATERIAL RECIEPT, HOMOGENIZATION, AND CHARACTERIZATION 1
3.0 STABILIZATION EVALUATIONS 3
4.0 CONCLUSIONS 14

List Of Tables

Table 1 – Untreated Material Physical Properties Characterization
Table 2 – Preliminary Mixture Designs – Penetrometer, VE, pH, UCS, Permeability Testing
Table 3 – Optimization Mixture Designs – Penetrometer, VE, pH, UCS, Permeability Testing

List Of Attachments

Appendix A – Untreated Physical Properties Testing
Appendix B – Preliminary Treatment Data Sheets
Appendix C – Optimization Treatment Data Sheets

Acronyms

ASTM	American Society of Testing and Materials
˚C	Degrees Celsius
cm/sec	Centimeters per second
DI	De-ionized
EPA	U.S. Environmental Protection Agency
KEMRON	Kemron Environmental Services
psi	Pounds per square inch
UCS	Unconfined Compressive Strength

1.0 INTRODUCTION

KEMRON Environmental Services, Inc. (KEMRON) has developed the Patchogue MGP Site Bench-Scale Treatability Study Final Report to summarize the results of testing performed on materials from the site, and to present the protocols used in testing of the site materials. All testing performed during the study were conducted in accordance with the Work Plan developed by Brown and Caldwell and the subsequent cost proposal prepared by KEMRON, and subsequent telephone conferences and communications between KEMRON and Brown and Caldwell. All treatability testing was conducted at KEMRON's facilities located in Atlanta, Georgia.
The bench-scale testing was performed in a phased approach and included untreated material characterization, and solidification evaluations. Throughout the study, KEMRON and Brown and Caldwell were in frequent communication, and the progression of the study was relatively fluid. Some changes to the original scope/proposal were made during the course of the study, based on the on-going analysis of the results available at the time.

This report does not describe the study in an exact chronological order, but rather it has been organized in a way to show the effectiveness of treatments evaluated and results of testing performed on those treated materials.

The untreated material testing was performed to provide information on the physical and chemical properties of the site materials. Untreated material characterization is important to the success of the study by providing a baseline of contaminant concentration to evaluate the effectiveness of treatment as well as ensuring that the materials provided for the study were similar to those anticipated at the site.

The primary objective of the bench-scale study was to evaluate the effectiveness of different reagent admixtures at improving of physical properties including UCS and permeability of the treated materials. The following discussions summarize the various treatment alternatives and methods.

2.0 MATERIAL RECIEPT, HOMOGENIZATION, AND CHARACTERIZATION

KEMRON received two distinct materials from the site labeled "Native", and "Fill". Immediately following the receipt of the site materials, KEMRON logged the materials into a sample tracking database and placed them in a 4-degree-Celsius (°C) walk-in cooler for storage.

KEMRON individually homogenized the site materials by placing the contents from the shipping containers into a pre-cleaned plastic mixing pan and gently blending by hand using a stainless steel spoon until visually homogenous. At this time aliquots of both site materials were removed for particle size analysis testing in accordance with the American Society of Testing and Materials (ASTM) Method 422. The remaining soil was further homogenized, and any particles measuring greater than 0.5 inches in diameter were removed in order to facilitate bench-scale treatment and adhere to particle-size limits outlined in certain ASTM and EPA test methods.

KEMRON performed homogenization activities on the chilled samples to minimize volatilization of organic contaminants of concern.

To characterize each the physical properties of each site material, KEMRON performed the following testing on aliquots of each untreated material:

PARAMETER	METHOD
Moisture Content	ASTM D2216
Loss on Ignition (Organic Content)	ASTM D2974
Soil Classification	USCS D2487
Particle Size Analysis with Hydrometer	ASTM D422
Atterberg Limits	ASTM D4318
Material pH	EPA Method 9045

A summary of the results of the physical properties testing are provided on Table 1, and physical properties data sheets for the untreated materials are included in Appendix A.
The following is a summary of the data presented in Table 1:

Table 1 – Untreated Material Physical Properties Testing

TESTING PARAMETER	TEST METHOD	UNIT	SAMPLE	
			NATIVE	FILL
Moisture Content	ASTM D2216			
ASTM Moisture Content		%	15.21	17.09
Percent Solids		%	86.80	85.41
Bulk Unit Weight	ASTM D7263	pcf	116.8	115.0
Atterberg Limits	ASTM D4318			
Liquid Limit		LL	NV	NV
Plastic Limit		PL	NP	NP
Plasticity Index		PI	NP	NP
Loss on Ignition*	ASTM D2974	%		
Moisture Content		%	30	17
Ash Content		%	78.2	91.5
Organic Matter		%	21.8	8.5
Particle Size Distribution	ASTM D422/D854			
Gravel		%	4.4	12.3
Sand		%	92.7	79.4
Silt		%	0.4	4.8
Clay		%	2.5	3.5

Table 1 – Untreated Material Physical Properties Testing (con't)

TESTING PARAMETER	TEST METHOD	UNIT	SAMPLE	
			NATIVE	FILL
pH	EPA 9045	s.u.	7.47	9.51
Sample Description	USCS (D2487)		Black poorly graded sand	Very dark brown poorly graded sand with silt
Sample Classification	USCS (D2487)		SP	SP-SM

Notes

% = Percent

pcf = pounds per cubic foot

NV = Non-Viscous

NP = Not Plastic

Sample descriptions based on the Unified Classification System.

Sample color determined by the Munsell Soil Color Charts.

* Loss on Ignition testing was performed by GeoTesting Express, who indicated that high petroleum content likely caused the results of the moisture content and organic matter content to appear higher than they actually were, particularly in the case of the Native sample.

s.u. - Standard Units

The results presented in Table 1 indicate that the site soils were relatively similar with the exception that the Native material contained a higher percentage of organic material than the Fill material and was classified as a poorly graded sand where the Fill material contained a slightly higher percentages of silt and clay.

2.0 PRELIMINARY SOLIDIFICATION EVALUATIONS

KEMRON prepared a total of eight mixtures, four for each on the Native and Fill materials. Below is a summary of the preliminary mixtures developed.

KEMRON Sample Number	Untreated Material Type	Reagent Type	Reagent Addition % by Wet Soil wt.	Water Addition % by Reagent wt.
0427-001	Native	Portland Cement	7.5	50
0427-002	Native	Portland Cement	12.5	50
0427-003	Native	Portland Cement / Bentonite	7.5 / 1.5	140
0427-004	Native	Portland Cement / Bentonite	12.5 / 1.5	110
0427-005	Fill	Portland Cement	5.0	50
0427-006	Fill	Portland Cement	10.0	50
0427-007	Fill	Portland Cement / Bentonite	5.0 / 1.5	185
0427-008	Fill	Portland Cement / Bentonite	10.0 / 1.5	125

Note that the reagents or reagent blends were added to the untreated material as a pumpable slurry using potable tap water. In mixtures where bentonite was included, the bentonite was hydrated with water overnight before blending with the other reagent materials and subsequent mixing with the untreated material.

The reagent additions were calculated on a by-weight basis according to the quantity of untreated material utilized. The water used in each mixture was based on the total weight of the reagents (Portland cement and bentonite) utilized in the mixture. For example in a mixture with 7.5 percent (%) Portland cement, and 1.5% bentonite with a 140% water addition, for every 100g of untreated material, 1.5 grams (g) of bentonite, 7.5g of Portland cement and 12.6g of water was used. The bentonite was first hydrated overnight using the majority of water in the mixture. The cement was then hydrated with the remaining water and mixed with the untreated soil. The specific amounts of water used for each phase of mixing are presented in the Mixture Development Data Sheets included in the attachments to this text. Mixture data sheets for mixtures 001 through 008 are found in Attachment B.

All mixtures were prepared using a Hobart-type kitchen mixer with a paddle-type mixing arm. Mixtures were developed by preparing the appropriate reagents, hydrated bentonite and / or hydrated cement. An aliquot of the appropriate untreated material was placed into the mixing chamber. The reagent slurry was then added to the untreated material while mixing. Each mixture was blended for a period of approximately 60 to 90 seconds at a rate of approximately 60 revolutions per minute (rpm).Treatment utilizing this mixer is intended to simulate potential full-scale remediation options, to the extent possible on the bench-scale. This approach is routinely utilized to simulate a wide range of potential full-scale remediation approaches, including both in-situ and ex-situ applications.

Reagent Selection

Throughout the treatability study, KEMRON utilized additives which are commonly utilized in solidification treatment of organic containing soils. These additives are readily accessible and have proven effective at treating similar materials to those from the site. The following discussions are generalizations regarding the selection of these materials for evaluation in this study.

Type I Portland cement (PC) – Used in solidification / stabilization to provide strength and bind contaminants through macro and micro encapsulation. Portland cement typically provides relatively quick curing strengths. Ultimate final strength as well as setting properties can be affected by certain contaminants, and other additives.

Bentonite – Bentonite is typically utilized to reduce the permeability of a soil during remediation. Bentonite may also be used to adsorb organic contaminants providing further leachability reduction. Bentonite used in combination with cementitious additives can reduce the ultimate final strength of the treated material over cement alone.

As outlined above, the additives were typically used in different combinations to take advantage of different benefits provided by the different additives. Following the preparation of each

mixture design, the treated materials were placed into cylindrical plastic molds for curing. At curing intervals of 1 and 7 days, KEMRON evaluated the potential setting properties of each mixture through pocket penetrometer testing. The results of penetrometer testing are presented in Table 2. The following is a summary of the data presented in Table 2:

TABLE 2 – Preliminary Solidification Mixture Designs and Penetrometer Test Results

KEMRON Sample Number	Untreated Material Type	Reagent Type	Reagent Addition % by Wet Soil wt.	Water Addition % by Reagent wt.	Pocket Penetrometer TSF	
					1 Day	7 Day
0427-001	Native	Portland Cement	7.5	50	1.25	>4.5
0427-002	Native	Portland Cement	12.5	50	>4.5	>4.5
0427-003	Native	Portland Cement / Bentonite	7.5 / 1.5	140	1.25	>4.5
0427-004	Native	Portland Cement / Bentonite	12.5 / 1.5	110	>4.5	>4.5
0427-005	Fill	Portland Cement	5.0	50	>4.5	>4.5
0427-006	Fill	Portland Cement	10.0	50	>4.5	>4.5
0427-007	Fill	Portland Cement / Bentonite	5.0 / 1.5	185	0.25	2.75
0427-008	Fill	Portland Cement / Bentonite	10.0 / 1.5	125	3.25	>4.5

Penetrometer data indicates that within 7 days of curing, all samples with the exception of the Fill material treated with 5% cement and 1.5% bentonite exceeded 4.5 tons per square foot (TSF). Note that the maximum value registered on a standard pocket penetrometer device is 4.5 TSF. The actual strength of the treated material may actually be in excessive of 4.5 TSF.

Following 28 days of curing each treated material was subjected to Unconfined Compressive Strength (UCS) testing in accordance with the American Society of Testing and Materials (ASTM) Method 2166. The results of UCS testing are also included in Table 2. The following is a summary of the UCS results for mixtures 001 through 008.

TABLE 2 Continued – Preliminary Solidification UCS Test Results

KEMRON Sample Number	Untreated Material Type	Unconfined Compressive Strength			
		Moisture Content (%)	Bulk Density (lb/ft³)	Dry Density (lb/ft³)	UCS (lb/in²)
0427-001	Native	21.5	120.5	99.2	98.7
0427-002	Native	21.7	126.9	104.3	250.5
0427-003	Native	30.9	108.3	82.7	26.0
0427-004	Native	30.4	111.6	85.6	91.4
0427-005	Fill	18.2	117.9	99.7	56.1
0427-006	Fill	19.0	123.8	104.0	310.1
0427-007	Fill	25.9	100.1	79.5	21.1
0427-008	Fill	25.4	108.0	86.1	110.2

Review of the UCS data shows that strength is directly related to Portland cement addition rate, and that the incorporation of bentonite in the mixture significantly reduces the effectiveness of cement on strength gain.

Table 2 also presents the results of permeability testing performed on the treated mixtures. Permeability testing was conducted on the treated materials following a 28 day curing interval. Testing was conducted in accordance with ASTM Method D5084. The following is a summary of permeability testing;

TABLE 2 Continued – Preliminary Solidification Permeability Test Results

KEMRON Sample Number	Untreated Material Type	Hydraulic Conductivity (k) (cm/sec)			
		Moisture Content (%)	Bulk Density (lb/ft³)	Dry Density (lb/ft³)	Perm (cm/sec)
0427-001	Native	21.9	124	101.8	5.90E-06
0427-002	Native	21.3	127	104.5	3.00E-07
0427-003	Native	30.9	109	83.2	4.30E-07
0427-004	Native	28.7	112	87.2	2.60E-06
0427-005	Fill	17.1	117	100.2	3.10E-07
0427-006	Fill	19.0	122	102.5	3.30E-07
0427-007	Fill	23.6	103	83.0	2.50E-07
0427-008	Fill	25.4	107	85.4	1.90E-07

The permeability data indicates that all of the treated materials exhibited hydraulic conductivity values in the10^{-6} to 10^{-7} cm/sec range. Given the sandy makeup of the untreated materials, KEMRON believes this is an extensive permeability reduction in the site materials.

In addition to the testing results presented above, Table 2 also shows the results for material pH testing and volumetric expansion testing. Volumetric expansion is a comparison in the volume of a known amount of untreated soil and the volume of that same volume of soil treated with the outlined mixture designs. For example, a 100g aliquot of each untreated material was placed into separate curing molds and compacted to remove any air voids using minimal compaction effort. The height of the untreated material in the mold was then measured and recorded. Separate 100g aliquots of the untreated materials were then treated using the appropriate mixture designs. Each mixture was then placed into identical curing molds. Following 28 days of curing, the height of the treated material within the curing mold was measured and recorded and the volumetric expansion was calculated using the following formula:

(Ht. of treated material – Ht. of untreated aliquot) / Ht. of untreated aliquot x 100%

The results of material pH as well as 28-day volumetric expansion results are summarized below;

TABLE 2 Continued – Preliminary Solidification Material pH and Volumetric Expansion

KEMRON Sample Number	Untreated Material Type	Untreated Material pH	Treated Material pH	Volumetric Expansion (%)
0427-001	Native	7.47	11.43	14.9010.3
0427-002	Native	7.47	11.83	20.2115.4
0427-003	Native	7.47	11.24	45.0039.2
0427-004	Native	7.47	11.77	50.7344.7
0427-005	Fill	9.51	11.25	18.1414.6
0427-006	Fill	9.51	11.16	22.7819.1
0427-007	Fill	9.51	10.66	47.3242.9
0427-008	Fill	9.51	11.04	47.7343.3

As expected the addition of the treatment reagents increased the pH of the site materials, as well as the volume of material. The volume increase is directly related to the quantity of reagents added to the site materials. Copies of all bench scale data sheets for testing conducted during the preliminary phase of testing are included in Attachment B of this text.

IMMERSION TESTING

KEMRON performed immersion testing on the preliminary candidate mixture designs. The purpose of the immersion test is to see if there would be a release of free product from the treated materials when in the presence of water. The immersion tests also gives an indication of the integrity of the material, and how well it holds together and potentially will hold together over time.

Immersion testing was performed by submerging a 28 day cured specimen into a beaker of de-ionized (DI) water and swirled continuously for a period of 7 days at approximately 150 rotations per minute (rpm). Throughout that time KEMRON made visual observations regarding the integrity of the treated specimen and the clarity and odor of the DI water. Observations documentation of the treated mixture immersion testing is included in Attachment D accompanying this report. Photographs of the immersion testing are included in a separate media disk. No sheen was observed on the water surface during the testing. The samples held together well. KEMRON observed minor disintegration on the edges of each of the solidified samples.

3.0 OPTIMIZATION SOLIDIFICATION EVALUATIONS

Based on the results of preliminary solidification testing Brown and Caldwell and KEMRON developed 10 additional mixtures for evaluation of the Native soil and 7 additional mixtures for the Fill material. These mixtures were designed to evaluate the effectiveness of mixtures with reduced addition rates of bentonite, cement, or both.

Initially KEMRON prepared the mixtures using much less water than those outlined below. After consideration and some testing, KEMRON determined that the quantity of water utilized in the initial mixtures would not facilitate in-situ mixing, as the reagent slurries were not pumpable. KEMRON prepared alternative mixtures which are represented by the sample number followed by the letter "A". Note that the mixtures including bentonite alone were not remade. All mixtures were prepared in the manner previously outlined in this text. The following is a summary of the mixtures prepared for the Optimization testing phase of the study.

KEMRON Sample Number	Untreated Material Type	Reagent Type	Reagent Addition % by Wet Soil wt.	Water Addition % by Reagent wt.
0427-009	Native	Bentonite	0.5	730
0427-010	Native	Bentonite	1.5	533
0427-011A	Native	Portland Cement / Bentonite	12.5 / 0.5	81.3
0427-012A	Native	Portland Cement / Bentonite	7.5 / 0.5	116.4
0427-013A	Native	Portland Cement	5	100
0427-014A	Native	Portland Cement / Bentonite	5 / 0.5	133.8
0427-015A	Native	Portland Cement / Bentonite	5 / 1.5	231.9
0427-016A	Native	Portland Cement	3	166.7
0427-017A	Native	Portland Cement / Bentonite	3 / 0.5	181.6
0427-018A	Native	Portland Cement / Bentonite	3 / 1.5	274.6
0427-019	Fill	Bentonite	0.5	730
0427-020	Fill	Bentonite	1.5	533
0427-021A	Fill	Portland Cement / Bentonite	10 / 0.5	93.9
0427-022A	Fill	Portland Cement / Bentonite	5 / 0.5	136.4
0427-023A	Fill	Portland Cement	3	147.6
0427-024A	Fill	Portland Cement / Bentonite	3 / 0.5	185.7
0427-025A	Fill	Portland Cement / Bentonite	3 / 1.5	277.8

During the initial curing process, KEMRON evaluated the setting properties of the optimized mixtures via pocket penetrometer testing. The results of penetrometer testing are presented in Table 3. The table below represents a a summary of the volumetric expansion results presented in Table 3 in the attachments:

TABLE 3 – Optimization Solidification Pocket Penetrometer Test Results

KEMRON Sample Number	Untreated Material Type	Reagent Type	Reagent Addition % by Wet Soil wt.	Water Addition % by Reagent wt.	Pocket Penetrometer TSF		
					2 Day	5 Day	7 Day
0427-009	Native	Bentonite	0.5	730	NT	NT	NT
0427-010	Native	Bentonite	1.5	533	NT	NT	NT
0427-011A	Native	Portland Cement / Bentonite	12.5 / 0.5	81.3	4.25	>4.5	>4.5
0427-012A	Native	Portland Cement / Bentonite	7.5 / 0.5	116.4	2.25	4.50	4.50
0427-013A	Native	Portland Cement	5	100	4.25	4.50	4.50
0427-014A	Native	Portland Cement / Bentonite	5 / 0.5	133.8	2.00	2.75	3.00
0427-015A	Native	Portland Cement / Bentonite	5 / 1.5	231.9	0.75	1.00	1.25
0427-016A	Native	Portland Cement	3	166.7	1.25	3.50	4.00
0427-017A	Native	Portland Cement / Bentonite	3 / 0.5	181.6	0.75	1.50	2.00
0427-018A	Native	Portland Cement / Bentonite	3 / 1.5	274.6	0.00	0.75	1.00
0427-019	Fill	Portland Cement	0.5	730	NT	NT	NT
0427-020	Fill	Portland Cement	1.5	533	NT	NT	NT
0427-021A	Fill	Portland Cement / Bentonite	10 / 0.5	93.9	>4.5	>4.5	>4.5
0427-022A	Fill	Portland Cement / Bentonite	5 / 0.5	136.4	>4.5	>4.5	>4.5
0427-023A	Fill	Portland Cement	3	147.6	4.00	4.50	4.50
0427-024A	Fill	Portland Cement / Bentonite	3 / 0.5	185.7	2.50	3.50	4.50
0427-025A	Fill	Portland Cement / Bentonite	3 / 1.5	277.8	1.00	2.75	3.00

Notes:

NT= Not Tested

TSF= Tons per Square Foot

In general the results of penetrometer testing indicate that increased bentonite addition reduces the setting of the mixture.

At curing intervals including 7, 14, and 28 days, each treated material was subjected to UCS testing in accordance with the previously specified ASTM test method. The results of UCS testing are presented in Table 3. The following is a summary of the data in Table 3:

TABLE 3 Continued – Optimization Solidification UCS Testing Results

KEMRON Sample Number	Untreated Material Type	Cure (Days)	Unconfined Compressive Strength			
			Moisture Content (%)	Bulk Density (lb/ft³)	Dry Density (lb/ft³)	UCS (lb/in²)
0427-009	Native	7	NT	NT	NT	NT
		28	NT	NT	NT	NT
0427-010	Native	7	NT	NT	NT	NT
		28	NT	NT	NT	NT
0427-011A	Native	7	23.08	116.4	94.6	100.4
		14	21.73	119.0	97.8	118.7
		28	22.53	117.6	95.9	186.4
0427-012A	Native	7	23.44	115.6	93.6	19.9
		14	21.56	118.0	97.0	49.2
		28	23.77	118.0	95.3	52.1
0427-013A	Native	7	18.20	120.4	101.9	30.4
		14	17.02	121.4	103.7	43.6
		28	20.75	120.9	100.1	30.7
0427-014A	Native	7	24.08	117.2	94.4	14.9
		14	21.88	115.5	94.8	21.0
		28	21.88	116.3	95.4	17.7
0427-015A	Native	7	34.80	109.6	81.3	10.3
		14	33.45	112.7	84.5	15.5
		28	34.55	111.0	82.5	11.5
0427-016A	Native	7	18.85	120.7	101.6	9.8
		14	21.81	118.5	97.3	15.2
		28	18.01	120.3	101.9	6.0
0427-017A	Native	7	23.61	113.6	91.9	6.6
		14	22.87	113.6	92.5	12.0
		28	23.32	112.3	91.0	8.9
0427-018A	Native	7	29.74	108.4	83.6	5.7
		14	29.65	109.6	84.6	6.0
		28	30.85	104.8	80.1	5.7
0427-019	Fill	7	NT	NT	NT	NT
		28	NT	NT	NT	NT
0427-020	Fill	7	NT	NT	NT	NT
		28	NT	NT	NT	NT
0427-021A	Fill	7	21.84	118.0	96.8	103.0
		14	20.96	115.8	95.7	177.3
		28	19.52	115.1	96.3	149.0
0427-022A	Fill	7	21.71	116.9	96.0	30.5
		14	21.65	113.3	93.1	33.6
		28	19.70	114.4	95.6	23.1

Notes
NT – Not tested because the sample collapsed under its own weight.

TABLE 3 Continued – Optimization Solidification UCS Testing Results

KEMRON Sample Number	Untreated Material Type	Cure (Days)	Unconfined Compressive Strength			
			Moisture Content (%)	Bulk Density (lb/ft³)	Dry Density (lb/ft³)	UCS (lb/in²)
0427-023A	Fill	7	20.92	117.3	97.0	21.5
		14	17.50	120.4	102.4	24.7
		28	17.65	121.8	103.6	28.2
0427-024A	Fill	7	22.21	110.8	90.6	11.9
		14	19.19	115.6	97.0	11.7
		28	18.77	111.3	93.7	9.6
0427-025A	Fill	7	26.47	114.4	88.1	9.9
		14	25.53	109.6	87.3	10.4
		28	23.53	109.5	88.7	10.0

The results of UCS testing presented in Table 3 shows how significantly the addition of bentonite affects the strength of the treated material. The highest UCS values were achieved in mixtures with higher cement additions and lower bentonite rates.

At curing intervals of 14 and 28 days, KEMRON performed permeability testing on each treated mixture with the exception of those developed with bentonite alone. The results of permeability testing are also found in Table 3. The following is a summary of the permeability results presented in Table 3:

TABLE 3 Continued – Optimization Solidification Permeability Test Results

KEMRON Sample Number	Untreated Material Type	Reagent Type	Reagent Addition % by Wet Soil wt.	Cure (Days)	Hydraulic Conductivity (k) (cm/sec)	
					Moisture Content (%)	Perm (cm/sec)
0427-011A	Native	PC / Bentonite	12.5 / 0.5	14	25.1	1.40E-06
				28	25.3	1.10E-06
0427-012A	Native	PC / Bentonite	7.5 / 0.5	14	25.8	5.10E-06
				28	26.3	6.90E-06
0427-013A	Native	Portland Cement	5	14	20.9	2.40E-05
				28	20.0	1.80E-05
0427-014A	Native	PC / Bentonite	5 / 0.5	14	28.6	2.00E-05
				28	25.7	6.70E-06
0427-015A	Native	PC / Bentonite	5 / 1.5	14	44.4	5.10E-06
				28	32.9	2.00E-06
0427-016A	Native	Portland Cement	3	14	21.1	3.10E-05
				28	21.7	8.70E-05
0427-017A	Native	PC / Bentonite	3 / 0.5	14	25.9	2.00E-05
				28	24.5	1.60E-05
0427-018A	Native	PC / Bentonite	3 / 1.5	14	25.3	5.60E-06
				28	29.9	5.50E-06
0427-021A	Fill	PC / Bentonite	10 / 0.5	14	21.1	4.90E-07
				28	21.2	3.20E-07
0427-022A	Fill	PC / Bentonite	5 / 0.5	14	22.4	7.00E-06
				28	20.2	1.10E-06
0427-023A	Fill	Portland Cement	3	14	22.4	1.40E-05
				28	20.7	4.30E-06
0427-024A	Fill	PC / Bentonite	3 / 0.5	14	22.3	3.90E-06
				28	21.9	2.00E-06
0427-025A	Fill	PC / Bentonite	3 / 1.5	14	29.6	4.20E-06
				28	26.2	2.90E-06

Review of the permeability data shows that in general, the permeability of the treated materials decrease with an increase in cure time. Additionally, treatment of the native soil with cement addition rates below 7.5% resulted in a hydraulic conductivity value of 10^{-5} cm/sec, except when accompanied by bentonite at a rate of 1.5%. The fill material requires less cement to achieve similar permeability values.

TABLE 3 Continued – Optimization Solidification pH and Volumetric Expansion Results

KEMRON Sample Number	Untreated Material Type	Reagent Type	Reagent Addition % by Wet Soil wt.	Cure (Days)	pH Untreated Soil	pH Treated Soil	Volumetric Expansion (%)
0427-009	Native	Bentonite	0.5	7	7.47		9.38
				28		7.49	10.42
0427-010	Native	Bentonite	1.5	7	7.47		23.96
				28		7.60	20.83
0427-011A	Native	Portland Cement / Bentonite	12.5/0.5	7	7.47		34.69
				14		11.99	36.08
				28		12.09	31.04
0427-012A	Native	Portland Cement / Bentonite	7.5/0.5	7	7.47		29.79
				14		11.63	30.42
				28		12.11	25.73
0427-013A	Native	Portland Cement	5	7	7.47		19.48
				14		11.88	19.90
				28		12.02	15.83
0427-014A	Native	Portland Cement / Bentonite	5/0.5	7	7.47		28.85
				14		12.00	31.77
				28		12.07	21.67
0427-015A	Native	Portland Cement / Bentonite	5/1.5	7	7.47		42.60
				14		12.02	42.40
				28		11.95	30.94
0427-016A	Native	Portland Cement	3	7	7.47		15.52
				14		11.93	18.44
				28		11.98	14.27
0427-017A	Native	Portland Cement / Bentonite	3/0.5	7	7.47		28.44
				14		11.92	30.31
				28		12.08	22.4
0427-018A	Native	Portland Cement / Bentonite	3/1.5	7	7.47		43.85
				14		12.14	46.04
				28		12.01	37.92
0427-019	Fill	Bentonite	0.5	7	9.51		6.19
				28		9.54	8.25
0427-020	Fill	Bentonite #807	1.5	7	9.51		15.46
				28		9.93	14.43
0427-021A	Fill	Portland Cement / Bentonite	10/0.5	7	9.51		34.54
				14		12.22	37.01
				28		12.22	30.1
0427-022A	Fill	Portland Cement / Bentonite	5/0.5	7	9.51		32.58
				14		12.12	34.23
				28		12.00	24.95

KEMRON Sample Number	Untreated Material Type	Reagent Type	Reagent Addition % by Wet Soil wt.	Cure (Days)	pH Untreated Soil	pH Treated Soil	Volumetric Expansion (%)
0427-023A	Fill	Portland Cement	3	7	9.51		16.39
				14		11.95	18.97
				28		11.84	14.43
0427-024A	Fill	Portland Cement / Bentonite	3/0.5	7	9.51		24.12
				14		11.93	24.64
				28		12.08	21.24
0427-025A	Fill	Portland Cement / Bentonite	3/1.5	7	9.51		39.28
				14		12.00	43.81
				28		11.91	36.8

The results of pH testing show an expected increase in pH with all of the treatments. The results of volumetric expansion testing show some variability with increased cure times. Specifically the mixtures exhibited an increase in volume between the 7 and 14 day cure interval, but then a reduction in volume at the 28 day cure time.

Copies of all testing conducted on the Optimized mixture designs are included in Attachment C of this report.

IMMERSION TESTING

KEMRON performed immersion testing on candidate mixture designs. Immersion testing was performed by submerging a 14 day and 28 day cured specimen into a beaker of de-ionized (DI) water for a period of 7 days and swirled continuously at approximately 150 rpm. Throughout that time KEMRON made visual observations regarding the integrity of the treated specimen and the clarity and odor of the DI water. Tabulated documentation of the treated mixture immersion testing is included in Attachment D accompanying this report. Photographs of the immersion testing are included in a separate media disk. The test resulted in samples 015A, 023A, 024A, and 025A showing some disintegrating and the remaining 9 samples maintaining their integrity. Samples 021A and 022A exhibited a menthol odor and sample 024A exhibited the strongest naphthalene odor of the 13 mixes. No oily sheen was observed with any of the samples.

4.0 CONCLUSIONS

KEMRON performed testing for the Patchogue MGP site treatability study to evaluate potential mixture designs capable of improving the strength and permeability of the site materials. Reagents including bentonite and Type I Portland cement were evaluated individually and in differing combinations. KEMRON performed testing including pocket penetrometer testing, material pH, volumetric expansion, UCS, and permeability testing.

Review of the results of testing conducted on the treated materials show that multiple mixtures were capable of improving the physical properties of the site materials. Treatment simulations applied to the Native soil material including the use of Type I Portland cement at addition rates of 7.5 and 12% achieved significant strength gains with hydraulic conductivity values of 5.90 x 10^{-6} and 3.00 x 10^{-7} cm/sec respectively. Treatment simulations performed on the Native material using combinations of cement and bentonite showed that the use of bentonite reduced the strength gain of the treated material over the use of cement alone.

In general, the use of bentonite, in conjunction with cement, provided additional reduction in permeability over the use of cement alone. However, this study did not reveal a clear trend with the reduction in permeability with an increase in cement and bentonite.

The results of volumetric expansion testing showed that the volume increase is directly related to the reagent addition rate. KEMRON observed some volume decrease between the 14 and 28 day cure intervals in several mixtures using bentonite.

The immersion testing indicated that none of the treated materials exhibited a release of free product in the form of oil or an oily sheen. KEMRON noted that mixtures 021A, 023A did exhibit a menthol odor, and mixture 024A had a naphthalene type odor during immersion testing. Based on the testing performed KEMRON cannot determine the source of these odors or comment on whether the presence of these odors represents a contaminant release. Mixtures prepared with the lowest cement addition rates did show some degradation during immersion testing.

Review of the data collected in the study indicates that the treatment of the Native material using cement alone at an addition rate of 12.5% resulted in a treated material with a UCS value of 250 psi and a hydraulic conductivity rate of 3.00 x 10^{-7} cm/sec. When the Native material was treated with cement at a rate of 7.5% combined with 0.5% bentonite the 28 day UCS value was 52.1 psi with a hydraulic conductivity of 6.90 x 10^{-6} cm/sec. Treatment using 7.5% cement and 1.5% bentonite resulted in a treated material with a UCS value of 26 psi and a hydraulic conductivity value of 4.30 x 10^{-7} cm/sec.

Testing performed on the Fill material showed similar trends as the Native material but required less cement due to the reduced amount of organic contaminant present in the untreated sample. Test results indicate that a 5% addition rate of cement resulted in a treated Fill material with a UCS value of 56.1 psi and a hydraulic conductivity of 3.10 x 10^{-7} cm/sec. The use of bentonite in combination with cement shows a reduction in permeability but may require increased cement additions to achieve similar UCS values.

In general KEMRON believes that a minimum cement addition rate of 7.5% with 0.5% may be required to develop a treated Native soil material that exhibits the characteristics desired. While lower reagent addition rates may be utilized for treatment of the Fill material, KEMRON understands that a single treatment design will be used for both the Native and Fill materials. In order to provide some degree surety in the treatment results, it may be advisable to slightly increase the addition rate of cement utilized in the mixture design.

Appendix A:

Untreated Physical Properties Testing

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	Patchogue
PROJECT No.:	SH0427
SAMPLE No.:	Native - Untreated
TESTING DATE:	04/19/12
TESTED BY:	JGS
TRACKING CODE:	8032_MC

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.3166	g	1.3254	g	1.3335	g
3. WT WET SOIL + TARE	20.0306	g	17.3699	g	19.6406	g
4. WT DRY SOIL + TARE	17.6789	g	15.1815	g	17.1903	g
5. WT WATER, Ww	2.3517	g	2.1884	g	2.4503	g
6. WT DRY SOIL, Ws	16.3623	g	13.8561	g	15.8568	g
7. ASTM MOISTURE CONTENT	14.37	%	15.79	%	15.45	%
8. PERCENT SOLIDS	87.43	%	86.36	%	86.62	%
9. AVERAGE ASTM MOISTURE CONTENT	15.21	%				
10. AVERAGE PERCENT SOLIDS	86.80	%				

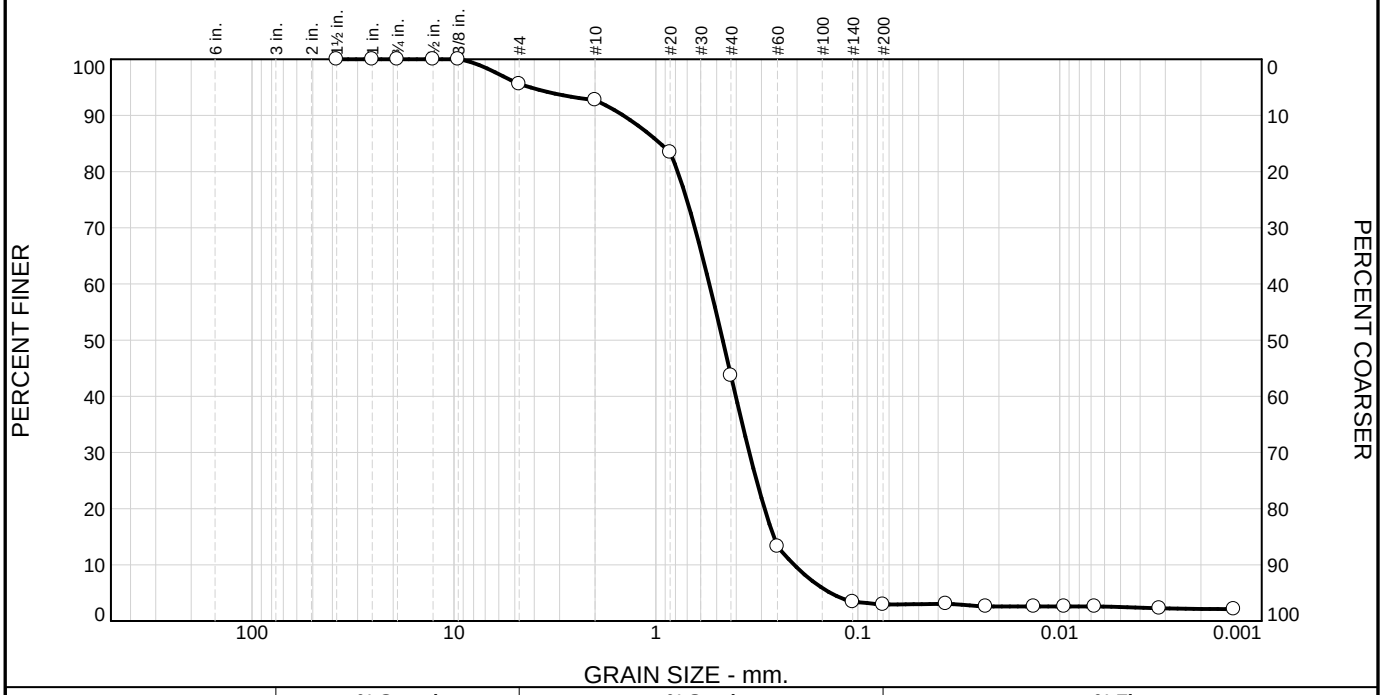
UNIT WEIGHT DETERMINATION

DATA SHEET
ASTM D7263

PROJECT:	Patchogue
PROJECT No.:	SH0427
SAMPLE No.:	Native - Untreated
TESTING DATE:	4/25/12
TESTED BY:	JGS
TRACKING CODE:	8032_UW

UNIT WEIGHT (DENSITY)							
1. SAMPLE NO.	A		B		C		
2. WT OF MOLD (tare weight)	18.62	g	18.62	g	18.62	g	
3. WT OF MOLD + SOIL	408.61	g	400.81	g	402.72	g	
4. WT OF WET SOIL, W	389.99	g	382.19	g	384.10	g	
5. DIAMETER OF SPECIMEN, D	2.00	in	2.00	in	2.00	in	
6. HEIGHT OF SPECIMEN, H	4.00	in	4.00	in	4.00	in	
7. VOLUME OF SPECIMEN	12.57	in^3	12.57	in^3	12.57	in^3	
8. BULK UNIT WEIGHT	118.2	pcf	115.9	pcf	116.4	pcf	
9. BULK SPECIFIC GRAVITY	1.9		1.9		1.9		
10. AVERAGE BULK UNIT WEIGHT	116.8	pcf					
11. AVERAGE BULK SPECIFIC GRAVITY	1.9						

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.4	2.9	49.0	40.8	0.4	2.5

Test Results (ASTM D 422 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	95.6		
#10	92.7		
#20	83.4		
#40	43.7		
#60	13.3		
#140	3.4		
#200	2.9		
0.0367 mm.	3.0		
0.0233 mm.	2.6		
0.0134 mm.	2.6		
0.0095 mm.	2.6		
0.0067 mm.	2.6		
0.0032 mm.	2.3		
0.0014 mm.	2.1		

* (no specification provided)

Material Description

Black poorly graded sand

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= SP **AASHTO (M 145)=**

Coefficients

D_{90}= 1.4506 D_{85}= D_{60}= 0.5437
D_{50}= 0.4668 D_{30}= 0.3446 D_{15}= 0.2608
D_{10}= 0.2067 C_u= 2.63 C_c= 1.06

Remarks

F.M.=2.30

Date Received: **Date Tested:** 5/1/12

Tested By: JGS

Checked By: TAJ

Title: Program Manager

Sample Number: Native - Untreated **Date Sampled:**

KEMRON Environmental Services Inc.
Atlanta, Georgia

Client: Brown & Caldwell
Project: Patchogue MGP Site

Project No: SH0427 **Lab ID** 8032_GR

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	Patchogue
PROJECT No.:	SH0427
SAMPLE No.:	Fill - Untreated
TESTING DATE:	04/19/12
TESTED BY:	JGS
TRACKING CODE:	8033_MC

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.3245	g	1.3183	g	1.3194	g
3. WT WET SOIL + TARE	21.9875	g	16.7329	g	25.3814	g
4. WT DRY SOIL + TARE	19.1356	g	14.3963	g	21.8181	g
5. WT WATER, Ww	2.8519	g	2.3366	g	3.5633	g
6. WT DRY SOIL, Ws	17.8111	g	13.0780	g	20.4987	g
7. ASTM MOISTURE CONTENT	16.01	%	17.87	%	17.38	%
8. PERCENT SOLIDS	86.20	%	84.84	%	85.19	%
9. AVERAGE ASTM MOISTURE CONTENT	17.09	%				
10. AVERAGE PERCENT SOLIDS	85.41	%				

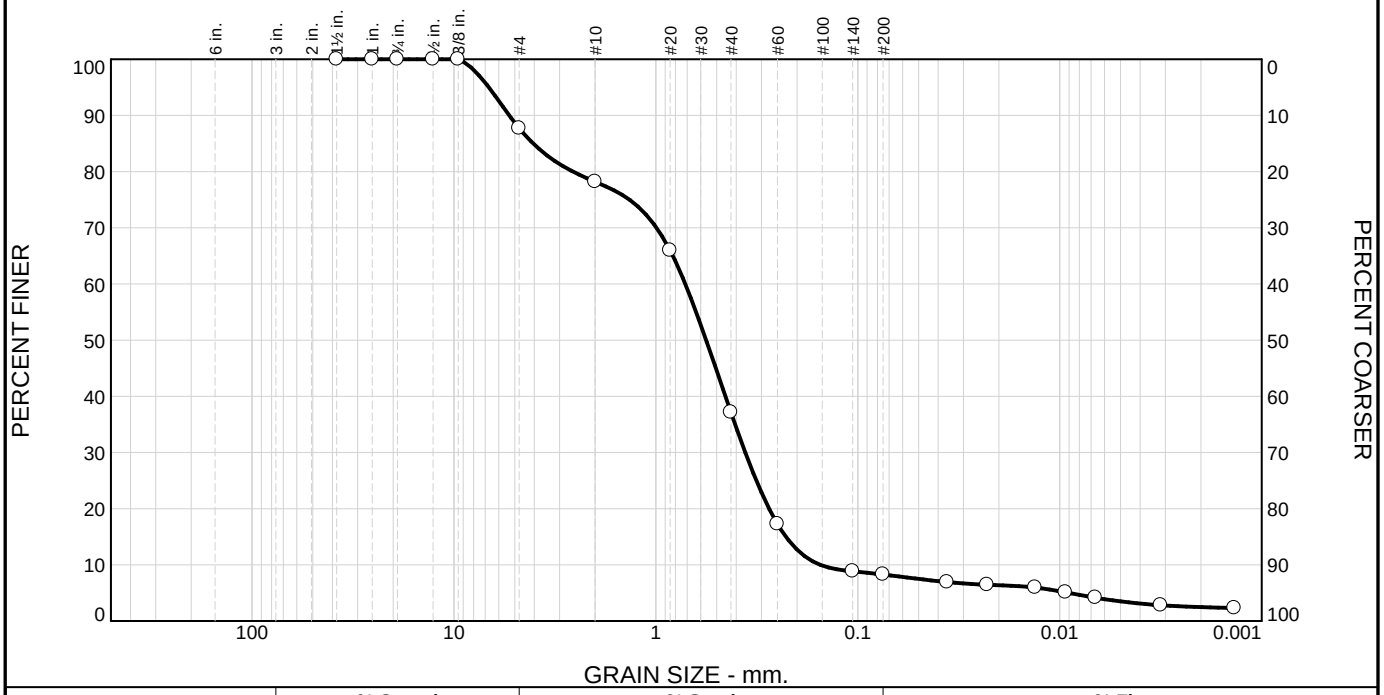
UNIT WEIGHT DETERMINATION

DATA SHEET
ASTM D7263

PROJECT:	Patchogue
PROJECT No.:	SH0427
SAMPLE No.:	Fill - Untreated
TESTING DATE:	4/25/12
TESTED BY:	JGS
TRACKING CODE:	8033_UW

UNIT WEIGHT (DENSITY)						
1. SAMPLE NO.	A		B		C	
2. WT OF MOLD (tare weight)	18.62	g	18.62	g	18.62	g
3. WT OF MOLD + SOIL	394.03	g	401.61	g	398.61	g
4. WT OF WET SOIL, W	375.41	g	382.99	g	379.99	g
5. DIAMETER OF SPECIMEN, D	2.00	in	2.00	in	2.00	in
6. HEIGHT OF SPECIMEN, H	4.00	in	4.00	in	4.00	in
7. VOLUME OF SPECIMEN	12.57	in^3	12.57	in^3	12.57	in^3
8. BULK UNIT WEIGHT	113.8	pcf	116.1	pcf	115.2	pcf
9. BULK SPECIFIC GRAVITY	1.8		1.9		1.8	
10. AVERAGE BULK UNIT WEIGHT	115.0	pcf				
11. AVERAGE BULK SPECIFIC GRAVITY	1.8					

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.3	9.5	41.1	28.8	4.8	3.5

Test Results (ASTM D 422 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	87.7		
#10	78.2		
#20	65.9		
#40	37.1		
#60	17.2		
#140	8.9		
#200	8.3		
0.0361 mm.	6.9		
0.0229 mm.	6.4		
0.0132 mm.	6.0		
0.0094 mm.	5.1		
0.0067 mm.	4.1		
0.0032 mm.	2.8		
0.0014 mm.	2.3		

* (no specification provided)

Material Description

Very dark brown poorly graded sand with silt

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=**

Coefficients

D_{90}= 5.3203 D_{85}= 4.0510 D_{60}= 0.7153
D_{50}= 0.5638 D_{30}= 0.3606 D_{15}= 0.2273
D_{10}= 0.1533 C_u= 4.67 C_c= 1.19

Remarks

F.M.=2.74

Date Received: **Date Tested:** 4/26/12

Tested By: JGS

Checked By: TAJ

Title: Program Manager

Sample Number: Fill - Untreated **Date Sampled:**

KEMRON Environmental Services Inc.
Atlanta, Georgia

Client: Brown & Caldwell
Project: Patchogue MGP Site

Project No: SH0427 **Lab ID** 8033 GR

GeoTesting EXPRESS

Client:	Kemron				
Project:	Patchogue				
Location:	---		Project No:	GTX-1816	
Boring ID:	---	Sample Type:	---	Tested By:	jm
Sample ID:	---	Test Date:	05/07/12	Checked By:	MCM
Depth :	---	Test Id:	222074		

Moisture, Ash, and Organic Matter - ASTM D 2974

Boring ID	Sample ID	Depth	Description	Moisture Content,%	Ash Content,%	Organic Matter,%
---	Fill	---	Moist, grayish brown sand silty sand with organics	17	91.5	8.5
---	Native	---	Wet, gray silty sand with organics	30	78.2	21.8

Notes: Moisture content determined by Method A and reported as a percentage of oven-dried mass;
dried to a constant mass at temperature of 110° C
Ash content and organic matter determined by Method C; dried to constant mass at temperature 440° C

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	6/27/2012
TESTED BY:	MMR
TRACKING CODE:	8211_PH

KEMRON SAMPLE No.		MATERIAL pH
1.	Fill - Homo - Untreated	9.51
2.	Native - Homo - Untreated	7.47

Appendix B:

Preliminary Treatment Data Sheets

MIX DEVELOPMENT DATA SHEET

PROJECT:	Patchogue	MIX No.	
PROJECT No.:	SH-0427		0427-001
MIXING DATE:	24-May-12	MIXED BY:	JGS/MMR

UNTREATED MATERIAL TYPE		Native
WEIGHT OF UNTREATED MATERIAL		2,500 g
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	7.50 %	187.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	50 %	93.8 g

OBSERVATIONS / NOTES

Added 93.8 g water to Portland Cement to get a consistency of paint.
The mix had a consistency of applesauce or a thin milkshake.
28-Day UCS
28-Day Perm (possibly)
28-Day VE

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	1.25			>4.5	

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	0.96	FINAL HEIGHT (in):	1.103
VOLUMETRIC EXPANSION (%):		14.90	

MIX DEVELOPMENT DATA SHEET

PROJECT:	Patchogue	MIX No.	
PROJECT No.:	SH-0427		0427-002
MIXING DATE:	24-May-12	MIXED BY:	JGS/MMR

UNTREATED MATERIAL TYPE		Native
WEIGHT OF UNTREATED MATERIAL		2,500 g
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	12.50 %	312.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	50 %	156.3 g

OBSERVATIONS / NOTES

Added 156.5 g water to Portland Cement
28-Day UCS
28-Day Perm (possibly)
28-Day VE

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	>4.5			>4.5	

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	0.96	FINAL HEIGHT (in):	1.154
VOLUMETRIC EXPANSION (%):	20.21		

MIX DEVELOPMENT DATA SHEET

PROJECT:	Patchogue	MIX No.	
PROJECT No.:	SH-0427		0427-003
MIXING DATE:	24-May-12	MIXED BY:	JGS/MMR

UNTREATED MATERIAL TYPE		Native
WEIGHT OF UNTREATED MATERIAL		**2,500 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	7.50 %	187.5 g
Bentonite #807	1.50 %	37.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	140 %	315.0 g

OBSERVATIONS / NOTES

Added 200 g water to hydrate bentonite.
Added 75 g water to PC
Mixed bentonite and PC together, added another 40 g water to get a marginally pumpable reagent mix.
28-Day UCS
28-Day Perm (possibly)
28-Day VE

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	1.25			4.5	

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	0.96	FINAL HEIGHT (in):	1.392
VOLUMETRIC EXPANSION (%):	45.00		

MIX DEVELOPMENT DATA SHEET

PROJECT:	Patchogue	MIX No.	
PROJECT No.:	SH-0427		0427-004
MIXING DATE:	24-May-12	MIXED BY:	JGS/MMR

UNTREATED MATERIAL TYPE		Native
WEIGHT OF UNTREATED MATERIAL		2,500 g
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	12.50 %	312.5 g
Bentonite #807	1.50 %	37.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	110 %	385.0 g

OBSERVATIONS / NOTES

Added 200 g water to hydrate bentonite
Added 125 g water to Portland Cement
Added another 60 g water to reagent mix to get marginally pumpable reagent mix.
28-Day UCS
28-Day Perm (possibly)
28-Day VE

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	4.25			>4.5	

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	0.96	FINAL HEIGHT (in):	1.447
VOLUMETRIC EXPANSION (%):		50.73	

MIX DEVELOPMENT DATA SHEET

PROJECT:	Patchogue	MIX No.	
PROJECT No.:	SH-0427		0427-005
MIXING DATE:	24-May-12	MIXED BY:	JGS/MMR

UNTREATED MATERIAL TYPE		Fill
WEIGHT OF UNTREATED MATERIAL		2,500 g
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	5.00 %	125.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	50 %	62.5 g

OBSERVATIONS / NOTES

Added 62.5 g water to Portland Cement.
28-Day UCS
28-Day Perm (possibly)
28-Day VE

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	>4.5			>4.5	

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	0.97	FINAL HEIGHT (in):	1.146
VOLUMETRIC EXPANSION (%):	18.14		

MIX DEVELOPMENT DATA SHEET

PROJECT:	Patchogue	MIX No.	
PROJECT No.:	SH-0427		0427-006
MIXING DATE:	24-May-12	MIXED BY:	JGS/MMR

UNTREATED MATERIAL TYPE		Fill
WEIGHT OF UNTREATED MATERIAL		**2,500 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	10.00 %	250.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	50 %	125.0 g

OBSERVATIONS / NOTES

Added 125 g water to the Portland Cement
28-Day UCS
28-Day Perm (possibly)
28-Day VE

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	>4.5			>4.5	

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	0.97	FINAL HEIGHT (in):	1.191
VOLUMETRIC EXPANSION (%):	22.78		

MIX DEVELOPMENT DATA SHEET

PROJECT:	Patchogue	MIX No.	
PROJECT No.:	SH-0427		0427-007
MIXING DATE:	24-May-12	MIXED BY:	JGS/MMR

UNTREATED MATERIAL TYPE		Fill
WEIGHT OF UNTREATED MATERIAL		**2,500 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	5.00 %	125.0 g
Bentonite #807	1.50 %	37.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	185 %	300.6 g

OBSERVATIONS / NOTES

Added 200 g water to hydrate bentonite
Added 84.4 g water to Portland cement.
Added 16.2 g water to reagent mix to get marginally pumpable slurry.
28-Day UCS
28-Day Perm (possibly)
28-Day VE

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	0.25			2.75	

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	0.97	FINAL HEIGHT (in):	1.429
VOLUMETRIC EXPANSION (%):	47.32		

MIX DEVELOPMENT DATA SHEET

PROJECT:	Patchogue	MIX No.	
PROJECT No.:	SH-0427		0427-008
MIXING DATE:	24-May-12	MIXED BY:	JGS/MMR

UNTREATED MATERIAL TYPE		Fill
WEIGHT OF UNTREATED MATERIAL		**2,500 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	10.00 %	250.0 g
Bentonite #807	1.50 %	37.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	125 %	359.4 g

OBSERVATIONS / NOTES

Added 200 g water to hydrate bentonite
Added 159.4 g water to PC
28-Day UCS
28-Day Perm (possibly)
28-Day VE

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	3.25			>4.5	

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	0.97	FINAL HEIGHT (in):	1.433
VOLUMETRIC EXPANSION (%):	47.73		

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	Patchogue	TESTED BY:	MMR
PROJECT No.:	SH0427	TRACKING CODE:	8187_PM
SAMPLE No.:	0427-001 28 Day	EQUIPMENT No.:	7B
TEST DATE:	6/27/2012		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.	0427-001	0427-001
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	420.85 ***g***
3. WT WET SOIL + TARE	653.80 ***g***	1080.70 ***g***
4. WT DRY SOIL + TARE	536.45 ***g***	957.30 ***g***
5. WT WATER, Ww	117.35 g	123.40 g
6. WT DRY SOIL, Ws	536.45 g	536.45 g
7. MOISTURE CONTENT, W	21.88 %	23.00 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.98 in.***	***2.98 in.***	***2.88 in.***	***2.93 in.***
No. 2	***2.98 in.***	***2.99 in.***	***2.88 in.***	***2.92 in.***
No. 3	***2.97 in.***	***2.97 in.***	***2.90 in.***	***2.90 in.***
Average	2.98 in.	2.98 in.	2.89 in.	2.92 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***653.80 g***	***536.45 g***
Area, Ao	6.96 in^2	6.98 in^2
Volume, Vo	20.08 in^3	20.37 in^3
Bulk Unit Weight	124.1 lb/ft^3	100.3 lb/ft^3
Dry Unit Weight	101.8 lb/ft^3	81.6 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	Patchogue	TESTED BY:	MMR
PROJECT No.:	SH0427	TRACKING CODE:	8187_PM
SAMPLE No.:	0427-001 28 Day	EQUIPMENT No.:	7B
TEST DATE:	6/27/2012		

TEST	TIME	TESTED	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
DATE	(military)	BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
06/27/12	11 : 50	MMR	7.0	5.0	6.5	*			
06/27/12	12 : 50	MMR	17.0	15.0	16.3	12.3	10.0	5.8	0.58
06/27/12	14 : 3	MMR	27.0	25.0	26.2	21.0	10.0	4.7	0.47
06/27/12	16 : 34	MMR	37.0	35.0	36.9	32.8	10.0	6.6	0.66
06/28/12	8 : 39	MMR	47.0	45.0	47.8	39.2	10.0	2.3	0.23
06/28/12	9 : 41	MMR	57.0	55.0	57.8	56.5	10.0	8.7	0.87
06/28/12	10 : 55	MMR	67.0	65.0	*	67.4	10.0	9.6	0.96
06/28/12	10 : 56	MMR	57.0	55.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	Patchogue	MMR
PROJECT No.:	SH0427	8187_PM
SAMPLE No.:	0427-001 28 Day	7B
TEST DATE:	6/27/2012	

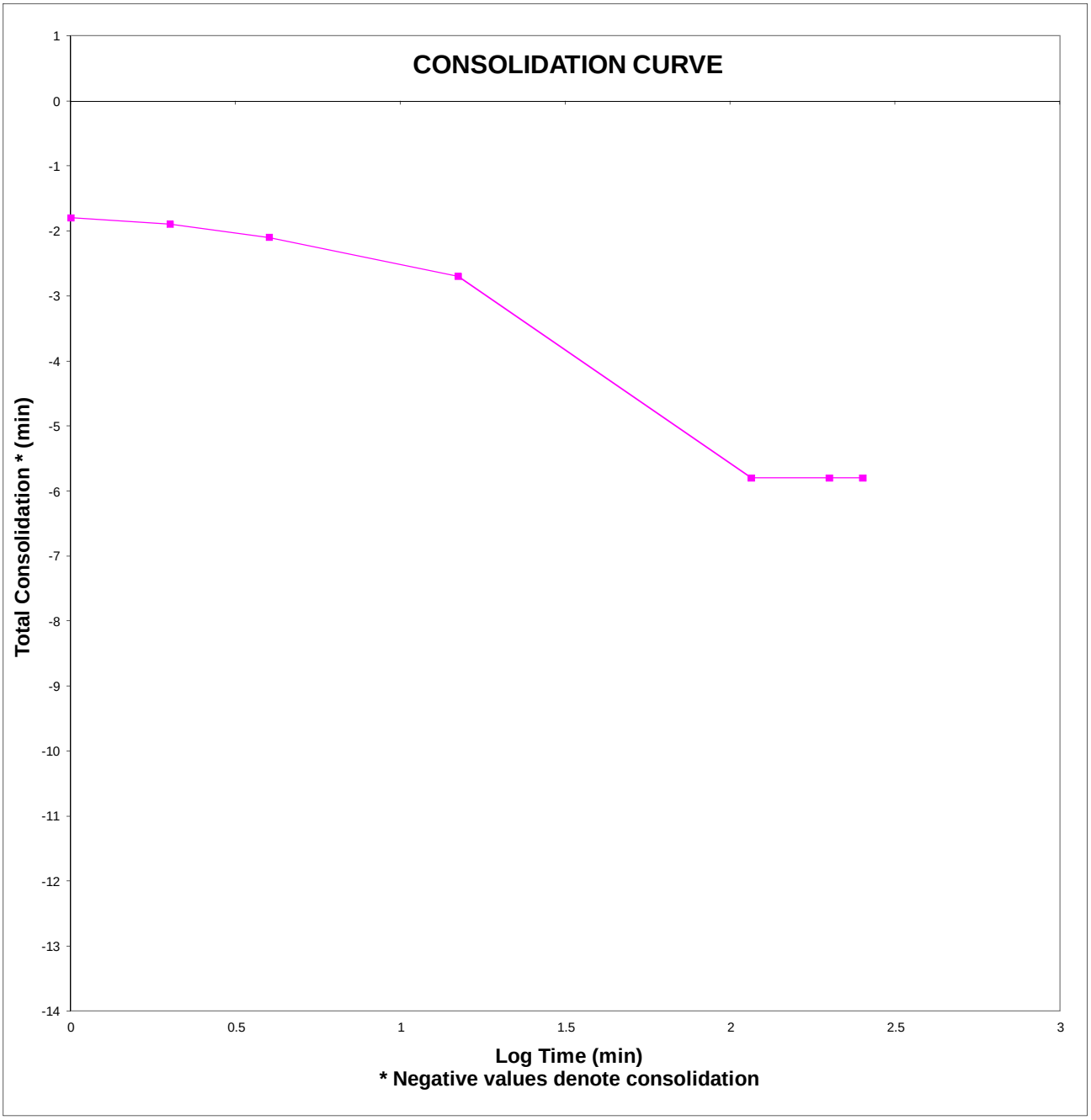
CELL PRESSURE: 65 psi **BACK PRESSURE:** 55 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML) READING BOTTOM*	*READING TOP*	*ACTUAL TOTAL (Ct)*
6 / 28 / 2012	MMR	10 : 58				24.0	24.0	0.0
6 / 28 / 2012	MMR	10 : 59	1	1	0.00	23.2	23.0	1.8
6 / 28 / 2012	MMR	11 : 0	1	2	0.30	23.2	22.9	1.9
6 / 28 / 2012	MMR	11 : 2	2	4	0.60	23.1	22.8	2.1
6 / 28 / 2012	MMR	11 : 13	11	15	1.18	23.0	22.3	2.7
6 / 28 / 2012	MMR	12 : 54	101	116	2.06	22.2	20.0	5.8
6 / 28 / 2012	MMR	14 : 18	84	200	2.30	22.2	20.0	5.8
6 / 28 / 2012	MMR	15 : 10	52	252	2.40	22.2	20.0	5.8

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	Patchogue	TESTED BY:	MMR
PROJECT No.:	SH0427	TRACKING CODE:	8187_PM
SAMPLE No.:	0427-001 28 Day	EQUIPMENT No.:	7B
TEST DATE:	6/27/2012		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	Patchogue	TESTED BY:	MMR
PROJECT No.:	SH0427	TRACKING CODE:	8187_PM
SAMPLE No.:	0427-001 28 Day	EQUIPMENT No.:	7B
TEST DATE:	6/27/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
6 / 28 / 12	MMR	15 : 2		0.0	24.0	20.0	65.0	55.0	55.0
6 / 28 / 12	MMR	15 : 45	43	1.5	22.5	20.0	65.0	55.0	55.0
6 / 28 / 12	MMR	16 : 20	35	2.8	21.2	20.0	65.0	55.0	55.0
6 / 28 / 12	MMR	17 : 0	40	4.2	19.8	20.0	65.0	55.0	55.0
6 / 29 / 12	MMR	7 : 8	RESET	4.2	19.8	20.0	65.0	55.0	55.0
6 / 29 / 12	MMR	7 : 45	37	5.5	18.5	20.0	65.0	55.0	55.0
6 / 29 / 12	MMR	8 : 21	36	6.7	17.3	20.0	65.0	55.0	55.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	Patchogue	TESTED BY:	MMR
PROJECT No.:	SH0427	TRACKING CODE:	8187_PM
SAMPLE No.:	0427-001 28 Day	EQUIPMENT No.:	7B
TEST DATE:	6/27/2012		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
43	1.5	1.5	1.00	2.865	4.23E-06	4.25E-06
35	1.3	1.3	1.00	2.510	5.14E-06	5.16E-06
40	1.4	1.4	1.00	2.128	5.62E-06	5.64E-06
RESET				2.128		
37	1.3	1.3	1.00	1.774	6.71E-06	6.74E-06
36	1.2	1.2	1.00	1.446	7.71E-06	7.75E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	Patchogue	TESTED BY:	MMR
PROJECT No.:	SH0427	TRACKING CODE:	8187_PM
SAMPLE No.:	0427-001 28 Day	EQUIPMENT No.:	7B
TEST DATE:	6/27/2012		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	124.1 lb/ft³	100.3 lb/ft³
DRY UNIT WEIGHT	101.8 lb/ft³	81.6 lb/ft³
MOISTURE CONTENT	21.9 %	23.0 %
PERMEABILITY @ 20°C	5.9E-06 cm/sec	

Client:	Kemron Environmental Services		
Project Name:	Patchogue MGP		
Project Location:	---		
GTX #:	1851		
Start Date:	7/3/2012	Tested By:	bhe
End Date:	7/5/2012	Checked By:	MCM
Location:	---	Test #:	K1.1
Sample #:	0427-002		
Elevation:	---		
Visual Description:	Moist, brown clayey sand		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D 5084 Increasing Tailwater

Sample Type:	UD	Permeant Fluid:	de-aired tap water
Orientation:	Vertical	Cell #:	P1
Sample Preparation:	---		

Parameter	Initial	Final
Height, in	2.42	2.42
Diameter, in	2.98	2.98
Area, in^2	6.97	6.97
Volume, in^3	16.9	16.9
Mass, g	563	563
Bulk Density, pcf	127	127
Moisture Content, %	21.3	21.3
Dry Density, pcf	104.5	104.5
Degree of Saturation, %	---	97

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	70	Pressure Increment, psi:	9.6
Sample Pressure, psi:	60	B Coefficient:	0.96

FLOW DATA

Date	Trial #	Pressure, psi		Head readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Sample	H_1	H_2	H_1-H_2						
7/5	6	70	60	145.7	143.3	2.4	600	23.7	3.1E-07	21	0.976	3.0E-07
7/5	7	70	60	143.3	142.2	1.1	300	23.3	2.9E-07	21	0.976	2.8E-07
7/5	8	70	90	142.3	141.1	1.2	300	23.1	3.1E-07	21	0.976	3.1E-07
7/5	9	70	90	141.1	139.9	1.2	300	23.0	3.2E-07	21	0.976	3.1E-07

PERMEABILITY AT 20° C: 3.0 x 10^{-7} cm/sec (@ 10 psi effective stress)

Client:	Kemron Environmental Services		
Project Name:	Patchogue MGP		
Project Location:	---		
GTX #:	1851		
Start Date:	7/3/2012	Tested By:	bhe
End Date:	7/5/2012	Checked By:	MCM
Location:	---	Test #:	K2.1
Sample #:	0427-003		
Elevation:	---		
Visual Description:	Moist, brown clayey sand		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D 5084 Increasing Tailwater

Sample Type:	UD	Permeant Fluid:	de-aired tap water
Orientation:	Vertical	Cell #:	1A
Sample Preparation:	---		

Parameter	Initial	Final
Height, in	3.81	3.81
Diameter, in	2.99	2.98
Area, in^2	7.03	6.97
Volume, in^3	26.8	26.6
Mass, g	768	787
Bulk Density, pcf	109	113
Moisture Content, %	30.9	34.1
Dry Density, pcf	83.2	83.9
Degree of Saturation, %	---	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	70	Pressure Increment, psi:	9.7
Sample Pressure, psi:	60	B Coefficient:	0.97

FLOW DATA

Date	Trial #	Pressure, psi		Head readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Sample	H_1	H_2	H_1-H_2						
7/5	6	70	60	145.5	143.5	2.0	540	15.0	4.5E-07	21	0.976	4.4E-07
7/5	7	70	60	143.5	141.4	2.1	600	14.8	4.3E-07	21	0.976	4.2E-07
7/5	8	70	90	141.4	139.5	1.9	540	14.6	4.4E-07	21	0.976	4.3E-07
7/5	9	70	90	139.5	137.8	1.7	480	14.4	4.5E-07	21	0.976	4.4E-07

PERMEABILITY AT 20° C: 4.3 x 10^{-7} cm/sec (@ 10 psi effective stress)

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	Patchogue	TESTED BY:	MMR
PROJECT No.:	SH0427	TRACKING CODE:	8190_PM
SAMPLE No.:	0427-004 28 Day	EQUIPMENT No.:	2
TEST DATE:	6/27/2012		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.	0427-004	0427-004
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	388.96 ***g***
3. WT WET SOIL + TARE	563.18 ***g***	967.90 ***g***
4. WT DRY SOIL + TARE	437.64 ***g***	826.60 ***g***
5. WT WATER, Ww	125.54 g	141.30 g
6. WT DRY SOIL, Ws	437.64 g	437.64 g
7. MOISTURE CONTENT, W	28.69 %	32.29 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.99 in.***	***2.99 in.***	***2.75 in.***	***2.73 in.***
No. 2	***2.97 in.***	***2.98 in.***	***2.74 in.***	***2.76 in.***
No. 3	***2.98 in.***	***2.98 in.***	***2.73 in.***	***2.75 in.***
Average	2.98 in.	2.98 in.	2.74 in.	2.75 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***563.18 g***	***437.64 g***
Area, Ao	6.97 in^2	7.00 in^2
Volume, Vo	19.12 in^3	19.21 in^3
Bulk Unit Weight	112.2 lb/ft^3	86.8 lb/ft^3
Dry Unit Weight	87.2 lb/ft^3	65.6 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	Patchogue	TESTED BY:	MMR
PROJECT No.:	SH0427	TRACKING CODE:	8190_PM
SAMPLE No.:	0427-004 28 Day	EQUIPMENT No.:	2
TEST DATE:	6/27/2012		

TEST	TIME	TESTED	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
DATE	(military)	BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
06/27/12	11 : 50	MMR	7.0	5.0	4.8	*			
06/27/12	12 : 50	MMR	17.0	15.0	24.9	10.7	10.0	5.9	0.59
06/27/12	14 : 3	MMR	27.0	25.0	38.2	26.5	10.0	1.6	0.16
06/27/12	16 : 34	MMR	37.0	35.0	50.9	46.4	10.0	8.2	0.82
06/28/12	8 : 39	MMR	47.0	45.0	62.4	59.4	10.0	8.5	0.85
06/28/12	9 : 41	MMR	57.0	55.0	*	72.4	10.0	10.0	1.00
06/28/12	9 : 55	MMR	47.0	45.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	Patchogue	MMR
PROJECT No.:	SH0427	8190_PM
SAMPLE No.:	0427-004 28 Day	2
TEST DATE:	6/27/2012	

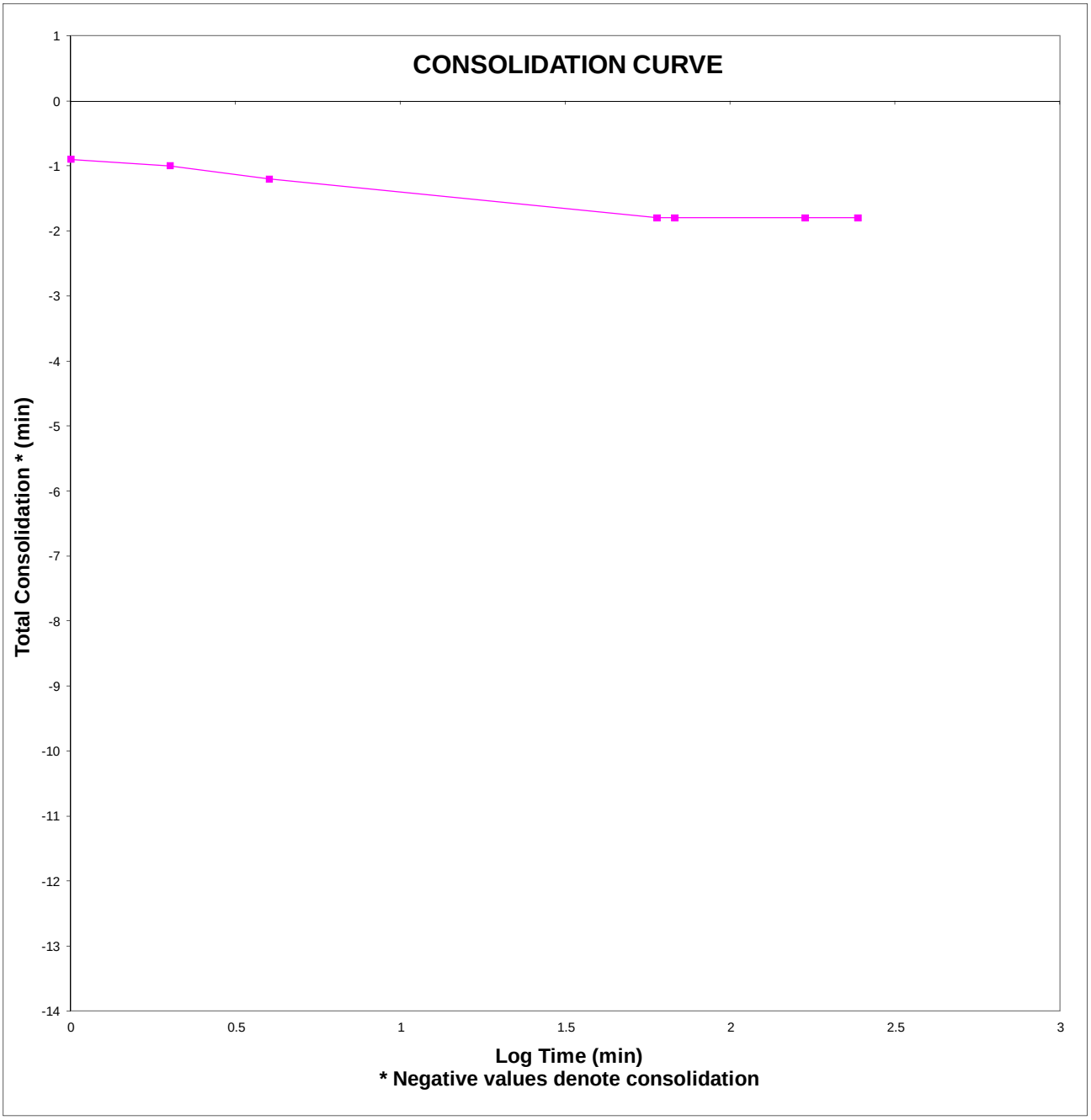
CELL PRESSURE: 55 psi **BACK PRESSURE:** 45 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML) READING BOTTOM*	*READING TOP*	*ACTUAL TOTAL (Ct)*
6 / 28 / 2012	MMR	10 : 6				23.0	23.0	0.0
6 / 28 / 2012	MMR	10 : 7	1	1	0.00	22.6	22.5	0.9
6 / 28 / 2012	MMR	10 : 8	1	2	0.30	22.6	22.4	1.0
6 / 28 / 2012	MMR	10 : 10	2	4	0.60	22.6	22.2	1.2
6 / 28 / 2012	MMR	11 : 6	56	60	1.78	22.6	21.6	1.8
6 / 28 / 2012	MMR	11 : 14	8	68	1.83	22.6	21.6	1.8
6 / 28 / 2012	MMR	12 : 55	101	169	2.23	22.6	21.6	1.8
6 / 28 / 2012	MMR	14 : 10	75	244	2.39	22.6	21.6	1.8

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	Patchogue	TESTED BY:	MMR
PROJECT No.:	SH0427	TRACKING CODE:	8190_PM
SAMPLE No.:	0427-004 28 Day	EQUIPMENT No.:	2
TEST DATE:	6/27/2012		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	Patchogue	TESTED BY:	MMR
PROJECT No.:	SH0427	TRACKING CODE:	8190_PM
SAMPLE No.:	0427-004 28 Day	EQUIPMENT No.:	2
TEST DATE:	6/27/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
6 / 28 / 12	MMR	14 : 1		0.0	24.0	20.0	55.0	45.0	45.0
6 / 28 / 12	MMR	14 : 38	37	0.7	22.3	20.0	55.0	45.0	45.0
6 / 28 / 12	MMR	15 : 9	31	1.3	21.8	20.0	55.0	45.0	45.0
6 / 28 / 12	MMR	16 : 15	66	2.3	20.8	20.0	55.0	45.0	45.0
6 / 28 / 12	MMR	16 : 57	42	3.0	20.1	20.0	55.0	45.0	45.0
6 / 28 / 12	MMR	17 : 41	44	3.8	19.3	20.0	55.0	45.0	45.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	Patchogue	TESTED BY:	MMR
PROJECT No.:	SH0427	TRACKING CODE:	8190_PM
SAMPLE No.:	0427-004 28 Day	EQUIPMENT No.:	2
TEST DATE:	6/27/2012		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
37	0.7	1.7	2.43	3.101	3.67E-06	3.69E-06
31	0.6	0.5	0.83	2.943	2.18E-06	2.19E-06
66	1.0	1.0	1.00	2.656	2.01E-06	2.02E-06
42	0.7	0.7	1.00	2.455	2.42E-06	2.43E-06
44	0.8	0.8	1.00	2.226	2.88E-06	2.89E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	Patchogue	TESTED BY:	MMR
PROJECT No.:	SH0427	TRACKING CODE:	8190_PM
SAMPLE No.:	0427-004 28 Day	EQUIPMENT No.:	2
TEST DATE:	6/27/2012		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	112.2 lb/ft³	86.8 lb/ft³
DRY UNIT WEIGHT	87.2 lb/ft³	65.6 lb/ft³
MOISTURE CONTENT	28.7 %	32.3 %
PERMEABILITY @ 20°C	2.6E-06 cm/sec	

Client:	Kemron Environmental Services		
Project Name:	Patchogue MGP		
Project Location:	---		
GTX #:	1851		
Start Date:	7/3/2012	Tested By:	bhe
End Date:	7/5/2012	Checked By:	MCM
Location:	---	Test #:	K3.1
Sample #:	0427-005		
Elevation:	---		
Visual Description:	Moist, brown clayey sand		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D 5084 Increasing Tailwater

Sample Type:	UD	Permeant Fluid:	de-aired tap water
Orientation:	Vertical	Cell #:	P2
Sample Preparation:	---		

Parameter	Initial	Final
Height, in	2.36	2.35
Diameter, in	2.98	2.98
Area, in^2	6.97	6.97
Volume, in^3	16.4	16.4
Mass, g	507	528
Bulk Density, pcf	117	122
Moisture Content, %	17.1	21.8
Dry Density, pcf	100.2	100.5
Degree of Saturation, %	---	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	70	Pressure Increment, psi:	9.7
Sample Pressure, psi:	60	B Coefficient:	0.97

FLOW DATA

Date	Trial #	Pressure, psi		Head readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Sample	H_1	H_2	H_1-H_2						
7/5	5	70	60	143.3	140.1	3.2	780	24.0	3.1E-07	21	0.976	3.1E-07
7/5	6	70	60	140.1	139.1	1.0	240	23.5	3.2E-07	21	0.976	3.2E-07
7/5	7	70	90	139.1	138.1	1.0	240	23.3	3.2E-07	21	0.976	3.2E-07
7/5	8	70	90	138.1	137.2	0.9	240	23.1	2.9E-07	21	0.976	2.9E-07

PERMEABILITY AT 20° C: 3.1 x 10^{-7} cm/sec (@ 10 psi effective stress)

Client:	Kemron Environmental Services		
Project Name:	Patchogue MGP		
Project Location:	---		
GTX #:	1851		
Start Date:	7/5/2012	Tested By:	bhe
End Date:	7/6/2012	Checked By:	MCM
Location:	---	Test #:	K4.1
Sample #:	0427-006		
Elevation:	---		
Visual Description:	Moist, brown clayey sand		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D 5084 Increasing Tailwater

Sample Type:	UD	Permeant Fluid:	de-aired tap water
Orientation:	Vertical	Cell #:	P2
Sample Preparation:	---		

Parameter	Initial	Final
Height, in	2.30	2.30
Diameter, in	2.98	2.98
Area, in^2	6.99	6.97
Volume, in^3	16.1	16.0
Mass, g	516	528
Bulk Density, pcf	122	125
Moisture Content, %	19.0	21.8
Dry Density, pcf	102.5	102.7
Degree of Saturation, %	---	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	70	Pressure Increment, psi:	9.7
Sample Pressure, psi:	60	B Coefficient:	0.97

FLOW DATA

Date	Trial #	Pressure, psi		Head readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Sample	H_1	H_2	H_1-H_2						
7/5	6	70	60	170.4	169.4	1.0	180	29.2	3.5E-07	21	0.976	3.4E-07
7/5	7	70	60	169.4	168.9	0.5	90	29.0	3.4E-07	21	0.976	3.3E-07
7/5	8	70	90	169.0	168.7	0.3	60	28.9	3.3E-07	21	0.976	3.3E-07
7/5	0	70	90	168.7	168.2	0.5	90	28.9	3.3E-07	21	0.976	3.2E-07

PERMEABILITY AT 20° C: 3.3 x 10^{-7} cm/sec (@ 10 psi effective stress)

Client:	Kemron Environmental Services		
Project Name:	Patchogue MGP		
Project Location:	---		
GTX #:	1851		
Start Date:	7/5/2012	Tested By:	bhe
End Date:	7/6/2012	Checked By:	MCM
Location:	---	Test #:	K5.1
Sample #:	0427-007		
Elevation:	---		
Visual Description:	Moist, brown clayey sand		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D 5084 Increasing Tailwater

Sample Type:	UD	Permeant Fluid:	de-aired tap water
Orientation:	Vertical	Cell #:	P2
Sample Preparation:	---		

Parameter	Initial	Final
Height, in	2.91	2.91
Diameter, in	2.98	2.98
Area, in^2	6.96	6.97
Volume, in^3	20.3	20.3
Mass, g	546	588
Bulk Density, pcf	103	110
Moisture Content, %	23.6	33.1
Dry Density, pcf	83.0	82.8
Degree of Saturation, %	---	96

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	70	Pressure Increment, psi:	9.6
Sample Pressure, psi:	60	B Coefficient:	0.96

FLOW DATA

Date	Trial #	Pressure, psi		Head readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Sample	H_1	H_2	H_1-H_2						
7/5	5	70	60	124.9	124.2	0.7	300	16.9	2.5E-07	21	0.976	2.5E-07
7/5	6	70	60	124.2	123.5	0.7	300	16.8	2.5E-07	21	0.976	2.5E-07
7/5	7	70	90	123.5	117.4	6.2	2600	16.7	2.6E-07	21	0.976	2.6E-07
7/5	8	70	90	117.3	116.0	1.3	600	15.9	2.5E-07	21	0.976	2.4E-07

PERMEABILITY AT 20° C: 2.5 x 10^{-7} cm/sec (@ 10 psi effective stress)

Client:	Kemron Environmental Services		
Project Name:	Patchogue MGP		
Project Location:	---		
GTX #:	1851		
Start Date:	7/5/2012	Tested By:	bhe
End Date:	7/6/2012	Checked By:	MCM
Location:	---	Test #:	K6.1
Sample #:	0427-008		
Elevation:	---		
Visual Description:	Moist, brown clayey sand		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D 5084 Increasing Tailwater

Sample Type:	UD	Permeant Fluid:	de-aired tap water
Orientation:	Vertical	Cell #:	1A
Sample Preparation:	---		

Parameter	Initial	Final
Height, in	2.74	2.77
Diameter, in	2.98	2.99
Area, in^2	6.98	7.02
Volume, in^3	19.1	19.4
Mass, g	539	570
Bulk Density, pcf	107	111
Moisture Content, %	25.4	32.6
Dry Density, pcf	85.4	84.0
Degree of Saturation, %	---	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	70	Pressure Increment, psi:	9.6
Sample Pressure, psi:	60	B Coefficient:	0.96

FLOW DATA

Date	Trial #	Pressure, psi		Head readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Sample	H_1	H_2	H_1-H_2						
7/6	5	70	60	90.1	89.3	0.8	540	12.8	2.1E-07	21	0.976	2.0E-07
7/6	6	70	60	89.3	88.5	0.8	600	12.7	1.9E-07	21	0.976	1.9E-07
7/6	7	70	90	88.5	87.0	1.5	1140	12.6	1.9E-07	21	0.976	1.9E-07
7/6	8	70	90	87.0	84.8	2.2	1560	12.4	2.1E-07	21	0.976	2.0E-07

PERMEABILITY AT 20° C: 1.9 x 10^{-7} cm/sec (@ 10 psi effective stress)

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-001 28 Day		
TESTING DATE:	21-Jun-12	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8187_US

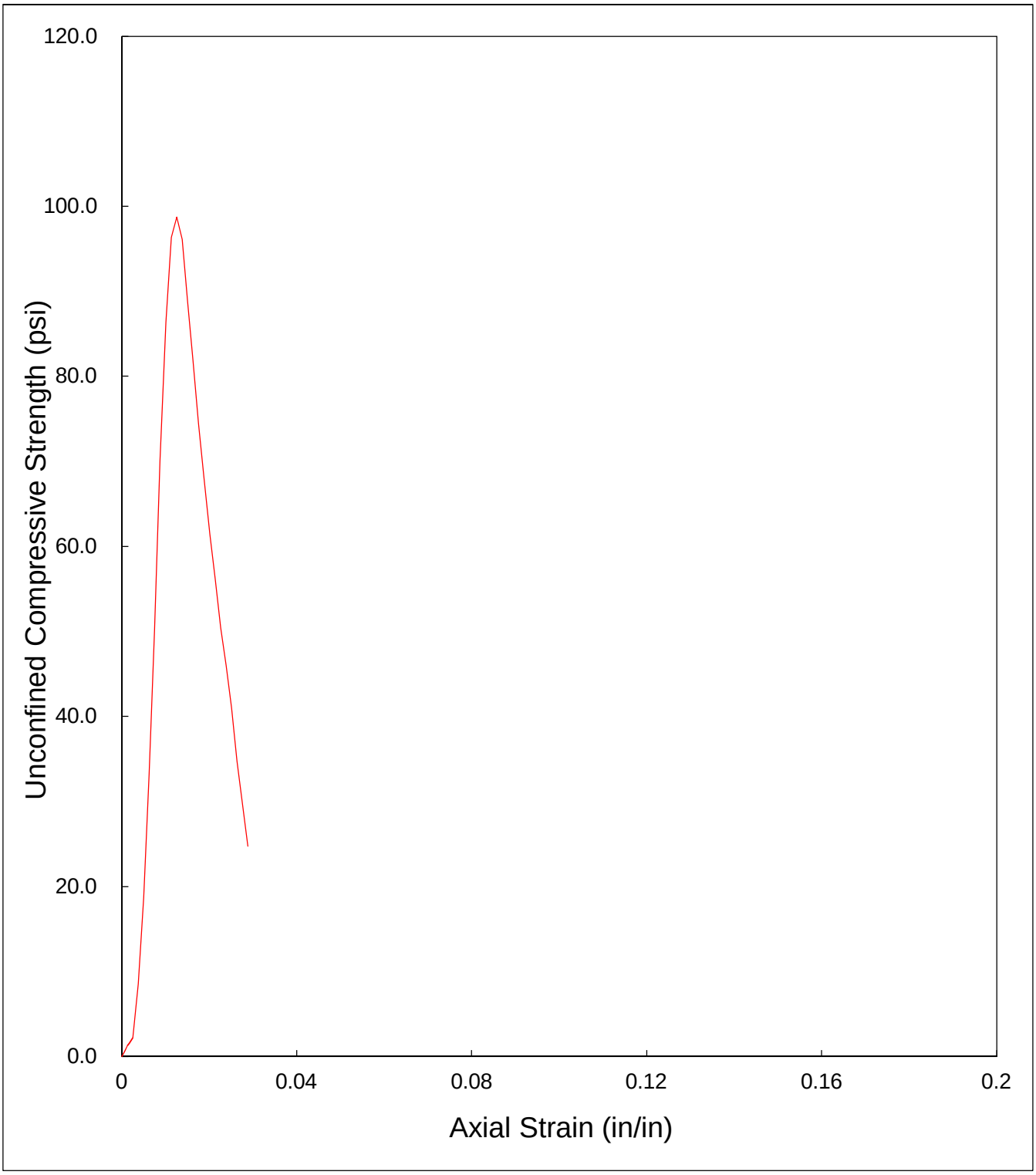
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0427-001	
2. WT MOISTURE TIN (tare weight)	113.67	g
3. WT WET SOIL + TARE	184.20	g
4. WT DRY SOIL + TARE	171.71	g
5. WT WATER, Ww	12.49	g
6. WT DRY SOIL, Ws	58.04	g
7. MOISTURE CONTENT, W	**21.52**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.99	in.
No. 2	2.00	in.	3.99	in.
No. 3	2.00	in.	3.98	in.
Average	**2.00**	**in.**	**3.98**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***395.86***	***g***
Initial Area, Ac	3.14	in^2
Initial Volume, Vc	12.51	in^3
Initial Bulk Unit Weight,	120.5	lb/ft^3
Initial Dry Unit Weigh	99.2	lb/ft^3
15 % Strain (0.15 Lo)	0.60	in.
UCS	98.7	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.141	0.0000	0.0
2	0.003	0.003	3.143	0.0008	0.6
4	0.005	0.005	3.144	0.0013	1.3
5	0.007	0.007	3.146	0.0018	1.6
7	0.010	0.010	3.148	0.0025	2.2
27	0.015	0.015	3.152	0.0038	8.6
59	0.020	0.020	3.156	0.0050	18.7
105	0.025	0.025	3.160	0.0063	33.2
159	0.030	0.030	3.164	0.0075	50.2
222	0.035	0.035	3.168	0.0088	70.1
274	0.040	0.040	3.172	0.0100	86.4
306	0.045	0.045	3.176	0.0113	96.3
314	0.050	0.050	3.180	0.0125	98.7
306	0.055	0.055	3.185	0.0138	96.1
283	0.060	0.060	3.189	0.0151	88.8
261	0.065	0.065	3.193	0.0163	81.8
238	0.070	0.070	3.197	0.0176	74.5
218	0.075	0.075	3.201	0.0188	68.1
197	0.080	0.080	3.205	0.0201	61.5
180	0.085	0.085	3.209	0.0213	56.1
162	0.090	0.090	3.213	0.0226	50.4
148	0.095	0.095	3.217	0.0238	46.0
132	0.100	0.100	3.221	0.0251	41.0
112	0.105	0.105	3.226	0.0264	34.7
96	0.110	0.110	3.230	0.0276	29.7
80	0.115	0.115	3.234	0.0289	24.7

UNCONFINED COMPRESSION TESTING
Sample No. 0427-001 28 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-001 28 Day		
TESTING DATE:	6/21/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8187_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	21.5	**%**
BULK UNIT WEIGHT	120.5	lb/ft^3
DRY UNIT WEIGHT	99.2	lb/ft^3
UCS *	98.7	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-002 28 Day		
TESTING DATE:	21-Jun-12	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8188_US

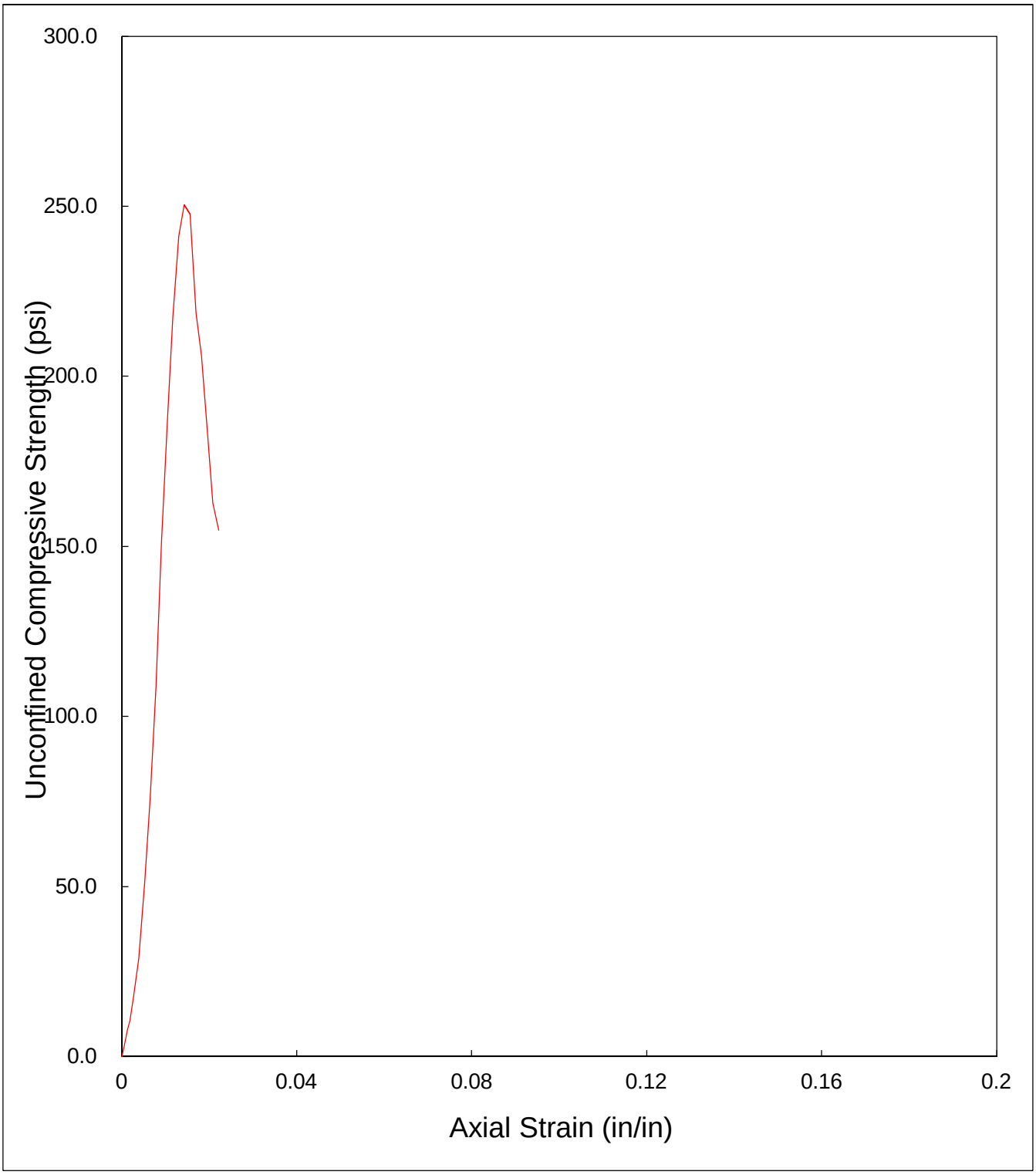
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0427-002	
2. WT MOISTURE TIN (tare weight)	88.28	g
3. WT WET SOIL + TARE	160.15	g
4. WT DRY SOIL + TARE	147.36	g
5. WT WATER, Ww	12.79	g
6. WT DRY SOIL, Ws	59.08	g
7. MOISTURE CONTENT, W	**21.65**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.83	in.
No. 2	2.00	in.	3.84	in.
No. 3	2.01	in.	3.86	in.
Average	**2.00**	**in.**	**3.84**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***403.40***	***g***
Initial Area, Ac	3.15	in^2
Initial Volume, Vc	12.11	in^3
Initial Bulk Unit Weight,	126.9	lb/ft^3
Initial Dry Unit Weigh	104.3	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	250.5	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.152	0.0000	0.0
15	0.003	0.003	3.155	0.0008	4.8
25	0.005	0.005	3.156	0.0013	7.9
33	0.007	0.007	3.158	0.0018	10.5
54	0.010	0.010	3.160	0.0026	17.1
91	0.015	0.015	3.164	0.0039	28.8
162	0.020	0.020	3.169	0.0052	51.1
240	0.025	0.025	3.173	0.0065	75.6
346	0.030	0.030	3.177	0.0078	108.9
481	0.035	0.035	3.181	0.0091	151.2
595	0.040	0.040	3.185	0.0104	186.8
693	0.045	0.045	3.189	0.0117	217.3
770	0.050	0.050	3.194	0.0130	241.1
801	0.055	0.055	3.198	0.0143	250.5
793	0.060	0.060	3.202	0.0156	247.7
701	0.065	0.065	3.206	0.0169	218.6
662	0.070	0.070	3.211	0.0182	206.2
591	0.075	0.075	3.215	0.0195	183.8
524	0.080	0.080	3.219	0.0208	162.8
499	0.085	0.085	3.223	0.0221	154.8

UNCONFINED COMPRESSION TESTING
Sample No. 0427-002 28 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-002 28 Day		
TESTING DATE:	6/21/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8188_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	21.6	**%**
BULK UNIT WEIGHT	126.9	lb/ft^3
DRY UNIT WEIGHT	104.3	lb/ft^3
UCS *	250.5	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-003 28 Day		
TESTING DATE:	21-Jun-12	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8189_US

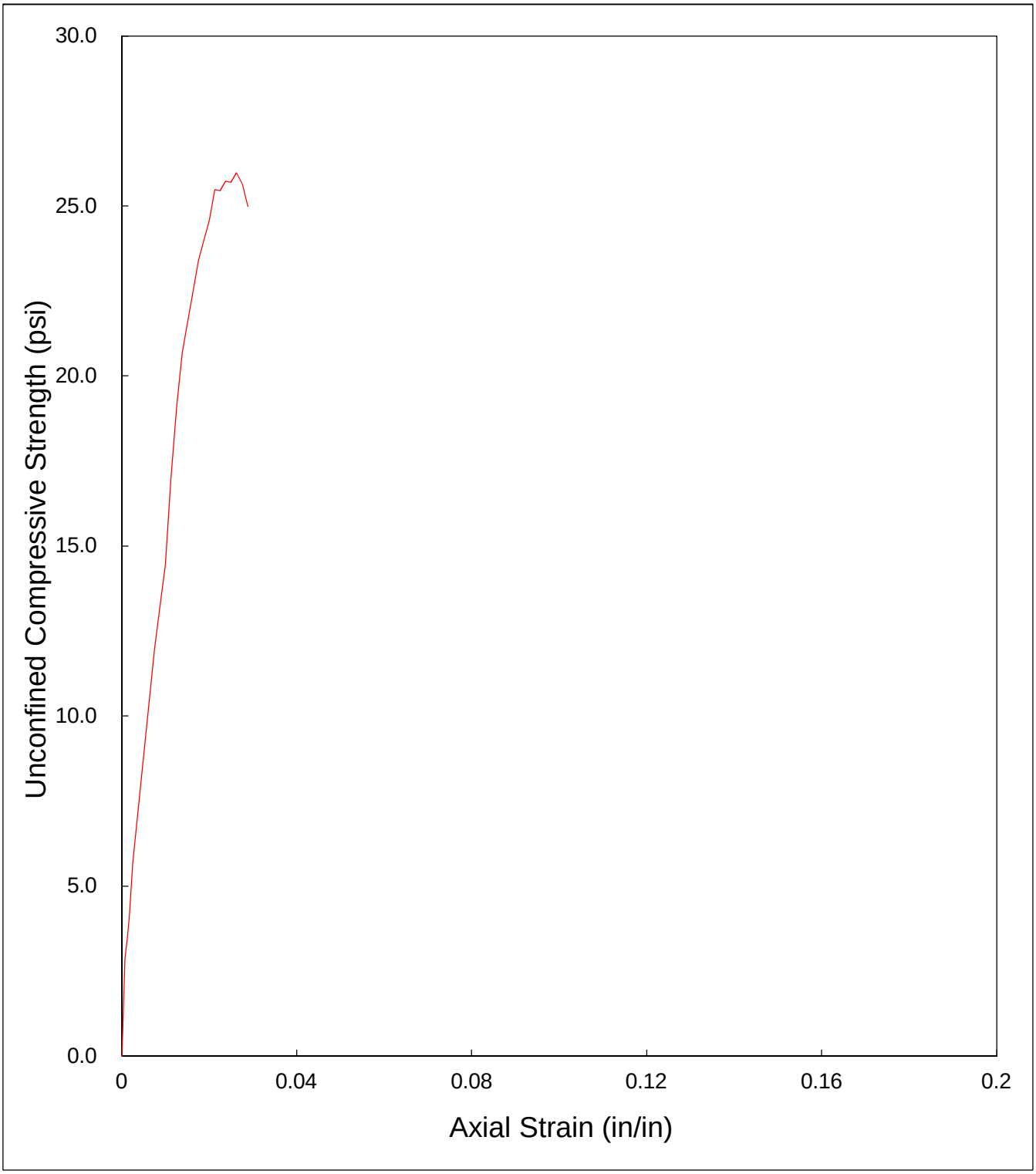
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0427-003	
2. WT MOISTURE TIN (tare weight)	87.17	g
3. WT WET SOIL + TARE	167.11	g
4. WT DRY SOIL + TARE	148.23	g
5. WT WATER, Ww	18.88	g
6. WT DRY SOIL, Ws	61.06	g
7. MOISTURE CONTENT, W	**30.92**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	4.00	in.
No. 2	2.00	in.	4.00	in.
No. 3	2.01	in.	3.99	in.
Average	**2.00**	**in.**	**4.00**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***357.77***	***g***
Initial Area, Ac	3.15	in^2
Initial Volume, Vc	12.58	in^3
Initial Bulk Unit Weight,	108.3	lb/ft^3
Initial Dry Unit Weigh	82.7	lb/ft^3
15 % Strain (0.15 Lo)	0.60	in.
UCS	26.0	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.149	0.0000	0.0
9	0.003	0.003	3.151	0.0008	2.9
11	0.005	0.005	3.153	0.0013	3.5
13	0.007	0.007	3.154	0.0018	4.1
18	0.010	0.010	3.157	0.0025	5.7
23	0.015	0.015	3.161	0.0038	7.3
28	0.020	0.020	3.165	0.0050	8.8
33	0.025	0.025	3.169	0.0063	10.4
38	0.030	0.030	3.173	0.0075	12.0
42	0.035	0.035	3.177	0.0088	13.2
46	0.040	0.040	3.181	0.0100	14.5
54	0.045	0.045	3.185	0.0113	17.0
61	0.050	0.050	3.189	0.0125	19.1
66	0.055	0.055	3.193	0.0138	20.7
69	0.060	0.060	3.197	0.0150	21.6
72	0.065	0.065	3.201	0.0163	22.5
75	0.070	0.070	3.205	0.0175	23.4
77	0.075	0.075	3.209	0.0188	24.0
79	0.080	0.080	3.213	0.0200	24.6
82	0.085	0.085	3.217	0.0213	25.5
82	0.090	0.090	3.221	0.0225	25.5
83	0.095	0.095	3.226	0.0238	25.7
83	0.100	0.100	3.230	0.0250	25.7
84	0.105	0.105	3.234	0.0263	26.0
83	0.110	0.110	3.238	0.0275	25.6
81	0.115	0.115	3.242	0.0288	25.0

UNCONFINED COMPRESSION TESTING
Sample No. 0427-003 28 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-003 28 Day		
TESTING DATE:	6/21/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8189_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	30.9	**%**
BULK UNIT WEIGHT	108.3	lb/ft^3
DRY UNIT WEIGHT	82.7	lb/ft^3
UCS *	26.0	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-004 28 Day		
TESTING DATE:	21-Jun-12	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8190_US

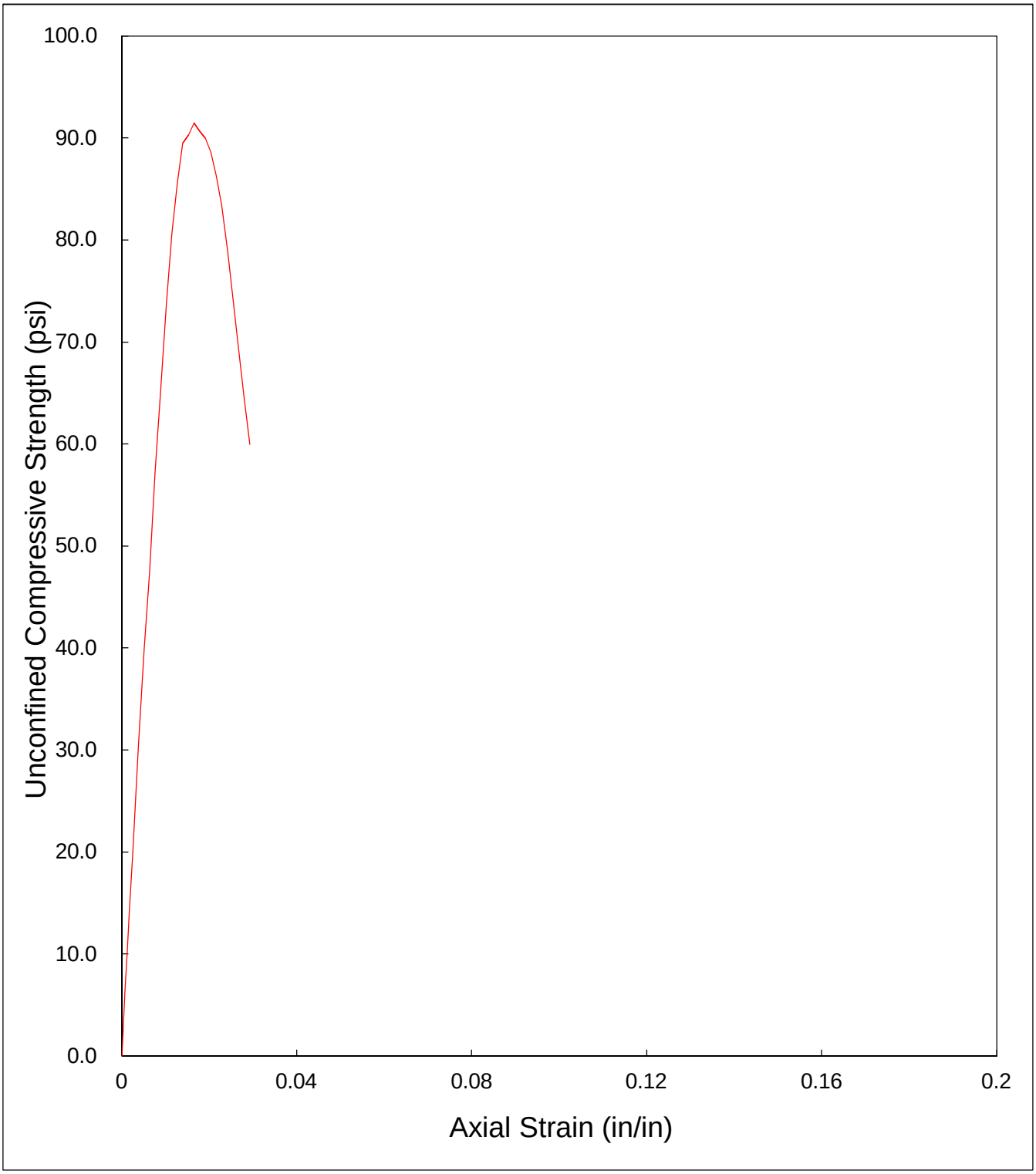
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0427-004	
2. WT MOISTURE TIN (tare weight)	66.12	g
3. WT WET SOIL + TARE	133.48	g
4. WT DRY SOIL + TARE	117.78	g
5. WT WATER, Ww	15.70	g
6. WT DRY SOIL, Ws	51.66	g
7. MOISTURE CONTENT, W	**30.39**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.94	in.
No. 2	2.00	in.	3.94	in.
No. 3	2.00	in.	3.93	in.
Average	**2.00**	**in.**	**3.94**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***362.00***	***g***
Initial Area, Ac	3.14	in^2
Initial Volume, Vc	12.36	in^3
Initial Bulk Unit Weight,	111.6	lb/ft^3
Initial Dry Unit Weigh	85.6	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	91.4	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.141	0.0000	0.0
20	0.003	0.003	3.143	0.0008	6.4
33	0.005	0.005	3.145	0.0013	10.5
45	0.007	0.007	3.146	0.0018	14.3
63	0.010	0.010	3.149	0.0025	20.0
95	0.015	0.015	3.153	0.0038	30.1
126	0.020	0.020	3.157	0.0051	39.9
150	0.025	0.025	3.161	0.0064	47.5
181	0.030	0.030	3.165	0.0076	57.2
206	0.035	0.035	3.169	0.0089	65.0
234	0.040	0.040	3.173	0.0102	73.8
256	0.045	0.045	3.177	0.0114	80.6
272	0.050	0.050	3.181	0.0127	85.5
285	0.055	0.055	3.185	0.0140	89.5
288	0.060	0.060	3.189	0.0152	90.3
292	0.065	0.065	3.193	0.0165	91.4
290	0.070	0.070	3.197	0.0178	90.7
288	0.075	0.075	3.202	0.0191	90.0
284	0.080	0.080	3.206	0.0203	88.6
277	0.085	0.085	3.210	0.0216	86.3
268	0.090	0.090	3.214	0.0229	83.4
254	0.095	0.095	3.218	0.0241	78.9
239	0.100	0.100	3.222	0.0254	74.2
224	0.105	0.105	3.227	0.0267	69.4
209	0.110	0.110	3.231	0.0280	64.7
194	0.115	0.115	3.235	0.0292	60.0

UNCONFINED COMPRESSION TESTING
Sample No. 0427-004 28 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-004 28 Day		
TESTING DATE:	6/21/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8190_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	30.4	**%**
BULK UNIT WEIGHT	111.6	lb/ft^3
DRY UNIT WEIGHT	85.6	lb/ft^3
UCS *	91.4	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-005 28 Day		
TESTING DATE:	21-Jun-12	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8191_US

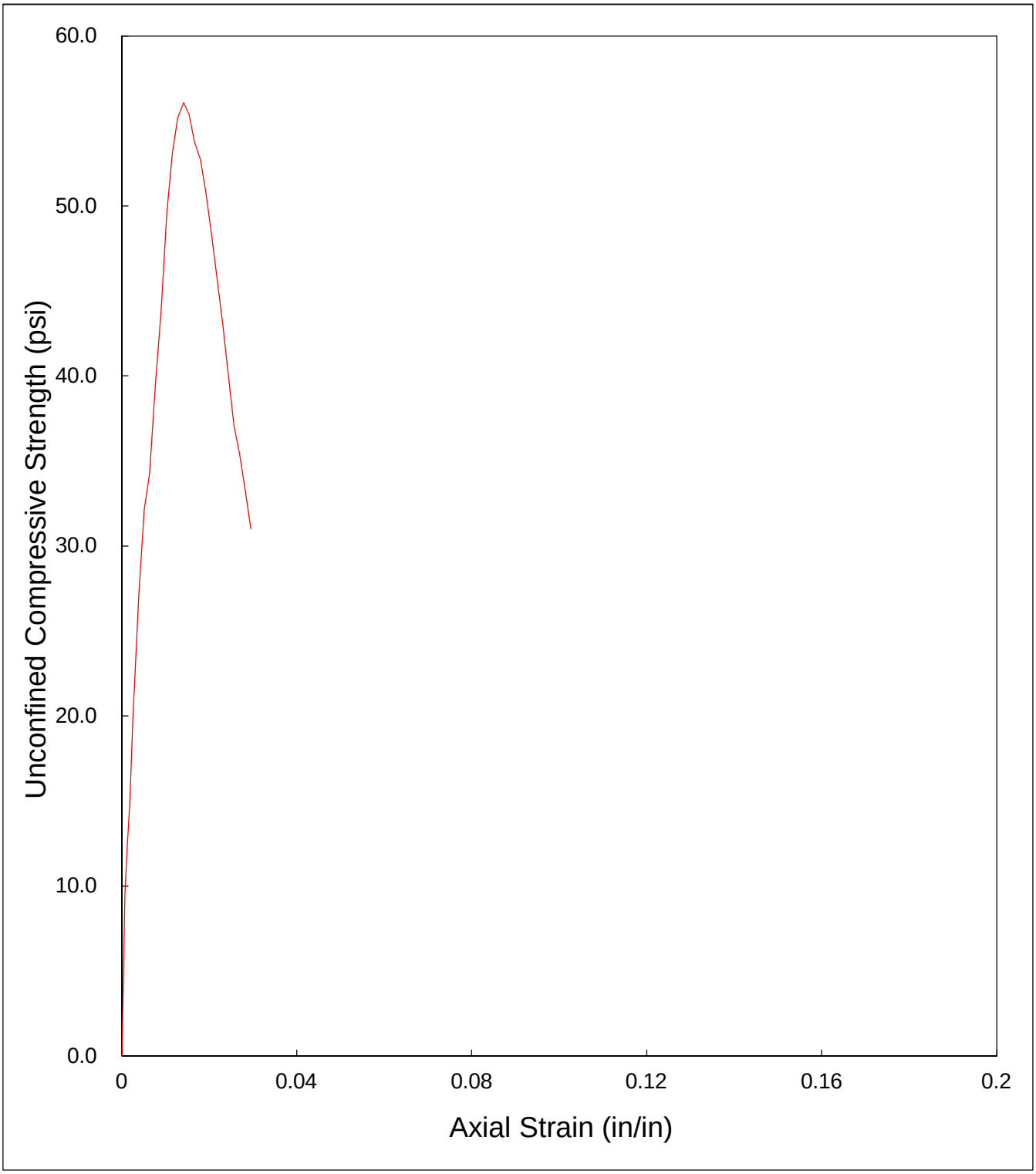
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0427-005	
2. WT MOISTURE TIN (tare weight)	68.85	g
3. WT WET SOIL + TARE	133.35	g
4. WT DRY SOIL + TARE	123.41	g
5. WT WATER, Ww	9.94	g
6. WT DRY SOIL, Ws	54.56	g
7. MOISTURE CONTENT, W	**18.22**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.90	in.
No. 2	1.99	in.	3.89	in.
No. 3	2.00	in.	3.90	in.
Average	**2.00**	**in.**	**3.90**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***377.48***	***g***
Initial Area, Ac	3.13	in^2
Initial Volume, Vc	12.20	in^3
Initial Bulk Unit Weight,	117.9	lb/ft^3
Initial Dry Unit Weigh	99.7	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	56.1	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.129	0.0000	0.0
30	0.003	0.003	3.131	0.0008	9.6
39	0.005	0.005	3.133	0.0013	12.4
47	0.007	0.007	3.135	0.0018	15.0
62	0.010	0.010	3.137	0.0026	19.8
85	0.015	0.015	3.141	0.0038	27.1
101	0.020	0.020	3.145	0.0051	32.1
108	0.025	0.025	3.149	0.0064	34.3
125	0.030	0.030	3.153	0.0077	39.6
138	0.035	0.035	3.157	0.0090	43.7
157	0.040	0.040	3.161	0.0103	49.7
168	0.045	0.045	3.166	0.0115	53.1
175	0.050	0.050	3.170	0.0128	55.2
178	0.055	0.055	3.174	0.0141	56.1
176	0.060	0.060	3.178	0.0154	55.4
171	0.065	0.065	3.182	0.0167	53.7
168	0.070	0.070	3.186	0.0180	52.7
162	0.075	0.075	3.190	0.0192	50.8
154	0.080	0.080	3.195	0.0205	48.2
146	0.085	0.085	3.199	0.0218	45.6
138	0.090	0.090	3.203	0.0231	43.1
128	0.095	0.095	3.207	0.0244	39.9
119	0.100	0.100	3.211	0.0257	37.1
114	0.105	0.105	3.216	0.0269	35.5
107	0.110	0.110	3.220	0.0282	33.2
100	0.115	0.115	3.224	0.0295	31.0

UNCONFINED COMPRESSION TESTING
Sample No. 0427-005 28 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-005 28 Day		
TESTING DATE:	6/21/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8191_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	18.2	**%**
BULK UNIT WEIGHT	117.9	lb/ft^3
DRY UNIT WEIGHT	99.7	lb/ft^3
UCS *	56.1	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-006 28 Day		
TESTING DATE:	21-Jun-12	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8192_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0427-006	
2. WT MOISTURE TIN (tare weight)	63.52	g
3. WT WET SOIL + TARE	116.60	g
4. WT DRY SOIL + TARE	108.12	g
5. WT WATER, Ww	8.48	g
6. WT DRY SOIL, Ws	44.60	g
7. MOISTURE CONTENT, W	**19.01**	**%**

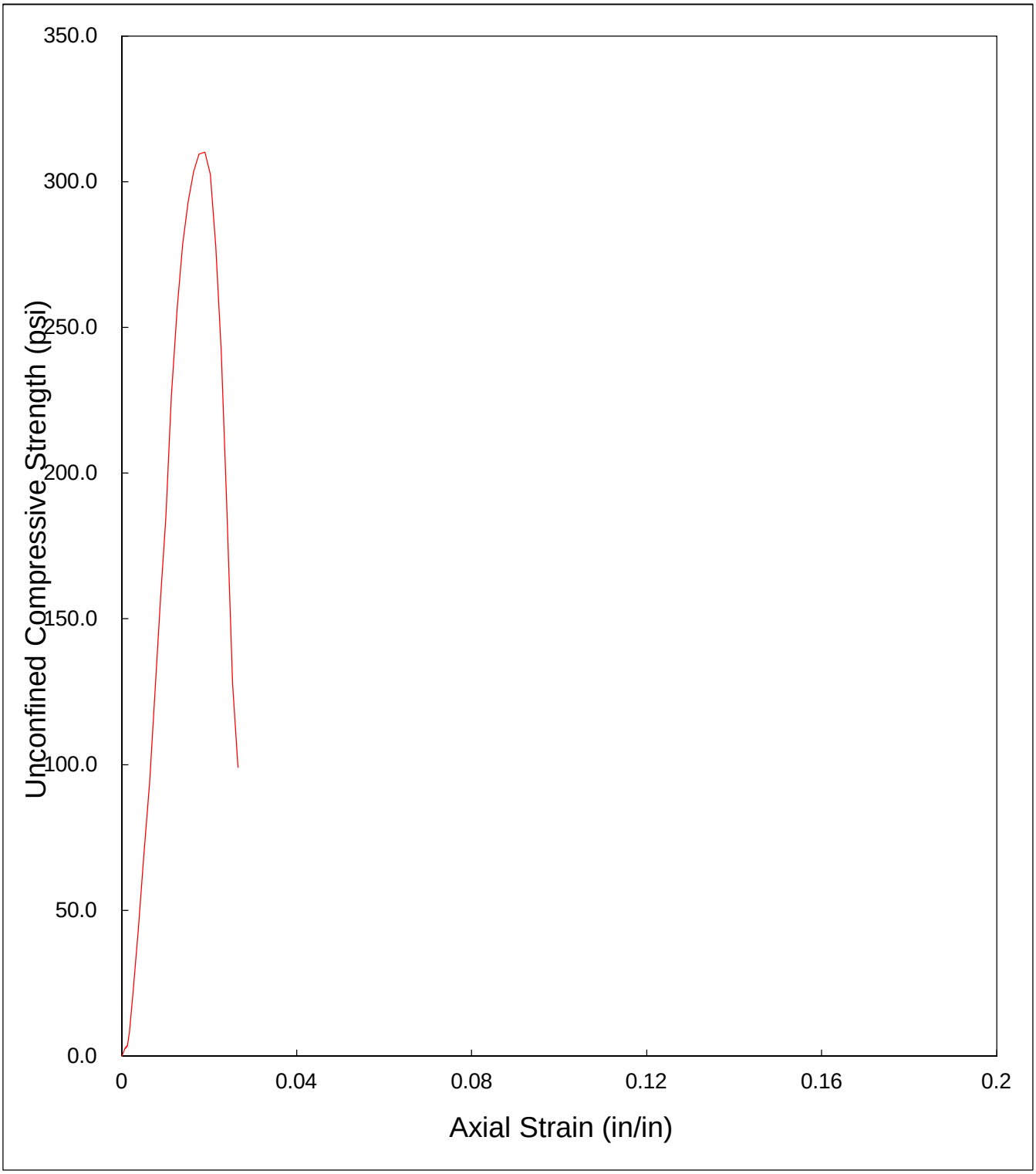
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.95	in.
No. 2	2.00	in.	3.96	in.
No. 3	2.00	in.	3.96	in.
Average	**2.00**	**in.**	**3.95**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***402.64***	***g***
Initial Area, Ac	3.13	in^2
Initial Volume, Vc	12.39	in^3
Initial Bulk Unit Weight,	123.8	lb/ft^3
Initial Dry Unit Weigh	104.0	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	310.1	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.132	0.0000	0.0
8	0.003	0.003	3.135	0.0008	2.6
11	0.005	0.005	3.136	0.0013	3.5
25	0.007	0.007	3.138	0.0018	8.0
66	0.010	0.010	3.140	0.0025	21.0
136	0.015	0.015	3.144	0.0038	43.3
215	0.020	0.020	3.148	0.0051	68.3
296	0.025	0.025	3.152	0.0063	93.9
395	0.030	0.030	3.156	0.0076	125.2
495	0.035	0.035	3.160	0.0089	156.6
586	0.040	0.040	3.164	0.0101	185.2
717	0.045	0.045	3.168	0.0114	226.3
815	0.050	0.050	3.172	0.0126	256.9
885	0.055	0.055	3.176	0.0139	278.6
932	0.060	0.060	3.180	0.0152	293.0
966	0.065	0.065	3.185	0.0164	303.3
987	0.070	0.070	3.189	0.0177	309.5
990	0.075	0.075	3.193	0.0190	310.1
967	0.080	0.080	3.197	0.0202	302.5
889	0.085	0.085	3.201	0.0215	277.7
776	0.090	0.090	3.205	0.0228	242.1
610	0.095	0.095	3.209	0.0240	190.1
411	0.100	0.100	3.213	0.0253	127.9
319	0.105	0.105	3.218	0.0266	99.1

UNCONFINED COMPRESSION TESTING

Sample No. 0427-006 28 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-006 28 Day		
TESTING DATE:	6/21/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8192_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	19.0	**%**
BULK UNIT WEIGHT	123.8	lb/ft^3
DRY UNIT WEIGHT	104.0	lb/ft^3
UCS *	310.1	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-007 28 Day		
TESTING DATE:	21-Jun-12	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8193_US

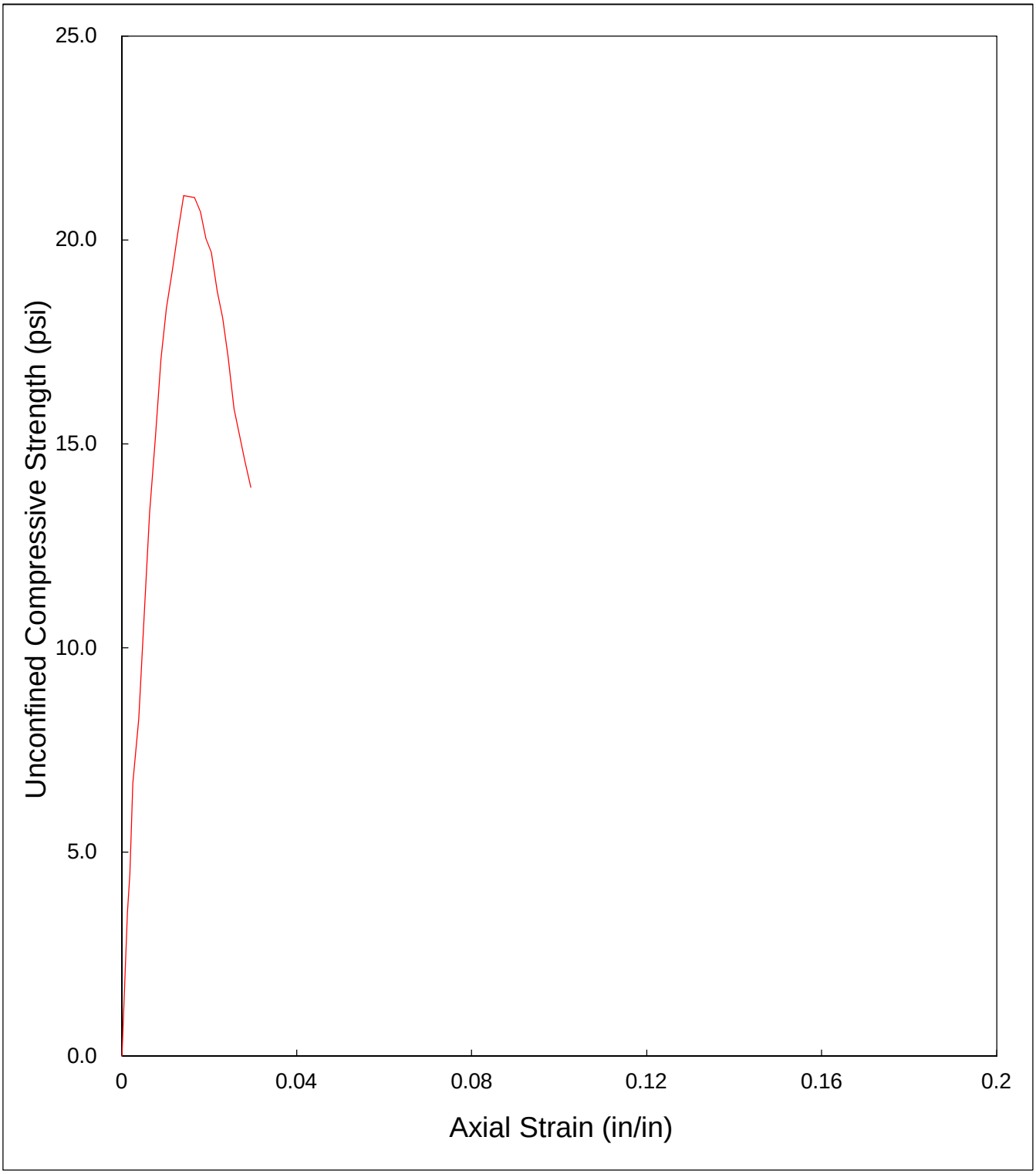
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0427-007	
2. WT MOISTURE TIN (tare weight)	69.74	g
3. WT WET SOIL + TARE	134.13	g
4. WT DRY SOIL + TARE	120.89	g
5. WT WATER, Ww	13.24	g
6. WT DRY SOIL, Ws	51.15	g
7. MOISTURE CONTENT, W	**25.88**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.91	in.
No. 2	2.00	in.	3.89	in.
No. 3	2.00	in.	3.91	in.
Average	**2.00**	**in.**	**3.90**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***321.28***	***g***
Initial Area, Ac	3.13	in^2
Initial Volume, Vc	12.22	in^3
Initial Bulk Unit Weight,	100.1	lb/ft^3
Initial Dry Unit Weigh	79.5	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	21.1	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.132	0.0000	0.0
6	0.003	0.003	3.135	0.0008	1.9
11	0.005	0.005	3.136	0.0013	3.5
14	0.007	0.007	3.138	0.0018	4.5
21	0.010	0.010	3.140	0.0026	6.7
26	0.015	0.015	3.144	0.0038	8.3
34	0.020	0.020	3.148	0.0051	10.8
42	0.025	0.025	3.152	0.0064	13.3
48	0.030	0.030	3.156	0.0077	15.2
54	0.035	0.035	3.161	0.0090	17.1
58	0.040	0.040	3.165	0.0102	18.3
61	0.045	0.045	3.169	0.0115	19.3
64	0.050	0.050	3.173	0.0128	20.2
67	0.055	0.055	3.177	0.0141	21.1
67	0.060	0.060	3.181	0.0154	21.1
67	0.065	0.065	3.185	0.0167	21.0
66	0.070	0.070	3.189	0.0179	20.7
64	0.075	0.075	3.194	0.0192	20.0
63	0.080	0.080	3.198	0.0205	19.7
60	0.085	0.085	3.202	0.0218	18.7
58	0.090	0.090	3.206	0.0231	18.1
55	0.095	0.095	3.210	0.0243	17.1
51	0.100	0.100	3.215	0.0256	15.9
49	0.105	0.105	3.219	0.0269	15.2
47	0.110	0.110	3.223	0.0282	14.6
45	0.115	0.115	3.227	0.0295	13.9

UNCONFINED COMPRESSION TESTING
Sample No. 0427-007 28 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-007 28 Day		
TESTING DATE:	6/21/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8193_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	25.9	**%**
BULK UNIT WEIGHT	100.1	lb/ft^3
DRY UNIT WEIGHT	79.5	lb/ft^3
UCS *	21.1	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-008 28 Day		
TESTING DATE:	21-Jun-12	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8194_US

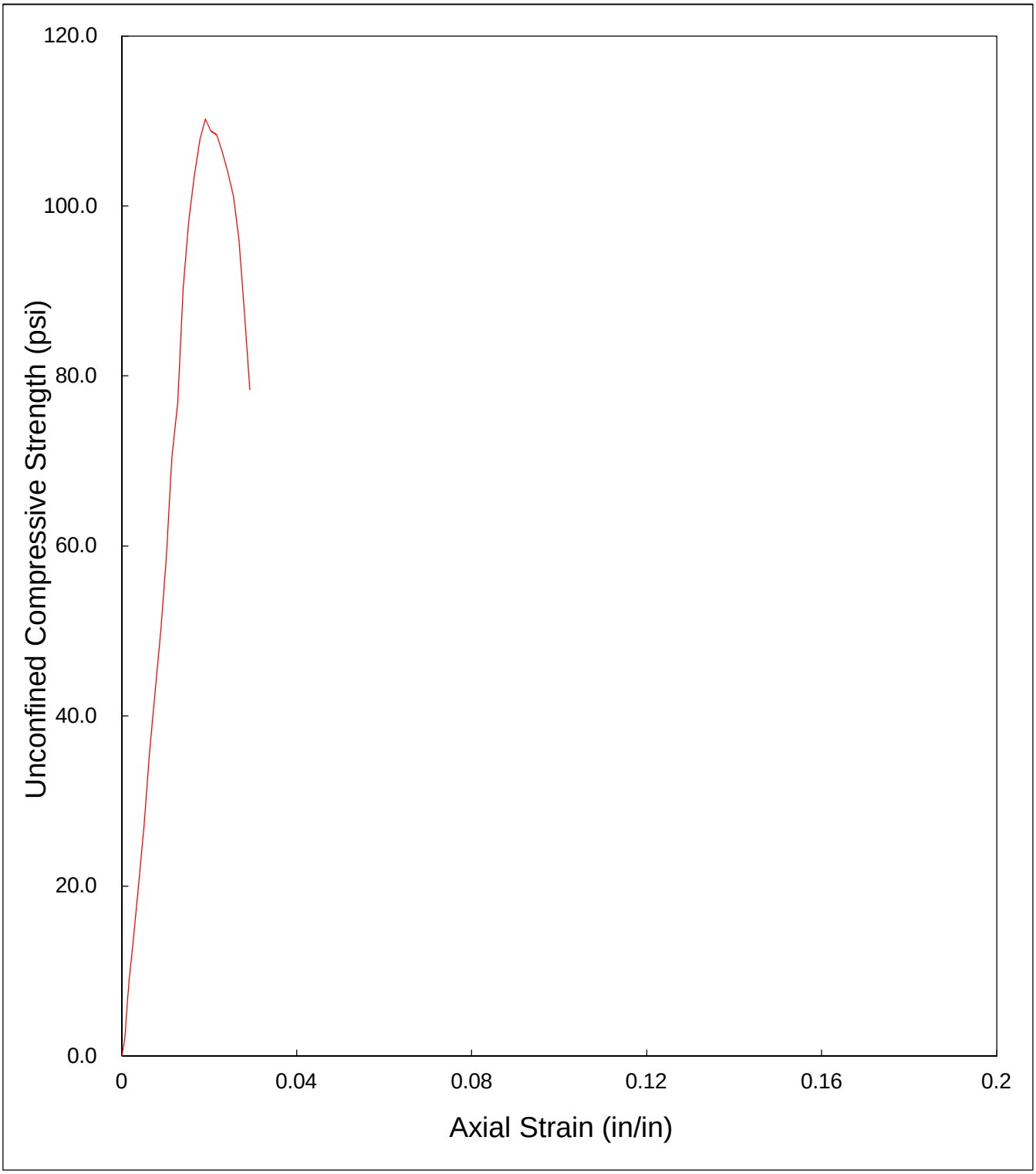
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0427-008	
2. WT MOISTURE TIN (tare weight)	63.34	g
3. WT WET SOIL + TARE	151.20	g
4. WT DRY SOIL + TARE	133.43	g
5. WT WATER, Ww	17.77	g
6. WT DRY SOIL, Ws	70.09	g
7. MOISTURE CONTENT, W	**25.35**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.93	in.
No. 2	2.00	in.	3.92	in.
No. 3	2.01	in.	3.92	in.
Average	**2.00**	**in.**	**3.92**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***348.16***	***g***
Initial Area, Ac	3.13	in²
Initial Volume, Vc	12.28	in³
Initial Bulk Unit Weight,	108.0	lb/ft³
Initial Dry Unit Weigh	86.1	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	110.2	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.132	0.0000	0.0
7	0.003	0.003	3.135	0.0008	2.2
20	0.005	0.005	3.136	0.0013	6.4
29	0.007	0.007	3.138	0.0018	9.2
41	0.010	0.010	3.140	0.0025	13.1
64	0.015	0.015	3.144	0.0038	20.4
86	0.020	0.020	3.148	0.0051	27.3
113	0.025	0.025	3.152	0.0064	35.8
135	0.030	0.030	3.156	0.0076	42.8
159	0.035	0.035	3.160	0.0089	50.3
186	0.040	0.040	3.164	0.0102	58.8
223	0.045	0.045	3.169	0.0115	70.4
244	0.050	0.050	3.173	0.0127	76.9
287	0.055	0.055	3.177	0.0140	90.3
312	0.060	0.060	3.181	0.0153	98.1
329	0.065	0.065	3.185	0.0166	103.3
344	0.070	0.070	3.189	0.0178	107.9
352	0.075	0.075	3.193	0.0191	110.2
348	0.080	0.080	3.197	0.0204	108.8
347	0.085	0.085	3.202	0.0217	108.4
341	0.090	0.090	3.206	0.0229	106.4
334	0.095	0.095	3.210	0.0242	104.1
325	0.100	0.100	3.214	0.0255	101.1
309	0.105	0.105	3.218	0.0268	96.0
282	0.110	0.110	3.223	0.0280	87.5
253	0.115	0.115	3.227	0.0293	78.4

UNCONFINED COMPRESSION TESTING
Sample No. 0427-008 28 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-008 28 Day		
TESTING DATE:	6/21/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8194_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	25.4	**%**
BULK UNIT WEIGHT	108.0	lb/ft^3
DRY UNIT WEIGHT	86.1	lb/ft^3
UCS *	110.2	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	6/26/2012
TESTED BY:	MMR
TRACKING CODE:	8210_PH

KEMRON SAMPLE No.		MATERIAL pH
1.	0427-001	11.43
2.	0427-002	11.83
3.	0427-003	11.24
4.	0427-004	11.77
5.	0427-005	11.25
6.	0427-006	11.16
7.	0427-007	10.66
8.	0427-008	11.04

Appendix C:

Optimization Treatment Data Sheets

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	8/17/2012
TESTED BY:	ZOD
TRACKING CODE:	8283_pH

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-009		7.49
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	7.49

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	8/17/2012
TESTED BY:	ZOD
TRACKING CODE:	8284_pH

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-010		7.60
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	7.60

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	8/17/2012
TESTED BY:	ZOD
TRACKING CODE:	8285_pH

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-011		12.07
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.07

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	8/17/2012
TESTED BY:	ZOD
TRACKING CODE:	8286_pH

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-012		12.16
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.16

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	8/17/2012
TESTED BY:	ZOD
TRACKING CODE:	8287_pH

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-013		11.92
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	11.92

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchouge		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-11A (7 day)		
TESTING DATE:	12-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8309

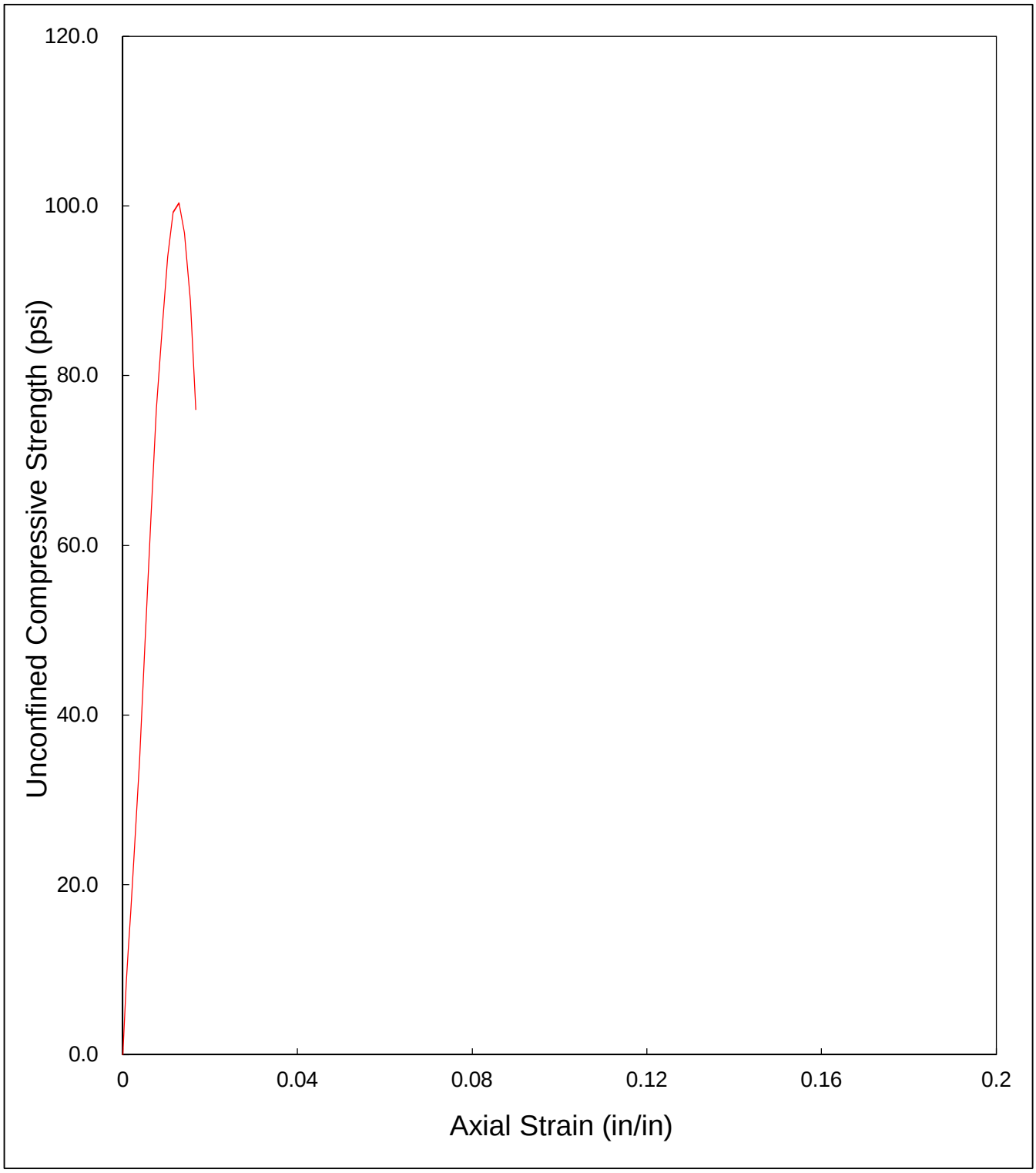
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	163.77	g
3. WT WET SOIL + TARE	307.05	g
4. WT DRY SOIL + TARE	280.18	g
5. WT WATER, Ww	26.87	g
6. WT DRY SOIL, Ws	116.41	g
7. MOISTURE CONTENT, W	**23.08**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.01	in.	3.88	in.
No. 2	2.01	in.	3.88	in.
No. 3	2.00	in.	3.89	in.
Average	**2.01**	**in.**	**3.88**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***374.46***	***g***
Initial Area, Ac	3.16	in²
Initial Volume, Vc	12.25	in³
Initial Bulk Unit Weight,	116.4	lb/ft³
Initial Dry Unit Weigh	94.6	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	100.4	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.157	0.0000	0.0
27	0.003	0.003	3.160	0.0008	8.5
39	0.005	0.005	3.161	0.0013	12.3
53	0.007	0.007	3.163	0.0018	16.8
75	0.010	0.010	3.165	0.0026	23.7
110	0.015	0.015	3.170	0.0039	34.7
154	0.020	0.020	3.174	0.0052	48.5
201	0.025	0.025	3.178	0.0064	63.3
242	0.030	0.030	3.182	0.0077	76.1
273	0.035	0.035	3.186	0.0090	85.7
300	0.040	0.040	3.190	0.0103	94.0
317	0.045	0.045	3.194	0.0116	99.2
321	0.050	0.050	3.199	0.0129	100.4
310	0.055	0.055	3.203	0.0142	96.8
285	0.060	0.060	3.207	0.0155	88.9
244	0.065	0.065	3.211	0.0167	76.0

UNCONFINED COMPRESSION TESTING
Sample No. 0427-11A (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchouge		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-11A (7 day)		
TESTING DATE:	9/12/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8309

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	23.1	**%**
BULK UNIT WEIGHT	116.4	lb/ft^3
DRY UNIT WEIGHT	94.6	lb/ft^3
UCS *	100.4	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-12A (7 day)		
TESTING DATE:	12-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8310

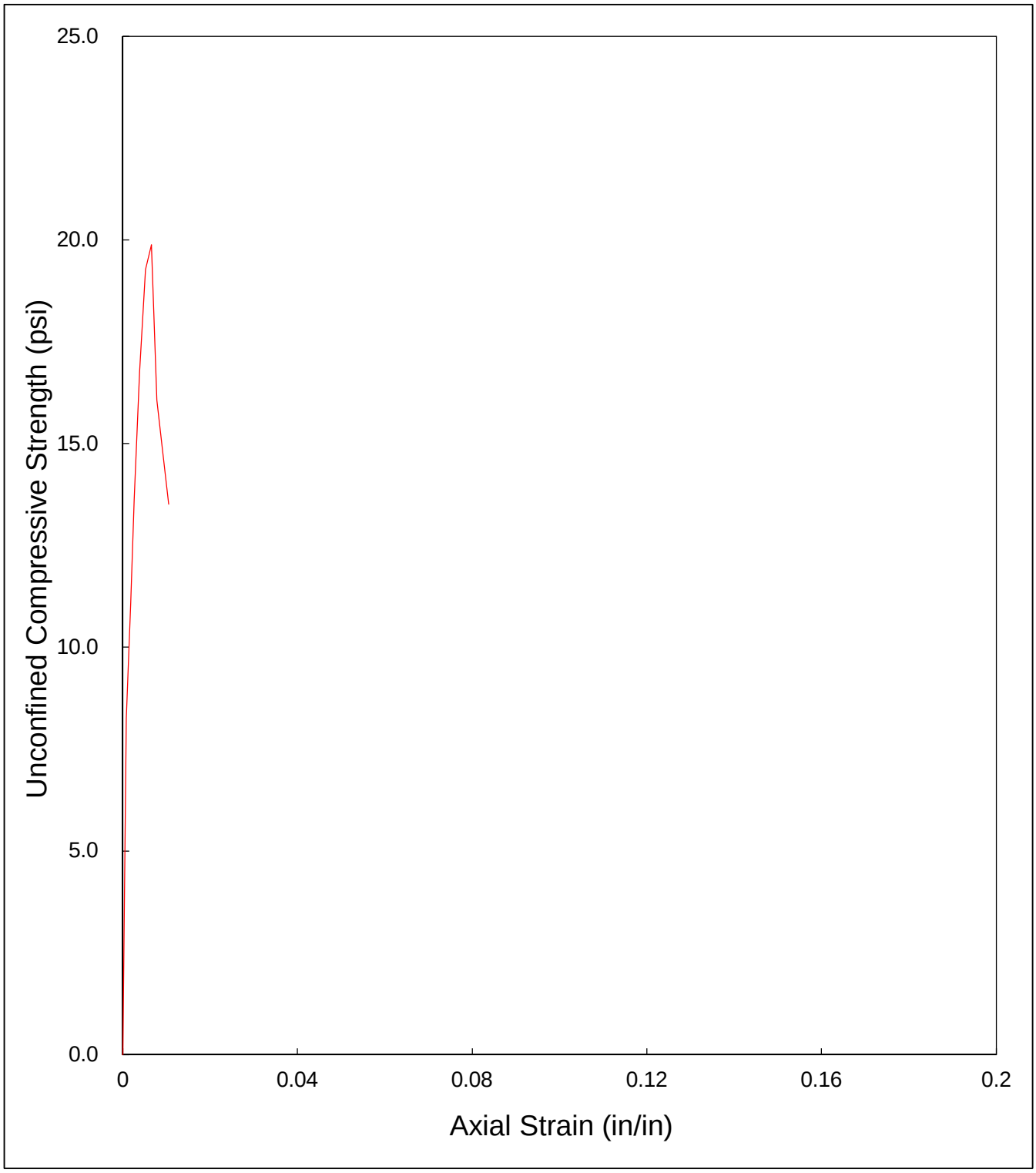
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	174.55	g
3. WT WET SOIL + TARE	314.72	g
4. WT DRY SOIL + TARE	288.10	g
5. WT WATER, Ww	26.62	g
6. WT DRY SOIL, Ws	113.55	g
7. MOISTURE CONTENT, W	**23.44**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.81	in.
No. 2	2.00	in.	3.83	in.
No. 3	2.02	in.	3.81	in.
Average	**2.00**	**in.**	**3.82**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***364.74***	***g***
Initial Area, Ac	3.15	in²
Initial Volume, Vc	12.02	in³
Initial Bulk Unit Weight,	115.6	lb/ft³
Initial Dry Unit Weigh	93.6	lb/ft³
15 % Strain (0.15 Lo)	0.57	in.
UCS	19.9	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.149	0.0000	0.0
26	0.003	0.003	3.151	0.0008	8.3
30	0.005	0.005	3.153	0.0013	9.5
35	0.007	0.007	3.155	0.0018	11.1
43	0.010	0.010	3.157	0.0026	13.6
53	0.015	0.015	3.161	0.0039	16.8
61	0.020	0.020	3.166	0.0052	19.3
63	0.025	0.025	3.170	0.0065	19.9
51	0.030	0.030	3.174	0.0079	16.1
47	0.035	0.035	3.178	0.0092	14.8
43	0.040	0.040	3.182	0.0105	13.5

UNCONFINED COMPRESSION TESTING
Sample No. 0427-12A (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-12A (7 day)		
TESTING DATE:	9/12/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8310

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	23.4	**%**
BULK UNIT WEIGHT	115.6	lb/ft^3
DRY UNIT WEIGHT	93.6	lb/ft^3
UCS *	19.9	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-13A (7 day)		
TESTING DATE:	12-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8311

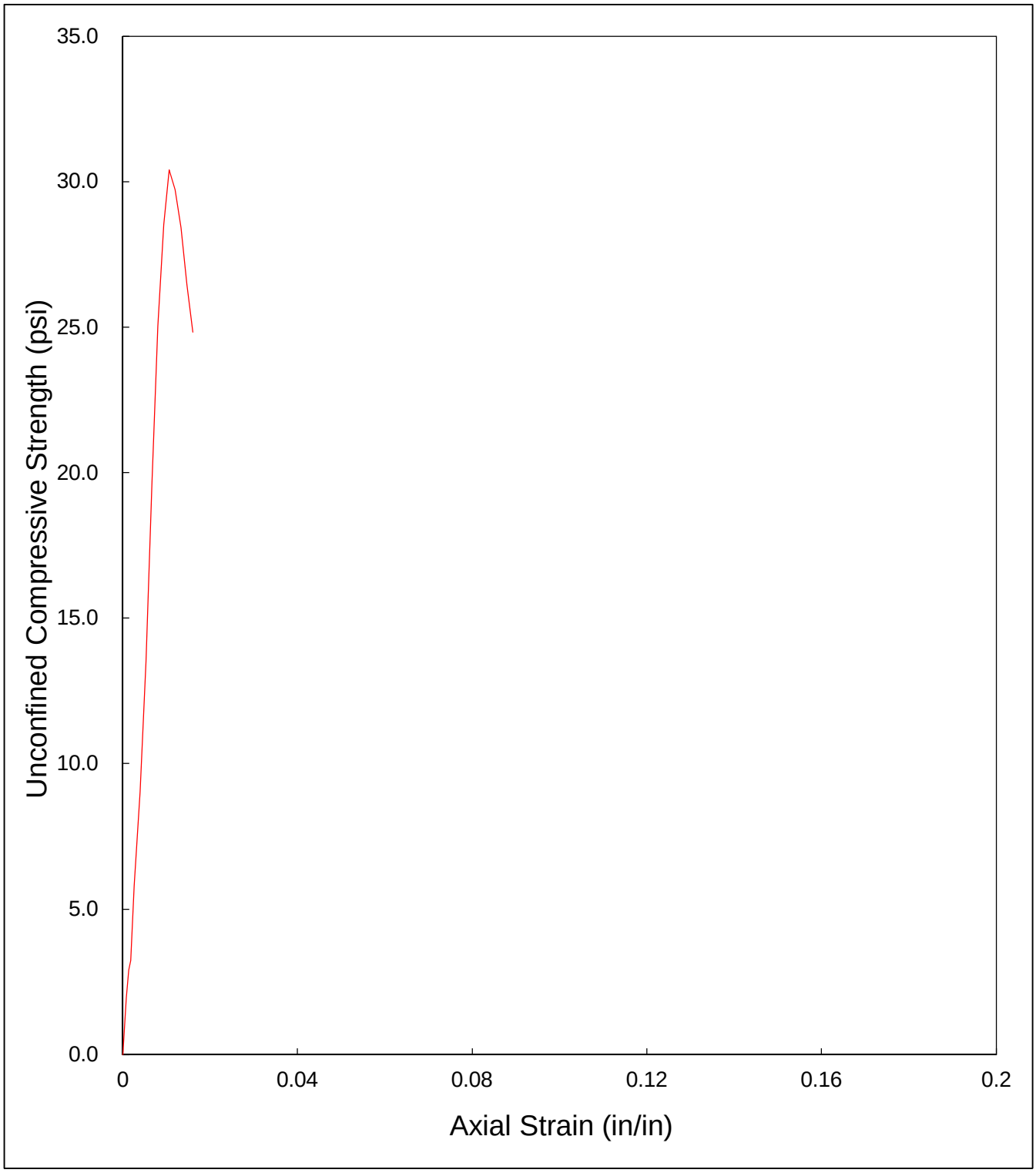
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	165.78	g
3. WT WET SOIL + TARE	308.78	g
4. WT DRY SOIL + TARE	286.76	g
5. WT WATER, Ww	22.02	g
6. WT DRY SOIL, Ws	120.98	g
7. MOISTURE CONTENT, W	**18.20**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.74	in.
No. 2	1.98	in.	3.75	in.
No. 3	1.98	in.	3.75	in.
Average	**1.98**	**in.**	**3.74**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***365.84***	***g***
Initial Area, Ac	3.09	in^2
Initial Volume, Vc	11.57	in^3
Initial Bulk Unit Weight,	120.4	lb/ft^3
Initial Dry Unit Weigh	101.9	lb/ft^3
15 % Strain (0.15 Lo)	0.56	in.
UCS	30.4	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.090	0.0000	0.0
6	0.003	0.003	3.093	0.0008	1.9
9	0.005	0.005	3.095	0.0013	2.9
10	0.007	0.007	3.096	0.0019	3.2
18	0.010	0.010	3.099	0.0027	5.8
28	0.015	0.015	3.103	0.0040	9.0
42	0.020	0.020	3.107	0.0053	13.5
61	0.025	0.025	3.111	0.0067	19.6
78	0.030	0.030	3.115	0.0080	25.0
89	0.035	0.035	3.120	0.0093	28.5
95	0.040	0.040	3.124	0.0107	30.4
93	0.045	0.045	3.128	0.0120	29.7
89	0.050	0.050	3.132	0.0134	28.4
83	0.055	0.055	3.137	0.0147	26.5
78	0.060	0.060	3.141	0.0160	24.8

UNCONFINED COMPRESSION TESTING
Sample No. 0427-13A (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-13A (7 day)		
TESTING DATE:	9/12/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8311

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	18.2	**%**
BULK UNIT WEIGHT	120.4	lb/ft^3
DRY UNIT WEIGHT	101.9	lb/ft^3
UCS *	30.4	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-14A (7 day)		
TESTING DATE:	12-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8312

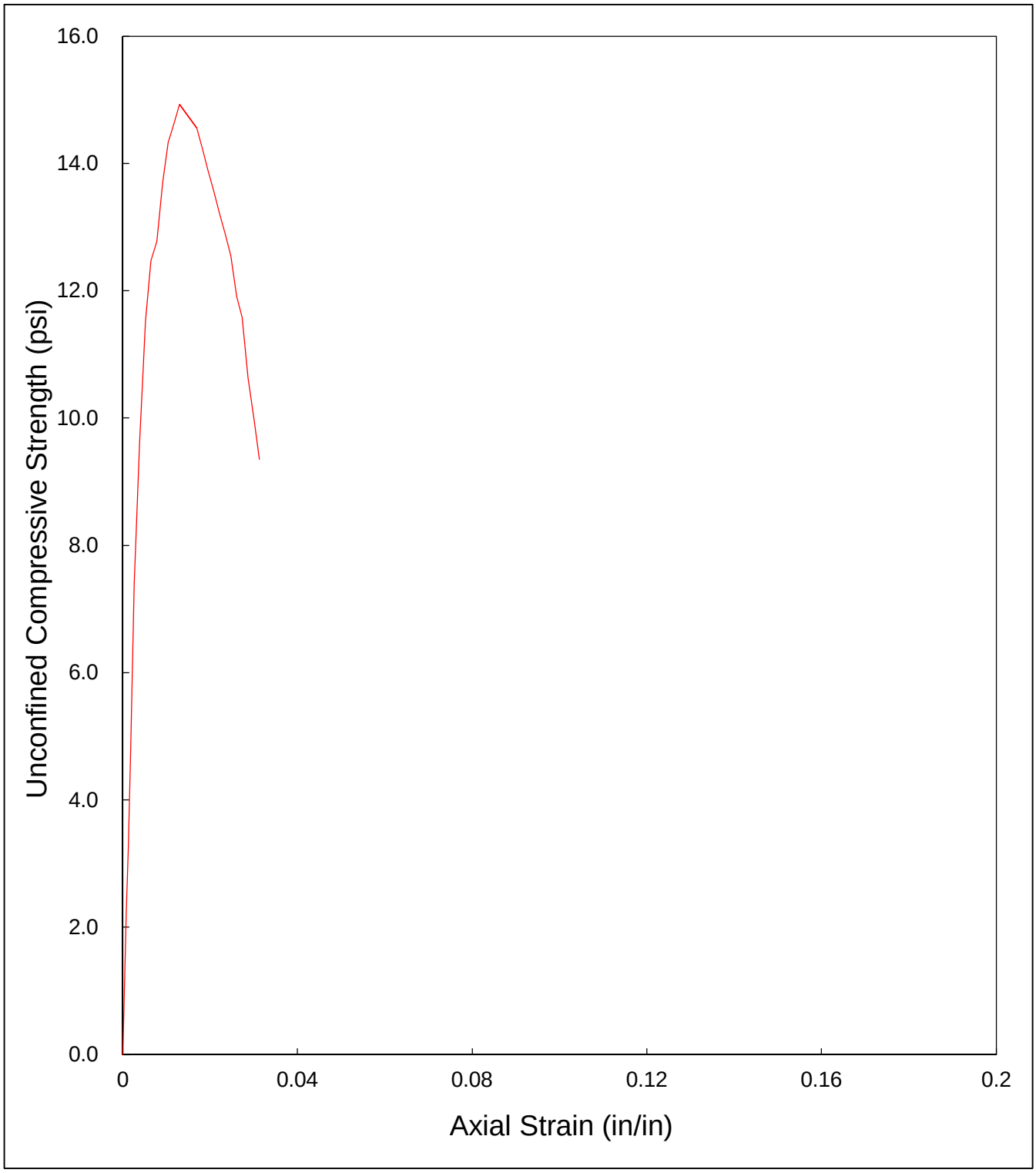
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	162.94	g
3. WT WET SOIL + TARE	331.98	g
4. WT DRY SOIL + TARE	299.17	g
5. WT WATER, Ww	32.81	g
6. WT DRY SOIL, Ws	136.23	g
7. MOISTURE CONTENT, W	**24.08**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.98	in.	3.83	in.
No. 2	2.00	in.	3.84	in.
No. 3	1.98	in.	3.84	in.
Average	**1.99**	**in.**	**3.83**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***366.26***	***g***
Initial Area, Ac	3.11	in²
Initial Volume, Vc	11.91	in³
Initial Bulk Unit Weight,	117.2	lb/ft³
Initial Dry Unit Weigh	94.4	lb/ft³
15 % Strain (0.15 Lo)	0.57	in.
UCS	14.9	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.107	0.0000	0.0
7	0.003	0.003	3.110	0.0008	2.3
10	0.005	0.005	3.111	0.0013	3.2
15	0.007	0.007	3.113	0.0018	4.8
23	0.010	0.010	3.115	0.0026	7.4
30	0.015	0.015	3.119	0.0039	9.6
36	0.020	0.020	3.123	0.0052	11.5
39	0.025	0.025	3.128	0.0065	12.5
40	0.030	0.030	3.132	0.0078	12.8
43	0.035	0.035	3.136	0.0091	13.7
45	0.040	0.040	3.140	0.0104	14.3
46	0.045	0.045	3.144	0.0117	14.6
47	0.050	0.050	3.148	0.0130	14.9
46	0.065	0.065	3.161	0.0170	14.6
45	0.070	0.070	3.165	0.0183	14.2
44	0.075	0.075	3.169	0.0196	13.9
43	0.080	0.080	3.173	0.0209	13.6
42	0.085	0.085	3.178	0.0222	13.2
41	0.090	0.090	3.182	0.0235	12.9
40	0.095	0.095	3.186	0.0248	12.6
38	0.100	0.100	3.190	0.0261	11.9
37	0.105	0.105	3.195	0.0274	11.6
34	0.110	0.110	3.199	0.0287	10.6
32	0.115	0.115	3.203	0.0300	10.0
30	0.120	0.120	3.208	0.0313	9.4

UNCONFINED COMPRESSION TESTING
Sample No. 0427-14A (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-14A (7 day)		
TESTING DATE:	9/12/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8312

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	24.1	**%**
BULK UNIT WEIGHT	117.2	lb/ft^3
DRY UNIT WEIGHT	94.4	lb/ft^3
UCS *	14.9	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-15A (7 day)		
TESTING DATE:	12-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8313

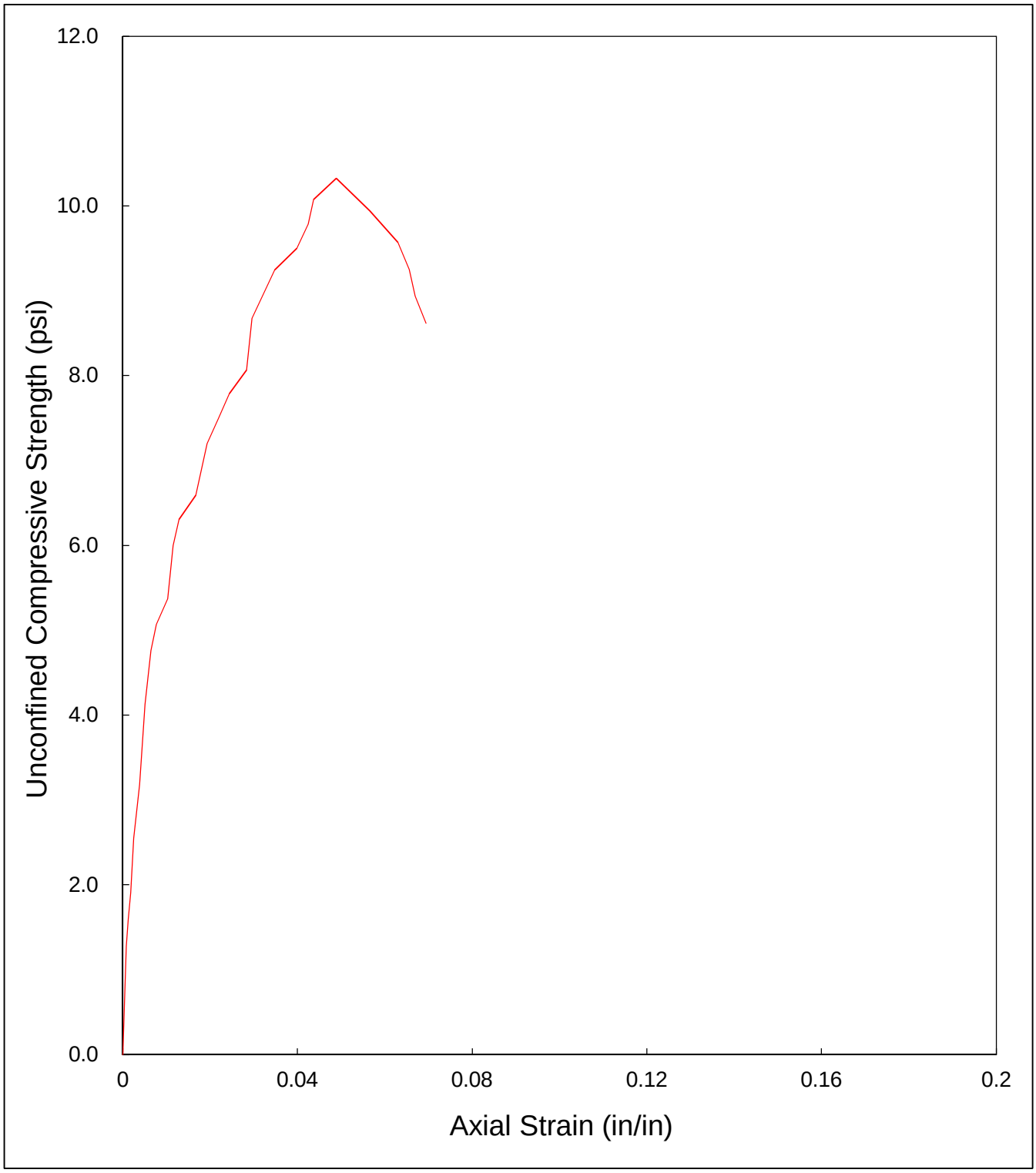
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	165.82	g
3. WT WET SOIL + TARE	322.09	g
4. WT DRY SOIL + TARE	281.75	g
5. WT WATER, Ww	40.34	g
6. WT DRY SOIL, Ws	115.93	g
7. MOISTURE CONTENT, W	**34.80**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.89	in.
No. 2	2.01	in.	3.89	in.
No. 3	1.99	in.	3.88	in.
Average	**2.00**	**in.**	**3.89**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***350.07***	***g***
Initial Area, Ac	3.13	in^2
Initial Volume, Vc	12.17	in^3
Initial Bulk Unit Weight,	109.6	lb/ft^3
Initial Dry Unit Weigh	81.3	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	10.3	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.132	0.0000	0.0
4	0.003	0.003	3.135	0.0008	1.3
5	0.005	0.005	3.136	0.0013	1.6
6	0.007	0.007	3.138	0.0018	1.9
8	0.010	0.010	3.140	0.0026	2.5
10	0.015	0.015	3.144	0.0039	3.2
13	0.020	0.020	3.148	0.0051	4.1
15	0.025	0.025	3.152	0.0064	4.8
16	0.030	0.030	3.157	0.0077	5.1
17	0.040	0.040	3.165	0.0103	5.4
19	0.045	0.045	3.169	0.0116	6.0
20	0.050	0.050	3.173	0.0129	6.3
21	0.065	0.065	3.185	0.0167	6.6
23	0.075	0.075	3.194	0.0193	7.2
24	0.085	0.085	3.202	0.0219	7.5
25	0.095	0.095	3.211	0.0244	7.8
26	0.110	0.110	3.223	0.0283	8.1
28	0.115	0.115	3.228	0.0296	8.7
29	0.125	0.125	3.236	0.0322	9.0
30	0.135	0.135	3.245	0.0347	9.2
31	0.155	0.155	3.262	0.0399	9.5
32	0.165	0.165	3.271	0.0425	9.8
33	0.170	0.170	3.275	0.0437	10.1
34	0.190	0.190	3.293	0.0489	10.3
33	0.220	0.220	3.320	0.0566	9.9
32	0.245	0.245	3.343	0.0630	9.6
31	0.255	0.255	3.352	0.0656	9.2
30	0.260	0.260	3.357	0.0669	8.9
29	0.270	0.270	3.366	0.0695	8.6

UNCONFINED COMPRESSION TESTING
Sample No. 0427-15A (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-15A (7 day)		
TESTING DATE:	9/12/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8313

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	34.8	**%**
BULK UNIT WEIGHT	109.6	lb/ft^3
DRY UNIT WEIGHT	81.3	lb/ft^3
UCS *	10.3	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-16A (7 day)		
TESTING DATE:	12-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8314

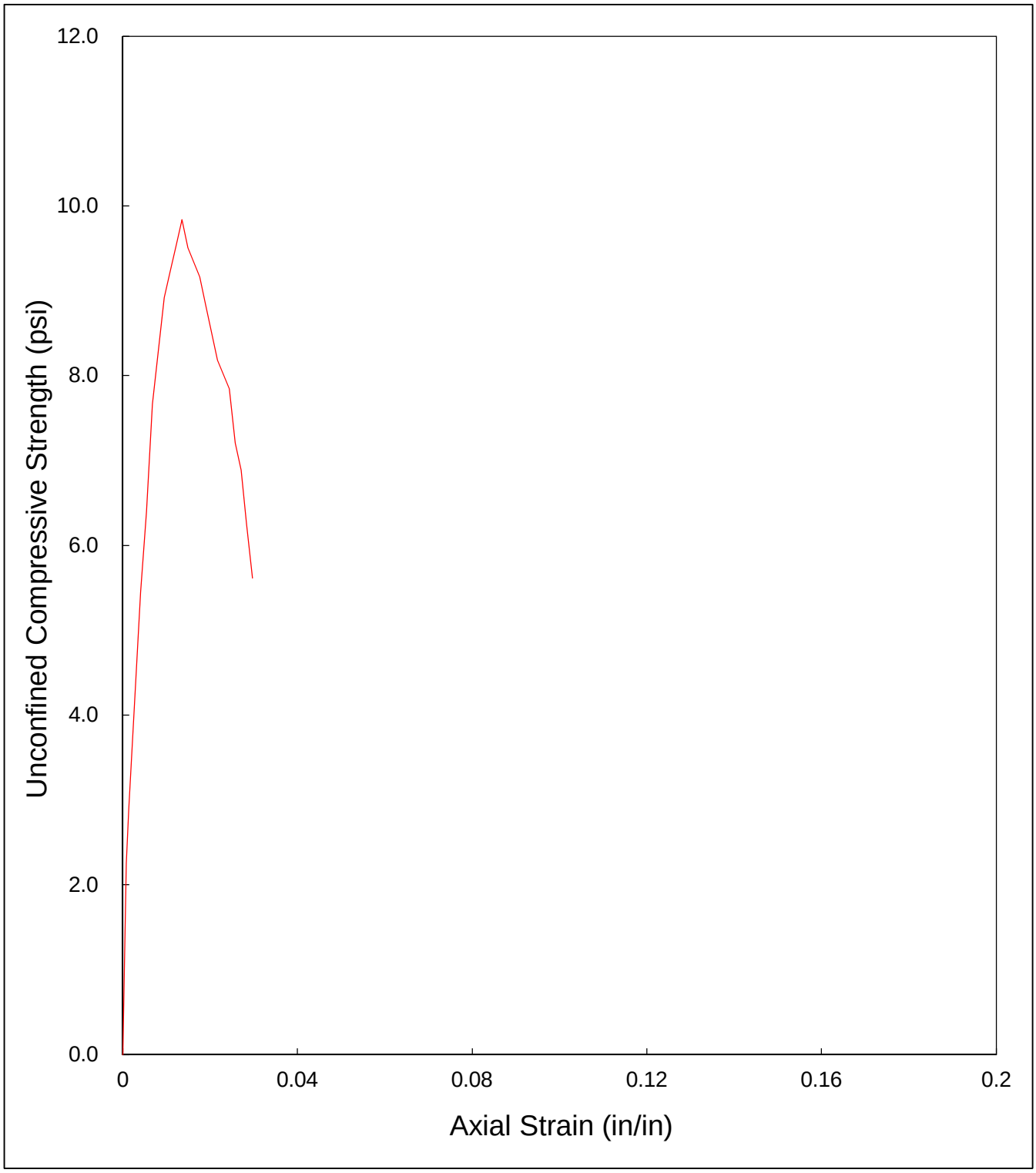
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	167.31	g
3. WT WET SOIL + TARE	345.65	g
4. WT DRY SOIL + TARE	317.37	g
5. WT WATER, Ww	28.28	g
6. WT DRY SOIL, Ws	150.06	g
7. MOISTURE CONTENT, W	**18.85**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	1.99	in.	3.70	in.
No. 2	1.99	in.	3.69	in.
No. 3	1.99	in.	3.69	in.
Average	**1.99**	**in.**	**3.70**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***364.14***	***g***
Initial Area, Ac	3.11	in²
Initial Volume, Vc	11.49	in³
Initial Bulk Unit Weight,	120.7	lb/ft³
Initial Dry Unit Weigh	101.6	lb/ft³
15 % Strain (0.15 Lo)	0.55	in.
UCS	9.8	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.109	0.0000	0.0
7	0.003	0.003	3.112	0.0008	2.2
9	0.005	0.005	3.113	0.0014	2.9
13	0.010	0.010	3.118	0.0027	4.2
17	0.015	0.015	3.122	0.0041	5.4
20	0.020	0.020	3.126	0.0054	6.4
24	0.025	0.025	3.130	0.0068	7.7
26	0.030	0.030	3.135	0.0081	8.3
28	0.035	0.035	3.139	0.0095	8.9
29	0.040	0.040	3.143	0.0108	9.2
30	0.045	0.045	3.148	0.0122	9.5
31	0.050	0.050	3.152	0.0135	9.8
30	0.055	0.055	3.156	0.0149	9.5
29	0.065	0.065	3.165	0.0176	9.2
28	0.070	0.070	3.169	0.0189	8.8
26	0.080	0.080	3.178	0.0217	8.2
25	0.090	0.090	3.187	0.0244	7.8
23	0.095	0.095	3.191	0.0257	7.2
22	0.100	0.100	3.196	0.0271	6.9
20	0.105	0.105	3.200	0.0284	6.2
18	0.110	0.110	3.205	0.0298	5.6

UNCONFINED COMPRESSION TESTING
Sample No. 0427-16A (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-16A (7 day)		
TESTING DATE:	9/12/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8314

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	18.8	**%**
BULK UNIT WEIGHT	120.7	lb/ft^3
DRY UNIT WEIGHT	101.6	lb/ft^3
UCS *	9.8	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-17A (7 day)		
TESTING DATE:	12-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8315

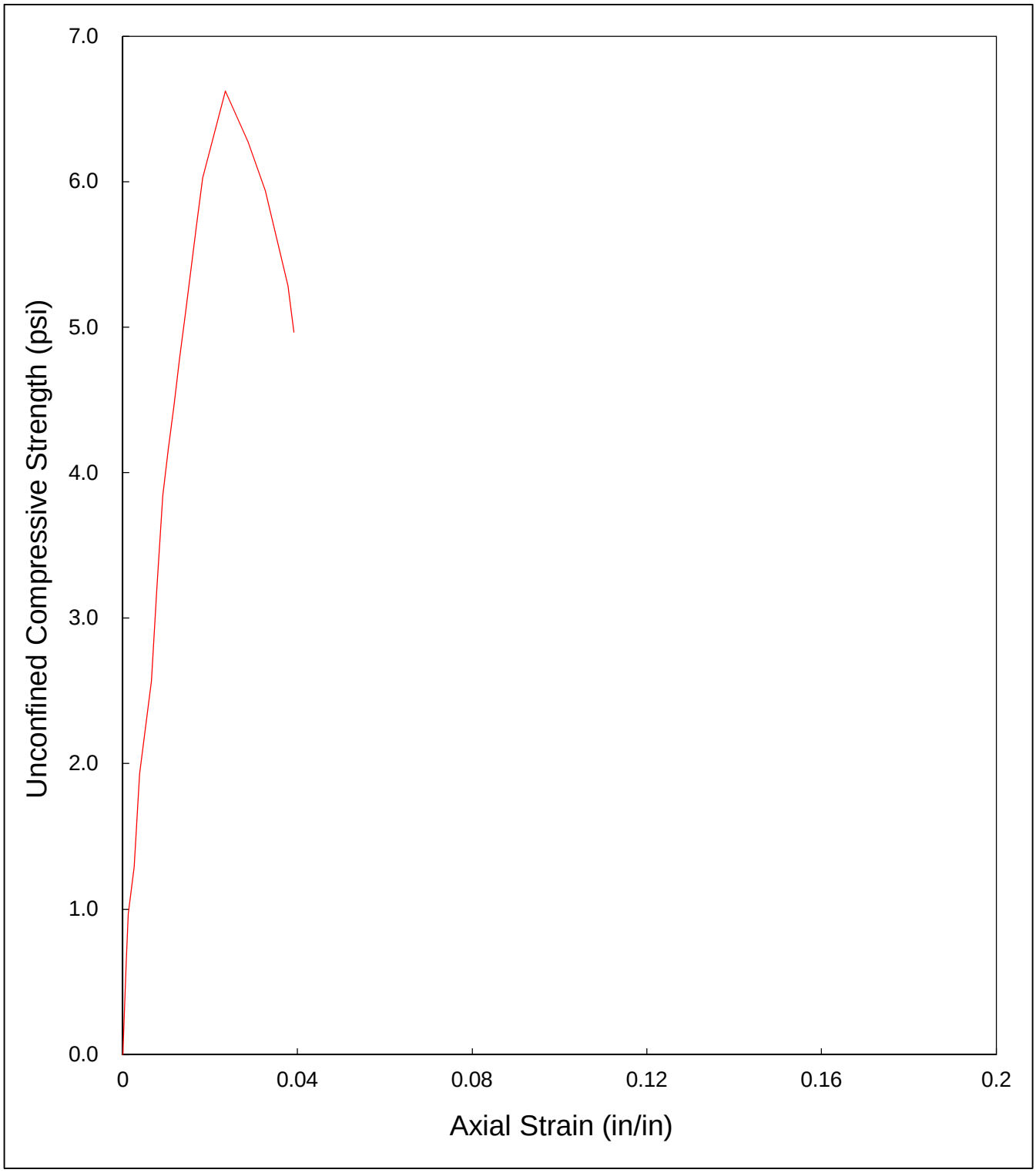
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	162.54	g
3. WT WET SOIL + TARE	318.06	g
4. WT DRY SOIL + TARE	288.35	g
5. WT WATER, Ww	29.71	g
6. WT DRY SOIL, Ws	125.81	g
7. MOISTURE CONTENT, W	**23.61**	**%**

SOIL SPECIMEN DIMENSIONS	*DIAMETER*		*LENGTH*	
No. 1	1.99	in.	3.84	in.
No. 2	1.99	in.	3.84	in.
No. 3	1.98	in.	3.81	in.
Average	**1.99**	**in.**	**3.83**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***353.55***	***g***
Initial Area, Ac	3.10	in²
Initial Volume, Vc	11.85	in³
Initial Bulk Unit Weight,	113.6	lb/ft³
Initial Dry Unit Weigh	91.9	lb/ft³
15 % Strain (0.15 Lo)	0.57	in.
UCS	6.6	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.096	0.0000	0.0
2	0.003	0.003	3.098	0.0008	0.6
3	0.005	0.005	3.100	0.0013	1.0
4	0.010	0.010	3.104	0.0026	1.3
6	0.015	0.015	3.108	0.0039	1.9
7	0.020	0.020	3.112	0.0052	2.2
8	0.025	0.025	3.116	0.0065	2.6
10	0.030	0.030	3.120	0.0078	3.2
12	0.035	0.035	3.124	0.0091	3.8
13	0.040	0.040	3.128	0.0104	4.2
14	0.045	0.045	3.132	0.0118	4.5
15	0.050	0.050	3.137	0.0131	4.8
16	0.055	0.055	3.141	0.0144	5.1
18	0.065	0.065	3.149	0.0170	5.7
19	0.070	0.070	3.153	0.0183	6.0
20	0.080	0.080	3.162	0.0209	6.3
21	0.090	0.090	3.170	0.0235	6.6
20	0.110	0.110	3.187	0.0287	6.3
19	0.125	0.125	3.200	0.0326	5.9
17	0.145	0.145	3.218	0.0379	5.3
16	0.150	0.150	3.222	0.0392	5.0

UNCONFINED COMPRESSION TESTING
Sample No. 0427-17A (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-17A (7 day)		
TESTING DATE:	9/12/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8315

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	23.6	**%**
BULK UNIT WEIGHT	113.6	lb/ft^3
DRY UNIT WEIGHT	91.9	lb/ft^3
UCS *	6.6	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-18A (7 day)		
TESTING DATE:	12-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8316

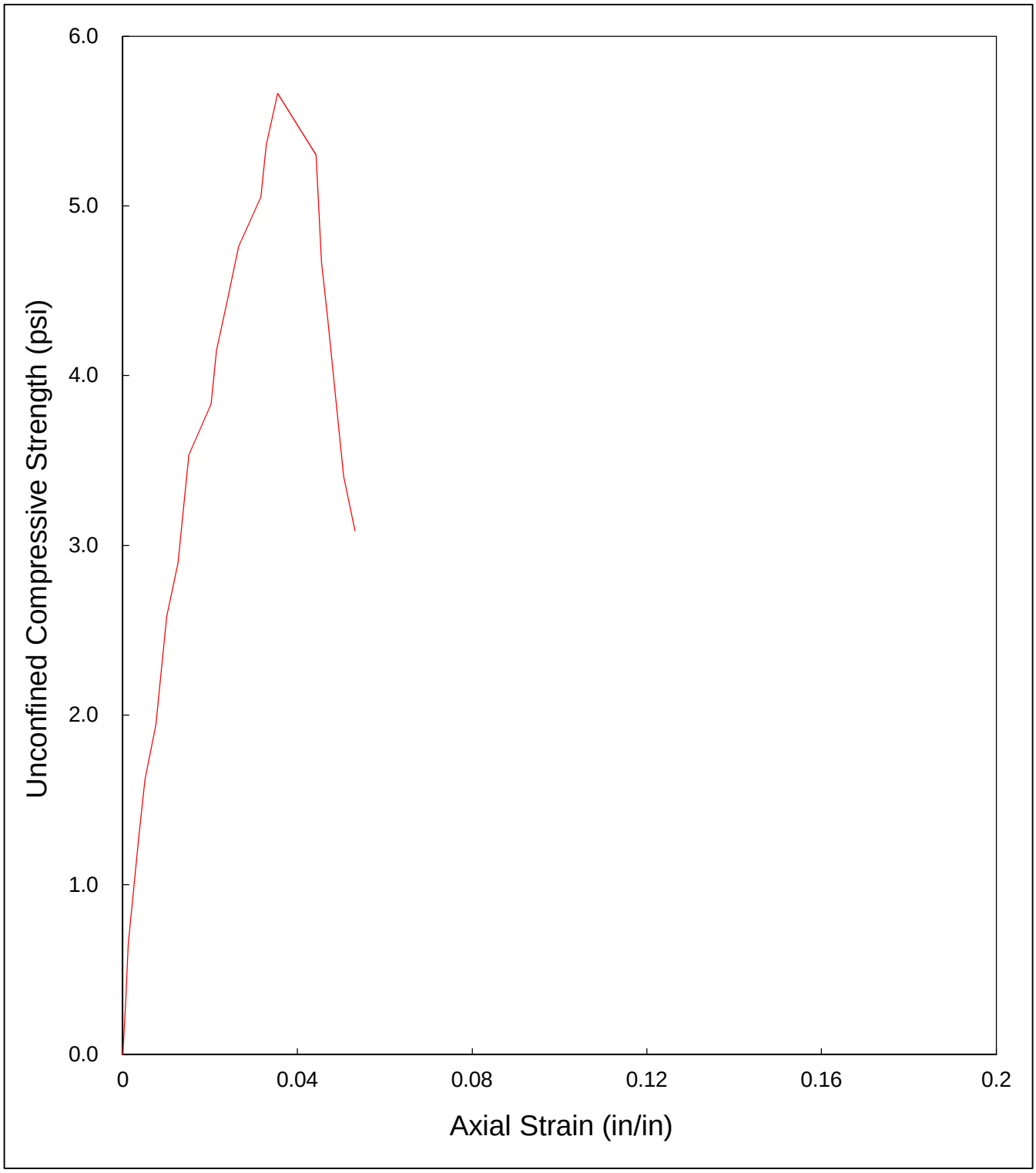
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	173.50	g
3. WT WET SOIL + TARE	332.51	g
4. WT DRY SOIL + TARE	296.06	g
5. WT WATER, Ww	36.45	g
6. WT DRY SOIL, Ws	122.56	g
7. MOISTURE CONTENT, W	**29.74**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.96	in.	3.99	in.
No. 2	1.98	in.	3.92	in.
No. 3	1.99	in.	3.95	in.
Average	**1.98**	**in.**	**3.95**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***344.91***	***g***
Initial Area, Ac	3.07	in²
Initial Volume, Vc	12.12	in³
Initial Bulk Unit Weight,	108.4	lb/ft³
Initial Dry Unit Weigh	83.6	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	5.7	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.067	0.0000	0.0
1	0.003	0.003	3.069	0.0008	0.3
2	0.005	0.005	3.071	0.0013	0.7
4	0.015	0.015	3.078	0.0038	1.3
5	0.020	0.020	3.082	0.0051	1.6
6	0.030	0.030	3.090	0.0076	1.9
7	0.035	0.035	3.094	0.0089	2.3
8	0.040	0.040	3.098	0.0101	2.6
9	0.050	0.050	3.106	0.0127	2.9
10	0.055	0.055	3.110	0.0139	3.2
11	0.060	0.060	3.114	0.0152	3.5
12	0.080	0.080	3.130	0.0202	3.8
13	0.085	0.085	3.134	0.0215	4.1
14	0.095	0.095	3.142	0.0240	4.5
15	0.105	0.105	3.150	0.0266	4.8
16	0.125	0.125	3.167	0.0316	5.1
17	0.130	0.130	3.171	0.0329	5.4
18	0.140	0.140	3.179	0.0354	5.7
17	0.175	0.175	3.209	0.0443	5.3
15	0.180	0.180	3.213	0.0456	4.7
14	0.185	0.185	3.217	0.0468	4.4
13	0.190	0.190	3.222	0.0481	4.0
12	0.195	0.195	3.226	0.0494	3.7
11	0.200	0.200	3.230	0.0506	3.4
10	0.210	0.210	3.239	0.0531	3.1

UNCONFINED COMPRESSION TESTING
Sample No. 0427-18A (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-18A (7 day)		
TESTING DATE:	9/12/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8316

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	29.7	**%**
BULK UNIT WEIGHT	108.4	lb/ft^3
DRY UNIT WEIGHT	83.6	lb/ft^3
UCS *	5.7	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchougue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-21A (7 day)		
TESTING DATE:	12-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8317

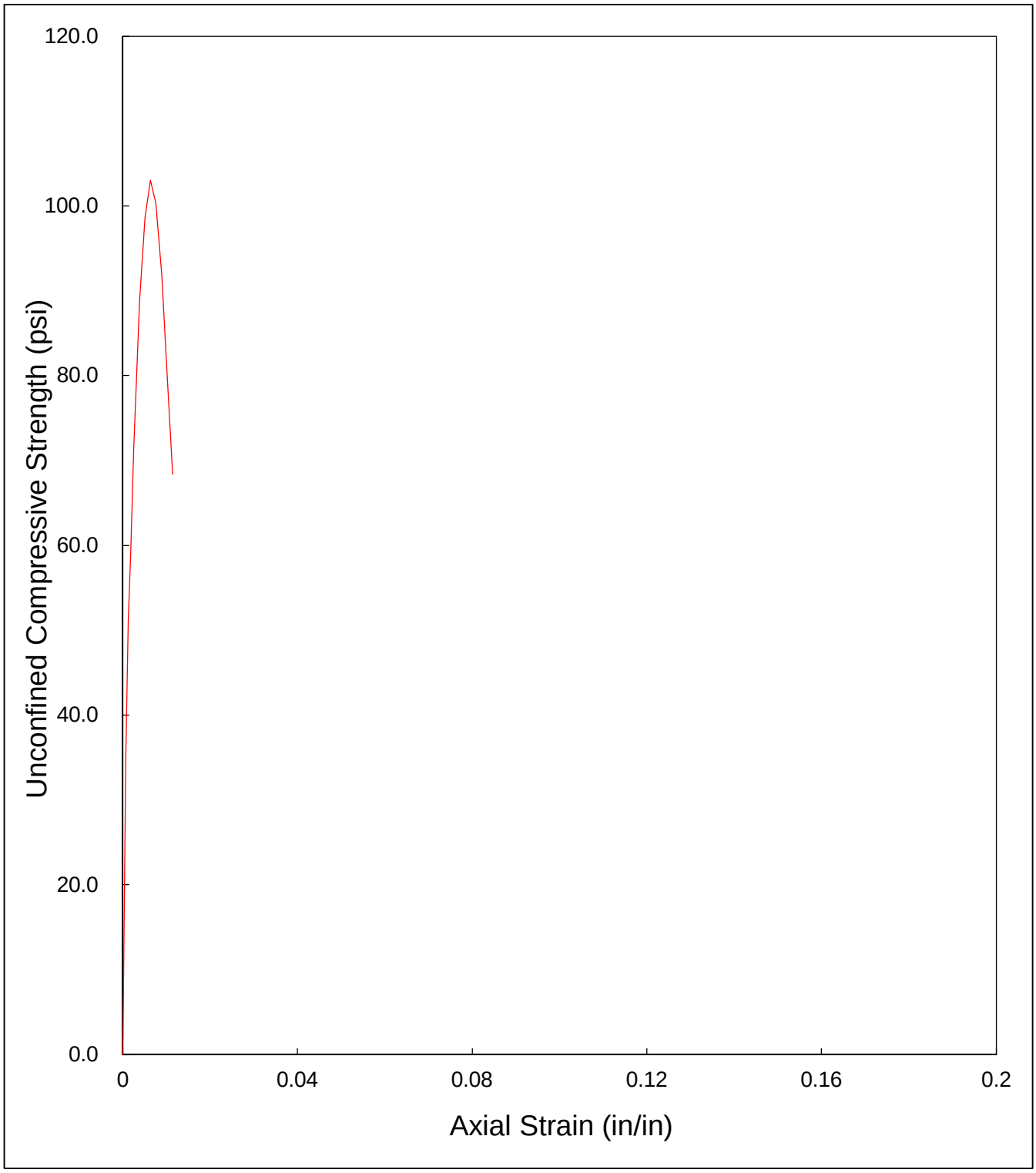
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	167.43	g
3. WT WET SOIL + TARE	302.36	g
4. WT DRY SOIL + TARE	278.17	g
5. WT WATER, Ww	24.19	g
6. WT DRY SOIL, Ws	110.74	g
7. MOISTURE CONTENT, W	**21.84**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.93	in.
No. 2	1.99	in.	3.92	in.
No. 3	1.98	in.	3.92	in.
Average	**1.99**	**in.**	**3.92**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***377.14***	***g***
Initial Area, Ac	3.11	in²
Initial Volume, Vc	12.18	in³
Initial Bulk Unit Weight,	118.0	lb/ft³
Initial Dry Unit Weigh	96.8	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	103.0	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.106	0.0000	0.0
109	0.003	0.003	3.108	0.0008	35.1
159	0.005	0.005	3.110	0.0013	51.1
184	0.007	0.007	3.112	0.0018	59.1
222	0.010	0.010	3.114	0.0026	71.3
277	0.015	0.015	3.118	0.0038	88.8
308	0.020	0.020	3.122	0.0051	98.7
322	0.025	0.025	3.126	0.0064	103.0
314	0.030	0.030	3.130	0.0077	100.3
288	0.035	0.035	3.134	0.0089	91.9
251	0.040	0.040	3.138	0.0102	80.0
215	0.045	0.045	3.142	0.0115	68.4

UNCONFINED COMPRESSION TESTING
Sample No. 0427-21A (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchougue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-21A (7 day)		
TESTING DATE:	9/12/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8317

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	21.8	**%**
BULK UNIT WEIGHT	118.0	lb/ft^3
DRY UNIT WEIGHT	96.8	lb/ft^3
UCS *	103.0	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-22A (7 day)		
TESTING DATE:	12-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8318

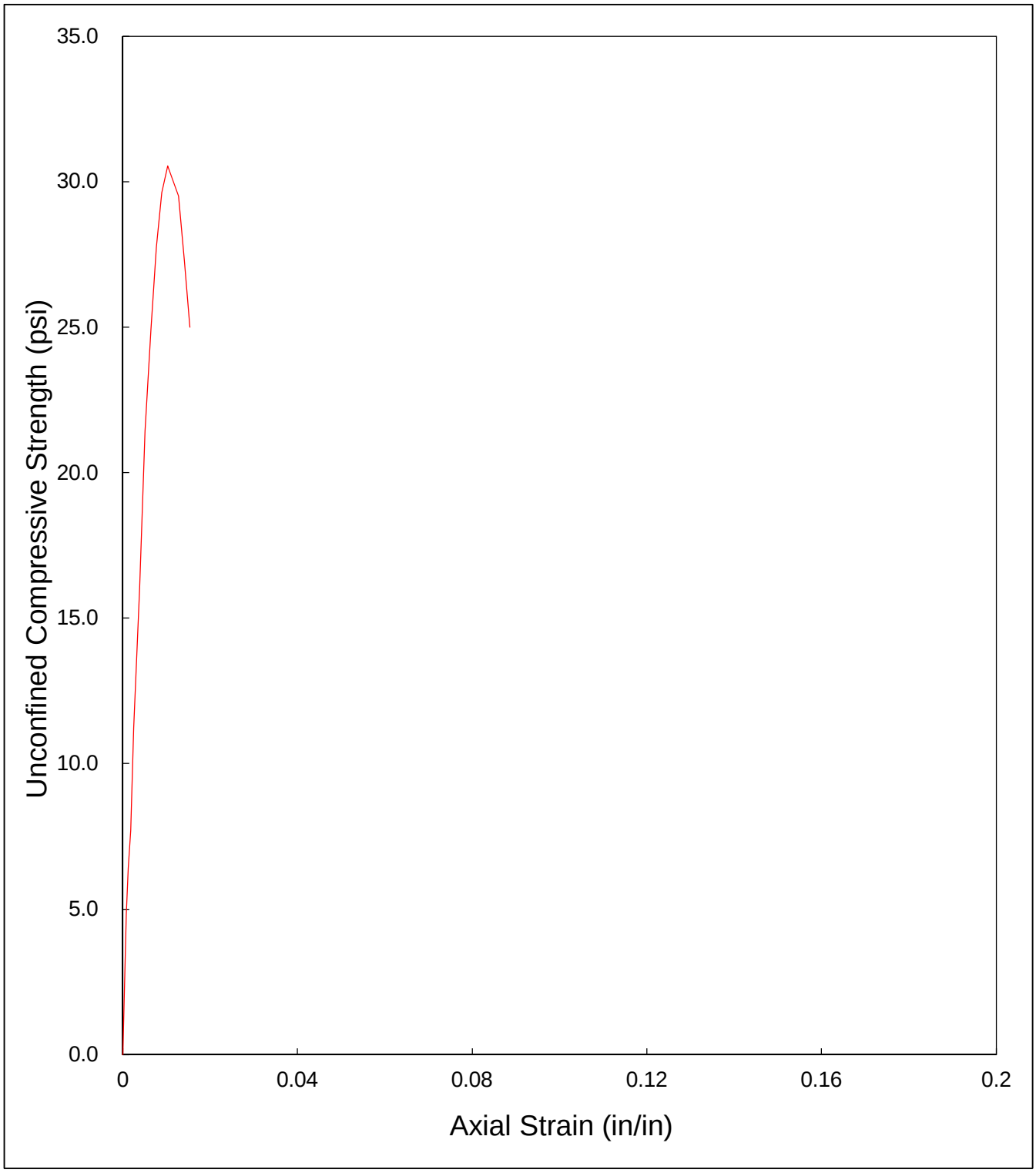
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	167.24	g
3. WT WET SOIL + TARE	342.79	g
4. WT DRY SOIL + TARE	311.48	g
5. WT WATER, Ww	31.31	g
6. WT DRY SOIL, Ws	144.24	g
7. MOISTURE CONTENT, W	**21.71**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.92	in.
No. 2	1.99	in.	3.88	in.
No. 3	1.98	in.	3.90	in.
Average	**1.99**	**in.**	**3.90**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***372.14***	***g***
Initial Area, Ac	3.11	in^2
Initial Volume, Vc	12.13	in^3
Initial Bulk Unit Weight,	116.9	lb/ft^3
Initial Dry Unit Weigh	96.0	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	30.5	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.111	0.0000	0.0
15	0.003	0.003	3.114	0.0008	4.8
20	0.005	0.005	3.115	0.0013	6.4
24	0.007	0.007	3.117	0.0018	7.7
35	0.010	0.010	3.119	0.0026	11.2
50	0.015	0.015	3.123	0.0038	16.0
67	0.020	0.020	3.127	0.0051	21.4
78	0.025	0.025	3.131	0.0064	24.9
87	0.030	0.030	3.135	0.0077	27.7
93	0.035	0.035	3.139	0.0090	29.6
96	0.040	0.040	3.144	0.0103	30.5
93	0.050	0.050	3.152	0.0128	29.5
86	0.055	0.055	3.156	0.0141	27.3
79	0.060	0.060	3.160	0.0154	25.0

UNCONFINED COMPRESSION TESTING
Sample No. 0427-22A (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-22A (7 day)		
TESTING DATE:	9/12/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8318

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	21.7	**%**
BULK UNIT WEIGHT	116.9	lb/ft^3
DRY UNIT WEIGHT	96.0	lb/ft^3
UCS *	30.5	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-23A (7 day)		
TESTING DATE:	12-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8319

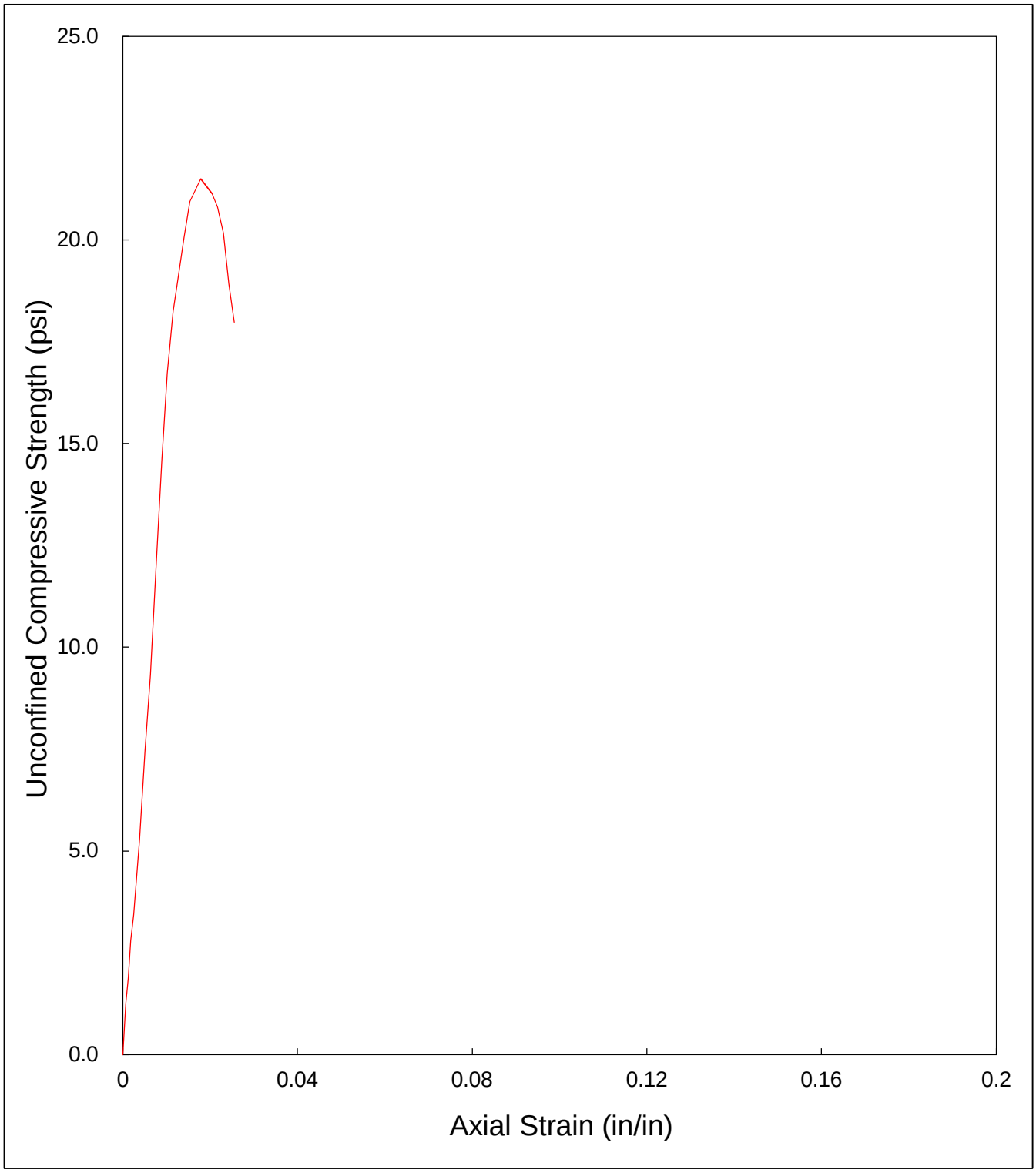
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	164.81	g
3. WT WET SOIL + TARE	341.41	g
4. WT DRY SOIL + TARE	310.86	g
5. WT WATER, Ww	30.55	g
6. WT DRY SOIL, Ws	146.05	g
7. MOISTURE CONTENT, W	**20.92**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.89	in.
No. 2	2.01	in.	3.94	in.
No. 3	2.05	in.	3.89	in.
Average	**2.02**	**in.**	**3.91**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***384.87***	***g***
Initial Area, Ac	3.20	in²
Initial Volume, Vc	12.49	in³
Initial Bulk Unit Weight,	117.3	lb/ft³
Initial Dry Unit Weigh	97.0	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	21.5	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.197	0.0000	0.0
4	0.003	0.003	3.200	0.0008	1.3
6	0.005	0.005	3.201	0.0013	1.9
9	0.007	0.007	3.203	0.0018	2.8
11	0.010	0.010	3.206	0.0026	3.4
17	0.015	0.015	3.210	0.0038	5.3
24	0.020	0.020	3.214	0.0051	7.5
30	0.025	0.025	3.218	0.0064	9.3
39	0.030	0.030	3.222	0.0077	12.1
47	0.035	0.035	3.226	0.0090	14.6
54	0.040	0.040	3.230	0.0102	16.7
59	0.045	0.045	3.235	0.0115	18.2
62	0.050	0.050	3.239	0.0128	19.1
65	0.055	0.055	3.243	0.0141	20.0
68	0.060	0.060	3.247	0.0154	20.9
69	0.065	0.065	3.251	0.0166	21.2
70	0.070	0.070	3.256	0.0179	21.5
69	0.080	0.080	3.264	0.0205	21.1
68	0.085	0.085	3.268	0.0218	20.8
66	0.090	0.090	3.273	0.0230	20.2
62	0.095	0.095	3.277	0.0243	18.9
59	0.100	0.100	3.281	0.0256	18.0

UNCONFINED COMPRESSION TESTING
Sample No. 0427-23A (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-23A (7 day)		
TESTING DATE:	9/12/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8319

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	20.9	**%**
BULK UNIT WEIGHT	117.3	lb/ft^3
DRY UNIT WEIGHT	97.0	lb/ft^3
UCS *	21.5	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-24A (7 day)		
TESTING DATE:	12-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8320

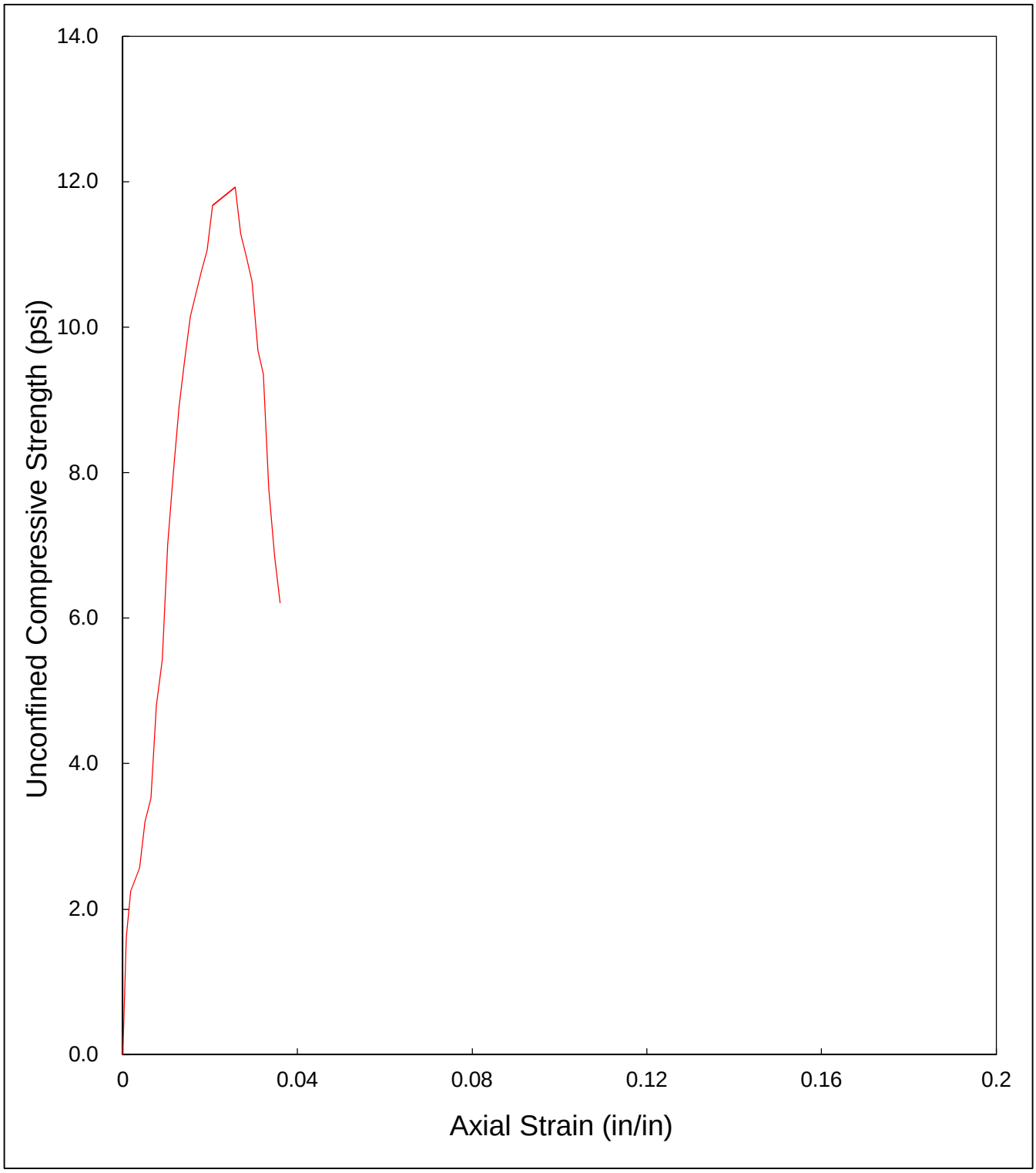
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	160.94	g
3. WT WET SOIL + TARE	329.67	g
4. WT DRY SOIL + TARE	299.01	g
5. WT WATER, Ww	30.66	g
6. WT DRY SOIL, Ws	138.07	g
7. MOISTURE CONTENT, W	**22.21**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.87	in.
No. 2	1.99	in.	3.89	in.
No. 3	1.97	in.	3.89	in.
Average	**1.99**	**in.**	**3.88**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***350.43***	***g***
Initial Area, Ac	3.10	in^2
Initial Volume, Vc	12.05	in^3
Initial Bulk Unit Weight,	110.8	lb/ft^3
Initial Dry Unit Weigh	90.6	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	11.9	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.104	0.0000	0.0
5	0.003	0.003	3.106	0.0008	1.6
7	0.007	0.007	3.110	0.0018	2.3
8	0.015	0.015	3.116	0.0039	2.6
10	0.020	0.020	3.120	0.0052	3.2
11	0.025	0.025	3.124	0.0064	3.5
15	0.030	0.030	3.128	0.0077	4.8
17	0.035	0.035	3.132	0.0090	5.4
22	0.040	0.040	3.136	0.0103	7.0
25	0.045	0.045	3.140	0.0116	8.0
28	0.050	0.050	3.145	0.0129	8.9
30	0.055	0.055	3.149	0.0142	9.5
32	0.060	0.060	3.153	0.0155	10.1
33	0.065	0.065	3.157	0.0167	10.5
34	0.070	0.070	3.161	0.0180	10.8
35	0.075	0.075	3.165	0.0193	11.1
37	0.080	0.080	3.169	0.0206	11.7
38	0.100	0.100	3.186	0.0258	11.9
36	0.105	0.105	3.190	0.0270	11.3
35	0.110	0.110	3.195	0.0283	11.0
34	0.115	0.115	3.199	0.0296	10.6
31	0.120	0.120	3.203	0.0309	9.7
30	0.125	0.125	3.207	0.0322	9.4
25	0.130	0.130	3.212	0.0335	7.8
22	0.135	0.135	3.216	0.0348	6.8
20	0.140	0.140	3.220	0.0361	6.2

UNCONFINED COMPRESSION TESTING
Sample No. 0427-24A (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-24A (7 day)		
TESTING DATE:	9/12/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8320

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	22.2	**%**
BULK UNIT WEIGHT	110.8	lb/ft^3
DRY UNIT WEIGHT	90.6	lb/ft^3
UCS *	11.9	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-25A (7 day)		
TESTING DATE:	13-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD	TRACKING CODE:	8321

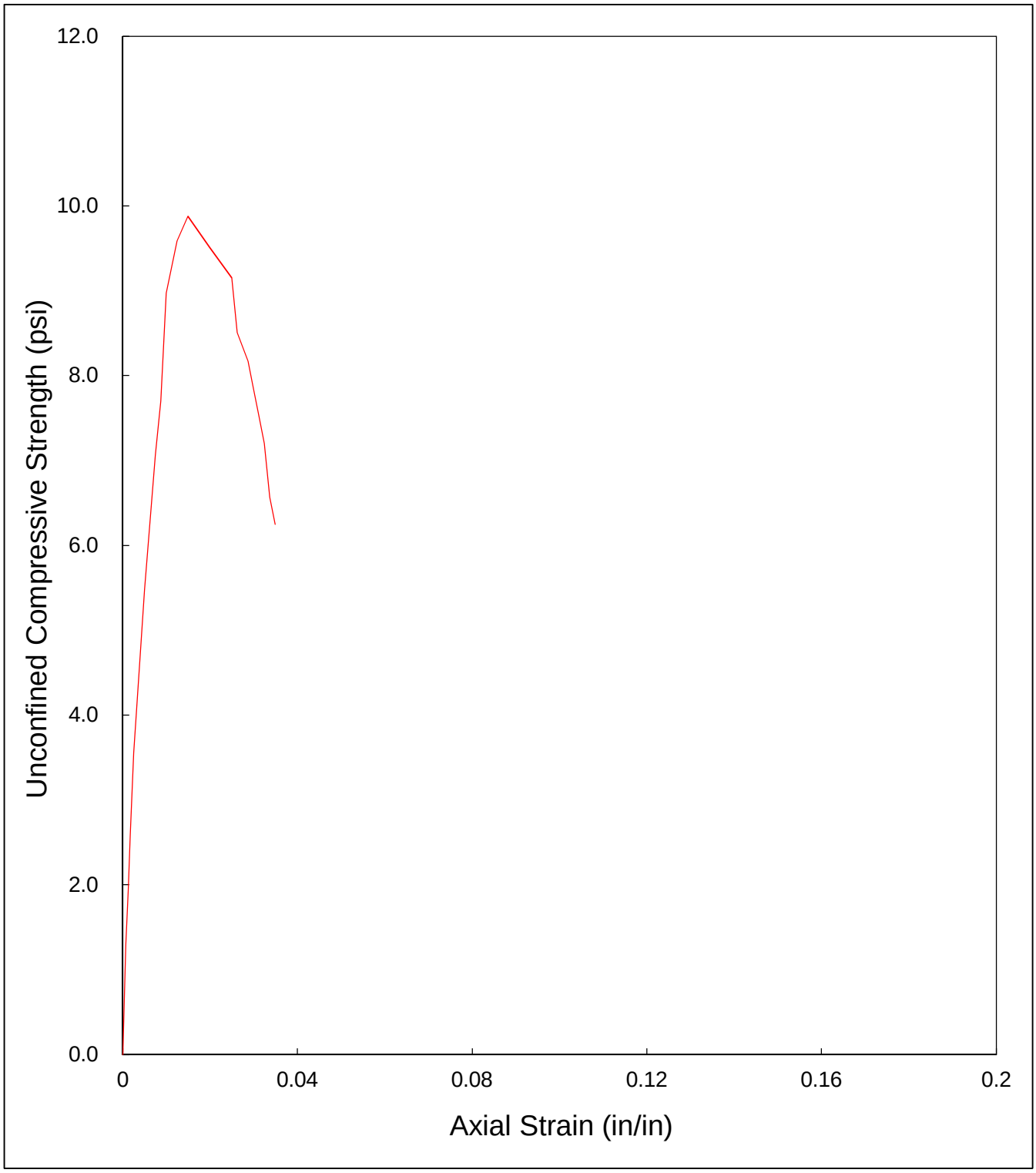
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	165.36	g
3. WT WET SOIL + TARE	320.96	g
4. WT DRY SOIL + TARE	288.39	g
5. WT WATER, Ww	32.57	g
6. WT DRY SOIL, Ws	123.03	g
7. MOISTURE CONTENT, W	**26.47**	**%**

SOIL SPECIMEN DIMENSIONS	*DIAMETER*	*LENGTH*
No. 1	1.99 in.	4.04 in.
No. 2	1.98 in.	4.01 in.
No. 3	1.99 in.	3.99 in.
Average	**1.98 in.**	**4.01 in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***362.69***	***g***
Initial Area, Ac	3.09	in²
Initial Volume, Vc	12.40	in³
Initial Bulk Unit Weight,	111.4	lb/ft³
Initial Dry Unit Weigh	88.1	lb/ft³
15 % Strain (0.15 Lo)	0.60	in.
UCS	9.9	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.090	0.0000	0.0
4	0.003	0.003	3.093	0.0007	1.3
6	0.005	0.005	3.094	0.0012	1.9
8	0.007	0.007	3.096	0.0017	2.6
11	0.010	0.010	3.098	0.0025	3.6
14	0.015	0.015	3.102	0.0037	4.5
17	0.020	0.020	3.106	0.0050	5.5
22	0.030	0.030	3.114	0.0075	7.1
24	0.035	0.035	3.118	0.0087	7.7
28	0.040	0.040	3.122	0.0100	9.0
29	0.045	0.045	3.126	0.0112	9.3
30	0.050	0.050	3.129	0.0125	9.6
31	0.060	0.060	3.137	0.0150	9.9
30	0.080	0.080	3.153	0.0199	9.5
29	0.100	0.100	3.169	0.0249	9.1
27	0.105	0.105	3.174	0.0262	8.5
26	0.115	0.115	3.182	0.0287	8.2
25	0.120	0.120	3.186	0.0299	7.8
24	0.125	0.125	3.190	0.0312	7.5
23	0.130	0.130	3.194	0.0324	7.2
21	0.135	0.135	3.198	0.0336	6.6
20	0.140	0.140	3.202	0.0349	6.2

UNCONFINED COMPRESSION TESTING
Sample No. 0427-25A (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-25A (7 day)		
TESTING DATE:	9/13/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD	TRACKING CODE:	8321

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	26.5	**%**
BULK UNIT WEIGHT	111.4	lb/ft^3
DRY UNIT WEIGHT	88.1	lb/ft^3
UCS *	9.9	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	9/19/2012
TESTED BY:	ZOD/TNR
TRACKING CODE:	8368_pH

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-011A		11.99
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	11.99

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8368_PM
SAMPLE No.:	11A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/18/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	228.51 ***g***
3. WT WET SOIL + TARE	490.80 ***g***	721.50 ***g***
4. WT DRY SOIL + TARE	392.19 ***g***	620.70 ***g***
5. WT WATER, Ww	98.61 g	100.80 g
6. WT DRY SOIL, Ws	392.19 g	392.19 g
7. MOISTURE CONTENT, W	25.14 %	25.70 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.99 in.***	***2.99 in.***	***2.24 in.***	***2.27 in.***
No. 2	***2.98 in.***	***2.98 in.***	***2.22 in.***	***2.24 in.***
No. 3	***2.98 in.***	***2.97 in.***	***2.23 in.***	***2.26 in.***
Average	2.98 in.	2.98 in.	2.23 in.	2.26 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***490.80 g***	***492.99 g***
Area, Ao	6.98 in^2	6.97 in^2
Volume, Vo	15.58 in^3	15.73 in^3
Bulk Unit Weight	120.0 lb/ft^3	119.4 lb/ft^3
Dry Unit Weight	95.9 lb/ft^3	95.0 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SHO427	TRACKING CODE:	8368_PM
SAMPLE No.:	11A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/18/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
09/18/12	11 : 30	RJB	7.0	5.0	5.2	*	*	*	*
09/18/12	12 : 2	RJB	17.0	15.0	15.2	*	*	*	*
09/18/12	12 : 39	RJB	27.0	25.0	25.1	16.7	10.0	1.5	0.15
09/18/12	13 : 39	RJB	37.0	35.0	35.2	31.3	10.0	6.2	0.62
09/18/12	14 : 9	RJB	47.0	45.0	45.0	42.4	10.0	7.2	0.72
09/18/12	16 : 25	RJB	57.0	55.0	55.3	53.6	10.0	8.6	0.86
09/18/12	17 : 3	RJB	67.0	65.0	65.2	64.2	10.0	8.9	0.89
09/18/12	17 : 32	RJB	77.0	75.0	75.2	74.6	10.0	9.4	0.94
09/18/12	17 : 55	RJB	87.0	85.0	*	84.8	10.0	9.6	0.96
09/18/12	17 : 56	RJB	77.0	75.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8368_PM
SAMPLE No.:	11A (14 DAY)	3
TEST DATE:	9/18/12	

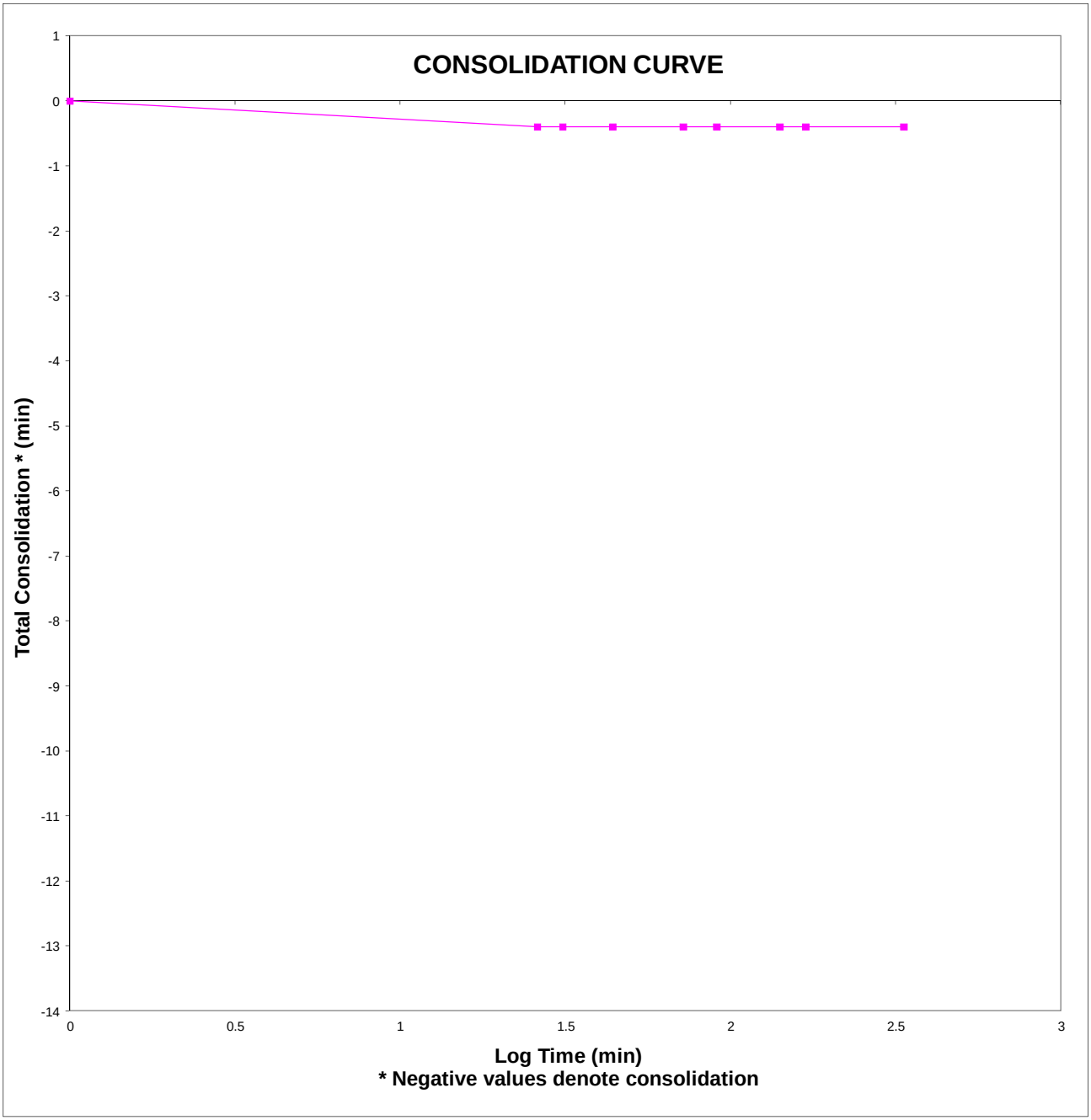
CELL PRESSURE: 85 psi **BACK PRESSURE:** 75 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML) READING BOTTOM*	*READING TOP*	*ACTUAL TOTAL (Ct)*
9 / 19 / 2012	RJB	8 : 13			0	24.0	24.0	0.0
9 / 19 / 2012	RJB	8 : 39	26	26	1.41	23.8	23.8	0.4
9 / 19 / 2012	RJB	8 : 44	5	31	1.49	23.8	23.8	0.4
9 / 19 / 2012	RJB	8 : 57	13	44	1.64	23.8	23.8	0.4
9 / 19 / 2012	RJB	9 : 25	28	72	1.86	23.8	23.8	0.4
9 / 19 / 2012	RJB	9 : 44	19	91	1.96	23.8	23.8	0.4
9 / 19 / 2012	RJB	10 : 34	50	141	2.15	23.8	23.8	0.4
9 / 19 / 2012	RJB	11 : 2	28	169	2.23	23.8	23.8	0.4
9 / 19 / 2012	RJB	13 : 48	166	335	2.53	23.8	23.8	0.4

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8368_PM
SAMPLE No.:	11A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/18/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8368_PM
SAMPLE No.:	11A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/18/12		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
9 / 19 / 12	RJB	15 : 12		0.0	24.0	20.0	85.0	75.0	74.0
9 / 19 / 12	RJB	15 : 24	12	0.7	23.3	20.0	85.0	75.0	74.0
9 / 19 / 12	RJB	15 : 52	28	2.2	21.8	20.0	85.0	75.0	74.0
9 / 19 / 12	RJB	16 : 50	58	5.4	18.5	20.0	85.0	75.0	74.0
9 / 19 / 12	RJB	17 : 33	43	7.8	16.1	20.0	85.0	75.0	74.0
9 / 19 / 12	RJB	18 : 2	29	9.4	14.5	20.0	85.0	75.0	74.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8368_PM
SAMPLE No.:	11A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/18/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				16.633		
12	0.7	0.7	1.00	16.386	1.31E-06	1.31E-06
28	1.5	1.5	1.00	15.857	1.23E-06	1.24E-06
58	3.2	3.3	1.03	14.711	1.36E-06	1.36E-06
43	2.4	2.4	1.00	13.865	1.45E-06	1.45E-06
29	1.6	1.6	1.00	13.301	1.50E-06	1.51E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8368_PM
SAMPLE No.:	11A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/18/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	120.0 lb/ft³	119.4 lb/ft³
DRY UNIT WEIGHT	95.9 lb/ft³	95.0 lb/ft³
MOISTURE CONTENT	25.1 %	25.7 %
PERMEABILITY @ 20°C	1.4E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-11A (14 day)		
TESTING DATE:	19-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8368

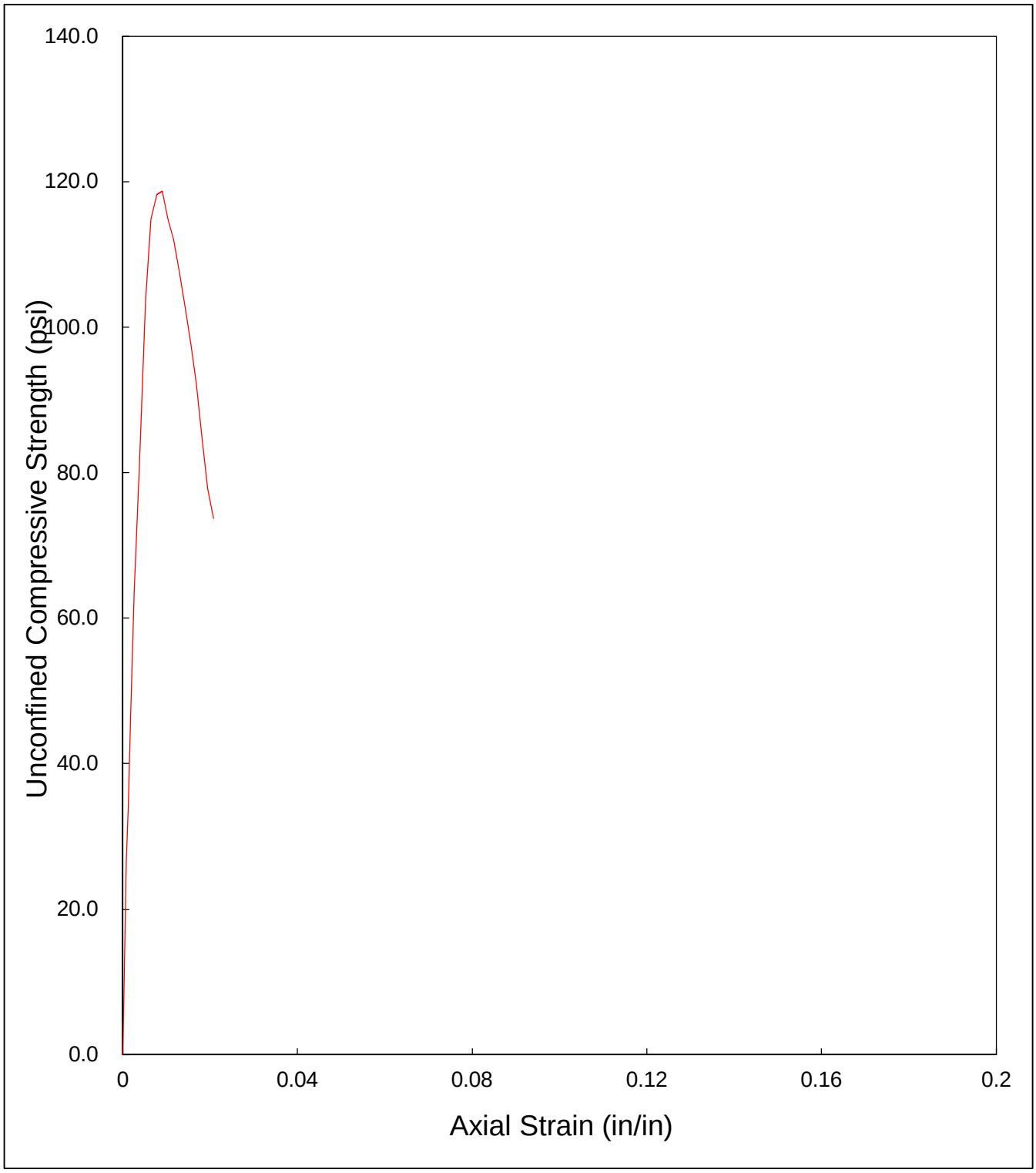
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	162.52	g
3. WT WET SOIL + TARE	383.04	g
4. WT DRY SOIL + TARE	343.68	g
5. WT WATER, Ww	39.36	g
6. WT DRY SOIL, Ws	181.16	g
7. MOISTURE CONTENT, W	**21.73**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.01	in.	3.83	in.
No. 2	2.00	in.	3.86	in.
No. 3	1.98	in.	3.85	in.
Average	**1.99**	**in.**	**3.85**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***375.22***	***g***
Initial Area, Ac	3.12	in^2
Initial Volume, Vc	12.01	in^3
Initial Bulk Unit Weight,	119.0	lb/ft^3
Initial Dry Unit Weigh	97.8	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	118.7	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.123	0.0000	0.0
83	0.003	0.003	3.125	0.0008	26.6
106	0.005	0.005	3.127	0.0013	33.9
147	0.007	0.007	3.128	0.0018	47.0
199	0.010	0.010	3.131	0.0026	63.6
256	0.015	0.015	3.135	0.0039	81.7
325	0.020	0.020	3.139	0.0052	103.5
361	0.025	0.025	3.143	0.0065	114.9
372	0.030	0.030	3.147	0.0078	118.2
374	0.035	0.035	3.151	0.0091	118.7
362	0.040	0.040	3.156	0.0104	114.7
354	0.045	0.045	3.160	0.0117	112.0
340	0.050	0.050	3.164	0.0130	107.5
326	0.055	0.055	3.168	0.0143	102.9
310	0.060	0.060	3.172	0.0156	97.7
293	0.065	0.065	3.176	0.0169	92.2
269	0.070	0.070	3.181	0.0182	84.6
248	0.075	0.075	3.185	0.0195	77.9
235	0.080	0.080	3.189	0.0208	73.7

UNCONFINED COMPRESSION TESTING
Sample No. 0427-11A (14 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-11A (14 day)		
TESTING DATE:	9/19/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8368

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	21.7	**%**
BULK UNIT WEIGHT	119.0	lb/ft^3
DRY UNIT WEIGHT	97.8	lb/ft^3
UCS *	118.7	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	9/19/2012
TESTED BY:	ZOD/TNR
TRACKING CODE:	8369_pH

KEMRON SAMPLE No.		MATERIAL pH
1.	0427-012A	11.63
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	11.63

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8369_PM
SAMPLE No.:	12A (14 DAY)	EQUIPMENT No.:	2
TEST DATE:	9/18/2012		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	206.81 ***g***
3. WT WET SOIL + TARE	470.09 ***g***	677.90 ***g***
4. WT DRY SOIL + TARE	373.76 ***g***	580.57 ***g***
5. WT WATER, Ww	96.33 g	97.33 g
6. WT DRY SOIL, Ws	373.76 g	373.76 g
7. MOISTURE CONTENT, W	25.77 %	26.04 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.98 in.***	***2.98 in.***	***2.29 in.***	***2.16 in.***
No. 2	***2.98 in.***	***2.97 in.***	***2.27 in.***	***2.18 in.***
No. 3	***2.96 in.***	***2.96 in.***	***2.13 in.***	***2.20 in.***
Average	2.98 in.	2.97 in.	2.23 in.	2.18 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***470.09 g***	***471.09 g***
Area, Ao	6.95 in^2	6.93 in^2
Volume, Vo	15.48 in^3	15.10 in^3
Bulk Unit Weight	115.7 lb/ft^3	118.9 lb/ft^3
Dry Unit Weight	92.0 lb/ft^3	94.3 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8369_PM
SAMPLE No.:	12A (14 DAY)	EQUIPMENT No.:	2
TEST DATE:	9/18/2012		

TEST	TIME	TESTED	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
DATE	(military)	BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
09/18/12	11 : 31	RJB	7.0	5.0	5.3	*	*	*	*
09/18/12	12 : 8	RJB	17.0	15.0	15.3	8.0	10.0	2.7	0.27
09/18/12	12 : 41	RJB	27.0	25.0	25.4	20.1	10.0	4.8	0.48
09/18/12	13 : 41	RJB	37.0	35.0	35.4	32.6	10.0	7.2	0.72
09/18/12	14 : 10	RJB	47.0	45.0	45.2	43.7	10.0	8.3	0.83
09/18/12	16 : 29	RJB	57.0	55.0	*	54.7	10.0	9.5	0.95
09/18/12	16 : 30	RJB	47.0	45.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8369_PM
SAMPLE No.:	12A (14 DAY)	2
TEST DATE:	9/18/2012	

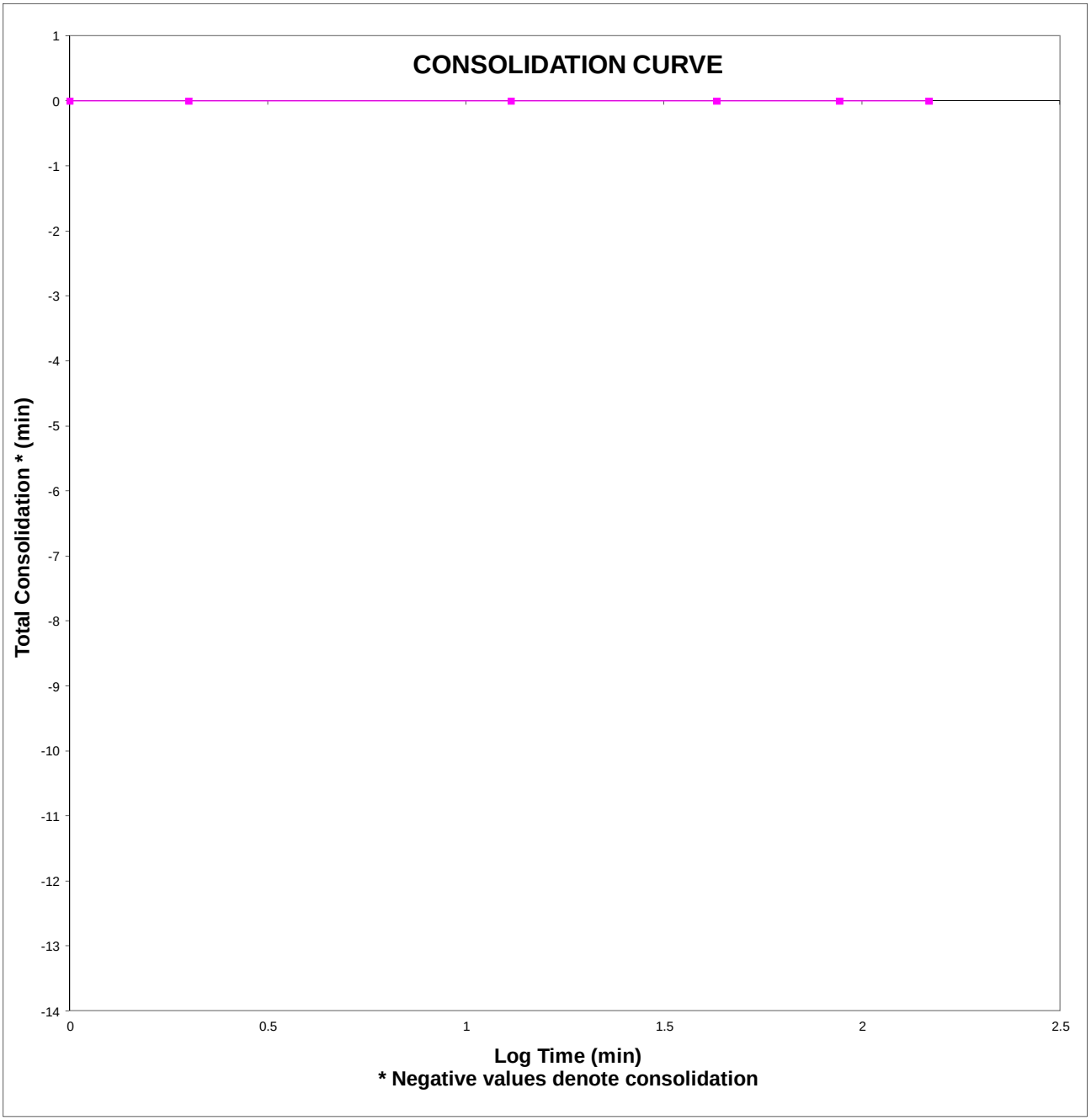
CELL PRESSURE: 55 psi **BACK PRESSURE:** 45 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
9 / 19 / 12	RJB	14 : 2	0	0	0	23.0	23.0	0.0
9 / 19 / 12	RJB	14 : 4	2	2	0.30	23.0	23.0	0.0
9 / 19 / 12	RJB	14 : 15	11	13	1.11	23.0	23.0	0.0
9 / 19 / 12	RJB	14 : 45	30	43	1.63	23.0	23.0	0.0
9 / 19 / 12	RJB	15 : 30	45	88	1.94	23.0	23.0	0.0
9 / 19 / 12	RJB	16 : 30	60	148	2.17	23.0	23.0	0.0

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8369_PM
SAMPLE No.:	12A (14 DAY)	EQUIPMENT No.:	2
TEST DATE:	9/18/2012		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8369_PM
SAMPLE No.:	12A (14 DAY)	EQUIPMENT No.:	2
TEST DATE:	9/18/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
9 / 20 / 12	RJB	10 : 41	0	0.0	25.0	20.0	55.0	45.0	45.0
9 / 20 / 12	RJB	10 : 50	9	0.5	24.5	20.0	55.0	45.0	45.0
9 / 20 / 12	RJB	10 : 59	9	1.0	24.0	20.0	55.0	45.0	45.0
9 / 20 / 12	RJB	11 : 8	9	1.5	23.5	20.0	55.0	45.0	45.0
9 / 20 / 12	RJB	11 : 17	9	2.0	23.0	20.0	55.0	45.0	45.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8369_PM
SAMPLE No.:	12A (14 DAY)	EQUIPMENT No.:	2
TEST DATE:	9/18/2012		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				4.421		
9	0.5	0.5	1.00	4.244	4.77E-06	4.79E-06
9	0.5	0.5	1.00	4.067	4.97E-06	4.99E-06
9	0.5	0.5	1.00	3.890	5.19E-06	5.21E-06
9	0.5	0.5	1.00	3.714	5.43E-06	5.46E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8369_PM
SAMPLE No.:	12A (14 DAY)	EQUIPMENT No.:	2
TEST DATE:	9/18/2012		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	115.7 lb/ft³	118.9 lb/ft³
DRY UNIT WEIGHT	92.0 lb/ft³	94.3 lb/ft³
MOISTURE CONTENT	25.8 %	26.0 %
PERMEABILITY @ 20°C	5.1E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-12A (14 day)		
TESTING DATE:	19-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8369

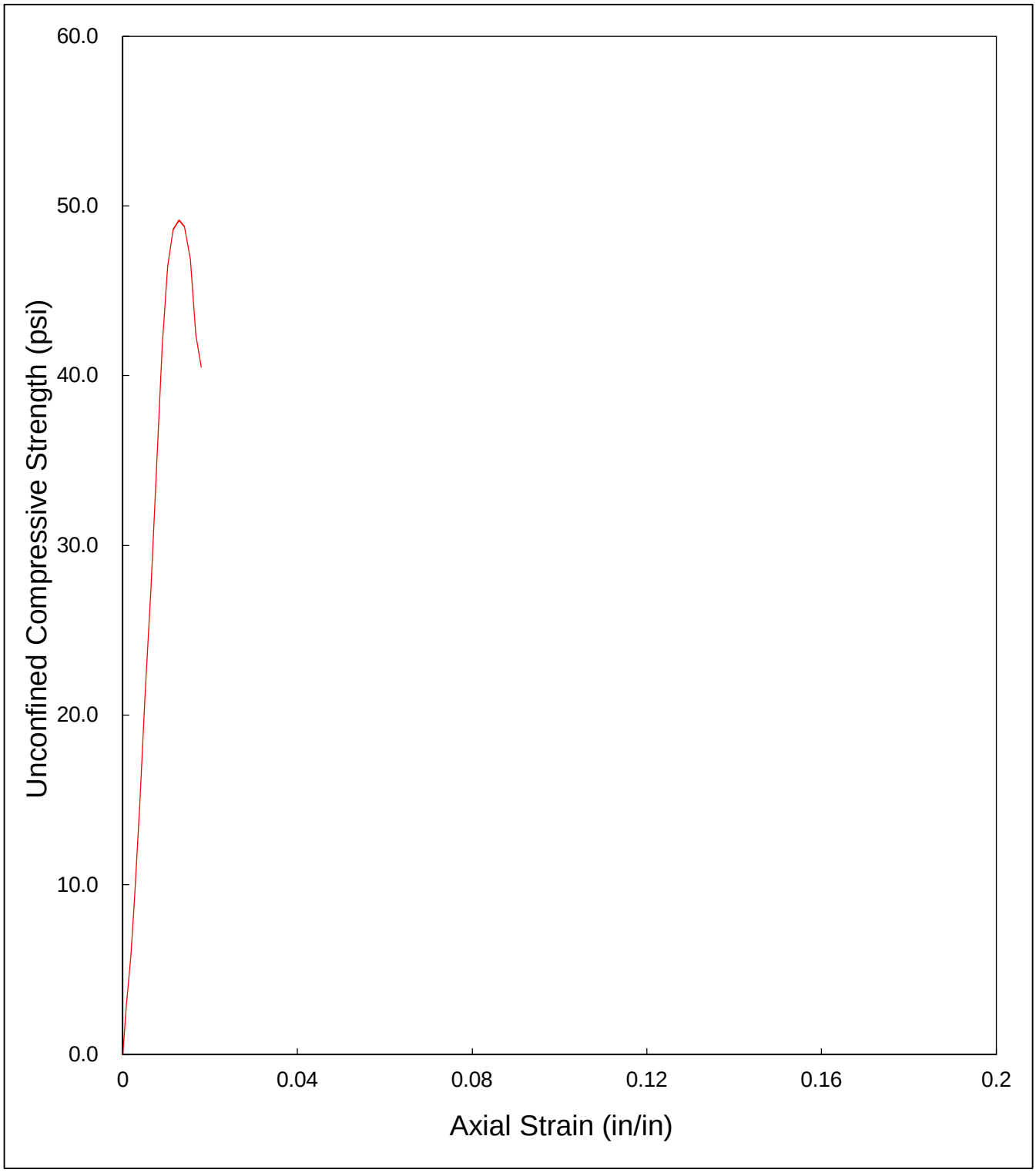
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	168.14	g
3. WT WET SOIL + TARE	378.99	g
4. WT DRY SOIL + TARE	341.60	g
5. WT WATER, Ww	37.39	g
6. WT DRY SOIL, Ws	173.46	g
7. MOISTURE CONTENT, W	**21.56**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.88	in.
No. 2	2.01	in.	3.88	in.
No. 3	2.01	in.	3.88	in.
Average	**2.00**	**in.**	**3.88**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***378.94***	***g***
Initial Area, Ac	3.15	in^2
Initial Volume, Vc	12.24	in^3
Initial Bulk Unit Weight,	118.0	lb/ft^3
Initial Dry Unit Weigh	97.0	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	49.2	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.152	0.0000	0.0
9	0.003	0.003	3.155	0.0008	2.9
13	0.005	0.005	3.156	0.0013	4.1
18	0.007	0.007	3.158	0.0018	5.7
28	0.010	0.010	3.160	0.0026	8.9
46	0.015	0.015	3.164	0.0039	14.5
67	0.020	0.020	3.168	0.0052	21.1
87	0.025	0.025	3.173	0.0064	27.4
109	0.030	0.030	3.177	0.0077	34.3
133	0.035	0.035	3.181	0.0090	41.8
148	0.040	0.040	3.185	0.0103	46.5
155	0.045	0.045	3.189	0.0116	48.6
157	0.050	0.050	3.193	0.0129	49.2
156	0.055	0.055	3.197	0.0142	48.8
150	0.060	0.060	3.202	0.0155	46.9
136	0.065	0.065	3.206	0.0167	42.4
130	0.070	0.070	3.210	0.0180	40.5

UNCONFINED COMPRESSION TESTING
Sample No. 0427-12A (14 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-12A (14 day)		
TESTING DATE:	9/19/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8369

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	21.6	**%**
BULK UNIT WEIGHT	118.0	lb/ft^3
DRY UNIT WEIGHT	97.0	lb/ft^3
UCS *	49.2	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	9/19/2012
TESTED BY:	ZOD/TNR
TRACKING CODE:	8370_pH

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-013A		11.88
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	11.88

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8370_PM
SAMPLE No.:	13A (14 DAY)	EQUIPMENT No.:	6B
TEST DATE:	9/18/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	211.68 ***g***
3. WT WET SOIL + TARE	498.89 ***g***	709.90 ***g***
4. WT DRY SOIL + TARE	412.62 ***g***	624.30 ***g***
5. WT WATER, Ww	86.27 g	85.60 g
6. WT DRY SOIL, Ws	412.62 g	412.62 g
7. MOISTURE CONTENT, W	20.91 %	20.75 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.98 in.***	***2.98 in.***	***2.19 in.***	***2.17 in.***
No. 2	***2.98 in.***	***2.98 in.***	***2.19 in.***	***2.19 in.***
No. 3	***2.97 in.***	***2.95 in.***	***2.23 in.***	***2.22 in.***
Average	2.98 in.	2.97 in.	2.20 in.	2.19 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***498.89 g***	***498.22 g***
Area, Ao	6.97 in^2	6.93 in^2
Volume, Vo	15.34 in^3	15.18 in^3
Bulk Unit Weight	123.9 lb/ft^3	125.0 lb/ft^3
Dry Unit Weight	102.5 lb/ft^3	103.5 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8370_PM
SAMPLE No.:	13A (14 DAY)	EQUIPMENT No.:	6B
TEST DATE:	9/18/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
09/18/12	11 : 31	RJB	7.0	5.0	5.7	*	*	*	*
09/18/12	12 : 41	RJB	17.0	15.0	15.7	8.6	10.0	2.9	0.29
09/18/12	13 : 44	RJB	27.0	25.0	25.8	20.5	10.0	4.8	0.48
09/18/12	15 : 34	RJB	37.0	35.0	35.8	32.7	10.0	6.9	0.69
09/18/12	16 : 32	RJB	47.0	45.0	45.7	43.6	10.0	7.8	0.78
09/18/12	17 : 10	RJB	57.0	55.0	55.8	54.4	10.0	8.7	0.87
09/18/12	17 : 33	RJB	67.0	65.0	65.6	65.0	10.0	9.2	0.92
09/18/12	17 : 56	RJB	77.0	75.0	*	75.1	10.0	9.5	0.95
09/18/12	17 : 57	RJB	67.0	65.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8370_PM
SAMPLE No.:	13A (14 DAY)	6B
TEST DATE:	9/18/12	

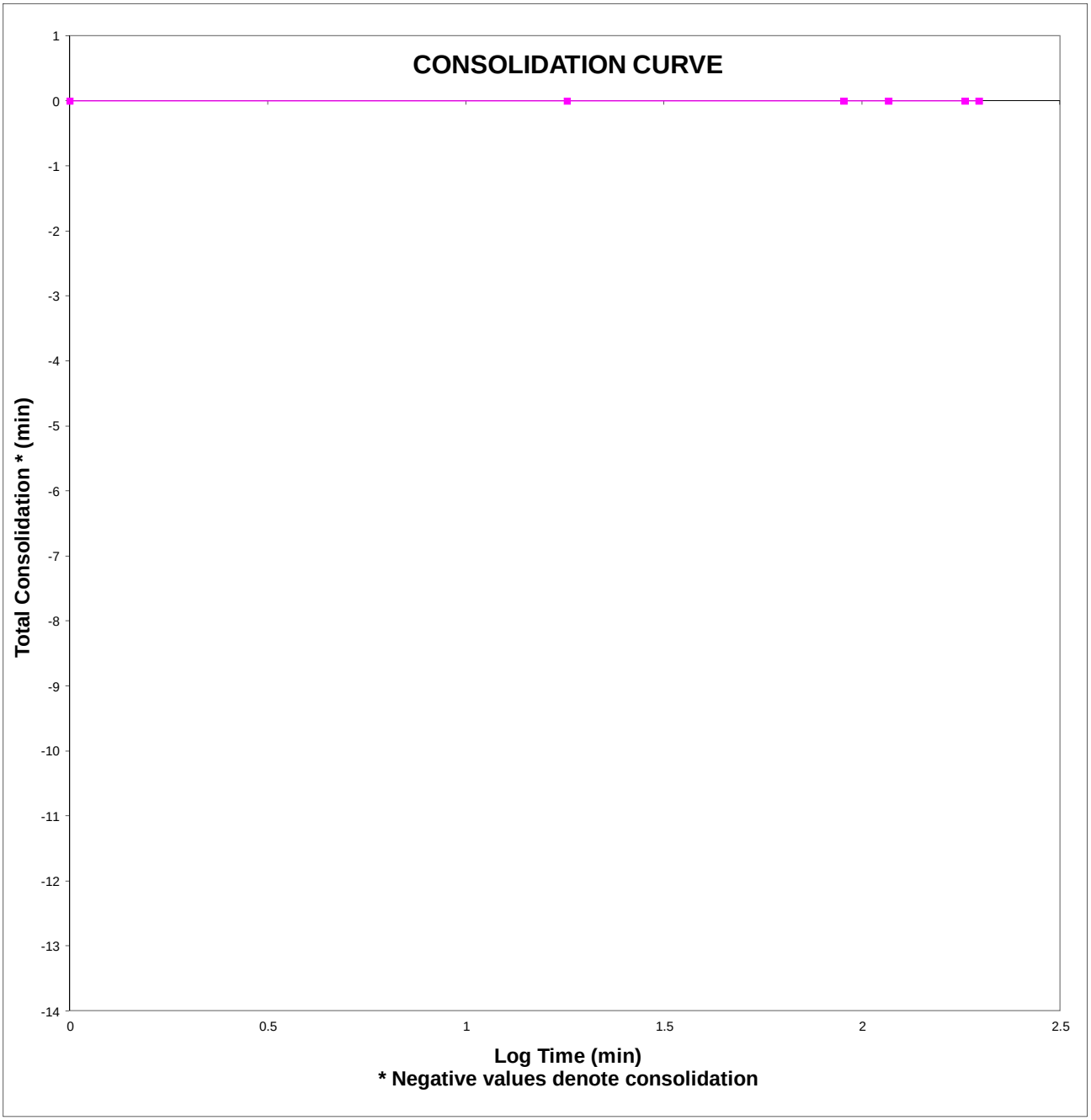
CELL PRESSURE: 75 psi **BACK PRESSURE:** 65 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML) READING BOTTOM*	*READING TOP*	*ACTUAL TOTAL (Ct)*
9 / 19 / 2012	RJB	10 : 45	0	0	0	24.0	24.0	0.0
9 / 19 / 2012	RJB	11 : 3	18	18	1.26	24.0	24.0	0.0
9 / 19 / 2012	RJB	12 : 15	72	90	1.95	24.0	24.0	0.0
9 / 19 / 2012	RJB	12 : 42	27	117	2.07	24.0	24.0	0.0
9 / 19 / 2012	RJB	13 : 47	65	182	2.26	24.0	24.0	0.0
9 / 19 / 2012	RJB	14 : 3	16	198	2.30	24.0	24.0	0.0

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8370_PM
SAMPLE No.:	13A (14 DAY)	EQUIPMENT No.:	6B
TEST DATE:	9/18/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8370_PM
SAMPLE No.:	13A (14 DAY)	EQUIPMENT No.:	6B
TEST DATE:	9/18/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
9 / 20 / 12	RJB	10 : 15		1.0	25.0	20.0	75.0	65.0	65.0
9 / 20 / 12	RJB	10 : 17	2	1.5	24.5	20.0	75.0	65.0	65.0
9 / 20 / 12	RJB	10 : 19	2	2.0	24.0	20.0	75.0	65.0	65.0
9 / 20 / 12	RJB	10 : 21	2	2.5	23.5	20.0	75.0	65.0	65.0
9 / 20 / 12	RJB	10 : 23	2	3.0	23.0	20.0	75.0	65.0	65.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8370_PM
SAMPLE No.:	13A (14 DAY)	EQUIPMENT No.:	6B
TEST DATE:	9/18/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				4.290		
2	0.5	0.5	1.00	4.112	2.21E-05	2.22E-05
2	0.5	0.5	1.00	3.933	2.31E-05	2.32E-05
2	0.5	0.5	1.00	3.754	2.41E-05	2.42E-05
2	0.5	0.5	1.00	3.575	2.53E-05	2.54E-05

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8370_PM
SAMPLE No.:	13A (14 DAY)	EQUIPMENT No.:	6B
TEST DATE:	9/18/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	**123.9 lb/ft³**	**125.0 lb/ft³**
DRY UNIT WEIGHT	**102.5 lb/ft³**	**103.5 lb/ft³**
MOISTURE CONTENT	**20.9 %**	**20.7 %**
PERMEABILITY @ 20°C	**2.4E-05 cm/sec**	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-13A (14 day)		
TESTING DATE:	19-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8370

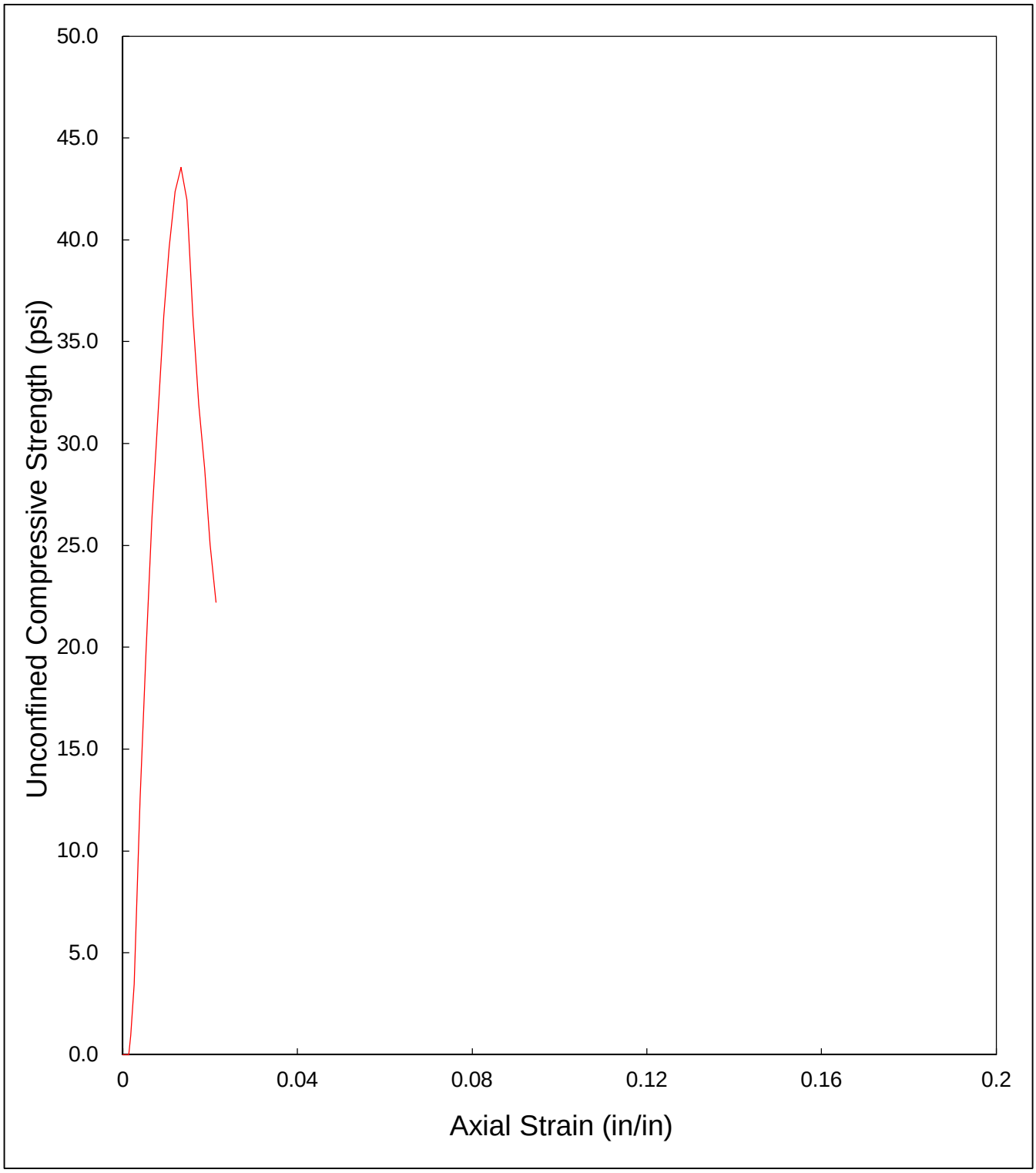
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	174.52	g
3. WT WET SOIL + TARE	308.41	g
4. WT DRY SOIL + TARE	288.94	g
5. WT WATER, Ww	19.47	g
6. WT DRY SOIL, Ws	114.42	g
7. MOISTURE CONTENT, W	**17.02**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.01	in.	3.75	in.
No. 2	2.01	in.	3.73	in.
No. 3	2.01	in.	3.74	in.
Average	**2.01**	**in.**	**3.74**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***377.70***	***g***
Initial Area, Ac	3.17	in²
Initial Volume, Vc	11.86	in³
Initial Bulk Unit Weight,	121.4	lb/ft³
Initial Dry Unit Weigh	103.7	lb/ft³
15 % Strain (0.15 Lo)	0.56	in.
UCS	43.6	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.171	0.0000	0.0
0	0.003	0.003	3.174	0.0008	0.0
0	0.005	0.005	3.175	0.0013	0.0
3	0.007	0.007	3.177	0.0019	0.9
11	0.010	0.010	3.179	0.0027	3.5
40	0.015	0.015	3.184	0.0040	12.6
63	0.020	0.020	3.188	0.0053	19.8
84	0.025	0.025	3.192	0.0067	26.3
100	0.030	0.030	3.197	0.0080	31.3
116	0.035	0.035	3.201	0.0094	36.2
127	0.040	0.040	3.205	0.0107	39.6
136	0.045	0.045	3.210	0.0120	42.4
140	0.050	0.050	3.214	0.0134	43.6
135	0.055	0.055	3.218	0.0147	41.9
117	0.060	0.060	3.223	0.0160	36.3
103	0.065	0.065	3.227	0.0174	31.9
93	0.070	0.070	3.231	0.0187	28.8
81	0.075	0.075	3.236	0.0201	25.0
72	0.080	0.080	3.240	0.0214	22.2

UNCONFINED COMPRESSION TESTING
Sample No. 0427-13A (14 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-13A (14 day)		
TESTING DATE:	9/19/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8370

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	17.0	**%**
BULK UNIT WEIGHT	121.4	lb/ft^3
DRY UNIT WEIGHT	103.7	lb/ft^3
UCS *	43.6	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	9/19/2012
TESTED BY:	ZOD/TNR
TRACKING CODE:	8371_pH

KEMRON SAMPLE No.		MATERIAL pH
1.	0427-014A	12.00
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.00

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8371_PM
SAMPLE No.:	014A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/18/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.	014	014
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	241.65 ***g***
3. WT WET SOIL + TARE	570.28 ***g***	796.60 ***g***
4. WT DRY SOIL + TARE	443.55 ***g***	685.20 ***g***
5. WT WATER, Ww	126.73 g	111.40 g
6. WT DRY SOIL, Ws	443.55 g	443.55 g
7. MOISTURE CONTENT, W	28.57 %	25.12 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***3.00 in.***	***2.94 in.***	***2.65 in.***	***2.66 in.***
No. 2	***2.98 in.***	***2.96 in.***	***2.41 in.***	***2.66 in.***
No. 3	***2.77 in.***	***2.93 in.***	***2.54 in.***	***2.59 in.***
Average	2.92 in.	2.94 in.	2.53 in.	2.63 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***570.28 g***	***556.17 g***
Area, Ao	6.68 in^2	6.81 in^2
Volume, Vo	16.90 in^3	17.93 in^3
Bulk Unit Weight	128.5 lb/ft^3	118.2 lb/ft^3
Dry Unit Weight	100.0 lb/ft^3	94.5 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8371_PM
SAMPLE No.:	14A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/18/12		

TEST	TIME	TESTED	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
DATE	(military)	BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
09/20/12	15 : 18	RJB	7.0	5.0	9.3	*	*	*	*
09/20/12	15 : 44	RJB	17.0	15.0	15.5	13.9	10.0	4.6	0.46
09/20/12	16 : 6	RJB	27.0	25.0	25.5	22.5	10.0	7.0	0.70
09/20/12	16 : 41	RJB	37.0	35.0	32.5	33.5	10.0	8.0	0.80
09/20/12	17 : 40	RJB	47.0	45.0	45.4	44.1	10.0	11.6	1.16
09/20/12	18 : 0	RJB	57.0	55.0	55.5	54.6	10.0	9.2	0.92
09/20/12	18 : 22	RJB	67.0	65.0	*	65.1	10.0	9.6	0.96
09/20/12	18 : 23	RJB	67.0	65.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8371_PM
SAMPLE No.:	14A (14 DAY)	3
TEST DATE:	9/18/2012	

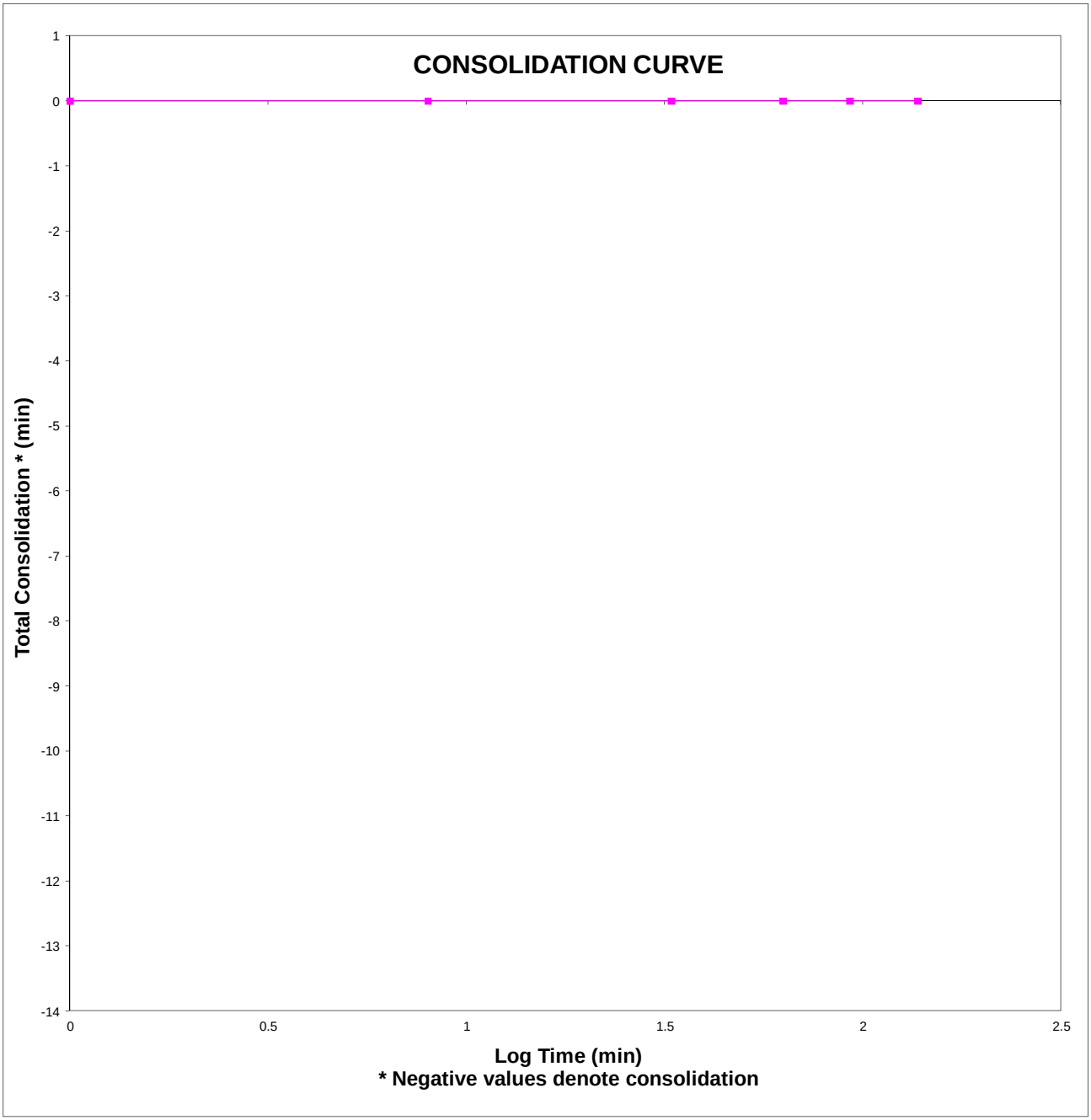
CELL PRESSURE: 75 psi **BACK PRESSURE:** 65 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML) READING BOTTOM*	*READING TOP*	*ACTUAL TOTAL (Ct)*
9 / 21 / 2012	RJB	8 : 37	0	0	0	24.0	24.0	0.0
9 / 21 / 2012	RJB	8 : 38	1	1	0.00	24.0	24.0	0.0
9 / 21 / 2012	RJB	8 : 45	7	8	0.90	24.0	24.0	0.0
9 / 21 / 2012	RJB	9 : 10	25	33	1.52	24.0	24.0	0.0
9 / 21 / 2012	RJB	9 : 40	30	63	1.80	24.0	24.0	0.0
9 / 21 / 2012	RJB	10 : 10	30	93	1.97	24.0	24.0	0.0
9 / 21 / 2012	RJB	10 : 55	45	138	2.14	24.0	24.0	0.0

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8371_PM
SAMPLE No.:	014A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/18/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8371_PM
SAMPLE No.:	14A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/18/2012		

				HYDRAULIC HEAD (cm)			GAUGE PRESSURE (psi)		
DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	INFLUENT	EFFLUENT	TEMP. C°	CELL	INFLUENT	EFFLUENT
9 / 21 / 12	RJB	11 : 6		0.0	24.0	20.0	75.0	65.0	65.0
9 / 21 / 12	RJB	11 : 9	3	0.5	23.5	20.0	75.0	65.0	65.0
9 / 21 / 12	RJB	11 : 12	3	1.0	23.0	20.0	75.0	65.0	65.0
9 / 21 / 12	RJB	11 : 15	3	1.5	22.5	20.0	75.0	65.0	65.0
9 / 21 / 12	RJB	11 : 18	3	2.0	22.0	20.0	75.0	65.0	65.0
9 / 21 / 12	RJB	11 : 30	12	4.0	20.0	20.0	75.0	65.0	65.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8371_PM
SAMPLE No.:	014A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/18/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.733		
3	0.5	0.5	1.00	3.577	1.76E-05	1.77E-05
3	0.5	0.5	1.00	3.422	1.84E-05	1.85E-05
3	0.5	0.5	1.00	3.266	1.93E-05	1.94E-05
3	0.5	0.5	1.00	3.111	2.02E-05	2.03E-05
12	2.0	2.0	1.00	2.488	2.31E-05	2.32E-05

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8371_PM
SAMPLE No.:	014A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/18/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	128.5 lb/ft³	118.2 lb/ft³
DRY UNIT WEIGHT	100.0 lb/ft³	94.5 lb/ft³
MOISTURE CONTENT	28.6 %	25.1 %
PERMEABILITY @ 20°C	2.0E-05 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-14A (14 day)		
TESTING DATE:	19-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8371

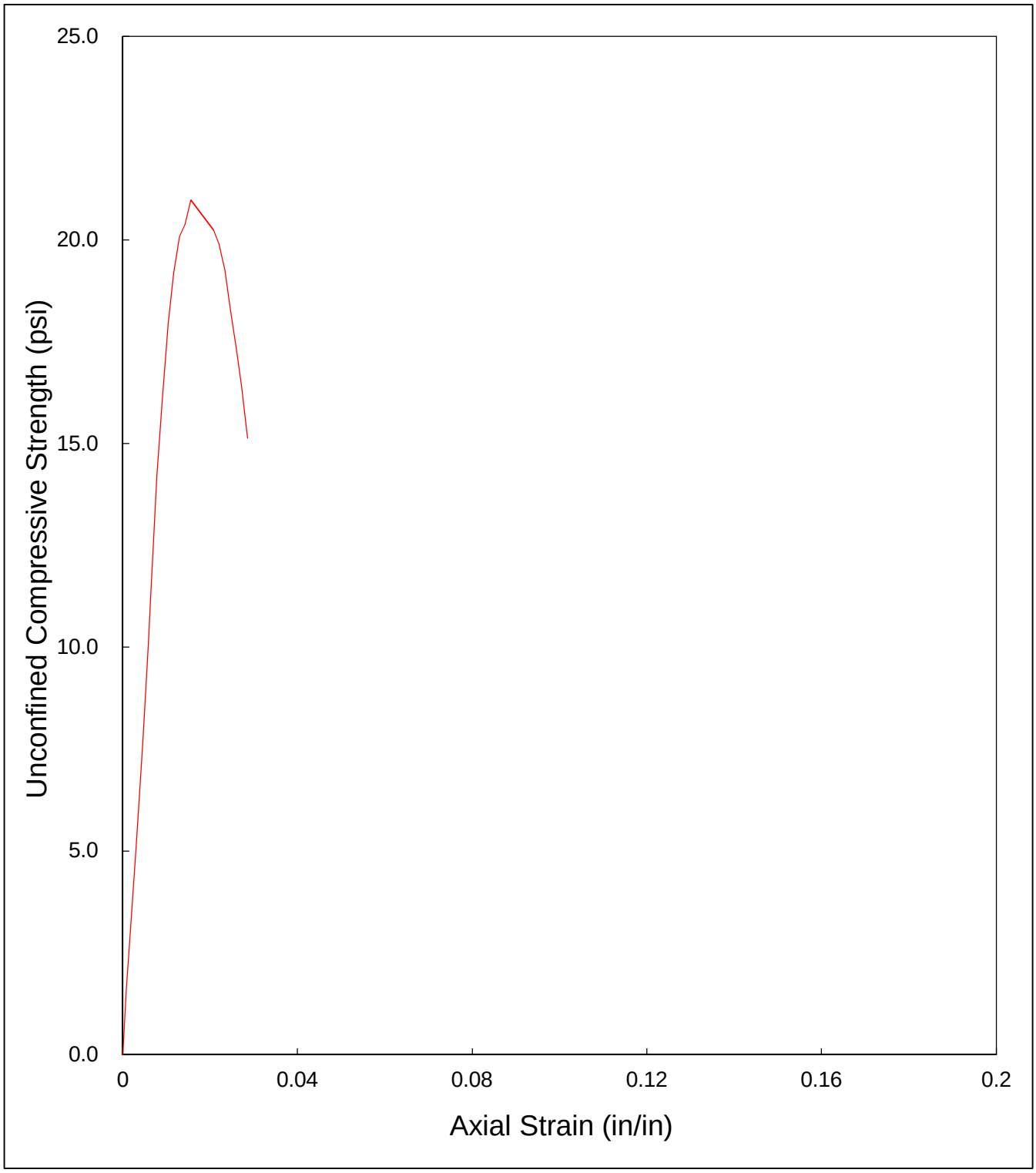
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	165.80	g
3. WT WET SOIL + TARE	359.42	g
4. WT DRY SOIL + TARE	324.66	g
5. WT WATER, Ww	34.76	g
6. WT DRY SOIL, Ws	158.86	g
7. MOISTURE CONTENT, W	**21.88**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.01	in.	3.86	in.
No. 2	2.00	in.	3.87	in.
No. 3	2.00	in.	3.84	in.
Average	**2.00**	**in.**	**3.85**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***367.53***	***g***
Initial Area, Ac	3.14	in²
Initial Volume, Vc	12.12	in³
Initial Bulk Unit Weight,	115.5	lb/ft³
Initial Dry Unit Weigh	94.8	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	21.0	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.145	0.0000	0.0
5	0.003	0.003	3.147	0.0008	1.6
7	0.005	0.005	3.149	0.0013	2.2
10	0.007	0.007	3.150	0.0018	3.2
14	0.010	0.010	3.153	0.0026	4.4
20	0.015	0.015	3.157	0.0039	6.3
28	0.020	0.020	3.161	0.0052	8.9
36	0.025	0.025	3.165	0.0065	11.4
45	0.030	0.030	3.169	0.0078	14.2
51	0.035	0.035	3.174	0.0091	16.1
57	0.040	0.040	3.178	0.0104	17.9
61	0.045	0.045	3.182	0.0117	19.2
64	0.050	0.050	3.186	0.0130	20.1
65	0.055	0.055	3.190	0.0143	20.4
67	0.060	0.060	3.194	0.0156	21.0
65	0.080	0.080	3.211	0.0208	20.2
64	0.085	0.085	3.216	0.0221	19.9
62	0.090	0.090	3.220	0.0234	19.3
59	0.095	0.095	3.224	0.0247	18.3
56	0.100	0.100	3.229	0.0259	17.3
53	0.105	0.105	3.233	0.0272	16.4
49	0.110	0.110	3.237	0.0285	15.1

UNCONFINED COMPRESSION TESTING
Sample No. 0427-14A (14 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-14A (14 day)		
TESTING DATE:	9/19/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8371

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	21.9	**%**
BULK UNIT WEIGHT	115.5	lb/ft^3
DRY UNIT WEIGHT	94.8	lb/ft^3
UCS *	21.0	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	9/19/2012
TESTED BY:	ZOD/TNR
TRACKING CODE:	8372_pH

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-015A		12.02
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.02

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8372_PM
SAMPLE No.:	15A (14 DAY)	EQUIPMENT No.:	1
TEST DATE:	9/18/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	211.01 ***g***
3. WT WET SOIL + TARE	305.97 ***g***	490.60 ***g***
4. WT DRY SOIL + TARE	211.82 ***g***	422.83 ***g***
5. WT WATER, Ww	94.15 g	67.77 g
6. WT DRY SOIL, Ws	211.82 g	211.82 g
7. MOISTURE CONTENT, W	44.45 %	31.99 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.96 in.***	***2.77 in.***	***1.52 in.***	***1.45 in.***
No. 2	***2.96 in.***	***2.91 in.***	***1.49 in.***	***1.45 in.***
No. 3	***2.91 in.***	***2.76 in.***	***1.47 in.***	***1.56 in.***
Average	2.94 in.	2.81 in.	1.50 in.	1.49 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***305.97 g***	***280.31 g***
Area, Ao	6.81 in^2	6.22 in^2
Volume, Vo	10.18 in^3	9.26 in^3
Bulk Unit Weight	114.5 lb/ft^3	115.4 lb/ft^3
Dry Unit Weight	79.2 lb/ft^3	87.4 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8372_PM
SAMPLE No.:	15A (14 DAY)	EQUIPMENT No.:	1
TEST DATE:	9/18/12		

TEST	TIME	TESTED	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
DATE	(military)	BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
09/20/12	14 : 20	RJB	7.0	5.0	*	*	*	*	*
09/20/12	14 : 41	RJB	17.0	15.0	*	*	*	*	*
09/20/12	15 : 4	RJB	27.0	25.0	*	*	*	*	*
09/20/12	15 : 30	RJB	37.0	35.0	*	*	*	*	*
09/20/12	15 : 57	RJB	47.0	45.0	45.3	*	*	*	*
09/20/12	16 : 39	RJB	57.0	55.0	55.3	54.4	10.0	9.1	0.91
09/20/12	17 : 16	RJB	67.0	65.0	65.4	64.7	10.0	9.4	0.94
09/20/12	17 : 40	RJB	77.0	75.0	*	75.1	10.0	9.7	0.97
09/20/12	17 : 41	RJB	67.0	65.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8372_PM
SAMPLE No.:	15A (14 DAY)	1
TEST DATE:	9/18/2012	

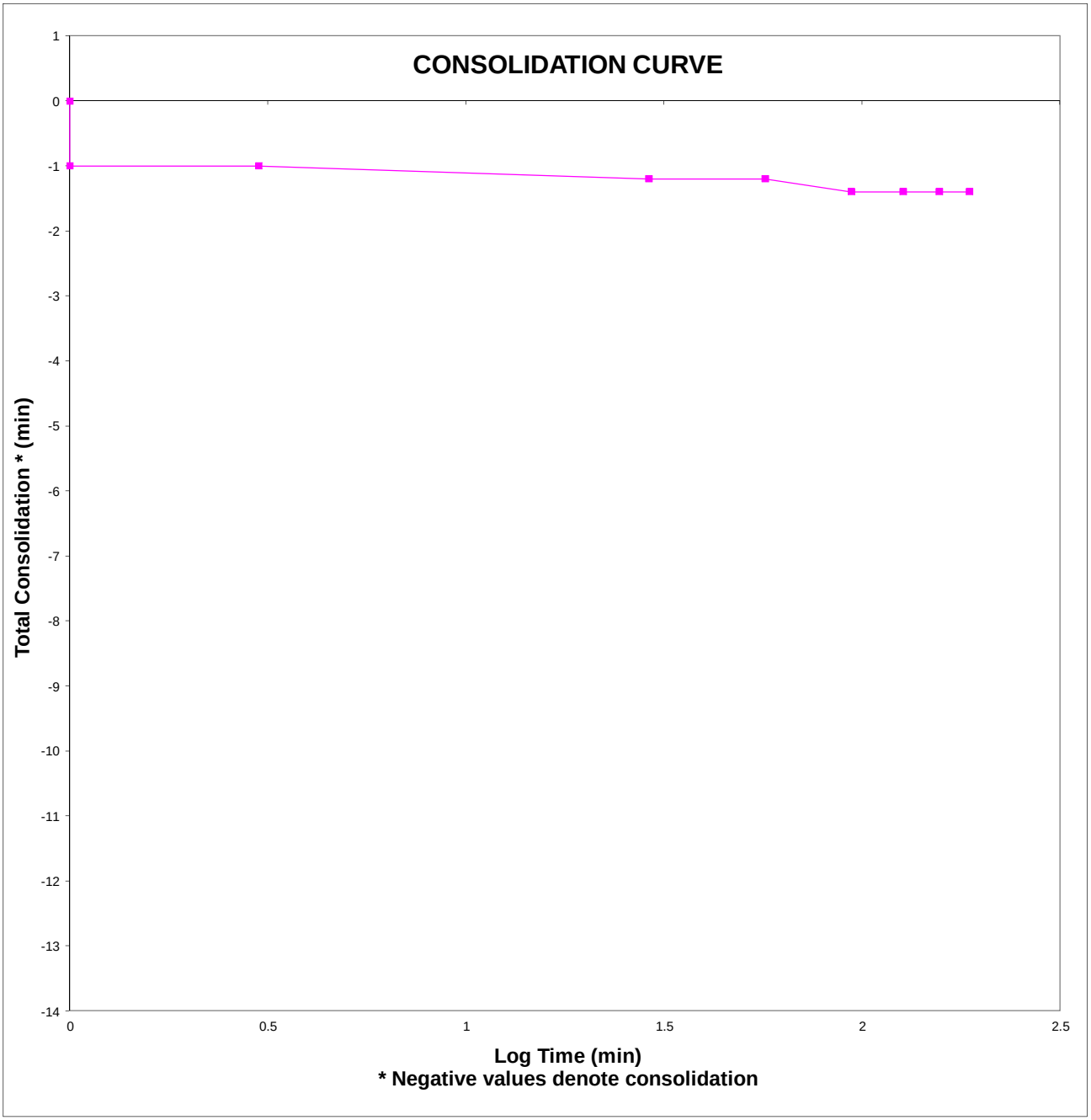
CELL PRESSURE: 75 psi **BACK PRESSURE:** 65 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
9 / 21 / 2012	RJB	8 : 3	0	0	0	25.0	25.0	0.0
9 / 21 / 2012	RJB	8 : 4	1	1	0.00	24.5	24.5	1.0
9 / 21 / 2012	RJB	8 : 6	2	3	0.48	24.5	24.5	1.0
9 / 21 / 2012	RJB	8 : 32	26	29	1.46	24.4	24.4	1.2
9 / 21 / 2012	RJB	9 : 0	28	57	1.76	24.4	24.4	1.2
9 / 21 / 2012	RJB	9 : 37	37	94	1.97	24.3	24.3	1.4
9 / 21 / 2012	RJB	10 : 10	33	127	2.10	24.3	24.3	1.4
9 / 21 / 2012	RJB	10 : 40	30	157	2.20	24.3	24.3	1.4
9 / 21 / 2012	RJB	11 : 10	30	187	2.27	24.3	24.3	1.4

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8372_PM
SAMPLE No.:	15A (14 DAY)	EQUIPMENT No.:	1
TEST DATE:	9/18/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8372_PM
SAMPLE No.:	15A (14 DAY)	EQUIPMENT No.:	1
TEST DATE:	9/18/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
9 / 21 / 12	RJB	11 : 15	0	0.0	25.0	20.0	75.0	65.0	65.0
9 / 21 / 12	RJB	11 : 22	7	0.5	24.5	20.0	75.0	65.0	65.0
9 / 21 / 12	RJB	11 : 32	10	1.0	24.0	20.0	75.0	65.0	65.0
9 / 21 / 12	RJB	11 : 44	12	2.2	22.8	20.0	75.0	65.0	65.0
9 / 21 / 12	RJB	11 : 52	8	3.2	21.8	20.0	75.0	65.0	65.0
9 / 21 / 12	RJB	12 : 21	29	4.7	20.5	20.0	75.0	65.0	65.0
9 / 21 / 12	RJB	12 : 33	12	5.4	19.8	20.0	75.0	65.0	65.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8372_PM
SAMPLE No.:	15A (14 DAY)	EQUIPMENT No.:	1
TEST DATE:	9/18/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				6.582		
7	0.5	0.5	1.00	6.319	4.20E-06	4.22E-06
10	0.5	0.5	1.00	6.056	3.07E-06	3.08E-06
12	1.2	1.2	1.00	5.424	6.62E-06	6.65E-06
8	1.0	1.0	1.00	4.897	9.20E-06	9.24E-06
29	1.5	1.3	0.87	4.160	4.05E-06	4.07E-06
12	0.7	0.7	1.00	3.791	5.57E-06	5.60E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8372_PM
SAMPLE No.:	15A (14 DAY)	EQUIPMENT No.:	1
TEST DATE:	9/18/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	114.5 lb/ft³	115.4 lb/ft³
DRY UNIT WEIGHT	79.2 lb/ft³	87.4 lb/ft³
MOISTURE CONTENT	44.4 %	32.0 %
PERMEABILITY @ 20°C	5.1E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-15A (14 day)		
TESTING DATE:	19-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8372

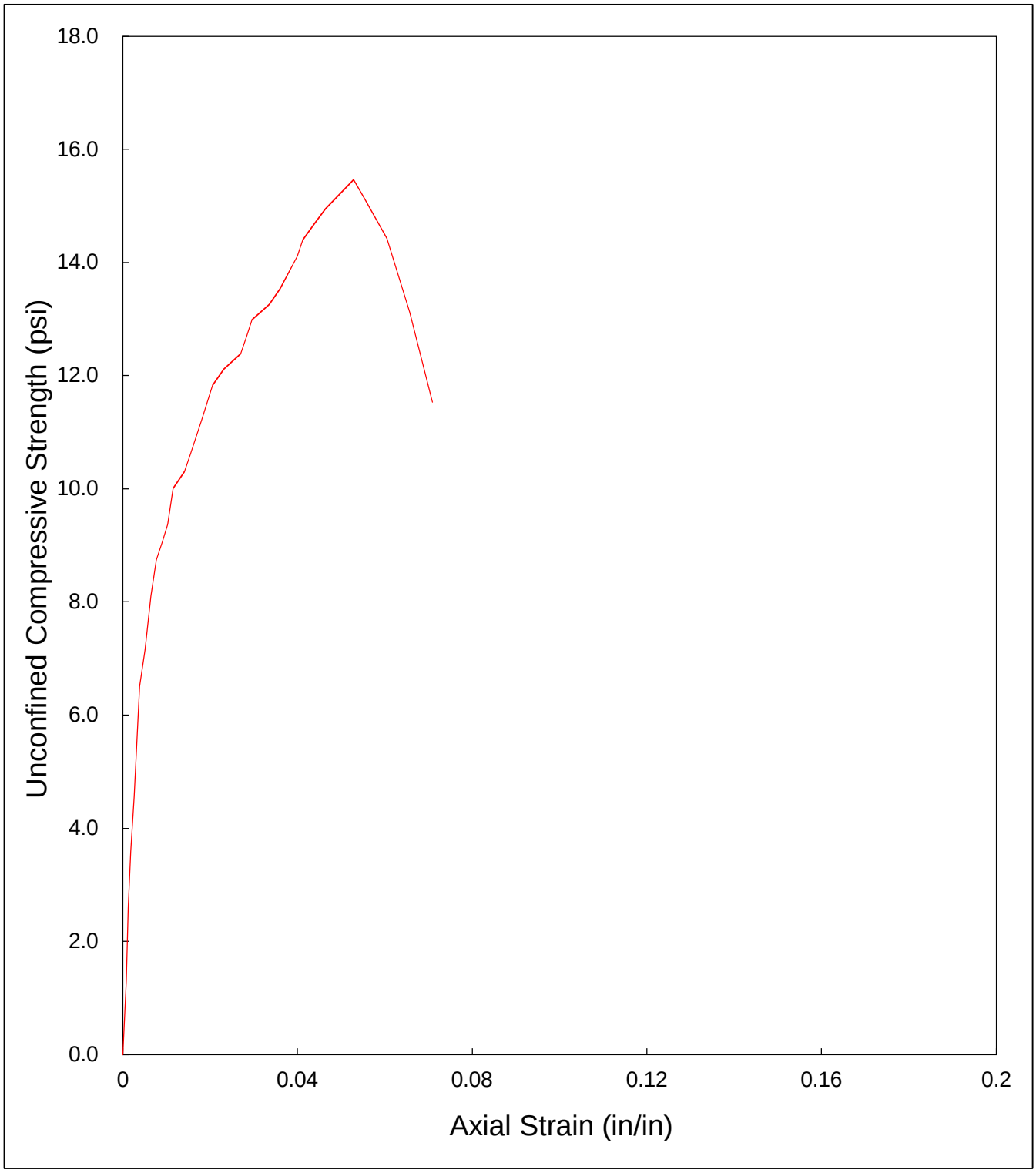
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	162.75	g
3. WT WET SOIL + TARE	300.51	g
4. WT DRY SOIL + TARE	265.98	g
5. WT WATER, Ww	34.53	g
6. WT DRY SOIL, Ws	103.23	g
7. MOISTURE CONTENT, W	**33.45**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.98	in.	3.89	in.
No. 2	1.97	in.	3.89	in.
No. 3	1.98	in.	3.86	in.
Average	**1.97**	**in.**	**3.88**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***351.70***	***g***
Initial Area, Ac	3.06	in²
Initial Volume, Vc	11.88	in³
Initial Bulk Unit Weight,	112.7	lb/ft³
Initial Dry Unit Weigh	84.5	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	15.5	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.063	0.0000	0.0
4	0.003	0.003	3.065	0.0008	1.3
8	0.005	0.005	3.066	0.0013	2.6
11	0.007	0.007	3.068	0.0018	3.6
14	0.010	0.010	3.070	0.0026	4.6
20	0.015	0.015	3.074	0.0039	6.5
22	0.020	0.020	3.078	0.0052	7.1
25	0.025	0.025	3.082	0.0064	8.1
27	0.030	0.030	3.086	0.0077	8.7
28	0.035	0.035	3.090	0.0090	9.1
29	0.040	0.040	3.094	0.0103	9.4
31	0.045	0.045	3.098	0.0116	10.0
32	0.055	0.055	3.107	0.0142	10.3
33	0.060	0.060	3.111	0.0155	10.6
35	0.070	0.070	3.119	0.0180	11.2
37	0.080	0.080	3.127	0.0206	11.8
38	0.090	0.090	3.135	0.0232	12.1
39	0.105	0.105	3.148	0.0271	12.4
40	0.110	0.110	3.152	0.0283	12.7
41	0.115	0.115	3.156	0.0296	13.0
42	0.130	0.130	3.169	0.0335	13.3
43	0.140	0.140	3.177	0.0361	13.5
45	0.155	0.155	3.190	0.0399	14.1
46	0.160	0.160	3.194	0.0412	14.4
47	0.170	0.170	3.203	0.0438	14.7
48	0.180	0.180	3.211	0.0464	14.9
50	0.205	0.205	3.233	0.0528	15.5
49	0.215	0.215	3.242	0.0554	15.1
47	0.235	0.235	3.260	0.0606	14.4
43	0.255	0.255	3.278	0.0657	13.1
38	0.275	0.275	3.296	0.0709	11.5

UNCONFINED COMPRESSION TESTING
Sample No. 0427-15A (14 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-15A (14 day)		
TESTING DATE:	9/19/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8372

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	33.4	**%**
BULK UNIT WEIGHT	112.7	lb/ft^3
DRY UNIT WEIGHT	84.5	lb/ft^3
UCS *	15.5	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	9/19/2012
TESTED BY:	ZOD/TNR
TRACKING CODE:	8373_pH

KEMRON SAMPLE No.		MATERIAL pH
1.	0427-016A	11.93
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	11.93

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8373_PM
SAMPLE No.:	16A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/19/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	207.06 ***g***
3. WT WET SOIL + TARE	675.90 ***g***	879.80 ***g***
4. WT DRY SOIL + TARE	558.34 ***g***	765.40 ***g***
5. WT WATER, Ww	117.56 g	114.40 g
6. WT DRY SOIL, Ws	558.34 g	558.34 g
7. MOISTURE CONTENT, W	21.06 %	20.49 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.97 in.***	***2.97 in.***	***2.99 in.***	***2.97 in.***
No. 2	***2.98 in.***	***2.97 in.***	***2.98 in.***	***3.00 in.***
No. 3	***2.95 in.***	***2.94 in.***	***2.94 in.***	***2.95 in.***
Average	2.97 in.	2.96 in.	2.97 in.	2.97 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***675.90 g***	***672.74 g***
Area, Ao	6.92 in^2	6.90 in^2
Volume, Vo	20.56 in^3	20.49 in^3
Bulk Unit Weight	125.2 lb/ft^3	125.1 lb/ft^3
Dry Unit Weight	103.5 lb/ft^3	103.8 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8373_PM
SAMPLE No.:	16A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/19/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
09/19/12	12 : 27	RJB	7.0	5.0	5.9	*	*	*	*
09/19/12	12 : 59	RJB	17.0	15.0	15.7	8.0	10.0	2.1	0.21
09/19/12	14 : 30	RJB	27.0	25.0	25.7	19.0	10.0	3.3	0.33
09/19/12	14 : 52	RJB	37.0	35.0	*	30.7	10.0	5.0	0.50
09/19/12	15 : 30	RJB	47.0	45.0	45.6	*	*	*	*
09/19/12	16 : 6	RJB	57.0	55.0	55.0	53.0	10.0	7.4	0.74
09/19/12	16 : 50	RJB	67.0	65.0	65.4	63.6	10.0	8.6	0.86
09/19/12	17 : 38	RJB	77.0	75.0	75.5	74.2	10.0	8.8	0.88
09/19/12	17 : 58	RJB	67.0	85.0	*	85.0	-10.0	9.5	-0.95
09/19/12	17 : 59	RJB	77.0	75.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8373_PM
SAMPLE No.:	16A (14 DAY)	7B
TEST DATE:	9/19/12	

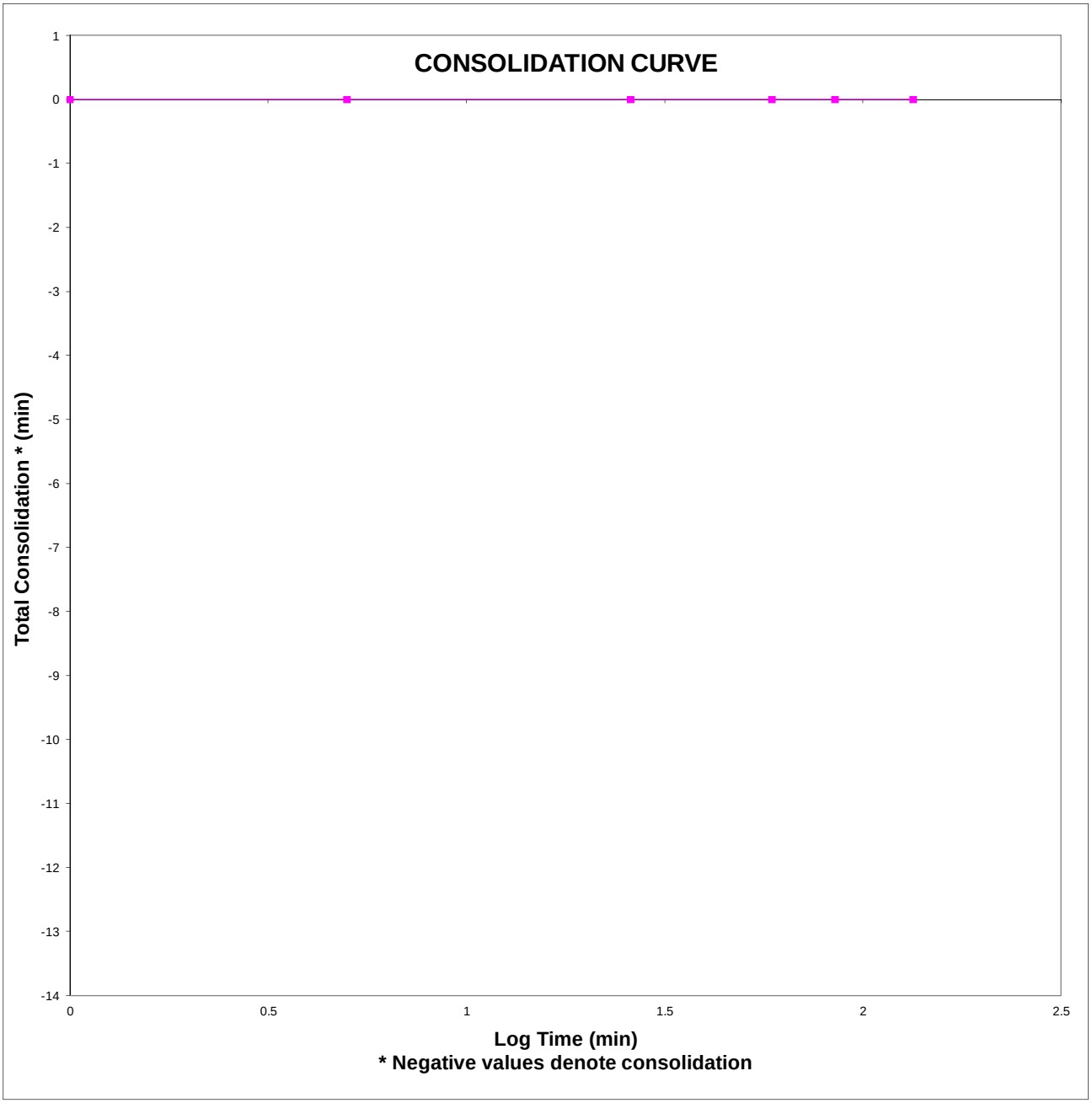
CELL PRESSURE: 75 psi **BACK PRESSURE:** 65 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
9 / 20 / 12	RJB	9 : 16	0	0	0	24.0	24.0	0.0
9 / 20 / 12	RJB	9 : 21	5	5	0.70	24.0	24.0	0.0
9 / 20 / 12	RJB	9 : 42	21	26	1.41	24.0	24.0	0.0
9 / 20 / 12	RJB	10 : 15	33	59	1.77	24.0	24.0	0.0
9 / 20 / 12	RJB	10 : 41	26	85	1.93	24.0	24.0	0.0
9 / 20 / 12	RJB	11 : 30	49	134	2.13	24.0	24.0	0.0

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8373_PM
SAMPLE No.:	16A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/19/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8373_PM
SAMPLE No.:	16A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/19/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
9 / 20 / 12	RJB	11 : 45	0	0.0	25.0	20.0	85.0	75.0	75.0
9 / 20 / 12	RJB	11 : 47	2	0.5	24.5	20.0	85.0	75.0	75.0
9 / 20 / 12	RJB	11 : 49	2	1.0	24.0	20.0	85.0	75.0	75.0
9 / 20 / 12	RJB	11 : 51	2	1.5	23.5	20.0	85.0	75.0	75.0
9 / 20 / 12	RJB	11 : 53	2	2.0	23.0	20.0	85.0	75.0	75.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8373_PM
SAMPLE No.:	16A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/19/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.314		
2	0.5	0.5	1.00	3.182	2.87E-05	2.89E-05
2	0.5	0.5	1.00	3.049	2.99E-05	3.01E-05
2	0.5	0.5	1.00	2.917	3.13E-05	3.14E-05
2	0.5	0.5	1.00	2.784	3.27E-05	3.29E-05

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8373_PM
SAMPLE No.:	16A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/19/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	125.2 lb/ft³	125.1 lb/ft³
DRY UNIT WEIGHT	103.5 lb/ft³	103.8 lb/ft³
MOISTURE CONTENT	21.1 %	20.5 %
PERMEABILITY @ 20°C	3.1E-05 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-16A (14 day)		
TESTING DATE:	19-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8373

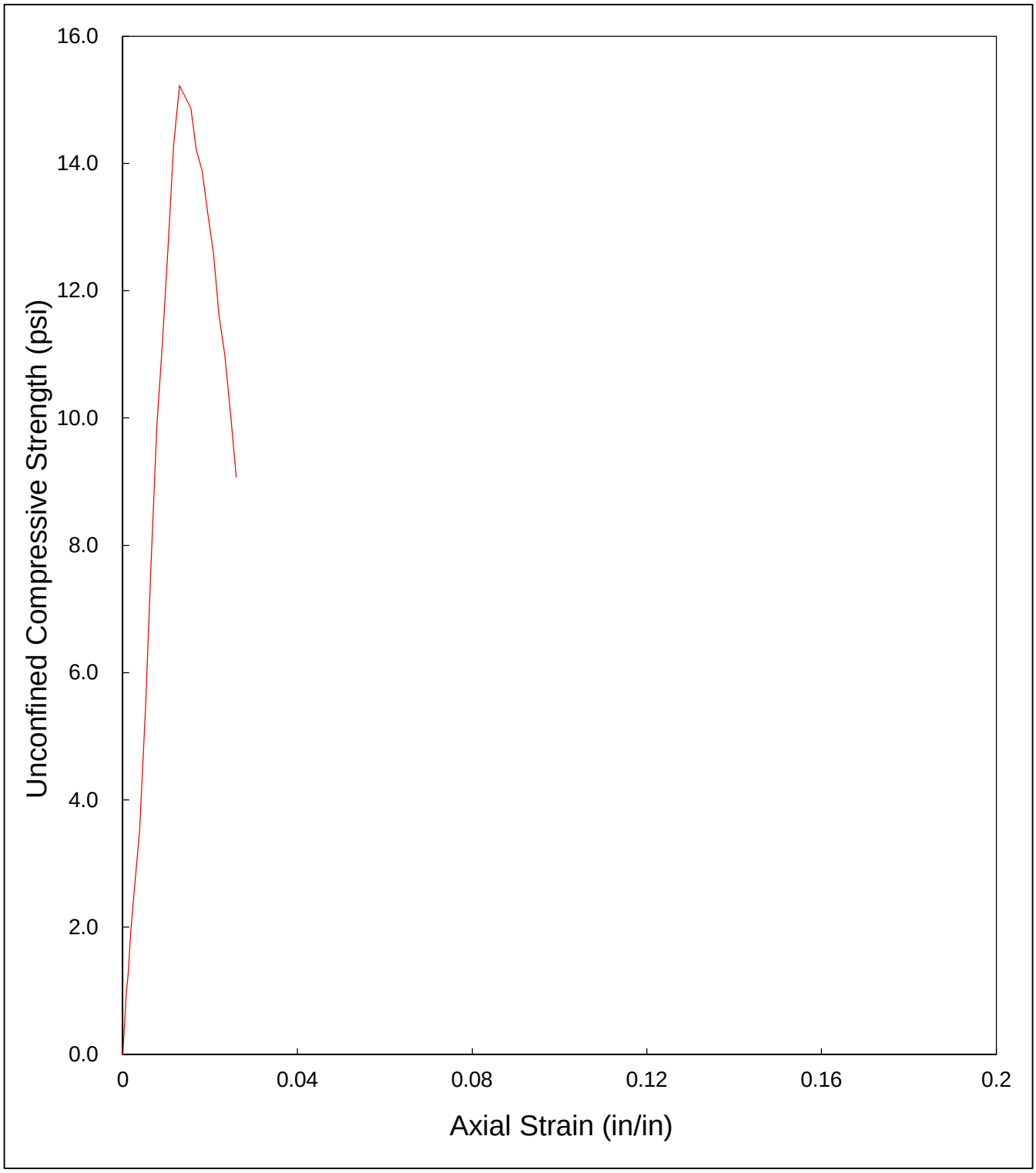
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	167.40	g
3. WT WET SOIL + TARE	360.54	g
4. WT DRY SOIL + TARE	325.96	g
5. WT WATER, Ww	34.58	g
6. WT DRY SOIL, Ws	158.56	g
7. MOISTURE CONTENT, W	**21.81**	**%**

SOIL SPECIMEN DIMENSIONS		
	DIAMETER	***LENGTH***
No. 1	2.00 in.	3.85 in.
No. 2	2.00 in.	3.85 in.
No. 3	1.98 in.	3.84 in.
Average	**1.99 in.**	**3.85 in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***372.38***	***g***
Initial Area, Ac	3.11	in^2
Initial Volume, Vc	11.97	in^3
Initial Bulk Unit Weight,	118.5	lb/ft^3
Initial Dry Unit Weigh	97.3	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	15.2	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.112	0.0000	0.0
3	0.003	0.003	3.115	0.0008	1.0
4	0.005	0.005	3.116	0.0013	1.3
6	0.007	0.007	3.118	0.0018	1.9
8	0.010	0.010	3.120	0.0026	2.6
11	0.015	0.015	3.125	0.0039	3.5
17	0.020	0.020	3.129	0.0052	5.4
24	0.025	0.025	3.133	0.0065	7.7
31	0.030	0.030	3.137	0.0078	9.9
35	0.035	0.035	3.141	0.0091	11.1
40	0.040	0.040	3.145	0.0104	12.7
45	0.045	0.045	3.149	0.0117	14.3
48	0.050	0.050	3.153	0.0130	15.2
47	0.060	0.060	3.162	0.0156	14.9
45	0.065	0.065	3.166	0.0169	14.2
44	0.070	0.070	3.170	0.0182	13.9
42	0.075	0.075	3.174	0.0195	13.2
40	0.080	0.080	3.178	0.0208	12.6
37	0.085	0.085	3.183	0.0221	11.6
35	0.090	0.090	3.187	0.0234	11.0
32	0.095	0.095	3.191	0.0247	10.0
29	0.100	0.100	3.195	0.0260	9.1

UNCONFINED COMPRESSION TESTING
Sample No. 0427-16A (14 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-16A (14 day)		
TESTING DATE:	9/19/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8373

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	21.8	**%**
BULK UNIT WEIGHT	118.5	lb/ft^3
DRY UNIT WEIGHT	97.3	lb/ft^3
UCS *	15.2	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	9/19/2012
TESTED BY:	ZOD/TNR
TRACKING CODE:	8374_pH

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-017A		11.92
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	11.92

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8374_PM
SAMPLE No.:	17A (14 DAY)	EQUIPMENT No.:	7A
TEST DATE:	9/19/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	227.66 ***g***
3. WT WET SOIL + TARE	411.69 ***g***	641.20 ***g***
4. WT DRY SOIL + TARE	326.92 ***g***	554.58 ***g***
5. WT WATER, Ww	84.77 g	86.62 g
6. WT DRY SOIL, Ws	326.92 g	326.92 g
7. MOISTURE CONTENT, W	25.93 %	26.50 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.95 in.***	***2.93 in.***	***1.96 in.***	***1.97 in.***
No. 2	***2.96 in.***	***2.94 in.***	***1.97 in.***	***1.96 in.***
No. 3	***2.94 in.***	***2.85 in.***	***1.92 in.***	***1.98 in.***
Average	2.95 in.	2.90 in.	1.95 in.	1.97 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***411.69 g***	***413.54 g***
Area, Ao	6.84 in^2	6.62 in^2
Volume, Vo	13.36 in^3	13.02 in^3
Bulk Unit Weight	117.4 lb/ft^3	121.0 lb/ft^3
Dry Unit Weight	93.2 lb/ft^3	95.6 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8374_PM
SAMPLE No.:	17A (14 DAY)	EQUIPMENT No.:	7A
TEST DATE:	9/19/12		

TEST	TIME	TESTED	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
DATE	(military)	BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
09/19/12	12 : 38	RJB	7.0	5.0	5.8	*	*	*	*
09/19/12	13 : 3	RJB	17.0	15.0	15.7	8.9	10.0	3.1	0.31
09/19/12	14 : 28	RJB	27.0	25.0	25.7	19.2	10.0	3.5	0.35
09/19/12	14 : 50	RJB	37.0	35.0	35.6	31.0	10.0	5.3	0.53
09/19/12	15 : 28	RJB	47.0	45.0	45.5	41.0	10.0	5.4	0.54
09/19/12	16 : 3	RJB	57.0	55.0	55.4	52.7	10.0	7.2	0.72
09/19/12	16 : 49	RJB	67.0	65.0	65.5	63.2	10.0	7.8	0.78
09/19/12	17 : 36	RJB	77.0	75.0	75.4	74.1	10.0	8.6	0.86
09/19/12	17 : 57	RJB	87.0	85.0	85.4	84.3	10.0	8.9	0.89
09/19/12	18 : 18	RJB	97.0	95.0	*	94.9	10.0	9.5	0.95
09/19/12	18 : 19	RJB	87.0	85.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8374_PM
SAMPLE No.:	17A (14 DAY)	7A
TEST DATE:	9/19/12	

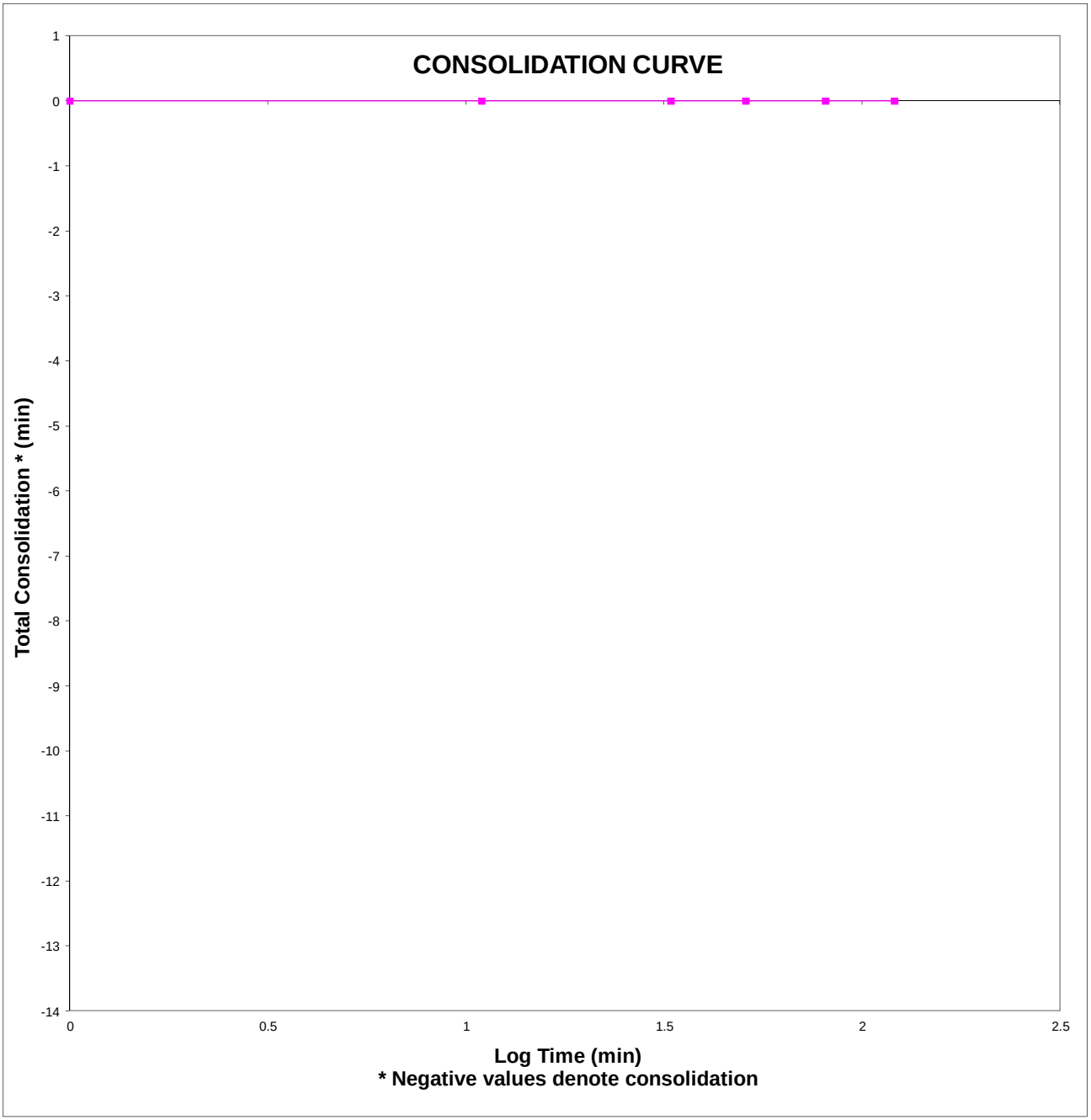
CELL PRESSURE: 95 psi **BACK PRESSURE:** 85 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML) READING BOTTOM*	*READING TOP*	*ACTUAL TOTAL (Ct)*
9 / 20 / 2012	RJB	9 : 9	0	0	0	24.0	24.0	0.0
9 / 20 / 2012	RJB	9 : 20	11	11	1.04	24.0	24.0	0.0
9 / 20 / 2012	RJB	9 : 42	22	33	1.52	24.0	24.0	0.0
9 / 20 / 2012	RJB	10 : 0	18	51	1.71	24.0	24.0	0.0
9 / 20 / 2012	RJB	10 : 30	30	81	1.91	24.0	24.0	0.0
9 / 20 / 2012	RJB	11 : 10	40	121	2.08	24.0	24.0	0.0

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8374_PM
SAMPLE No.:	17A (14 DAY)	EQUIPMENT No.:	7A
TEST DATE:	9/19/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8374_PM
SAMPLE No.:	17A (14 DAY)	EQUIPMENT No.:	7A
TEST DATE:	9/19/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
9 / 20 / 12	RJB	11 : 35		0.0	25.0	20.0	95.0	85.0	85.0
9 / 20 / 12	RJB	11 : 37	2	0.5	24.5	20.0	95.0	85.0	85.0
9 / 20 / 12	RJB	11 : 39	2	1.0	24.0	20.0	95.0	85.0	85.0
9 / 20 / 12	RJB	11 : 41	2	1.5	23.5	20.0	95.0	85.0	85.0
9 / 20 / 12	RJB	11 : 43	2	2.0	23.0	20.0	95.0	85.0	85.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8374_PM
SAMPLE No.:	17A (14 DAY)	EQUIPMENT No.:	7A
TEST DATE:	9/19/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				5.042		
2	0.5	0.5	1.00	4.841	1.91E-05	1.92E-05
2	0.5	0.5	1.00	4.639	1.99E-05	2.00E-05
2	0.5	0.5	1.00	4.437	2.08E-05	2.09E-05
2	0.5	0.5	1.00	4.236	2.18E-05	2.19E-05

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8374_PM
SAMPLE No.:	17A (14 DAY)	EQUIPMENT No.:	7A
TEST DATE:	9/19/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	117.4 lb/ft³	121.0 lb/ft³
DRY UNIT WEIGHT	93.2 lb/ft³	95.6 lb/ft³
MOISTURE CONTENT	25.9 %	26.5 %
PERMEABILITY @ 20°C	2.0E-05 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-17A (14 day)		
TESTING DATE:	19-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8374

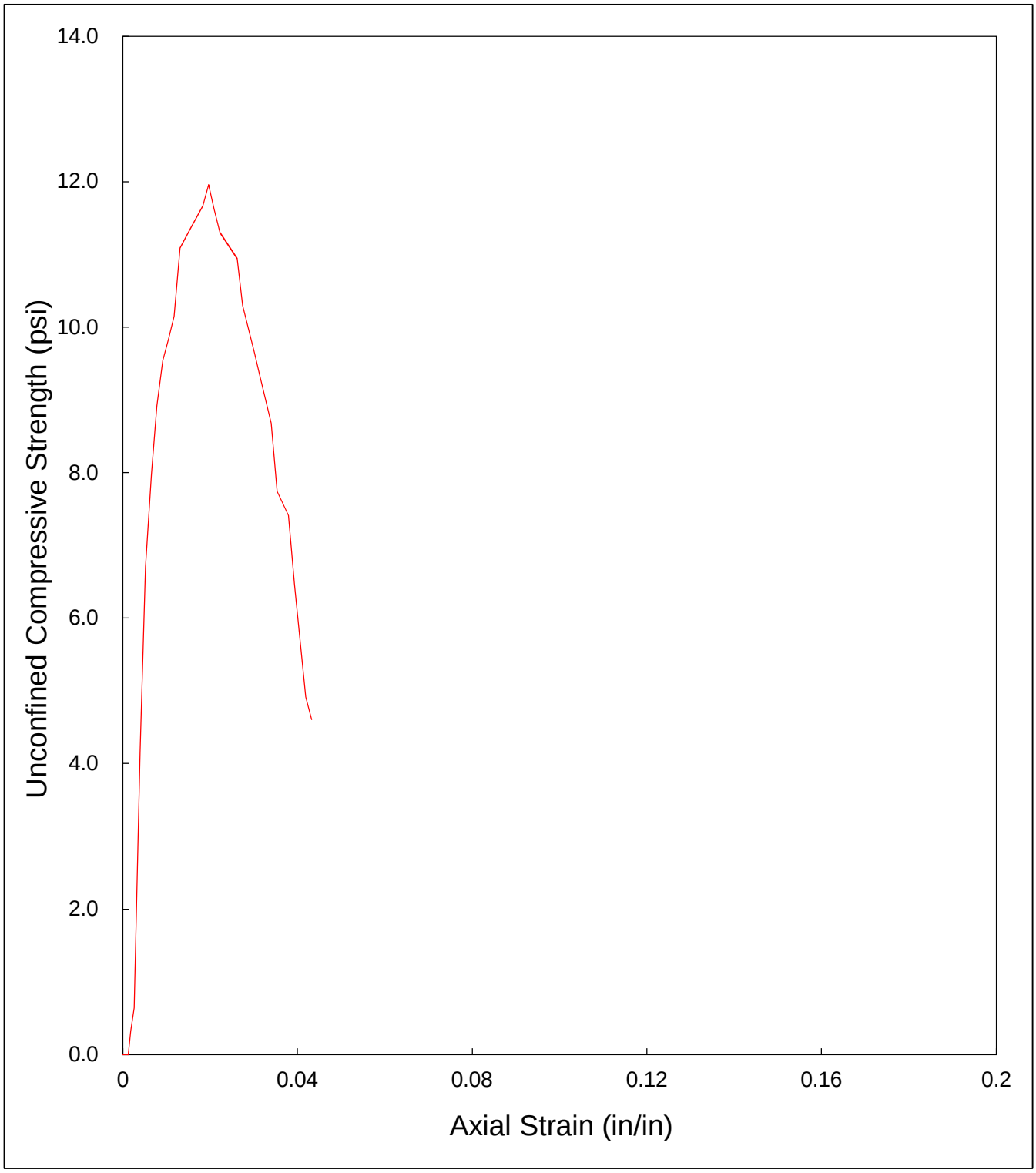
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	160.90	g
3. WT WET SOIL + TARE	265.84	g
4. WT DRY SOIL + TARE	246.31	g
5. WT WATER, Ww	19.53	g
6. WT DRY SOIL, Ws	85.41	g
7. MOISTURE CONTENT, W	**22.87**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.84	in.
No. 2	2.00	in.	3.81	in.
No. 3	1.97	in.	3.81	in.
Average	**1.99**	**in.**	**3.82**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***354.75***	***g***
Initial Area, Ac	3.12	in²
Initial Volume, Vc	11.89	in³
Initial Bulk Unit Weight,	113.6	lb/ft³
Initial Dry Unit Weigh	92.5	lb/ft³
15 % Strain (0.15 Lo)	0.57	in.
UCS	12.0	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.115	0.0000	0.0
0	0.005	0.005	3.120	0.0013	0.0
1	0.007	0.007	3.121	0.0018	0.3
2	0.010	0.010	3.124	0.0026	0.6
13	0.015	0.015	3.128	0.0039	4.2
21	0.020	0.020	3.132	0.0052	6.7
25	0.025	0.025	3.136	0.0065	8.0
28	0.030	0.030	3.140	0.0079	8.9
30	0.035	0.035	3.144	0.0092	9.5
31	0.040	0.040	3.148	0.0105	9.8
32	0.045	0.045	3.153	0.0118	10.2
35	0.050	0.050	3.157	0.0131	11.1
36	0.060	0.060	3.165	0.0157	11.4
37	0.070	0.070	3.174	0.0183	11.7
38	0.075	0.075	3.178	0.0196	12.0
37	0.080	0.080	3.182	0.0210	11.6
36	0.085	0.085	3.186	0.0223	11.3
35	0.100	0.100	3.199	0.0262	10.9
33	0.105	0.105	3.204	0.0275	10.3
32	0.110	0.110	3.208	0.0288	10.0
31	0.115	0.115	3.212	0.0301	9.7
30	0.120	0.120	3.217	0.0314	9.3
28	0.130	0.130	3.225	0.0341	8.7
25	0.135	0.135	3.230	0.0354	7.7
24	0.145	0.145	3.238	0.0380	7.4
21	0.150	0.150	3.243	0.0393	6.5
16	0.160	0.160	3.252	0.0419	4.9
15	0.165	0.165	3.256	0.0432	4.6

UNCONFINED COMPRESSION TESTING
Sample No. 0427-17A (14 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-17A (14 day)		
TESTING DATE:	9/19/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8374

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	22.9	**%**
BULK UNIT WEIGHT	113.6	lb/ft^3
DRY UNIT WEIGHT	92.5	lb/ft^3
UCS *	12.0	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	9/19/2012
TESTED BY:	ZOD/TNR
TRACKING CODE:	8375_pH

KEMRON SAMPLE No.		MATERIAL pH
1.	0427-018A	12.14
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.14

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8375_PM
SAMPLE No.:	18A (14 DAY)	EQUIPMENT No.:	4
TEST DATE:	9/21/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	207.50 ***g***
3. WT WET SOIL + TARE	602.85 ***g***	804.90 ***g***
4. WT DRY SOIL + TARE	481.30 ***g***	688.80 ***g***
5. WT WATER, Ww	121.55 g	116.10 g
6. WT DRY SOIL, Ws	481.30 g	481.30 g
7. MOISTURE CONTENT, W	25.25 %	24.12 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.96 in.***	***2.87 in.***	***3.06 in.***	***3.01 in.***
No. 2	***2.96 in.***	***2.91 in.***	***3.04 in.***	***3.00 in.***
No. 3	***2.92 in.***	***2.89 in.***	***2.96 in.***	***2.93 in.***
Average	2.95 in.	2.89 in.	3.02 in.	2.98 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***602.85 g***	***597.85 g***
Area, Ao	6.81 in^2	6.56 in^2
Volume, Vo	20.56 in^3	19.55 in^3
Bulk Unit Weight	111.7 lb/ft^3	116.5 lb/ft^3
Dry Unit Weight	89.2 lb/ft^3	93.9 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8375_PM
SAMPLE No.:	18A (14 DAY)	EQUIPMENT No.:	4
TEST DATE:	9/21/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
09/21/12	9 :	RJB	7.0	5.0	4.5	*	*	*	*
09/21/12	9 :	RJB	17.0	15.0	15.0	7.8	10.0	3.3	0.33
09/21/12	10 :	RJB	27.0	25.0	25.0	18.6	10.0	3.6	0.36
09/21/12	10 :	RJB	37.0	35.0	35.0	29.9	10.0	4.9	0.49
09/21/12	10 :	RJB	47.0	45.0	44.9	40.4	10.0	5.4	0.54
09/21/12	11 :	RJB	57.0	55.0	54.9	51.2	10.0	6.3	0.63
09/21/12	11 :	RJB	67.0	65.0	65.0	62.2	10.0	7.3	0.73
09/21/12	12 :	RJB	77.0	65.0	75.0	72.8	10.0	7.8	0.78
09/21/12	13 :	RJB	87.0	85.0	85.1	83.5	10.0	8.5	0.85
09/21/12	15 :	RJB	97.0	95.0	95.0	*	10.0	#VALUE!	#VALUE!
09/21/12	16 :	RJB	107.0	105.0	*	104.5	10.0	9.5	0.95
09/21/12	16 :	RJB	97.0	95.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8375_PM
SAMPLE No.:	18A (14 DAY)	4
TEST DATE:	9/21/2012	

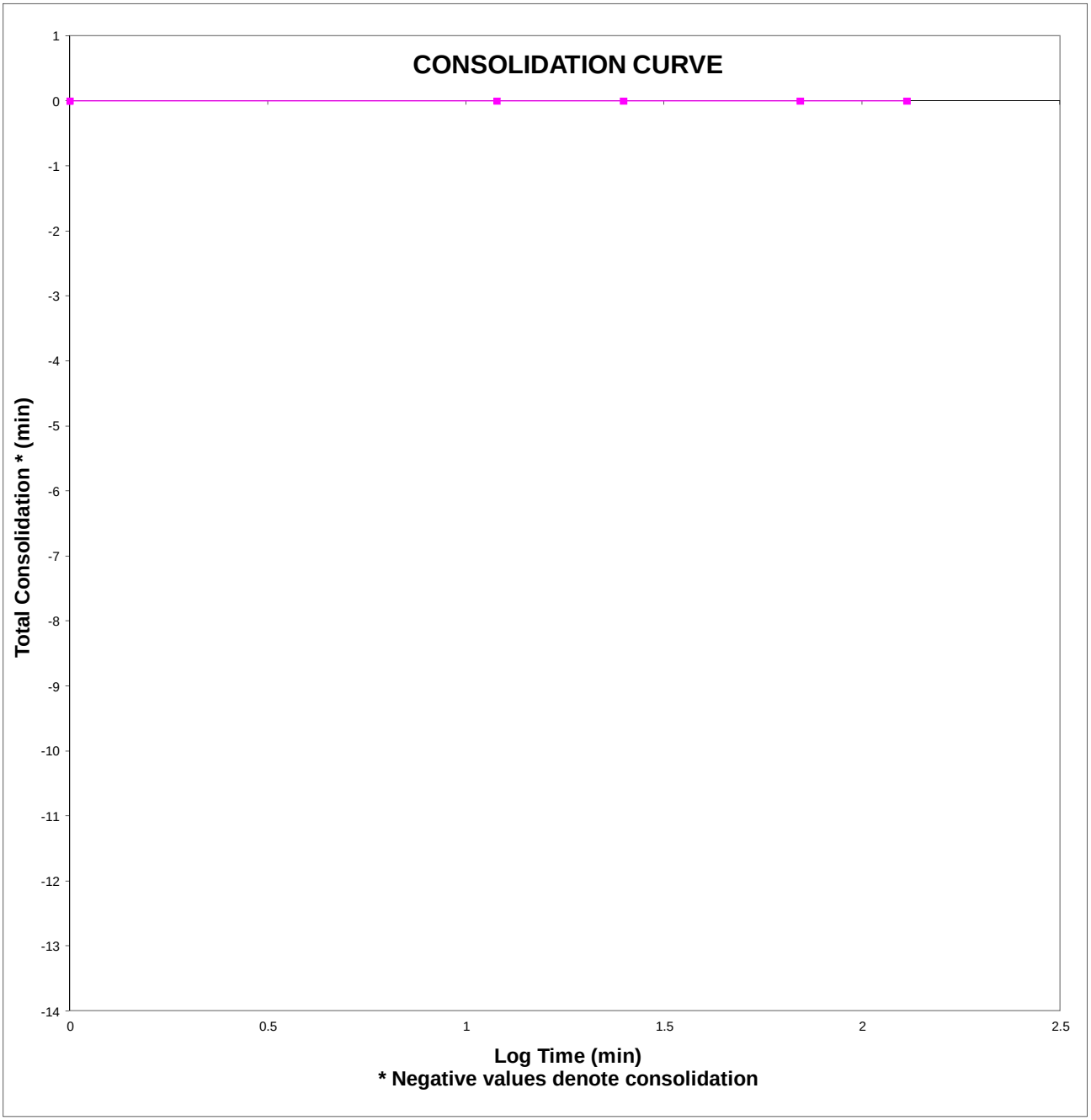
CELL PRESSURE: 105 psi **BACK PRESSURE:** 95 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML) READING BOTTOM*	*READING TOP*	*ACTUAL TOTAL (Ct)*
9 / 21 / 12	RJB	16 : 20	0	0	0	25.0	25.0	0.0
9 / 21 / 12	RJB	16 : 21	1	1	0.00	25.0	25.0	0.0
9 / 21 / 12	RJB	16 : 32	11	12	1.08	25.0	25.0	0.0
9 / 21 / 12	RJB	16 : 45	13	25	1.40	25.0	25.0	0.0
9 / 21 / 12	RJB	17 : 30	45	70	1.85	25.0	25.0	0.0
9 / 21 / 12	RJB	18 : 30	60	130	2.11	25.0	25.0	0.0

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8375_PM
SAMPLE No.:	18A (14 DAY)	EQUIPMENT No.:	4
TEST DATE:	9/21/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8375_PM
SAMPLE No.:	18A (14 DAY)	EQUIPMENT No.:	4
TEST DATE:	9/21/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
9 / 22 / 12	RJB	8 : 42	0	0.0	25.0	20.0	105.0	95.0	95.0
9 / 22 / 12	RJB	9 : 13	31	1.2	23.8	20.0	105.0	95.0	95.0
9 / 22 / 12	RJB	9 : 29	16	2.0	23.0	20.0	105.0	95.0	95.0
9 / 22 / 12	RJB	9 : 50	21	2.8	22.2	20.0	105.0	95.0	95.0
9 / 22 / 12	RJB	10 : 19	29	3.8	21.2	20.0	105.0	95.0	95.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8375_PM
SAMPLE No.:	18A (14 DAY)	EQUIPMENT No.:	4
TEST DATE:	9/21/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.261		
31	1.2	1.2	1.00	2.948	4.73E-06	4.76E-06
16	0.8	0.8	1.00	2.739	6.67E-06	6.70E-06
21	0.8	0.8	1.00	2.530	5.49E-06	5.51E-06
29	1.0	1.0	1.00	2.269	5.45E-06	5.48E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8375_PM
SAMPLE No.:	18A (14 DAY)	EQUIPMENT No.:	4
TEST DATE:	9/21/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	111.7 lb/ft³	116.5 lb/ft³
DRY UNIT WEIGHT	89.2 lb/ft³	93.9 lb/ft³
MOISTURE CONTENT	25.3 %	24.1 %
PERMEABILITY @ 20°C	5.6E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-18A (14 day)		
TESTING DATE:	19-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8375

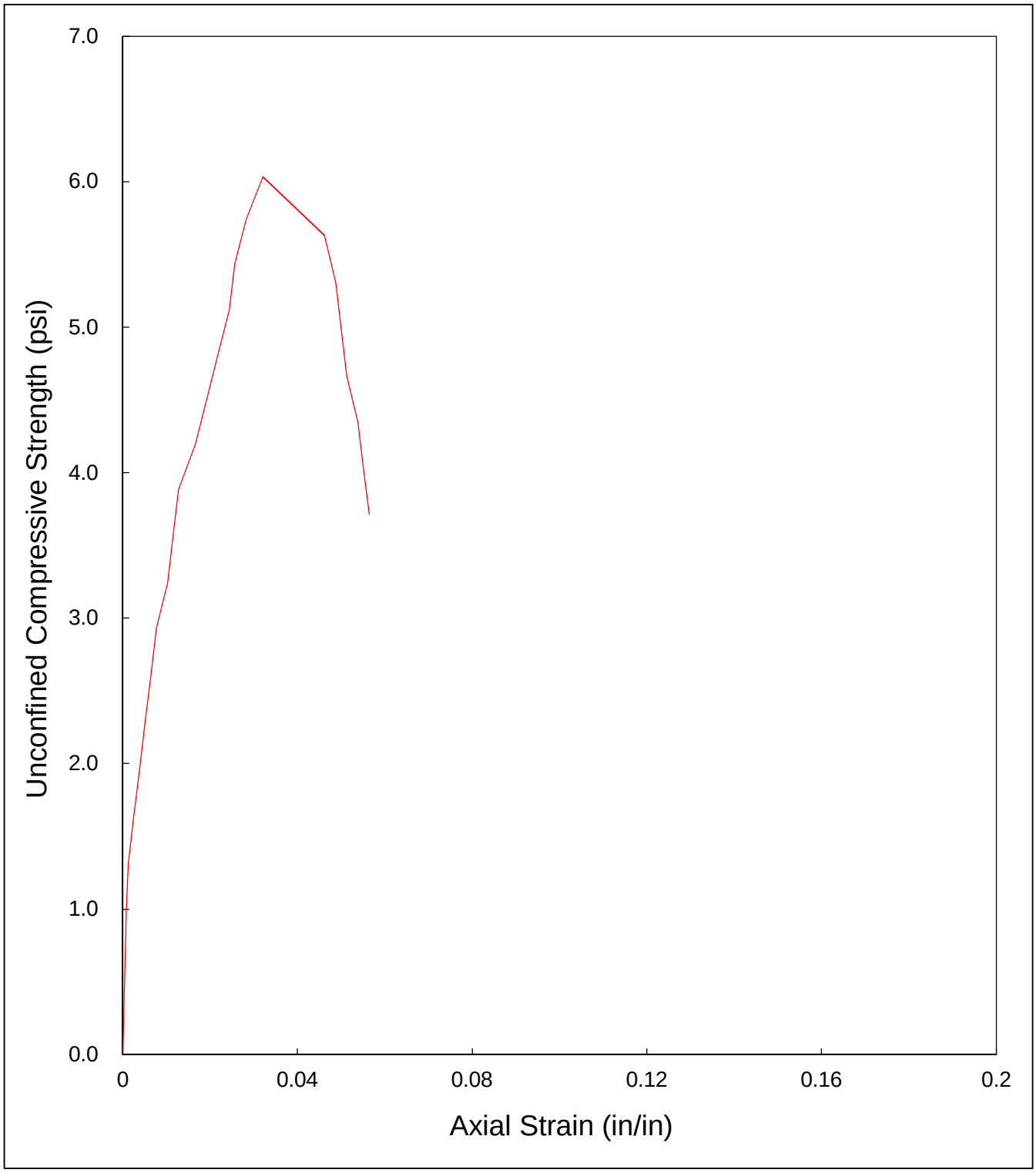
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	161.96	g
3. WT WET SOIL + TARE	343.90	g
4. WT DRY SOIL + TARE	302.29	g
5. WT WATER, Ww	41.61	g
6. WT DRY SOIL, Ws	140.33	g
7. MOISTURE CONTENT, W	**29.65**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.97	in.	3.90	in.
No. 2	1.98	in.	3.90	in.
No. 3	1.96	in.	3.90	in.
Average	**1.97**	**in.**	**3.90**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***342.03***	***g***
Initial Area, Ac	3.05	in^2
Initial Volume, Vc	11.88	in^3
Initial Bulk Unit Weight,	109.6	lb/ft^3
Initial Dry Unit Weigh	84.6	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	6.0	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.049	0.0000	0.0
3	0.003	0.003	3.051	0.0008	1.0
4	0.005	0.005	3.053	0.0013	1.3
5	0.010	0.010	3.057	0.0026	1.6
6	0.015	0.015	3.061	0.0038	2.0
7	0.020	0.020	3.065	0.0051	2.3
8	0.025	0.025	3.069	0.0064	2.6
9	0.030	0.030	3.073	0.0077	2.9
10	0.040	0.040	3.081	0.0103	3.2
11	0.045	0.045	3.085	0.0115	3.6
12	0.050	0.050	3.089	0.0128	3.9
13	0.065	0.065	3.101	0.0167	4.2
14	0.075	0.075	3.109	0.0192	4.5
15	0.085	0.085	3.117	0.0218	4.8
16	0.095	0.095	3.125	0.0244	5.1
17	0.100	0.100	3.129	0.0257	5.4
18	0.110	0.110	3.138	0.0282	5.7
19	0.125	0.125	3.150	0.0321	6.0
18	0.180	0.180	3.197	0.0462	5.6
17	0.190	0.190	3.205	0.0487	5.3
16	0.195	0.195	3.210	0.0500	5.0
15	0.200	0.200	3.214	0.0513	4.7
14	0.210	0.210	3.223	0.0539	4.3
13	0.215	0.215	3.227	0.0552	4.0
12	0.220	0.220	3.231	0.0564	3.7

UNCONFINED COMPRESSION TESTING
Sample No. 0427-18A (14 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-18A (14 day)		
TESTING DATE:	9/19/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8375

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	29.7	**%**
BULK UNIT WEIGHT	109.6	lb/ft^3
DRY UNIT WEIGHT	84.6	lb/ft^3
UCS *	6.0	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	9/19/2012
TESTED BY:	ZOD/TNR
TRACKING CODE:	8376_pH

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-021A		12.22
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.22

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8376_PM
SAMPLE No.:	21A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/22/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	208.58 ***g***
3. WT WET SOIL + TARE	630.80 ***g***	861.80 ***g***
4. WT DRY SOIL + TARE	521.02 ***g***	729.60 ***g***
5. WT WATER, Ww	109.78 g	132.20 g
6. WT DRY SOIL, Ws	521.02 g	521.02 g
7. MOISTURE CONTENT, W	21.07 %	25.37 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.98 in.***	***2.98 in.***	***2.96 in.***	***2.88 in.***
No. 2	***2.99 in.***	***2.99 in.***	***2.90 in.***	***2.89 in.***
No. 3	***2.98 in.***	***3.00 in.***	***2.89 in.***	***2.86 in.***
Average	2.98 in.	2.99 in.	2.92 in.	2.88 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***630.80 g***	***653.20 g***
Area, Ao	6.99 in^2	7.02 in^2
Volume, Vo	20.39 in^3	20.19 in^3
Bulk Unit Weight	117.8 lb/ft^3	123.2 lb/ft^3
Dry Unit Weight	97.3 lb/ft^3	98.3 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8376_PM
SAMPLE No.:	21A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/22/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
09/22/12	8 : 38	RJB	7.0	5.0	4.9	*	*	*	*
09/22/12	9 : 26	RJB	17.0	15.0	15.0	9.7	10.0	4.8	0.48
09/22/12	9 : 49	RJB	27.0	25.0	24.9	20.6	10.0	5.6	0.56
09/22/12	10 : 27	RJB	37.0	35.0	34.9	31.2	10.0	6.3	0.63
09/22/12	11 : 8	RJB	47.0	45.0	44.8	41.9	10.0	7.0	0.70
09/22/12	11 : 50	RJB	57.0	55.0	54.7	53.0	10.0	8.2	0.82
09/22/12	12 : 48	RJB	67.0	65.0	64.5	63.3	10.0	8.6	0.86
09/22/12	13 : 15	RJB	77.0	65.0	74.4	73.5	10.0	9.0	0.90
09/22/12	13 : 44	RJB	87.0	85.0	84.5	83.5	10.0	9.1	0.91
09/22/12	14 : 28	RJB	97.0	95.0	*	94.0	10.0	9.5	0.95
09/22/12	14 : 29	RJB	107.0	105.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8376_PM
SAMPLE No.:	21A (14 DAY)	7B
TEST DATE:	9/22/2012	

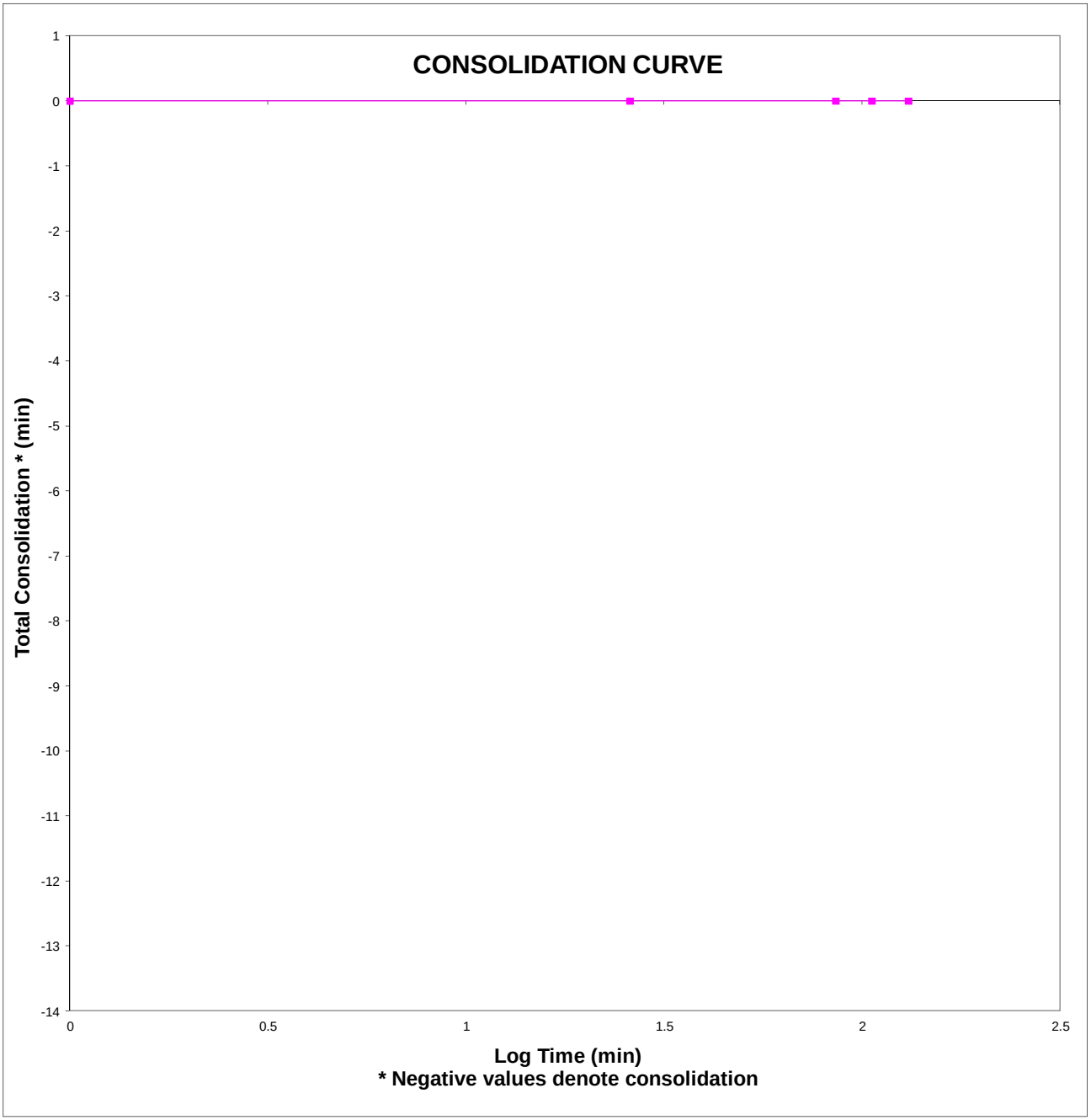
CELL PRESSURE: 95 psi **BACK PRESSURE:** 85 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
9 / 24 / 12	RJB	8 : 34	0	0	0	25.0	25.0	0.0
9 / 24 / 12	RJB	8 : 35	1	1	0.00	25.0	25.0	0.0
9 / 24 / 12	RJB	9 : 0	25	26	1.41	25.0	25.0	0.0
9 / 24 / 12	RJB	10 : 0	60	86	1.93	25.0	25.0	0.0
9 / 24 / 12	RJB	10 : 20	20	106	2.03	25.0	25.0	0.0
9 / 24 / 12	RJB	10 : 45	25	131	2.12	25.0	25.0	0.0

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8376_PM
SAMPLE No.:	21A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/22/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8376_PM
SAMPLE No.:	21A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/22/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
9 / 25 / 12	RJB	12 : 48	0	0.0	25.0	20.0	95.0	85.0	85.0
9 / 25 / 12	RJB	13 : 30	42	1.6	24.5	20.0	95.0	85.0	85.0
9 / 25 / 12	RJB	14 : 34	64	2.2	24.0	20.0	95.0	85.0	85.0
9 / 26 / 12	RJB	7 : 31	1017	5.3	19.2	20.0	95.0	85.0	85.0
9 / 26 / 12	RJB	11 : 18	227	5.8	18.6	20.0	95.0	85.0	85.0
9 / 27 / 12	RJB	7 : 10	1192	7.1	15.8	20.0	95.0	85.0	85.0
9 / 28 / 12	RJB	7 : 1	1431	8.2	13.9	20.0	95.0	85.0	85.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8376_PM
SAMPLE No.:	21A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/22/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.373		
42	1.6	0.5	0.31	3.090	2.86E-06	2.87E-06
64	0.6	0.5	0.83	2.941	1.05E-06	1.06E-06
1017	3.1	4.8	1.55	1.875	6.06E-07	6.09E-07
227	0.5	0.6	1.20	1.727	4.98E-07	5.00E-07
1192	1.3	2.8	2.15	1.174	4.44E-07	4.46E-07
1431	1.1	1.9	1.73	0.769	4.05E-07	4.07E-07

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8376_PM
SAMPLE No.:	21A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/22/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	117.8 lb/ft³	123.2 lb/ft³
DRY UNIT WEIGHT	97.3 lb/ft³	98.3 lb/ft³
MOISTURE CONTENT	21.1 %	25.4 %
PERMEABILITY @ 20°C	4.9E-07 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-21A (14 day)		
TESTING DATE:	19-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8376

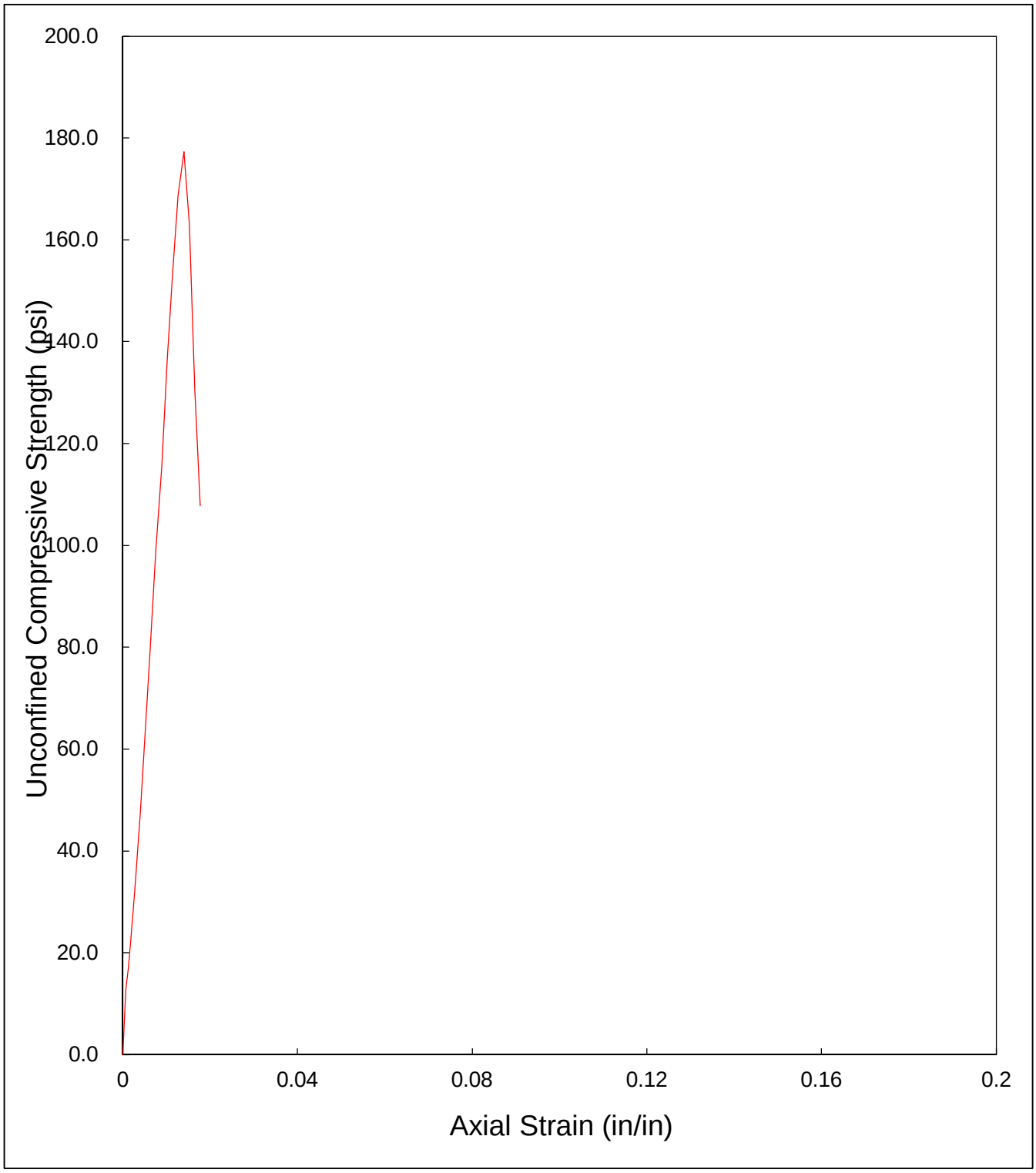
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	165.31	g
3. WT WET SOIL + TARE	325.04	g
4. WT DRY SOIL + TARE	297.36	g
5. WT WATER, Ww	27.68	g
6. WT DRY SOIL, Ws	132.05	g
7. MOISTURE CONTENT, W	**20.96**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.01	in.	3.94	in.
No. 2	2.00	in.	3.93	in.
No. 3	1.99	in.	3.94	in.
Average	**2.00**	**in.**	**3.93**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***375.87***	***g***
Initial Area, Ac	3.14	in²
Initial Volume, Vc	12.36	in³
Initial Bulk Unit Weight,	115.8	lb/ft³
Initial Dry Unit Weigh	95.7	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	177.3	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.143	0.0000	0.0
40	0.003	0.003	3.145	0.0008	12.7
53	0.005	0.005	3.147	0.0013	16.8
66	0.007	0.007	3.148	0.0018	21.0
94	0.010	0.010	3.151	0.0025	29.8
139	0.015	0.015	3.155	0.0038	44.1
196	0.020	0.020	3.159	0.0051	62.1
256	0.025	0.025	3.163	0.0064	80.9
314	0.030	0.030	3.167	0.0076	99.2
366	0.035	0.035	3.171	0.0089	115.4
433	0.040	0.040	3.175	0.0102	136.4
488	0.045	0.045	3.179	0.0114	153.5
537	0.050	0.050	3.183	0.0127	168.7
565	0.055	0.055	3.187	0.0140	177.3
520	0.060	0.060	3.191	0.0153	162.9
417	0.065	0.065	3.195	0.0165	130.5
345	0.070	0.070	3.200	0.0178	107.8

UNCONFINED COMPRESSION TESTING
Sample No. 0427-21A (14 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-21A (14 day)		
TESTING DATE:	9/19/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8376

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	21.0	**%**
BULK UNIT WEIGHT	115.8	lb/ft^3
DRY UNIT WEIGHT	95.7	lb/ft^3
UCS *	177.3	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	9/19/2012
TESTED BY:	ZOD/TNR
TRACKING CODE:	8377_pH

KEMRON SAMPLE No.		MATERIAL pH
1.	0427-022A	12.12
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.12

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8377_PM
SAMPLE No.:	22A (14 DAY)	EQUIPMENT No.:	2
TEST DATE:	9/21/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	228.50 ***g***
3. WT WET SOIL + TARE	622.40 ***g***	861.10 ***g***
4. WT DRY SOIL + TARE	508.40 ***g***	736.90 ***g***
5. WT WATER, Ww	114.00 g	124.20 g
6. WT DRY SOIL, Ws	508.40 g	508.40 g
7. MOISTURE CONTENT, W	22.42 %	24.43 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.97 in.***	***2.98 in.***	***3.01 in.***	***2.97 in.***
No. 2	***2.97 in.***	***2.97 in.***	***2.96 in.***	***2.87 in.***
No. 3	***2.98 in.***	***2.97 in.***	***2.92 in.***	***2.92 in.***
Average	2.98 in.	2.97 in.	2.96 in.	2.92 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***622.40 g***	***633.20 g***
Area, Ao	6.95 in^2	6.94 in^2
Volume, Vo	20.61 in^3	20.26 in^3
Bulk Unit Weight	115.1 lb/ft^3	119.1 lb/ft^3
Dry Unit Weight	94.0 lb/ft^3	95.7 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8375_PM
SAMPLE No.:	22A (14 DAY)	EQUIPMENT No.:	2
TEST DATE:	9/21/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
09/21/12	12 : 30	RJB	7.0	5.0	5.3	*	*	*	*
09/21/12	13 : 42	RJB	17.0	15.0	*	8.0	10.0	2.7	0.27
09/21/12	14 : 25	RJB	27.0	25.0	*	*	*	*	*
09/21/12	15 : 15	RJB	37.0	35.0	35.6	*	*	*	*
09/21/12	15 : 45	RJB	47.0	45.0	45.4	42.0	10.0	6.4	0.64
09/21/12	16 : 21	RJB	57.0	55.0	55.5	52.7	10.0	7.3	0.73
09/21/12	16 : 45	RJB	67.0	65.0	65.5	63.8	10.0	8.3	0.83
09/21/12	17 : 9	RJB	77.0	65.0	75.5	74.2	10.0	8.7	0.87
09/21/12	17 : 38	RJB	87.0	85.0	85.5	84.8	10.0	9.3	0.93
09/21/12	17 : 58	RJB	97.0	95.0	*	95.1	10.0	9.6	0.96
09/21/12	17 : 59	RJB	107.0	105.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8377_PM
SAMPLE No.:	22A (14 DAY)	2
TEST DATE:	9/21/2012	

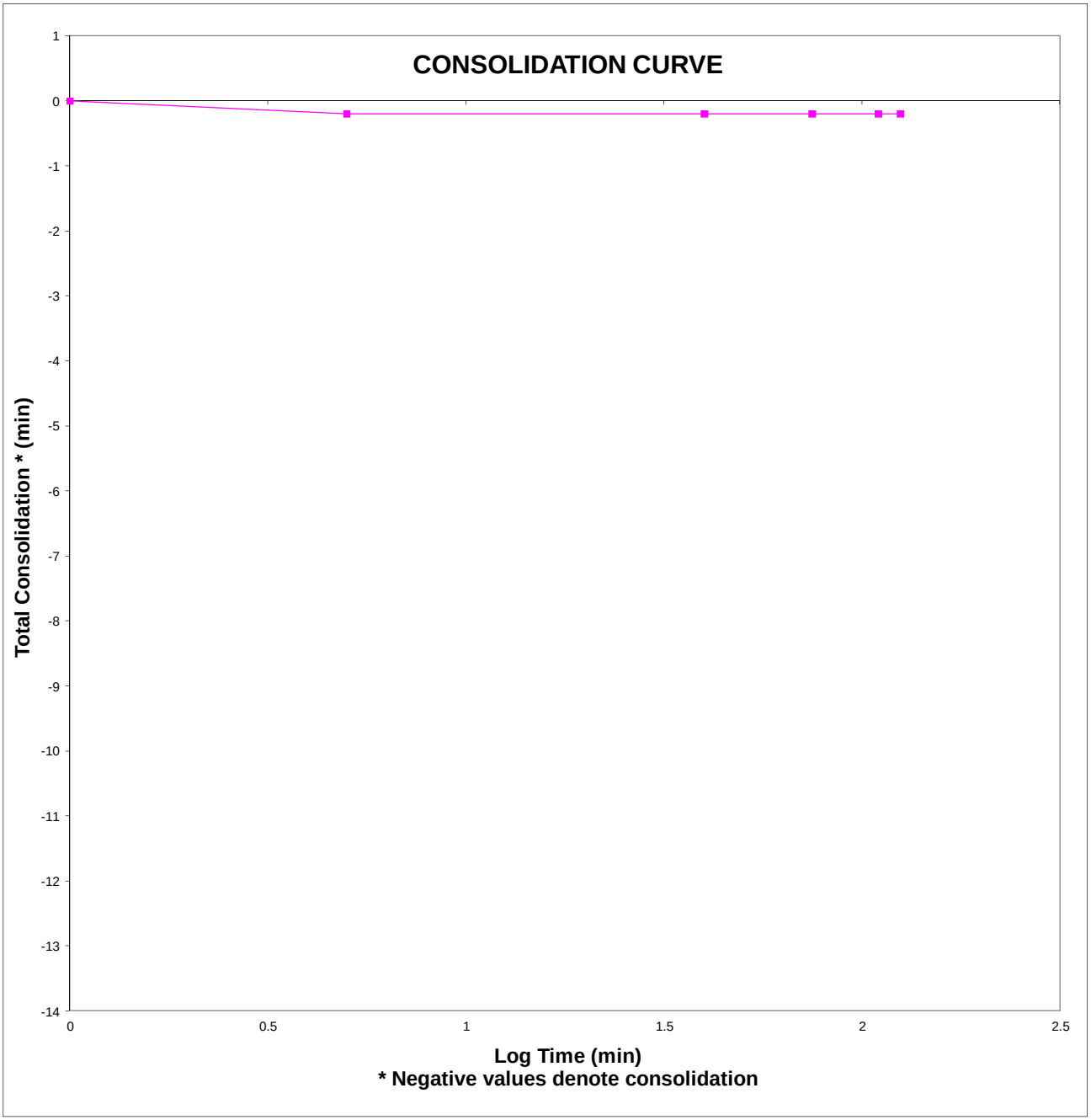
CELL PRESSURE: 95 psi **BACK PRESSURE:** 85 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
9 / 22 / 12	RJB	8 : 55	0	0	0	24.0	24.0	0.0
9 / 22 / 12	RJB	9 : 0	5	5	0.70	23.9	23.9	0.2
9 / 22 / 12	RJB	9 : 35	35	40	1.60	23.9	23.9	0.2
9 / 22 / 12	RJB	10 : 10	35	75	1.88	23.9	23.9	0.2
9 / 22 / 12	RJB	10 : 45	35	110	2.04	23.9	23.9	0.2
9 / 22 / 12	RJB	11 : 0	15	125	2.10	23.9	23.9	0.2

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8377_PM
SAMPLE No.:	22A (14 DAY)	EQUIPMENT No.:	2
TEST DATE:	9/21/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8377_PM
SAMPLE No.:	22A (14 DAY)	EQUIPMENT No.:	2
TEST DATE:	9/21/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
9 22 12	RJB	11 : 25	0	0.0	25.0	20.0	95.0	85.0	85.0
9 22 12	RJB	11 : 34	9	0.5	24.5	20.0	95.0	85.0	85.0
9 22 12	RJB	11 : 43	9	1.0	24.0	20.0	95.0	85.0	85.0
9 22 12	RJB	11 : 52	9	1.5	23.5	20.0	95.0	85.0	85.0
9 22 12	RJB	12 : 1	9	2.0	23.0	20.0	95.0	85.0	85.0
9 22 12	RJB	12 : 19	18	3.0	22.0	20.0	95.0	85.0	85.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8377_PM
SAMPLE No.:	22A (14 DAY)	EQUIPMENT No.:	2
TEST DATE:	9/21/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.320		
9	0.5	0.5	1.00	3.187	6.35E-06	6.38E-06
9	0.5	0.5	1.00	3.054	6.62E-06	6.65E-06
9	0.5	0.5	1.00	2.922	6.91E-06	6.94E-06
9	0.5	0.5	1.00	2.789	7.23E-06	7.27E-06
18	1.0	1.0	1.00	2.523	7.78E-06	7.82E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8377_PM
SAMPLE No.:	22A (14 DAY)	EQUIPMENT No.:	2
TEST DATE:	9/21/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	115.1 lb/ft³	119.1 lb/ft³
DRY UNIT WEIGHT	94.0 lb/ft³	95.7 lb/ft³
MOISTURE CONTENT	22.4 %	24.4 %
PERMEABILITY @ 20°C	7.0E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-22A (14 day)		
TESTING DATE:	19-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8377

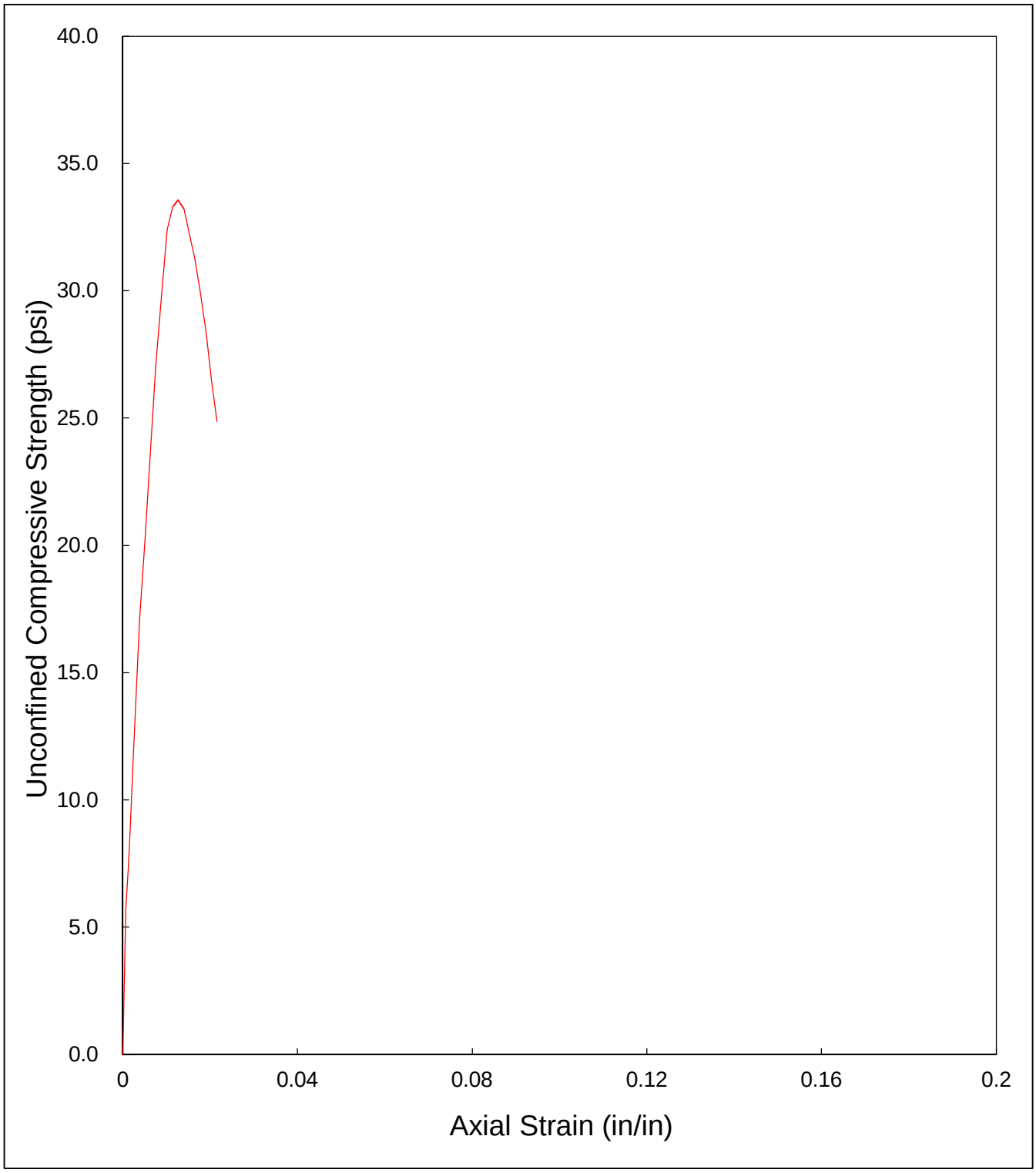
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	164.79	g
3. WT WET SOIL + TARE	345.42	g
4. WT DRY SOIL + TARE	313.27	g
5. WT WATER, Ww	32.15	g
6. WT DRY SOIL, Ws	148.48	g
7. MOISTURE CONTENT, W	**21.65**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.01	in.	3.92	in.
No. 2	2.01	in.	3.94	in.
No. 3	1.99	in.	3.94	in.
Average	**2.00**	**in.**	**3.93**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***367.82***	***g***
Initial Area, Ac	3.15	in^2
Initial Volume, Vc	12.37	in^3
Initial Bulk Unit Weight,	113.3	lb/ft^3
Initial Dry Unit Weigh	93.1	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	33.6	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.147	0.0000	0.0
18	0.003	0.003	3.149	0.0008	5.7
23	0.005	0.005	3.151	0.0013	7.3
28	0.007	0.007	3.152	0.0018	8.9
38	0.010	0.010	3.155	0.0025	12.0
54	0.015	0.015	3.159	0.0038	17.1
64	0.020	0.020	3.163	0.0051	20.2
75	0.025	0.025	3.167	0.0064	23.7
86	0.030	0.030	3.171	0.0076	27.1
95	0.035	0.035	3.175	0.0089	29.9
103	0.040	0.040	3.179	0.0102	32.4
106	0.045	0.045	3.183	0.0114	33.3
107	0.050	0.050	3.187	0.0127	33.6
106	0.055	0.055	3.191	0.0140	33.2
103	0.060	0.060	3.196	0.0153	32.2
100	0.065	0.065	3.200	0.0165	31.3
96	0.070	0.070	3.204	0.0178	30.0
91	0.075	0.075	3.208	0.0191	28.4
85	0.080	0.080	3.212	0.0203	26.5
80	0.085	0.085	3.216	0.0216	24.9

UNCONFINED COMPRESSION TESTING
Sample No. 0427-22A (14 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-22A (14 day)		
TESTING DATE:	9/19/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8377

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	21.7	**%**
BULK UNIT WEIGHT	113.3	lb/ft^3
DRY UNIT WEIGHT	93.1	lb/ft^3
UCS *	33.6	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	9/19/2012
TESTED BY:	ZOD/TNR
TRACKING CODE:	8378_pH

KEMRON SAMPLE No.		MATERIAL pH
1.	0427-023A	11.95
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	11.95

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8378_PM
SAMPLE No.:	23A (14 DAY)	EQUIPMENT No.:	1
TEST DATE:	9/21/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	230.65 ***g***
3. WT WET SOIL + TARE	446.99 ***g***	684.20 ***g***
4. WT DRY SOIL + TARE	365.21 ***g***	595.86 ***g***
5. WT WATER, Ww	81.78 g	88.34 g
6. WT DRY SOIL, Ws	365.21 g	365.21 g
7. MOISTURE CONTENT, W	22.39 %	24.19 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.97 in.***	***2.97 in.***	***2.12 in.***	***2.07 in.***
No. 2	***2.97 in.***	***2.98 in.***	***2.09 in.***	***2.10 in.***
No.3	***2.97 in.***	***2.96 in.***	***2.08 in.***	***2.13 in.***
Average	2.97 in.	2.97 in.	2.10 in.	2.10 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***446.99 g***	***453.65 g***
Area, Ao	6.93 in^2	6.91 in^2
Volume, Vo	14.54 in^3	14.50 in^3
Bulk Unit Weight	117.1 lb/ft^3	119.2 lb/ft^3
Dry Unit Weight	95.7 lb/ft^3	96.0 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8378_PM
SAMPLE No.:	23A (14 DAY)	EQUIPMENT No.:	1
TEST DATE:	9/21/12		

TEST	TIME	TESTED	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
DATE	(military)	BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
09/21/12	11 : 0	RJB	7.0	5.0	6.5	*	*	*	*
09/21/12	11 : 25	RJB	17.0	15.0	15.7	8.9	10.0	2.4	0.24
09/21/12	11 : 45	RJB	27.0	25.0	25.8	18.4	10.0	2.7	0.27
09/21/12	12 : 25	RJB	37.0	35.0	35.8	30.5	10.0	4.7	0.47
09/21/12	13 : 30	RJB	47.0	45.0	45.6	41.8	10.0	6.0	0.60
09/21/12	14 : 25	RJB	57.0	55.0	55.5	52.7	10.0	7.1	0.71
09/21/12	14 : 50	RJB	67.0	65.0	65.6	63.3	10.0	7.8	0.78
09/21/12	15 : 17	RJB	77.0	65.0	75.5	74.1	10.0	8.5	0.85
09/21/12	15 : 45	RJB	87.0	85.0	85.6	84.3	10.0	8.8	0.88
09/21/12	16 : 27	RJB	97.0	95.0	95.6	94.8	10.0	9.2	0.92
09/21/12	17 : 13	RJB	107.0	105.0	*	105.3	10.0	9.7	0.97
09/22/12	10 : 30	RJB	87.0	85.0	85.9	*	*	*	*
09/22/12	11 : 10	RJB	97.0	95.0	*	95.9	10.0	10.0	1.00
09/22/12	11 : 11	RJB	87.0	85.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8378_PM
SAMPLE No.:	23A (14 DAY)	1
TEST DATE:	9/21/2012	

CELL PRESSURE: 95 psi **BACK PRESSURE:** 85 psi **EFFECTIVE STRESS:** 10 psi

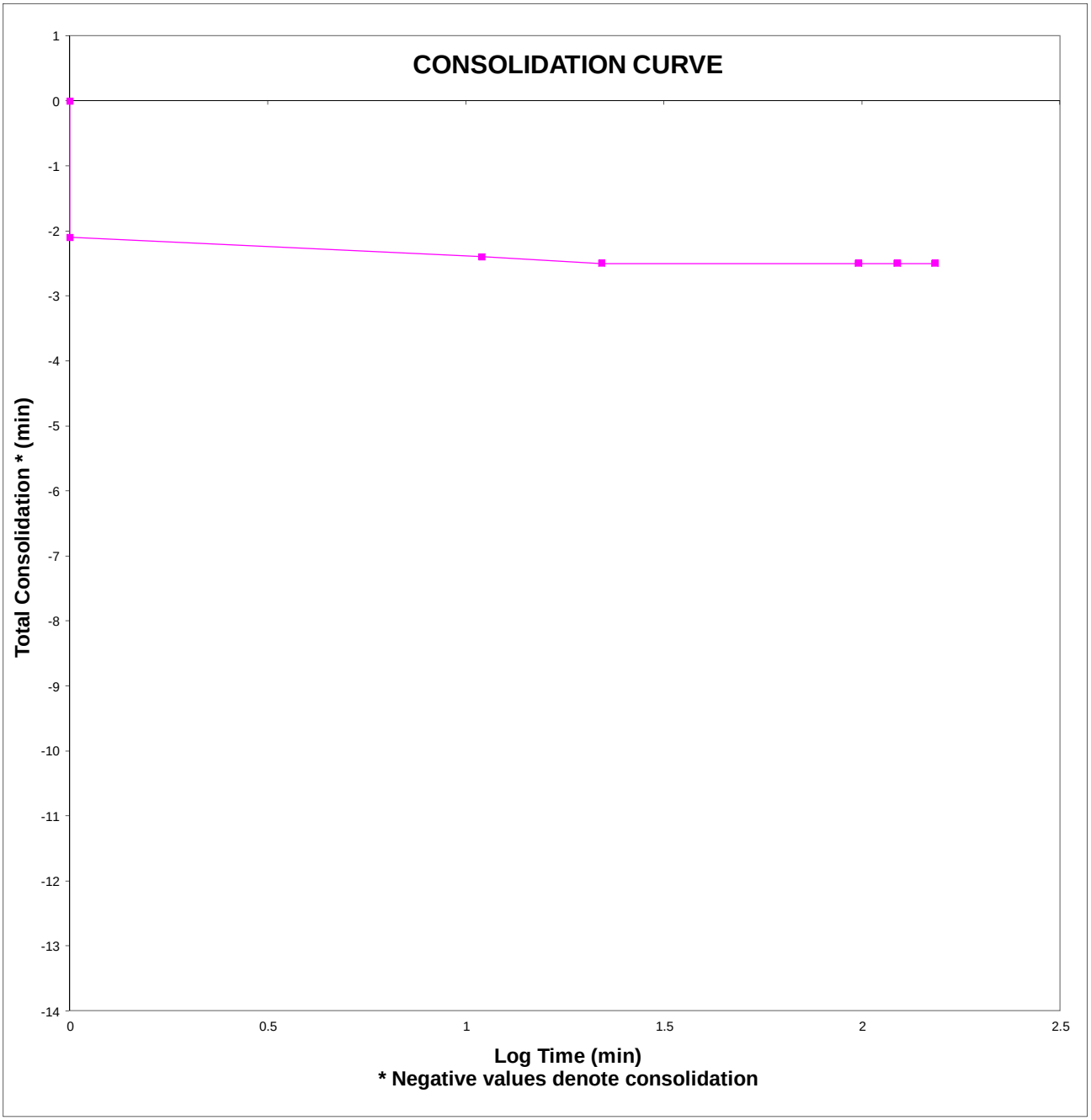
TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML) READING BOTTOM*	*READING TOP*	*ACTUAL TOTAL (Ct)*
9 / 22 / 12	RJB	11 : 12	0	0	0	25.0	25.0	0.0
9 / 22 / 12	RJB	11 : 13	1	1	0.00	23.7	24.2	2.1
9 / 22 / 12	RJB	11 : 23	10	11	1.04	23.5	24.1	2.4
9 / 22 / 12	RJB	11 : 34	11	22	1.34	23.5	24.0	2.5
9 / 22 / 12	RJB	12 : 50	76	98	1.99	23.5	24.0	2.5
9 / 22 / 12	RJB	13 : 15	25	123	2.09	23.5	24.0	2.5
9 / 22 / 12	RJB	13 : 45	30	153	2.18	23.5	24.0	2.5

5

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8378_PM
SAMPLE No.:	23A (14 DAY)	EQUIPMENT No.:	1
TEST DATE:	9/21/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8378_PM
SAMPLE No.:	23A (14 DAY)	EQUIPMENT No.:	1
TEST DATE:	9/21/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
9 / 24 / 12	RJB	8 : 28	0	0.0	25.0	20.0	95.0	85.0	85.0
9 / 24 / 12	RJB	8 : 35	7	1.0	24.0	20.0	95.0	85.0	85.0
9 / 24 / 12	RJB	8 : 42	7	2.0	23.0	20.0	95.0	85.0	85.0
9 / 24 / 12	RJB	8 : 49	7	3.0	22.0	20.0	95.0	85.0	85.0
9 / 24 / 12	RJB	8 : 56	7	4.0	21.0	20.0	95.0	85.0	85.0
9 / 24 / 12	RJB	11 : 59	RESET	0.0	25.0				
9 / 24 / 12	RJB	12 : 15	16	2.0	23.0	20.0	95.0	85.0	85.0
9 / 24 / 12	RJB	12 : 30	15	3.2	21.8	20.0	95.0	85.0	85.0
9 / 24 / 12	RJB	13 : 2	32	6.5	18.5	20.0	95.0	85.0	85.0
9 / 24 / 12	RJB	13 : 28	26	7.5	17.5	20.0	95.0	85.0	85.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8378_PM
SAMPLE No.:	23A (14 DAY)	EQUIPMENT No.:	1
TEST DATE:	9/21/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				4.691		
7	1.0	1.0	1.00	4.316	1.18E-05	1.19E-05
7	1.0	1.0	1.00	3.941	1.29E-05	1.30E-05
7	1.0	1.0	1.00	3.565	1.42E-05	1.43E-05
7	1.0	1.0	1.00	3.190	1.58E-05	1.59E-05
RESET				4.691		
16	2.0	2.0	1.00	3.941	1.08E-05	1.09E-05
15	1.2	1.2	1.00	3.490	8.04E-06	8.07E-06
32	3.3	3.3	1.00	2.252	1.36E-05	1.37E-05
26	1.0	1.0	1.00	1.877	6.97E-06	7.00E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8378_PM
SAMPLE No.:	23A (14 DAY)	EQUIPMENT No.:	1
TEST DATE:	9/21/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	117.1 lb/ft³	119.2 lb/ft³
DRY UNIT WEIGHT	95.7 lb/ft³	96.0 lb/ft³
MOISTURE CONTENT	22.4 %	24.2 %
PERMEABILITY @ 20°C	1.4E-05 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-23A (14 day)		
TESTING DATE:	19-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8378

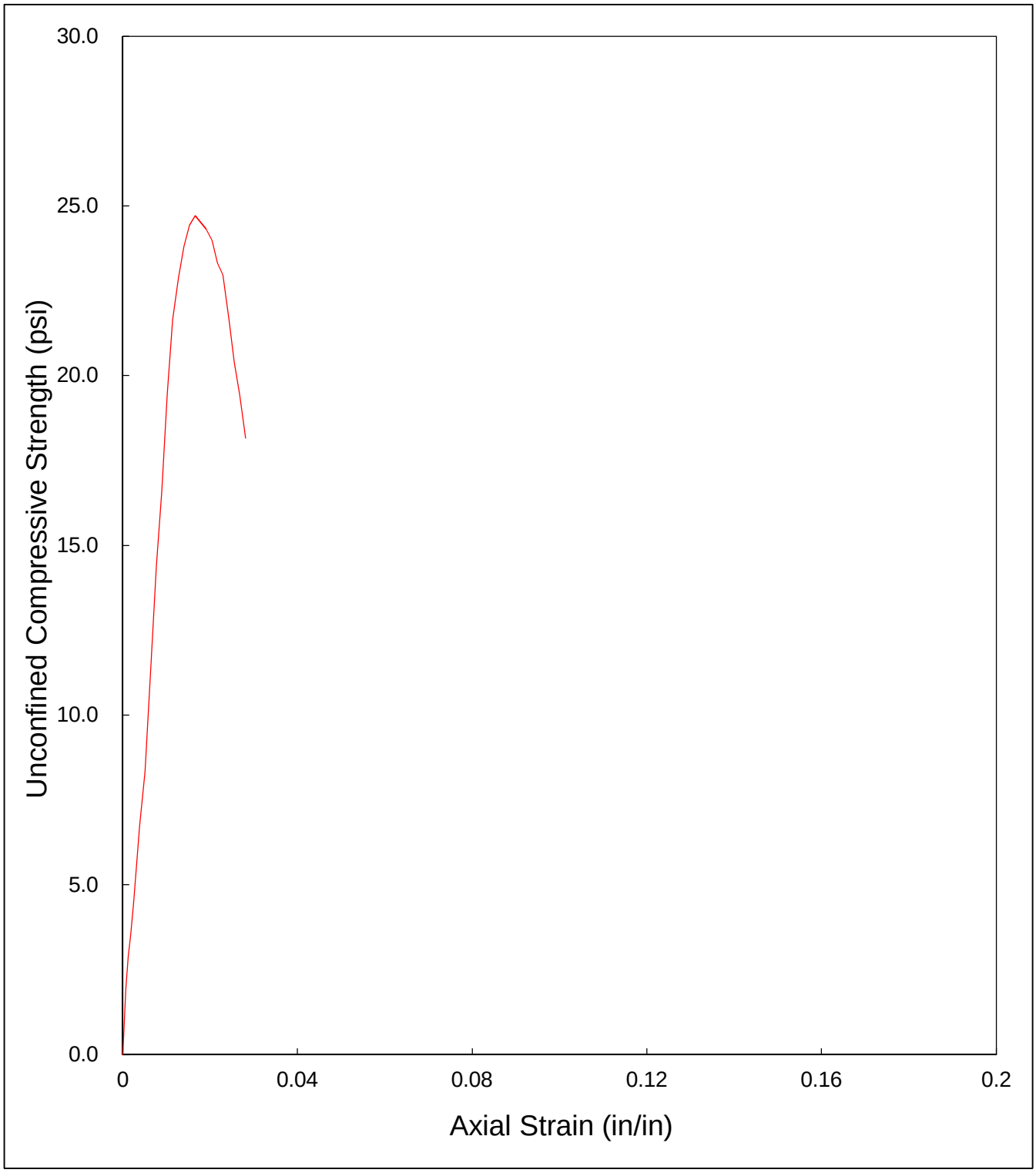
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	167.21	g
3. WT WET SOIL + TARE	370.96	g
4. WT DRY SOIL + TARE	340.62	g
5. WT WATER, Ww	30.34	g
6. WT DRY SOIL, Ws	173.41	g
7. MOISTURE CONTENT, W	**17.50**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.91	in.
No. 2	1.99	in.	3.93	in.
No. 3	1.98	in.	3.91	in.
Average	**1.99**	**in.**	**3.92**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***384.22***	***g***
Initial Area, Ac	3.11	in²
Initial Volume, Vc	12.16	in³
Initial Bulk Unit Weight,	120.4	lb/ft³
Initial Dry Unit Weigh	102.4	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	24.7	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.105	0.0000	0.0
6	0.003	0.003	3.107	0.0008	1.9
9	0.005	0.005	3.109	0.0013	2.9
11	0.007	0.007	3.111	0.0018	3.5
14	0.010	0.010	3.113	0.0026	4.5
21	0.015	0.015	3.117	0.0038	6.7
26	0.020	0.020	3.121	0.0051	8.3
35	0.025	0.025	3.125	0.0064	11.2
45	0.030	0.030	3.129	0.0077	14.4
52	0.035	0.035	3.133	0.0089	16.6
61	0.040	0.040	3.137	0.0102	19.4
68	0.045	0.045	3.141	0.0115	21.6
72	0.050	0.050	3.145	0.0128	22.9
75	0.055	0.055	3.149	0.0140	23.8
77	0.060	0.060	3.153	0.0153	24.4
78	0.065	0.065	3.157	0.0166	24.7
77	0.075	0.075	3.166	0.0191	24.3
76	0.080	0.080	3.170	0.0204	24.0
74	0.085	0.085	3.174	0.0217	23.3
73	0.090	0.090	3.178	0.0230	23.0
69	0.095	0.095	3.182	0.0243	21.7
65	0.100	0.100	3.186	0.0255	20.4
62	0.105	0.105	3.191	0.0268	19.4
58	0.110	0.110	3.195	0.0281	18.2

UNCONFINED COMPRESSION TESTING
Sample No. 0427-23A (14 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-23A (14 day)		
TESTING DATE:	9/19/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8378

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	17.5	**%**
BULK UNIT WEIGHT	120.4	lb/ft^3
DRY UNIT WEIGHT	102.4	lb/ft^3
UCS *	24.7	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	9/19/2012
TESTED BY:	ZOD/TNR
TRACKING CODE:	8379_pH

KEMRON SAMPLE No.		MATERIAL pH
1.	0427-024A	11.93
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	11.93

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8379_PM
SAMPLE No.:	24A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/22/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	408.63 ***g***
3. WT WET SOIL + TARE	628.70 ***g***	1054.40 ***g***
4. WT DRY SOIL + TARE	514.07 ***g***	922.70 ***g***
5. WT WATER, Ww	114.63 g	131.70 g
6. WT DRY SOIL, Ws	514.07 g	514.07 g
7. MOISTURE CONTENT, W	22.30 %	25.62 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.96 in.***	***2.96 in.***	***2.98 in.***	***2.94 in.***
No. 2	***2.98 in.***	***2.96 in.***	***3.04 in.***	***3.00 in.***
No. 3	***2.98 in.***	***2.99 in.***	***3.06 in.***	***3.06 in.***
Average	2.97 in.	2.97 in.	3.03 in.	3.00 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***628.70 g***	***646.00 g***
Area, Ao	6.93 in^2	6.92 in^2
Volume, Vo	20.98 in^3	20.75 in^3
Bulk Unit Weight	114.1 lb/ft^3	118.6 lb/ft^3
Dry Unit Weight	93.3 lb/ft^3	94.4 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8379_PM
SAMPLE No.:	24A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/22/12		

TEST	TIME	TESTED	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
DATE	(military)	BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
09/22/12	8 : 50	RJB	7.0	5.0	*	*	*	*	*
09/22/12	9 : 29	RJB	17.0	15.0	15.5	*	*	*	*
09/22/12	9 : 51	RJB	27.0	25.0	25.4	19.2	10.0	3.7	0.37
09/22/12	10 : 27	RJB	37.0	35.0	35.5	29.8	10.0	4.4	0.44
09/22/12	11 : 16	RJB	47.0	45.0	45.3	40.9	10.0	5.4	0.54
09/22/12	11 : 52	RJB	57.0	55.0	55.4	51.6	10.0	6.3	0.63
09/22/12	12 : 51	RJB	67.0	65.0	65.4	62.6	10.0	7.2	0.72
09/22/12	12 : 21	RJB	77.0	65.0	75.4	73.3	10.0	7.9	0.79
09/22/12	13 : 46	RJB	87.0	85.0	85.4	84.0	10.0	8.6	0.86
09/22/12	14 : 30	RJB	97.0	95.0	95.4	94.4	10.0	9.0	0.90
09/24/12	8 : 16	RJB	107.0	105.0	*	105.4	10.0	10.0	1.00
09/24/12	8 : 17	RJB	97.0	95.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8379_PM
SAMPLE No.:	24A (14 DAY)	3
TEST DATE:	9/22/2012	

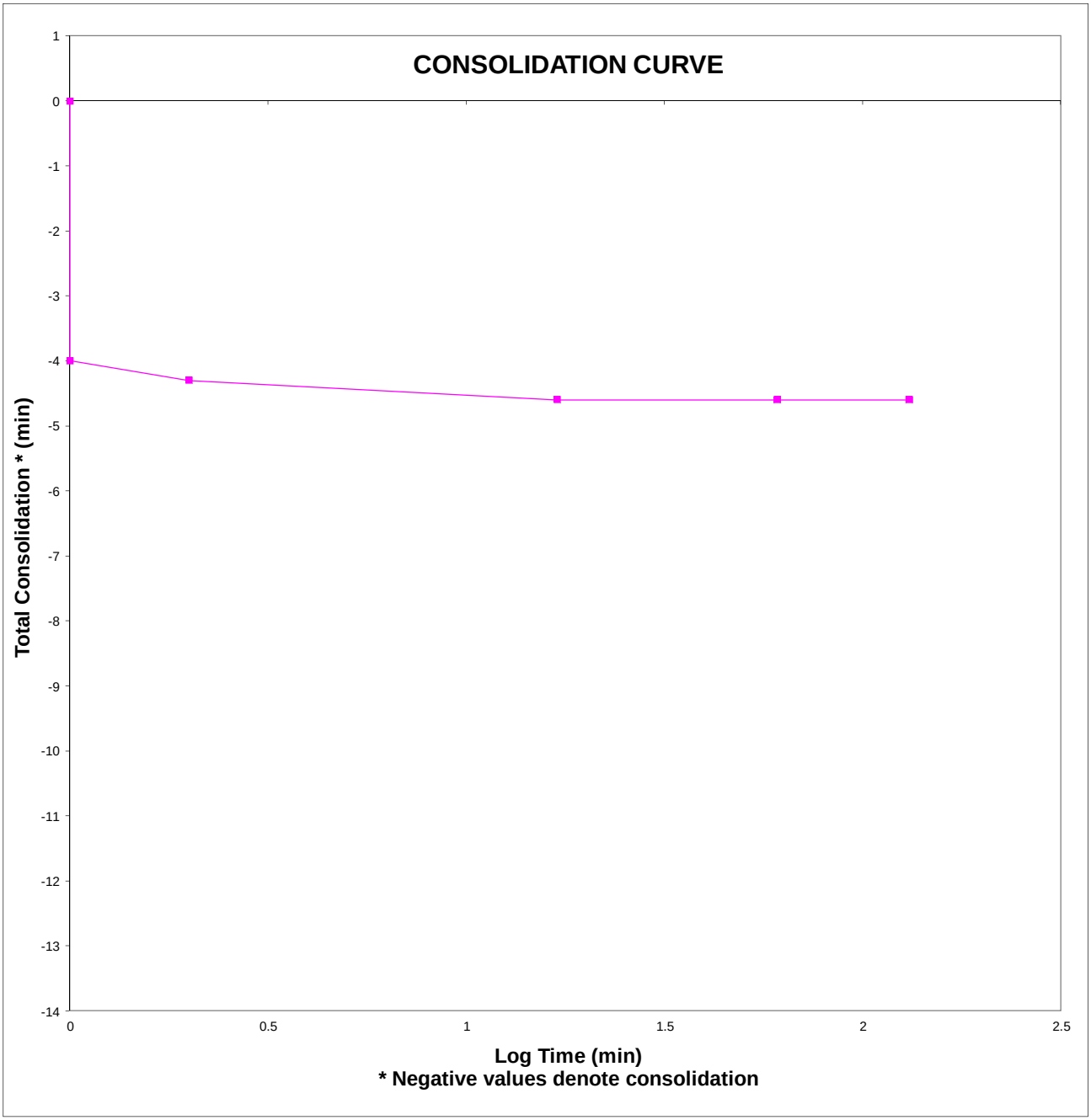
CELL PRESSURE: 105 psi **BACK PRESSURE:** 95 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
9 / 22 / 12	RJB	8 : 19	0	0	0	24.0	24.0	0.0
9 / 22 / 12	RJB	8 : 20	1	1	0.00	21.8	22.2	4.0
9 / 22 / 12	RJB	8 : 21	1	2	0.30	21.7	22.0	4.3
9 / 22 / 12	RJB	8 : 36	15	17	1.23	21.6	21.8	4.6
9 / 22 / 12	RJB	9 : 20	44	61	1.79	21.6	21.8	4.6
9 / 22 / 12	RJB	10 : 30	70	131	2.12	21.6	21.8	4.6

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8379_PM
SAMPLE No.:	24A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/22/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8379_PM
SAMPLE No.:	24A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/21/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
9 / 24 / 12	RJB	10 : 56	0	0.0	24.0	20.0	105.0	95.0	95.0
9 / 24 / 12	RJB	11 : 16	20	0.7	23.3	20.0	105.0	95.0	95.0
9 / 24 / 12	RJB	11 : 43	27	1.5	22.5	20.0	105.0	95.0	95.0
9 / 24 / 12	RJB	12 : 2	19	2.0	22.0	20.0	105.0	95.0	95.0
9 / 24 / 12	RJB	12 : 30	28	2.7	21.3	20.0	105.0	95.0	95.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8379_PM
SAMPLE No.:	24A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/22/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.122		
20	0.7	0.7	1.00	2.939	4.31E-06	4.32E-06
27	0.8	0.8	1.00	2.731	3.90E-06	3.91E-06
19	0.5	0.5	1.00	2.601	3.68E-06	3.70E-06
28	0.7	0.7	1.00	2.419	3.71E-06	3.73E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8379_PM
SAMPLE No.:	24A (14 DAY)	EQUIPMENT No.:	3
TEST DATE:	9/22/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	114.1 lb/ft³	118.6 lb/ft³
DRY UNIT WEIGHT	93.3 lb/ft³	94.4 lb/ft³
MOISTURE CONTENT	22.3 %	25.6 %
PERMEABILITY @ 20°C	3.9E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-24A (14 day)		
TESTING DATE:	19-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8379

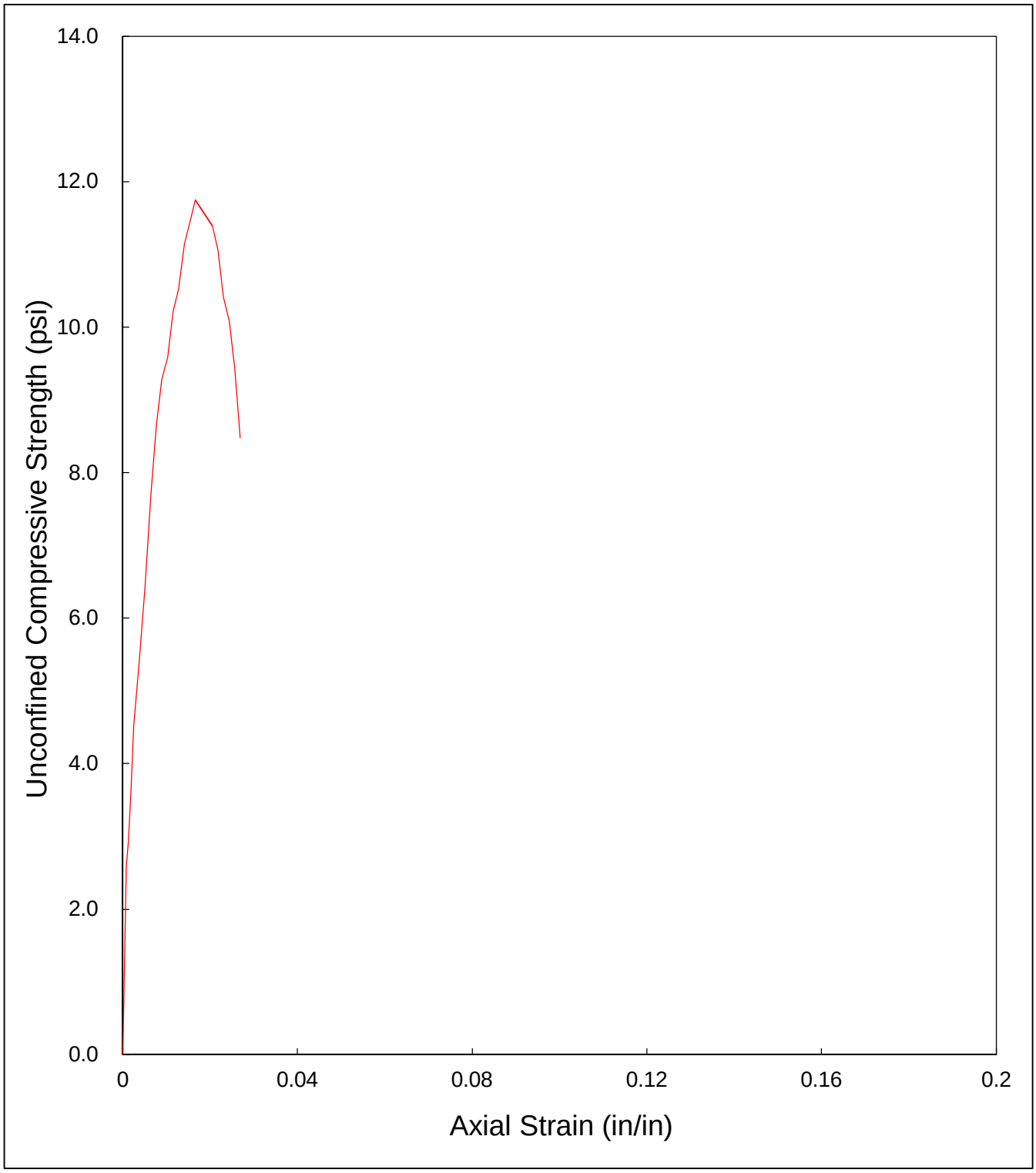
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	166.08	g
3. WT WET SOIL + TARE	337.54	g
4. WT DRY SOIL + TARE	309.93	g
5. WT WATER, Ww	27.61	g
6. WT DRY SOIL, Ws	143.85	g
7. MOISTURE CONTENT, W	**19.19**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.86	in.
No. 2	1.99	in.	3.91	in.
No. 3	1.98	in.	3.93	in.
Average	**1.99**	**in.**	**3.90**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***366.48***	***g***
Initial Area, Ac	3.10	in²
Initial Volume, Vc	12.07	in³
Initial Bulk Unit Weight,	115.6	lb/ft³
Initial Dry Unit Weigh	97.0	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	11.7	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.097	0.0000	0.0
8	0.003	0.003	3.099	0.0008	2.6
9	0.005	0.005	3.101	0.0013	2.9
11	0.007	0.007	3.102	0.0018	3.5
14	0.010	0.010	3.105	0.0026	4.5
17	0.015	0.015	3.109	0.0038	5.5
20	0.020	0.020	3.113	0.0051	6.4
24	0.025	0.025	3.117	0.0064	7.7
27	0.030	0.030	3.121	0.0077	8.7
29	0.035	0.035	3.125	0.0090	9.3
30	0.040	0.040	3.129	0.0103	9.6
32	0.045	0.045	3.133	0.0115	10.2
33	0.050	0.050	3.137	0.0128	10.5
35	0.055	0.055	3.141	0.0141	11.1
36	0.060	0.060	3.145	0.0154	11.4
37	0.065	0.065	3.149	0.0167	11.7
36	0.080	0.080	3.162	0.0205	11.4
35	0.085	0.085	3.166	0.0218	11.1
33	0.090	0.090	3.170	0.0231	10.4
32	0.095	0.095	3.174	0.0244	10.1
30	0.100	0.100	3.178	0.0256	9.4
27	0.105	0.105	3.182	0.0269	8.5

UNCONFINED COMPRESSION TESTING
Sample No. 0427-24A (14 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-24A (14 day)		
TESTING DATE:	9/19/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8379

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	19.2	**%**
BULK UNIT WEIGHT	115.6	lb/ft^3
DRY UNIT WEIGHT	97.0	lb/ft^3
UCS *	11.7	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	9/19/2012
TESTED BY:	ZOD/TNR
TRACKING CODE:	8380_pH

KEMRON SAMPLE No.		MATERIAL pH
1.	0427-025A	12.00
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.00

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8380_PM
SAMPLE No.:	25A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/22/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	211.67 ***g***
3. WT WET SOIL + TARE	429.27 ***g***	654.00 ***g***
4. WT DRY SOIL + TARE	331.17 ***g***	542.84 ***g***
5. WT WATER, Ww	98.10 g	111.16 g
6. WT DRY SOIL, Ws	331.17 g	331.17 g
7. MOISTURE CONTENT, W	29.62 %	33.57 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.97 in.***	***2.95 in.***	***2.19 in.***	***2.15 in.***
No. 2	***3.00 in.***	***2.98 in.***	***2.10 in.***	***2.18 in.***
No. 3	***2.97 in.***	***2.92 in.***	***2.19 in.***	***2.13 in.***
Average	2.98 in.	2.95 in.	2.16 in.	2.15 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***429.27 g***	***442.46 g***
Area, Ao	6.96 in^2	6.84 in^2
Volume, Vo	15.05 in^3	14.71 in^3
Bulk Unit Weight	108.7 lb/ft^3	114.6 lb/ft^3
Dry Unit Weight	83.8 lb/ft^3	85.8 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8380_PM
SAMPLE No.:	25A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/22/12		

TEST	TIME	TESTED	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
DATE	(military)	BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
09/22/12	9 : 20	RJB	7.0	5.0	5.9	*	*	*	*
09/22/12	9 : 52	RJB	17.0	15.0	15.7	9.6	10.0	3.7	0.37
09/22/12	10 : 28	RJB	27.0	25.0	25.7	20.4	10.0	4.7	0.47
09/22/12	11 : 18	RJB	37.0	35.0	35.7	31.2	10.0	5.5	0.55
09/22/12	11 : 50	RJB	47.0	45.0	45.7	42.6	10.0	6.9	0.69
09/22/12	12 : 52	RJB	57.0	55.0	55.7	53.6	10.0	7.9	0.79
09/22/12	12 : 22	RJB	67.0	65.0	65.7	64.0	10.0	8.3	0.83
09/22/12	13 : 48	RJB	77.0	65.0	75.7	74.5	10.0	8.8	0.88
09/22/12	14 : 25	RJB	87.0	85.0	85.8	84.8	10.0	9.1	0.91
09/24/12	8 : 8	RJB	97.0	95.0	*	95.5	10.0	9.7	0.97
09/24/12	8 : 9	RJB	87.0	85.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8380_PM
SAMPLE No.:	25A (14 DAY)	7B
TEST DATE:	9/22/2012	

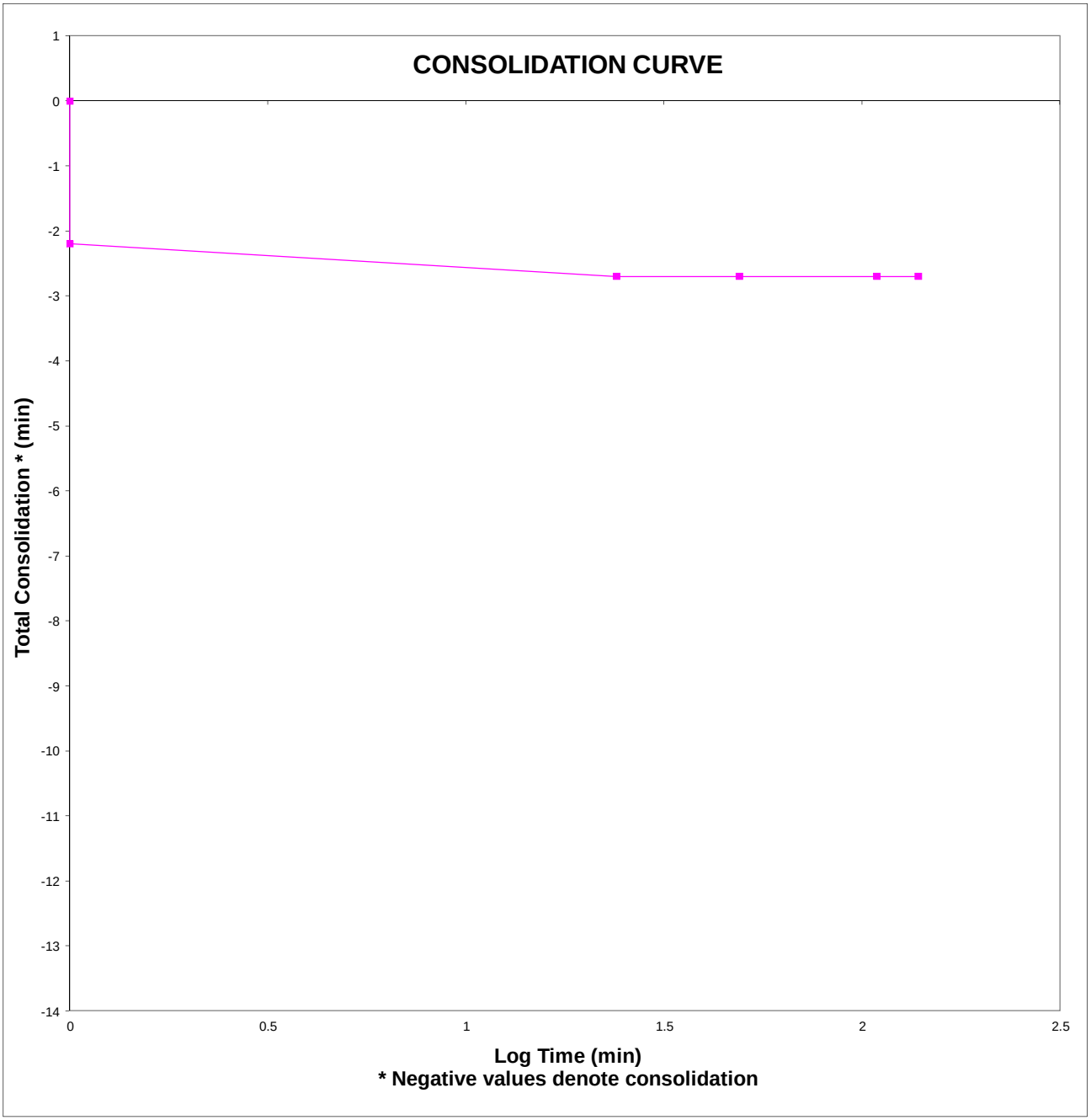
CELL PRESSURE: 95 psi **BACK PRESSURE:** 85 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
9 / 24 / 12	RJB	8 : 11	0	0	0	25.0	25.0	0.0
9 / 24 / 12	RJB	8 : 12	1	1	0.00	24.1	23.7	2.2
9 / 24 / 12	RJB	8 : 35	23	24	1.38	23.9	23.4	2.7
9 / 24 / 12	RJB	9 : 0	25	49	1.69	23.9	23.4	2.7
9 / 24 / 12	RJB	10 : 0	60	109	2.04	23.9	23.4	2.7
9 / 24 / 12	RJB	10 : 30	30	139	2.14	23.9	23.4	2.7

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8380_PM
SAMPLE No.:	25A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/22/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8380_PM
SAMPLE No.:	25A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/22/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
9 / 22 / 12	RJB	11 : 0	0	0.0	25.0	20.0	95.0	85.0	85.0
9 / 22 / 12	RJB	11 : 17	17	0.8	24.2	20.0	95.0	85.0	85.0
9 / 22 / 12	RJB	11 : 52	35	2.4	22.6	20.0	95.0	85.0	85.0
9 / 22 / 12	RJB	12 : 19	27	3.4	21.6	20.0	95.0	85.0	85.0
9 / 22 / 12	RJB	12 : 49	30	4.5	20.5	20.0	95.0	85.0	85.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8380_PM
SAMPLE No.:	25A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/22/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				4.555		
17	0.8	0.8	1.00	4.263	3.96E-06	3.98E-06
35	1.6	1.6	1.00	3.680	4.28E-06	4.30E-06
27	1.0	1.0	1.00	3.316	3.93E-06	3.95E-06
30	1.1	1.1	1.00	2.915	4.37E-06	4.39E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8380_PM
SAMPLE No.:	25A (14 DAY)	EQUIPMENT No.:	7B
TEST DATE:	9/22/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	108.7 lb/ft³	114.6 lb/ft³
DRY UNIT WEIGHT	83.8 lb/ft³	85.8 lb/ft³
MOISTURE CONTENT	29.6 %	33.6 %
PERMEABILITY @ 20°C	4.2E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-25A (14 day)		
TESTING DATE:	19-Sep-12	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8380

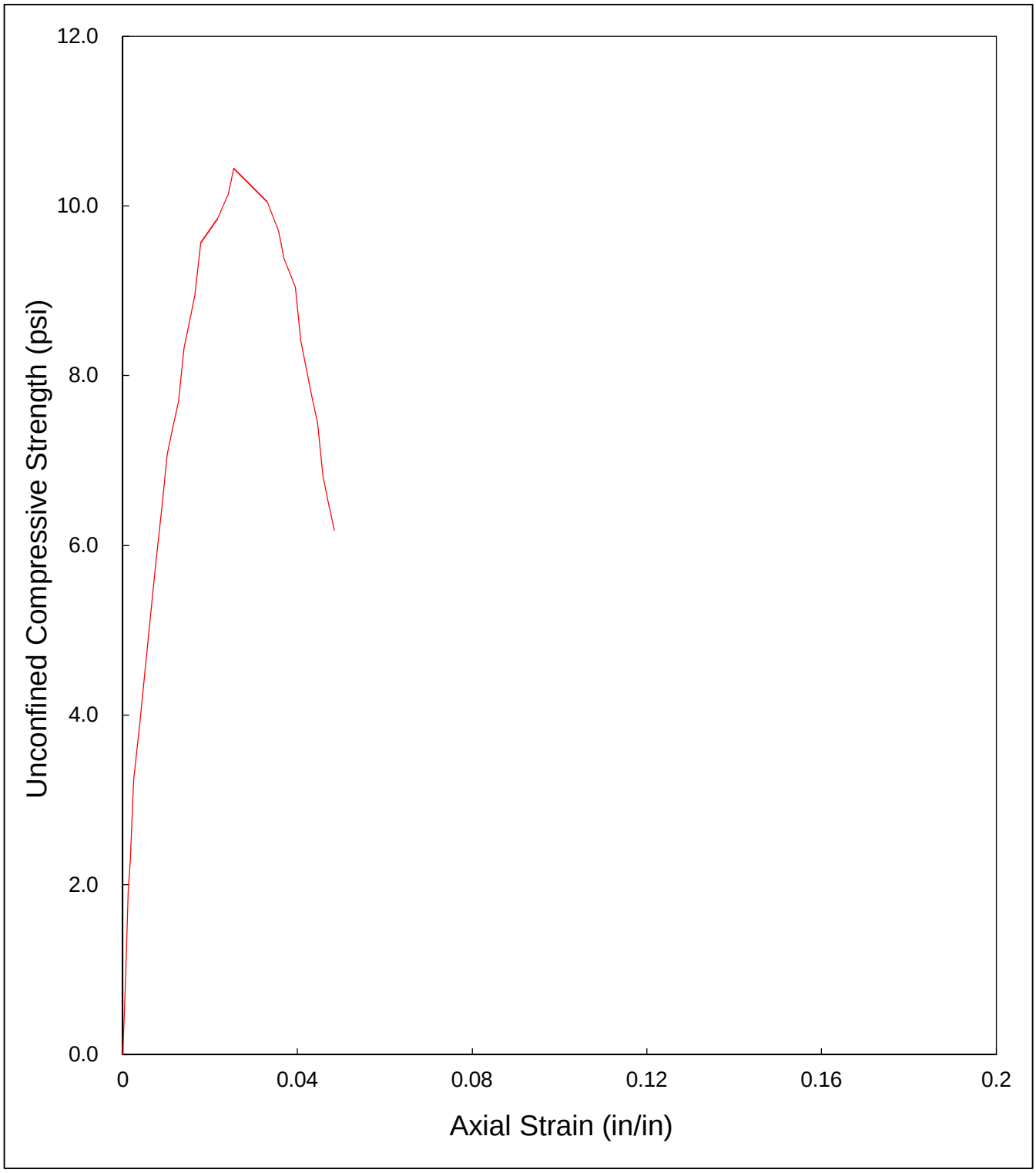
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	162.83	g
3. WT WET SOIL + TARE	314.95	g
4. WT DRY SOIL + TARE	284.01	g
5. WT WATER, Ww	30.94	g
6. WT DRY SOIL, Ws	121.18	g
7. MOISTURE CONTENT, W	**25.53**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.94	in.
No. 2	1.98	in.	3.91	in.
No. 3	1.97	in.	3.93	in.
Average	**1.98**	**in.**	**3.93**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***348.01***	***g***
Initial Area, Ac	3.08	in²
Initial Volume, Vc	12.09	in³
Initial Bulk Unit Weight,	109.6	lb/ft³
Initial Dry Unit Weigh	87.3	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	10.4	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.080	0.0000	0.0
3	0.003	0.003	3.082	0.0008	1.0
6	0.005	0.005	3.084	0.0013	1.9
7	0.007	0.007	3.086	0.0018	2.3
10	0.010	0.010	3.088	0.0025	3.2
12	0.015	0.015	3.092	0.0038	3.9
14	0.020	0.020	3.096	0.0051	4.5
16	0.025	0.025	3.100	0.0064	5.2
18	0.030	0.030	3.104	0.0076	5.8
20	0.035	0.035	3.108	0.0089	6.4
22	0.040	0.040	3.112	0.0102	7.1
23	0.045	0.045	3.116	0.0115	7.4
24	0.050	0.050	3.120	0.0127	7.7
26	0.055	0.055	3.124	0.0140	8.3
27	0.060	0.060	3.128	0.0153	8.6
28	0.065	0.065	3.132	0.0166	8.9
30	0.070	0.070	3.136	0.0178	9.6
31	0.085	0.085	3.148	0.0217	9.8
32	0.095	0.095	3.156	0.0242	10.1
33	0.100	0.100	3.161	0.0255	10.4
32	0.130	0.130	3.186	0.0331	10.0
31	0.140	0.140	3.194	0.0357	9.7
30	0.145	0.145	3.198	0.0369	9.4
29	0.155	0.155	3.207	0.0395	9.0
27	0.160	0.160	3.211	0.0408	8.4
26	0.165	0.165	3.215	0.0420	8.1
25	0.170	0.170	3.220	0.0433	7.8
24	0.175	0.175	3.224	0.0446	7.4
22	0.180	0.180	3.228	0.0459	6.8
21	0.185	0.185	3.232	0.0471	6.5
20	0.190	0.190	3.237	0.0484	6.2

UNCONFINED COMPRESSION TESTING
Sample No. 0427-25A (14 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-25A (14 day)		
TESTING DATE:	9/19/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	ZOD/TNR	TRACKING CODE:	8380

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	25.5	**%**
BULK UNIT WEIGHT	109.6	lb/ft^3
DRY UNIT WEIGHT	87.3	lb/ft^3
UCS *	10.4	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	10/3/2012
TESTED BY:	TNR
TRACKING CODE:	8407

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-11A		12.09
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.09

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8407_PM
SAMPLE No.:	11A (28 DAY)	EQUIPMENT No.:	5
TEST DATE:	10/2/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	213.63 ***g***
3. WT WET SOIL + TARE	544.41 ***g***	760.70 ***g***
4. WT DRY SOIL + TARE	434.57 ***g***	648.20 ***g***
5. WT WATER, Ww	109.84 g	112.50 g
6. WT DRY SOIL, Ws	434.57 g	434.57 g
7. MOISTURE CONTENT, W	25.28 %	25.89 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.98 in.***	***2.99 in.***	***2.46 in.***	***2.49 in.***
No. 2	***2.99 in.***	***2.98 in.***	***2.45 in.***	***2.44 in.***
No. 3	***2.96 in.***	***2.98 in.***	***2.48 in.***	***2.50 in.***
Average	2.98 in.	2.98 in.	2.46 in.	2.48 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***544.41 g***	***547.60 g***
Area, Ao	6.96 in^2	6.98 in^2
Volume, Vo	17.14 in^3	17.27 in^3
Bulk Unit Weight	121.0 lb/ft^3	120.8 lb/ft^3
Dry Unit Weight	96.6 lb/ft^3	95.9 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8407_PM
SAMPLE No.:	11A (28 DAY)	EQUIPMENT No.:	5
TEST DATE:	10/2/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
10/02/12	9 : 59	RJB	7.0	5.0	5.1	*	*	*	*
10/02/12	10 : 43	RJB	17.0	15.0	15.3	9.1	10.0	4.0	0.40
10/02/12	12 : 40	RJB	27.0	25.0	25.5	19.8	10.0	4.5	0.45
10/02/12	13 : 28	RJB	37.0	35.0	35.2	32.4	10.0	6.9	0.69
10/02/12	14 : 13	RJB	47.0	45.0	45.7	42.6	10.0	7.4	0.74
10/02/12	15 : 5	RJB	57.0	55.0	55.3	54.4	10.0	8.7	0.87
10/02/12	15 : 40	RJB	67.0	65.0	65.6	64.5	10.0	9.2	0.92
10/03/12	8 : 0	RJB	77.0	75.0	75.4	74.8	10.0	9.2	0.92
10/03/12	8 : 30	RJB	87.0	85.0	*	85.0	10.0	9.6	0.96
10/03/12	8 : 31	RJB	77.0	75.0	*	*	*	*	*
	:								
	:								

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8407_PM
SAMPLE No.:	11A (28 DAY)	5
TEST DATE:	10/2/2012	

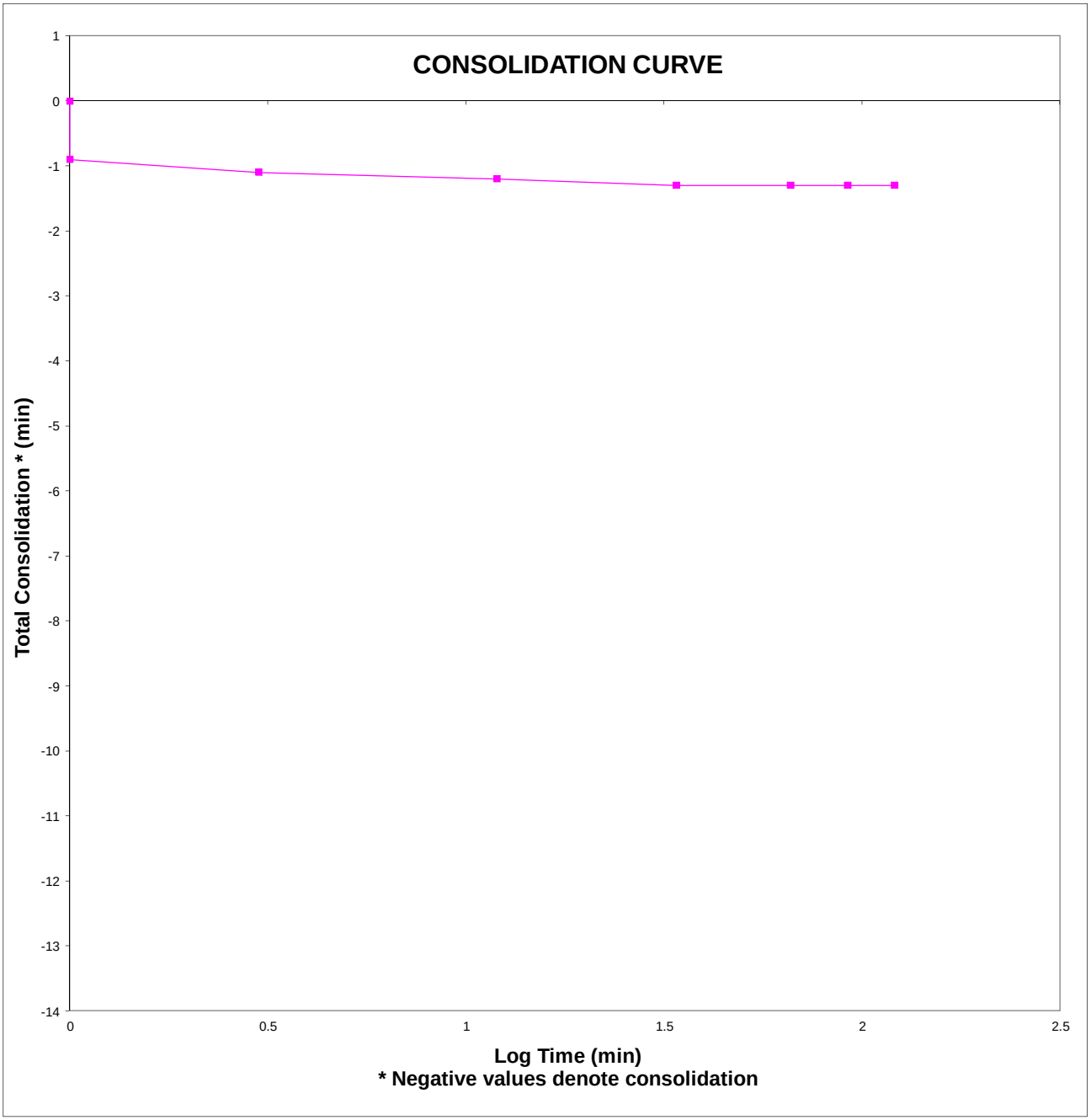
CELL PRESSURE: 85 psi **BACK PRESSURE:** 75 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
10 / 3 / 12	RJB	8 : 34	0	0	0	25.0	25.0	0.0
10 / 3 / 12	RJB	8 : 35	1	1	0.00	24.6	24.5	0.9
10 / 3 / 12	RJB	8 : 37	2	3	0.48	24.5	24.4	1.1
10 / 3 / 12	RJB	8 : 46	9	12	1.08	24.4	24.4	1.2
10 / 3 / 12	RJB	9 : 8	22	34	1.53	24.4	24.3	1.3
10 / 3 / 12	RJB	9 : 40	32	66	1.82	24.4	24.3	1.3
10 / 3 / 12	RJB	10 : 6	26	92	1.96	24.4	24.3	1.3
10 / 3 / 12	RJB	10 : 35	29	121	2.08	24.4	24.3	1.3

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8407_PM
SAMPLE No.:	11A (28 DAY)	EQUIPMENT No.:	5
TEST DATE:	10/2/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8407_PM
SAMPLE No.:	11A (28 DAY)	EQUIPMENT No.:	5
TEST DATE:	10/2/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
10 / 3 / 12	RJB	11 : 17	0	0.0	25.0	20.0	85.0	75.0	75.0
10 / 3 / 12	RJB	12 : 3	46	0.5	24.4	20.0	85.0	75.0	75.0
10 / 3 / 12	RJB	12 : 51	48	1.0	23.9	20.0	85.0	75.0	75.0
10 / 3 / 12	RJB	13 : 39	48	1.5	23.4	20.0	85.0	75.0	75.0
10 / 3 / 12	RJB	14 : 31	52	2.0	22.9	20.0	85.0	75.0	75.0
10 / 3 / 12	RJB	15 : 37	66	2.6	22.1	20.0	85.0	75.0	75.0
10 / 4 / 12	RJB	7 : 56	RESET	0.0	25.0	20.0	85.0	75.0	75.0
10 / 4 / 12	RJB	8 : 44	48	0.5	24.5	20.0	85.0	75.0	75.0
10 / 4 / 12	RJB	10 : 8	84	1.3	23.8	20.0	85.0	75.0	75.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8407_PM
SAMPLE No.:	11A (28 DAY)	EQUIPMENT No.:	5
TEST DATE:	10/2/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.995		
46	0.5	0.6	1.20	3.819	1.14E-06	1.14E-06
48	0.5	0.5	1.00	3.659	1.03E-06	1.04E-06
48	0.5	0.5	1.00	3.500	1.08E-06	1.09E-06
52	0.5	0.5	1.00	3.340	1.04E-06	1.05E-06
66	0.6	0.8	1.33	3.116	1.22E-06	1.23E-06
RESET				3.995		
48	0.5	0.5	1.00	3.835	9.88E-07	9.92E-07
84	0.8	0.7	0.87	3.596	8.92E-07	8.96E-07

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8407_PM
SAMPLE No.:	11A (28 DAY)	EQUIPMENT No.:	5
TEST DATE:	10/2/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	121.0 lb/ft³	120.8 lb/ft³
DRY UNIT WEIGHT	96.6 lb/ft³	95.9 lb/ft³
MOISTURE CONTENT	25.3 %	25.9 %
PERMEABILITY @ 20°C	1.0E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-11A (28 day)		
TESTING DATE:	3-Oct-12	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8407

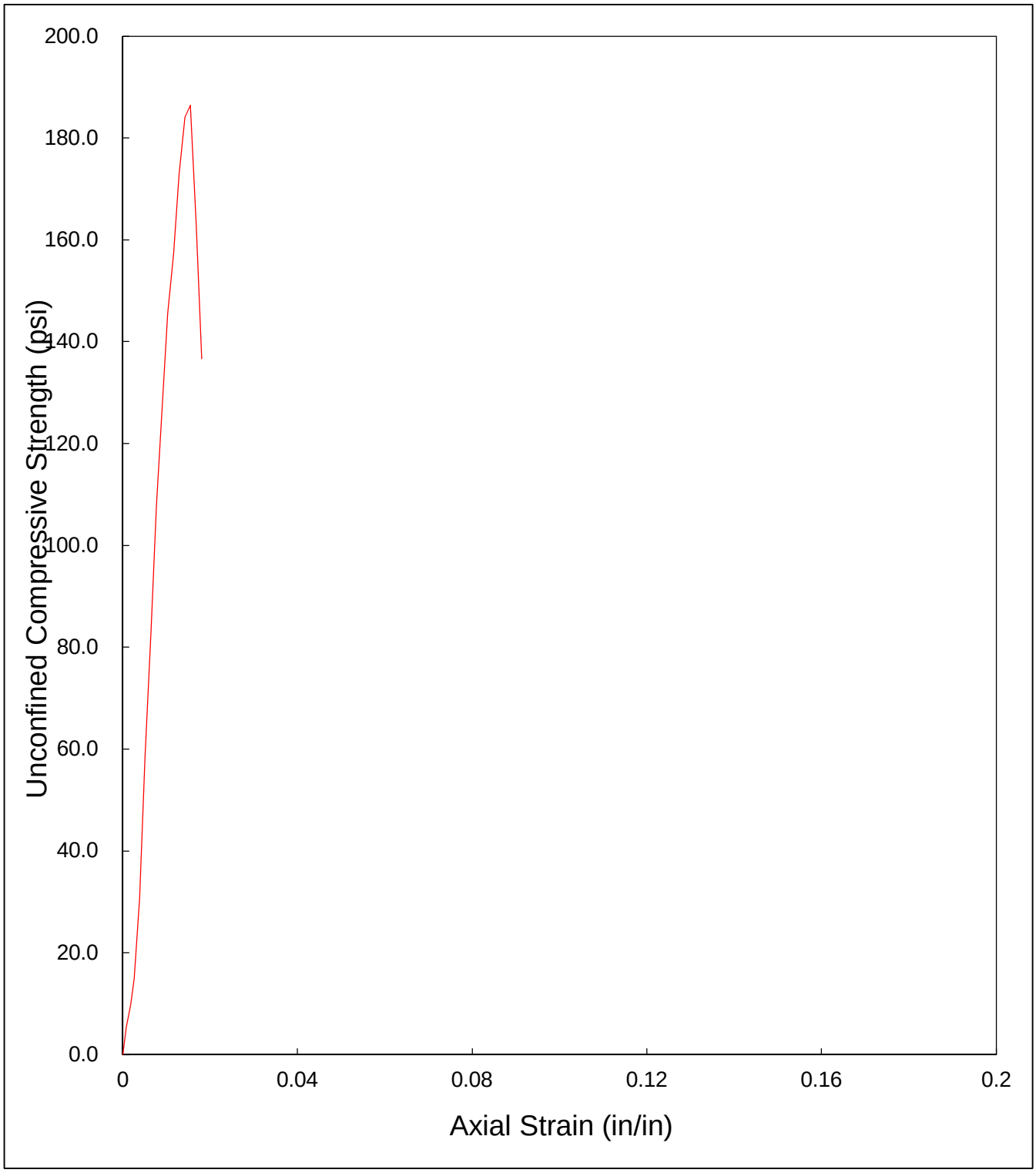
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	167.32	g
3. WT WET SOIL + TARE	330.83	g
4. WT DRY SOIL + TARE	300.76	g
5. WT WATER, Ww	30.07	g
6. WT DRY SOIL, Ws	133.44	g
7. MOISTURE CONTENT, W	**22.53**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.01	in.	3.87	in.
No. 2	2.00	in.	3.86	in.
No. 3	1.99	in.	3.88	in.
Average	**2.00**	**in.**	**3.87**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***375.89***	***g***
Initial Area, Ac	3.15	in²
Initial Volume, Vc	12.18	in³
Initial Bulk Unit Weight,	117.6	lb/ft³
Initial Dry Unit Weigh	95.9	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	186.4	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.148	0.0000	0.0
17	0.003	0.003	3.150	0.0008	5.4
23	0.005	0.005	3.152	0.0013	7.3
31	0.007	0.007	3.154	0.0018	9.8
47	0.010	0.010	3.156	0.0026	14.9
97	0.015	0.015	3.160	0.0039	30.7
185	0.020	0.020	3.164	0.0052	58.5
262	0.025	0.025	3.168	0.0065	82.7
341	0.030	0.030	3.172	0.0078	107.5
405	0.035	0.035	3.177	0.0090	127.5
463	0.040	0.040	3.181	0.0103	145.6
501	0.045	0.045	3.185	0.0116	157.3
551	0.050	0.050	3.189	0.0129	172.8
588	0.055	0.055	3.193	0.0142	184.1
596	0.060	0.060	3.197	0.0155	186.4
521	0.065	0.065	3.202	0.0168	162.7
438	0.070	0.070	3.206	0.0181	136.6

UNCONFINED COMPRESSION TESTING
Sample No. 0427-11A (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-11A (28 day)		
TESTING DATE:	10/3/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8407

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	22.5	**%**
BULK UNIT WEIGHT	117.6	lb/ft^3
DRY UNIT WEIGHT	95.9	lb/ft^3
UCS *	186.4	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	10/3/2012
TESTED BY:	TNR
TRACKING CODE:	8408

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-12A		12.11
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.11

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8408_PM
SAMPLE No.:	12A (28 DAY)	EQUIPMENT No.:	4
TEST DATE:	10/2/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	211.65 ***g***
3. WT WET SOIL + TARE	538.75 ***g***	752.50 ***g***
4. WT DRY SOIL + TARE	426.55 ***g***	638.20 ***g***
5. WT WATER, Ww	112.20 g	114.30 g
6. WT DRY SOIL, Ws	426.55 g	426.55 g
7. MOISTURE CONTENT, W	26.30 %	26.80 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.98 in.***	***2.99 in.***	***2.48 in.***	***2.51 in.***
No. 2	***2.98 in.***	***3.00 in.***	***2.48 in.***	***2.47 in.***
No. 3	***2.99 in.***	***2.98 in.***	***2.40 in.***	***2.49 in.***
Average	2.98 in.	2.99 in.	2.45 in.	2.49 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***538.75 g***	***541.67 g***
Area, Ao	7.00 in^2	7.01 in^2
Volume, Vo	17.16 in^3	17.44 in^3
Bulk Unit Weight	119.6 lb/ft^3	118.3 lb/ft^3
Dry Unit Weight	94.7 lb/ft^3	93.3 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8408_PM
SAMPLE No.:	12A (28 DAY)	EQUIPMENT No.:	4
TEST DATE:	10/2/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
10/02/12	10 : 8	RJB	7.0	5.0	5.5	*	*	*	*
10/02/12	10 : 45	RJB	17.0	15.0	*	10.5	10.0	5.0	0.50
10/02/12	13 : 0	RJB	27.0	25.0	26.0	*	*	*	*
10/02/12	13 : 30	RJB	37.0	35.0	35.4	36.0	10.0	10.0	1.00
10/02/12	14 : 15	RJB	47.0	45.0	46.0	45.4	10.0	10.0	1.00
10/02/12	15 : 45	RJB	57.0	55.0	*	56.0	10.0	10.0	1.00
10/02/12	15 : 46	RJB	47.0	45.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8408_PM
SAMPLE No.:	12A (28 DAY)	4
TEST DATE:	10/2/2012	

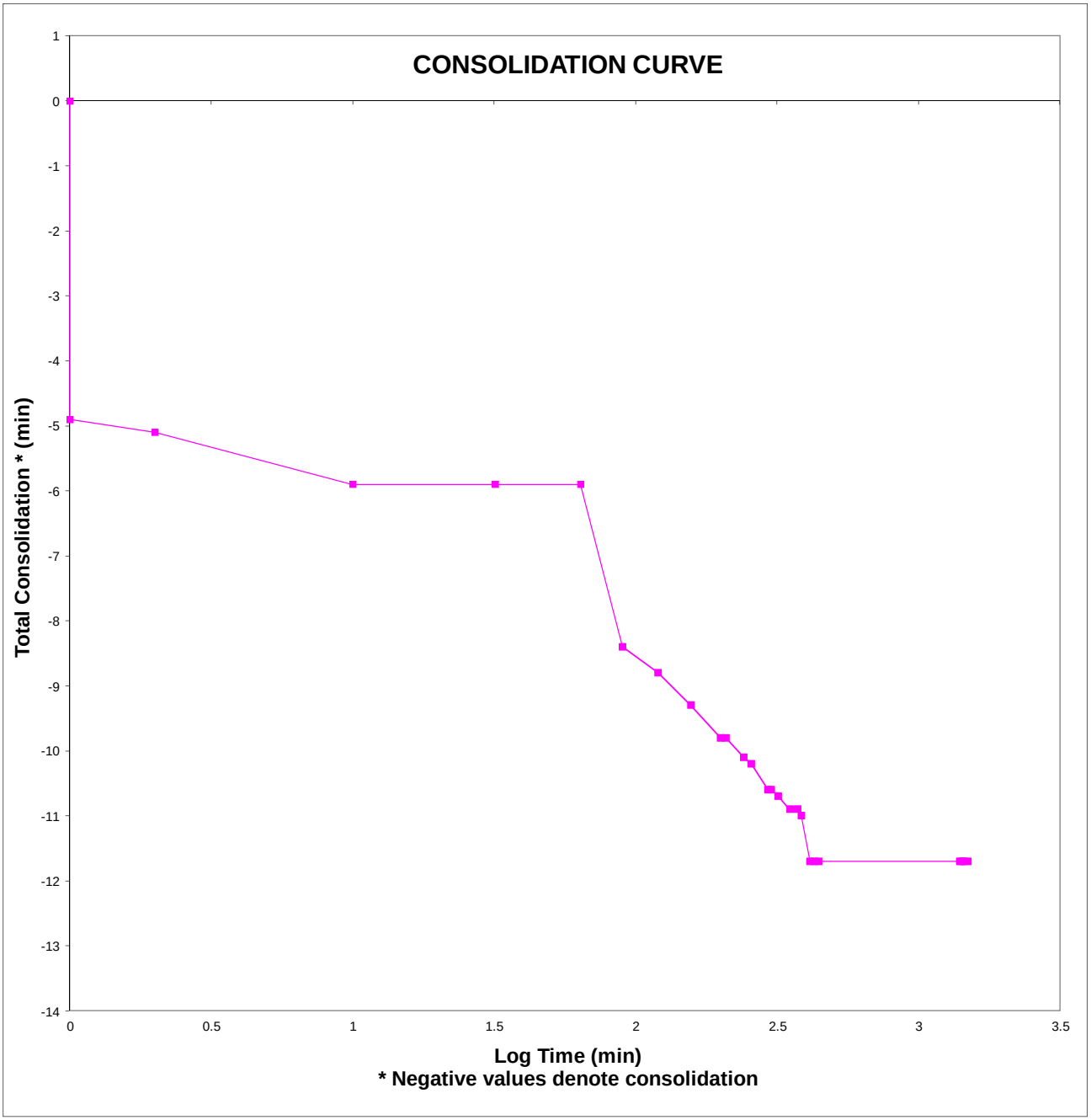
CELL PRESSURE: 55 psi **BACK PRESSURE:** 45 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
10 / 3 / 12	RJB	8 : 36	0	0	0	25.0	25.0	0.0
10 / 3 / 12	RJB	8 : 37	1	1	0.00	22.9	22.2	4.9
10 / 3 / 12	RJB	8 : 38	1	2	0.30	22.7	22.2	5.1
10 / 3 / 12	RJB	8 : 46	8	10	1.00	21.9	22.2	5.9
10 / 3 / 12	RJB	9 : 8	22	32	1.51	21.9	22.2	5.9
10 / 3 / 12	RJB	9 : 40	32	64	1.81	21.9	22.2	5.9
10 / 3 / 12	RJB	10 : 6	26	90	1.95	19.5	22.1	8.4
10 / 3 / 12	RJB	10 : 36	30	120	2.08	19.2	22.0	8.8
10 / 3 / 12	RJB	11 : 13	37	157	2.20	18.9	21.8	9.3
10 / 3 / 12	RJB	11 : 56	43	200	2.30	18.6	21.6	9.8
10 / 3 / 12	RJB	12 : 5	9.000000001	209	2.32	18.6	21.6	9.8
10 / 3 / 12	RJB	12 : 37	32	241	2.38	18.4	21.5	10.1
10 / 3 / 12	RJB	12 : 52	15	256	2.41	18.4	21.4	10.2
10 / 3 / 12	RJB	13 : 30	38	294	2.47	18.2	21.2	10.6
10 / 3 / 12	RJB	13 : 38	8	302	2.48	18.2	21.2	10.6
10 / 3 / 12	RJB	13 : 56	18	320	2.51	18.1	21.2	10.7
10 / 3 / 12	RJB	14 : 27	31	351	2.55	18.1	21.0	10.9
10 / 3 / 12	RJB	14 : 50	23	374	2.57	18.1	21.0	10.9
10 / 3 / 12	RJB	15 : 1	11	385	2.59	18.1	20.9	11.0
10 / 3 / 12	RJB	15 : 30	29	414	2.62	18.1	20.2	11.7
10 / 3 / 12	RJB	15 : 45	15	429	2.63	18.1	20.2	11.7
10 / 3 / 12	RJB	16 : 0	15	444	2.65	18.1	20.2	11.7
10 / 4 / 12	RJB	7 : 55	955	1399	3.15	18.1	20.2	11.7
10 / 4 / 12	RJB	8 : 20	25	1424	3.15	18.1	20.2	11.7
10 / 4 / 12	RJB	8 : 40	20	1444	3.16	18.1	20.2	11.7
10 / 4 / 12	RJB	9 : 30	50	1494	3.17	18.1	20.2	11.7

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8408_PM
SAMPLE No.:	12A (28 DAY)	EQUIPMENT No.:	4
TEST DATE:	10/2/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8408_PM
SAMPLE No.:	12A (28 DAY)	EQUIPMENT No.:	4
TEST DATE:	10/2/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
10 / 4 / 12	RJB	9 : 33	0	0.0	25.0	20.0	55.0	45.0	45.0
10 / 4 / 12	RJB	10 : 1	28	1.9	23.1	20.0	55.0	45.0	45.0
10 / 4 / 12	RJB	10 : 19	18	3.0	22.0	20.0	55.0	45.0	45.0
10 / 4 / 12	RJB	10 : 30	11	3.6	21.4	20.0	55.0	45.0	45.0
10 / 4 / 12	RJB	10 : 42	12	4.2	20.8	20.0	55.0	45.0	45.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8408_PM
SAMPLE No.:	12A (28 DAY)	EQUIPMENT No.:	4
TEST DATE:	10/2/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				4.014		
28	1.9	1.9	1.00	3.403	6.77E-06	6.80E-06
18	1.1	1.1	1.00	3.050	7.00E-06	7.03E-06
11	0.6	0.6	1.00	2.858	6.82E-06	6.85E-06
12	0.6	0.6	1.00	2.665	6.69E-06	6.72E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8408_PM
SAMPLE No.:	12A (28 DAY)	EQUIPMENT No.:	4
TEST DATE:	10/2/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	119.6 lb/ft³	118.3 lb/ft³
DRY UNIT WEIGHT	94.7 lb/ft³	93.3 lb/ft³
MOISTURE CONTENT	26.3 %	26.8 %
PERMEABILITY @ 20°C	6.9E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-12A (28 day)		
TESTING DATE:	3-Oct-12	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8408

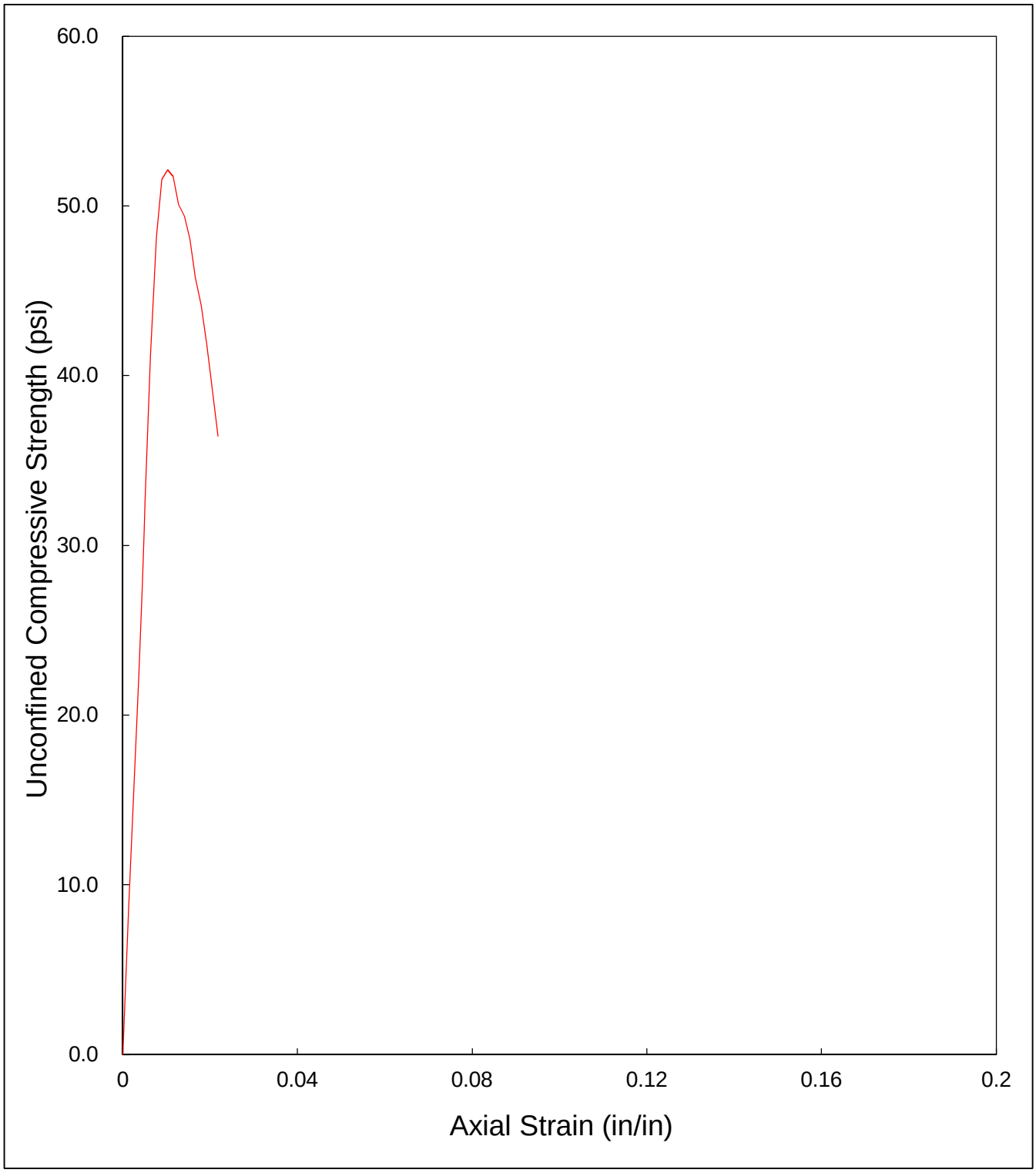
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	165.80	g
3. WT WET SOIL + TARE	396.59	g
4. WT DRY SOIL + TARE	352.26	g
5. WT WATER, Ww	44.33	g
6. WT DRY SOIL, Ws	186.46	g
7. MOISTURE CONTENT, W	**23.77**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.90	in.
No. 2	2.00	in.	3.91	in.
No. 3	1.99	in.	3.89	in.
Average	**1.99**	**in.**	**3.90**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***376.54***	***g***
Initial Area, Ac	3.11	in^2
Initial Volume, Vc	12.16	in^3
Initial Bulk Unit Weight,	118.0	lb/ft^3
Initial Dry Unit Weigh	95.3	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	52.1	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.114	0.0000	0.0
16	0.003	0.003	3.117	0.0008	5.1
25	0.005	0.005	3.118	0.0013	8.0
35	0.007	0.007	3.120	0.0018	11.2
49	0.010	0.010	3.122	0.0026	15.7
73	0.015	0.015	3.126	0.0038	23.3
102	0.020	0.020	3.130	0.0051	32.6
129	0.025	0.025	3.135	0.0064	41.2
151	0.030	0.030	3.139	0.0077	48.1
162	0.035	0.035	3.143	0.0090	51.5
164	0.040	0.040	3.147	0.0102	52.1
163	0.045	0.045	3.151	0.0115	51.7
158	0.050	0.050	3.155	0.0128	50.1
156	0.055	0.055	3.159	0.0141	49.4
152	0.060	0.060	3.163	0.0154	48.1
145	0.065	0.065	3.167	0.0167	45.8
140	0.070	0.070	3.171	0.0179	44.1
133	0.075	0.075	3.175	0.0192	41.9
125	0.080	0.080	3.180	0.0205	39.3
116	0.085	0.085	3.184	0.0218	36.4

UNCONFINED COMPRESSION TESTING
Sample No. 0427-12A (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-12A (28 day)		
TESTING DATE:	10/3/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8408

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	23.8	**%**
BULK UNIT WEIGHT	118.0	lb/ft^3
DRY UNIT WEIGHT	95.3	lb/ft^3
UCS *	52.1	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	10/3/2012
TESTED BY:	TNR
TRACKING CODE:	8409

KEMRON SAMPLE No.		MATERIAL pH
1.	0427-13A	12.02
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.02

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8409_PM
SAMPLE No.:	13A (28 DAY)	EQUIPMENT No.:	3
TEST DATE:	10/2/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	230.68 ***g***
3. WT WET SOIL + TARE	656.00 ***g***	889.90 ***g***
4. WT DRY SOIL + TARE	546.62 ***g***	777.30 ***g***
5. WT WATER, Ww	109.38 g	112.60 g
6. WT DRY SOIL, Ws	546.62 g	546.62 g
7. MOISTURE CONTENT, W	20.01 %	20.60 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.98 in.***	***2.99 in.***	***2.91 in.***	***2.87 in.***
No. 2	***2.99 in.***	***2.98 in.***	***2.87 in.***	***2.92 in.***
No. 3	***2.98 in.***	***3.01 in.***	***2.83 in.***	***2.91 in.***
Average	2.98 in.	3.00 in.	2.87 in.	2.90 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***656.00 g***	***659.80 g***
Area, Ao	6.99 in^2	7.05 in^2
Volume, Vo	20.09 in^3	20.42 in^3
Bulk Unit Weight	124.4 lb/ft^3	123.1 lb/ft^3
Dry Unit Weight	103.7 lb/ft^3	102.1 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8409_PM
SAMPLE No.:	13A (28 DAY)	EQUIPMENT No.:	3
TEST DATE:	10/2/12		

TEST	TIME	TESTED	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
DATE	(military)	BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
10/02/12	10 : 20	RJB	7.0	5.0	5.9	*	*	*	*
10/02/12	11 : 6	RJB	17.0	15.0	15.9	8.1	10.0	2.2	0.22
10/02/12	12 : 50	RJB	27.0	25.0	25.8	20.6	10.0	4.7	0.47
10/02/12	13 : 43	RJB	37.0	35.0	35.2	30.8	10.0	5.0	0.50
10/02/12	14 : 20	RJB	47.0	45.0	45.4	41.3	10.0	6.1	0.61
10/02/12	15 : 6	RJB	57.0	55.0	54.9	52.4	10.0	7.0	0.70
10/02/12	15 : 42	RJB	67.0	65.0	65.7	62.7	10.0	7.8	0.78
10/03/12	8 : 25	RJB	77.0	75.0	*	75.7	10.0	10.0	1.00
10/03/12	8 : 26	RJB	67.0	65.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8409_PM
SAMPLE No.:	13A (28 DAY)	3
TEST DATE:	10/2/2012	

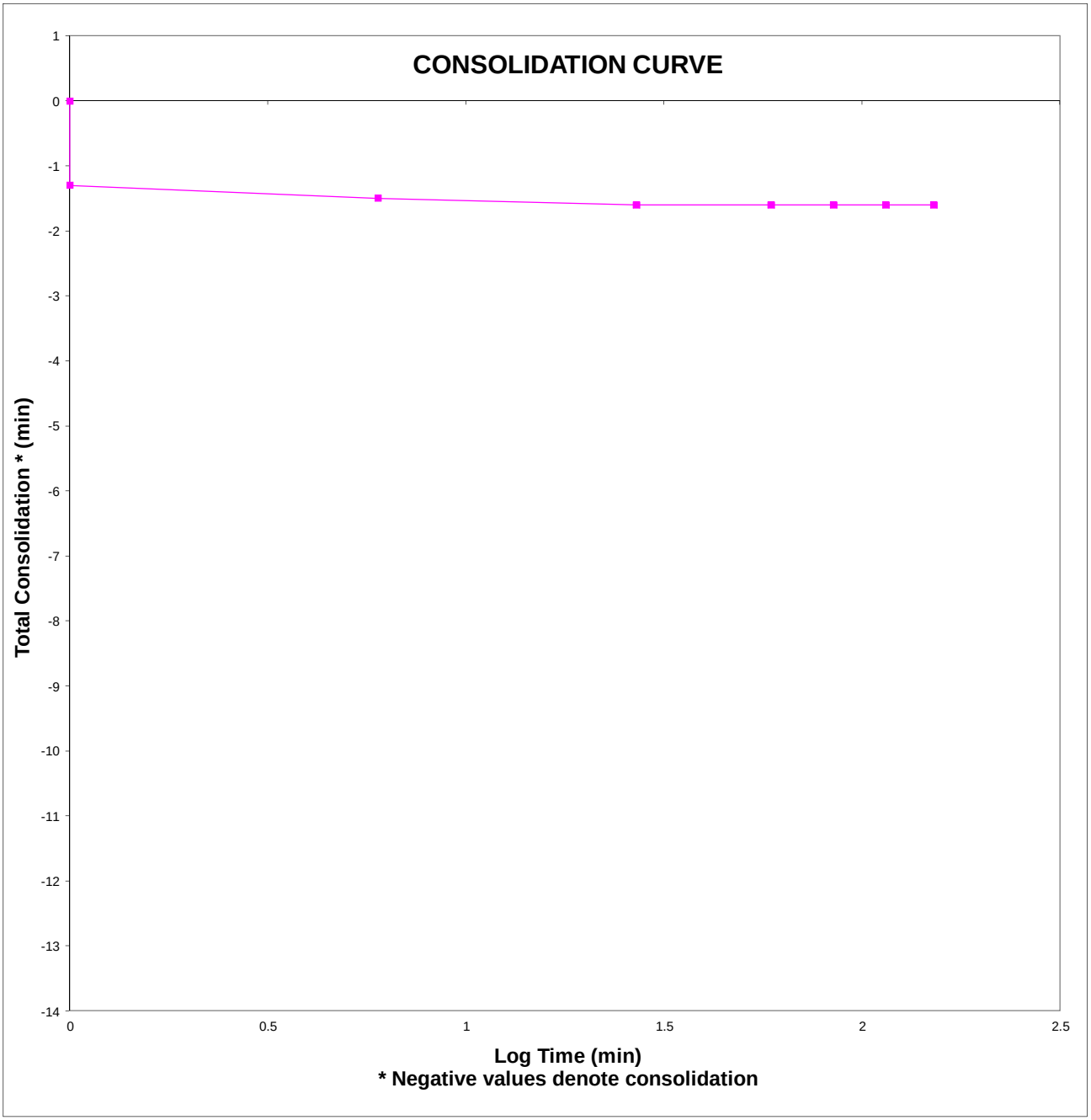
CELL PRESSURE: 75 psi **BACK PRESSURE:** 65 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
10 / 3 / 12	RJB	8 : 41	0	0	0	24.0	24.0	0.0
10 / 3 / 12	RJB	8 : 42	1	1	0.00	23.4	23.3	1.3
10 / 3 / 12	RJB	8 : 47	5	6	0.78	23.3	23.2	1.5
10 / 3 / 12	RJB	9 : 8	21	27	1.43	23.2	23.2	1.6
10 / 3 / 12	RJB	9 : 40	32	59	1.77	23.2	23.2	1.6
10 / 3 / 12	RJB	10 : 6	26	85	1.93	23.2	23.2	1.6
10 / 3 / 12	RJB	10 : 36	30	115	2.06	23.2	23.2	1.6
10 / 3 / 12	RJB	11 : 13	37	152	2.18	23.2	23.2	1.6

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8409_PM
SAMPLE No.:	13A (28 DAY)	EQUIPMENT No.:	3
TEST DATE:	10/2/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8409_PM
SAMPLE No.:	13A (28 DAY)	EQUIPMENT No.:	3
TEST DATE:	10/2/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
10 / 3 / 12	RJB	11 : 26	0	0.0	24.0	20.0	75.0	65.0	65.0
10 / 3 / 12	RJB	11 : 47	21	3.0	21.0	20.0	75.0	65.0	65.0
10 / 3 / 12	RJB	11 : 56	9	4.0	20.0	20.0	75.0	65.0	65.0
10 / 3 / 12	RJB	12 : 3	7	4.7	19.3	20.0	75.0	65.0	65.0
10 / 3 / 12	RJB	12 : 9	6	5.3	18.7	20.0	75.0	65.0	65.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8409_PM
SAMPLE No.:	13A (28 DAY)	EQUIPMENT No.:	3
TEST DATE:	10/2/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.290		
21	3.0	3.0	1.00	2.468	1.85E-05	1.85E-05
9	1.0	1.0	1.00	2.194	1.76E-05	1.77E-05
7	0.7	0.7	1.00	2.002	1.76E-05	1.77E-05
6	0.6	0.6	1.00	1.837	1.93E-05	1.93E-05

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8409_PM
SAMPLE No.:	13A (28 DAY)	EQUIPMENT No.:	3
TEST DATE:	10/2/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	124.4 lb/ft³	123.1 lb/ft³
DRY UNIT WEIGHT	103.7 lb/ft³	102.1 lb/ft³
MOISTURE CONTENT	20.0 %	20.6 %
PERMEABILITY @ 20°C	1.8E-05 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-13A (28 day)		
TESTING DATE:	3-Oct-12	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8409

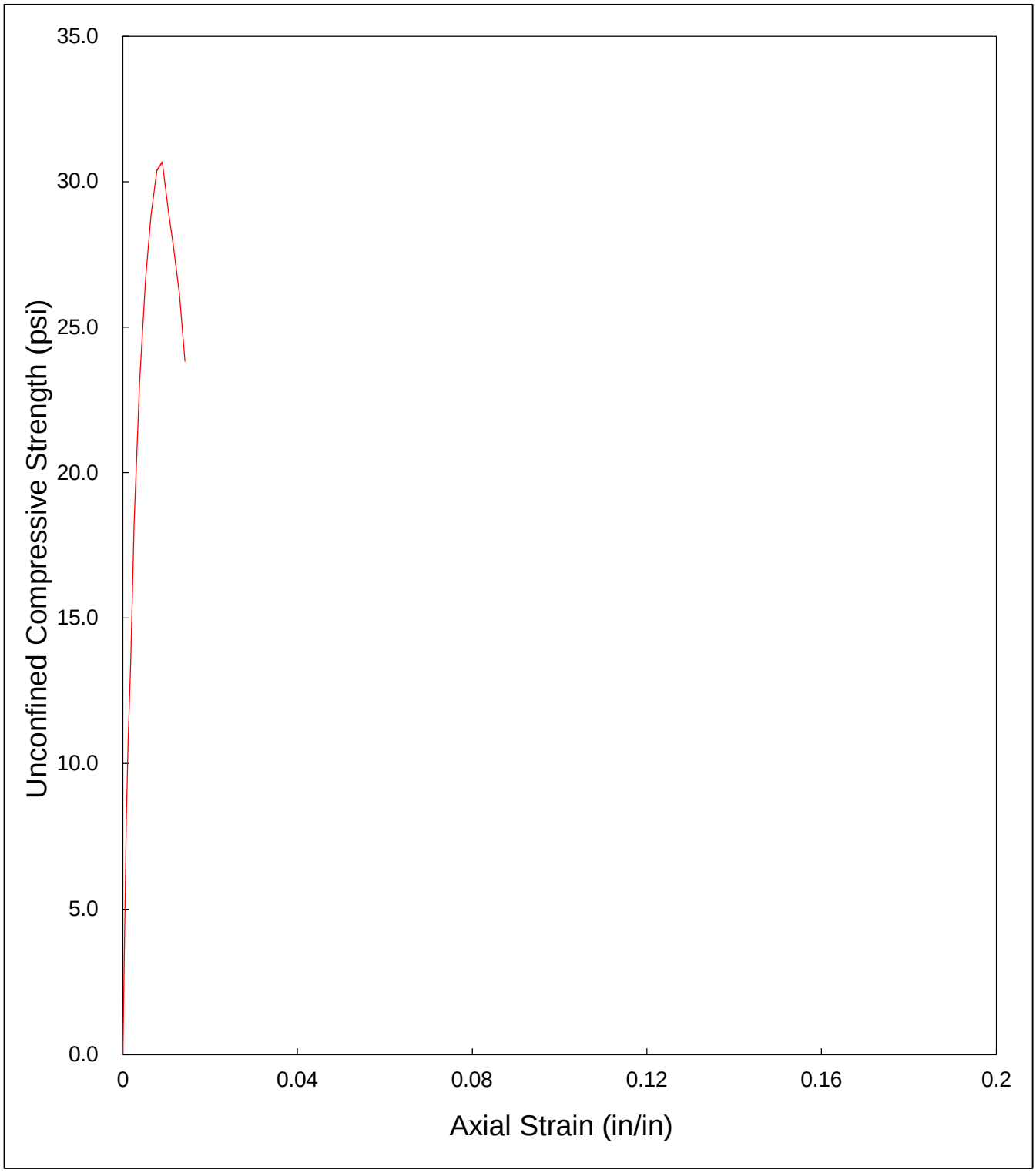
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	167.24	g
3. WT WET SOIL + TARE	317.86	g
4. WT DRY SOIL + TARE	291.98	g
5. WT WATER, Ww	25.88	g
6. WT DRY SOIL, Ws	124.74	g
7. MOISTURE CONTENT, W	**20.75**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.85	in.
No. 2	1.99	in.	3.87	in.
No. 3	1.98	in.	3.84	in.
Average	**1.99**	**in.**	**3.86**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***379.38***	***g***
Initial Area, Ac	3.10	in^2
Initial Volume, Vc	11.96	in^3
Initial Bulk Unit Weight,	120.9	lb/ft^3
Initial Dry Unit Weigh	100.1	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	30.7	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.102	0.0000	0.0
25	0.003	0.003	3.104	0.0008	8.1
34	0.005	0.005	3.106	0.0013	10.9
42	0.007	0.007	3.108	0.0018	13.5
57	0.010	0.010	3.110	0.0026	18.3
72	0.015	0.015	3.114	0.0039	23.1
83	0.020	0.020	3.118	0.0052	26.6
90	0.025	0.025	3.122	0.0065	28.8
95	0.030	0.030	3.126	0.0078	30.4
96	0.035	0.035	3.130	0.0091	30.7
91	0.040	0.040	3.134	0.0104	29.0
87	0.045	0.045	3.139	0.0117	27.7
82	0.050	0.050	3.143	0.0130	26.1
75	0.055	0.055	3.147	0.0143	23.8

UNCONFINED COMPRESSION TESTING
Sample No. 0427-13A (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-13A (28 day)		
TESTING DATE:	10/3/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8409

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	20.7	**%**
BULK UNIT WEIGHT	120.9	lb/ft^3
DRY UNIT WEIGHT	100.1	lb/ft^3
UCS *	30.7	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	10/3/2012
TESTED BY:	TNR
TRACKING CODE:	8410

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-14A		12.07
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.07

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8410_PM
SAMPLE No.:	14A(28 DAY)	EQUIPMENT No.:	2
TEST DATE:	10/2/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	228.52 ***g***
3. WT WET SOIL + TARE	365.76 ***g***	594.67 ***g***
4. WT DRY SOIL + TARE	290.95 ***g***	519.47 ***g***
5. WT WATER, Ww	74.81 g	75.20 g
6. WT DRY SOIL, Ws	290.95 g	290.95 g
7. MOISTURE CONTENT, W	25.71 %	25.85 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.97 in.***	***2.96 in.***	***1.63 in.***	***1.68 in.***
No. 2	***2.97 in.***	***2.98 in.***	***1.71 in.***	***1.70 in.***
No. 3	***2.92 in.***	***2.93 in.***	***1.73 in.***	***1.72 in.***
Average	2.95 in.	2.96 in.	1.69 in.	1.70 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***365.76 g***	***366.74 g***
Area, Ao	6.85 in^2	6.86 in^2
Volume, Vo	11.58 in^3	11.65 in^3
Bulk Unit Weight	120.3 lb/ft^3	119.9 lb/ft^3
Dry Unit Weight	95.7 lb/ft^3	95.3 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8410_PM
SAMPLE No.:	14A(28 DAY)	EQUIPMENT No.:	2
TEST DATE:	10/2/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
10/02/12	10 : 40	RJB	7.0	5.0	5.3	*	*	*	*
10/02/12	11 : 26	RJB	17.0	15.0	14.9	7.3	10.0	2.0	0.20
10/02/12	12 : 51	RJB	27.0	25.0	25.8	19.3	10.0	4.4	0.44
10/02/12	13 : 45	RJB	37.0	35.0	36.0	32.4	10.0	6.6	0.66
10/02/12	14 : 22	RJB	47.0	45.0	46.0	44.1	10.0	8.1	0.81
10/02/12	15 : 15	RJB	57.0	55.0	54.8	53.5	10.0	7.5	0.75
10/02/12	15 : 45	RJB	67.0	65.0	65.3	*	*	*	*
10/03/12	8 : 0	RJB	77.0	75.0	75.8	74.4	10.0	9.1	0.91
10/03/12	8 : 30	RJB	87.0	85.0	*	85.8	10.0	10.0	1.00
10/03/12	8 : 31	RJB	77.0	75.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8410_PM
SAMPLE No.:	14A (28 DAY)	2
TEST DATE:	10/2/2012	

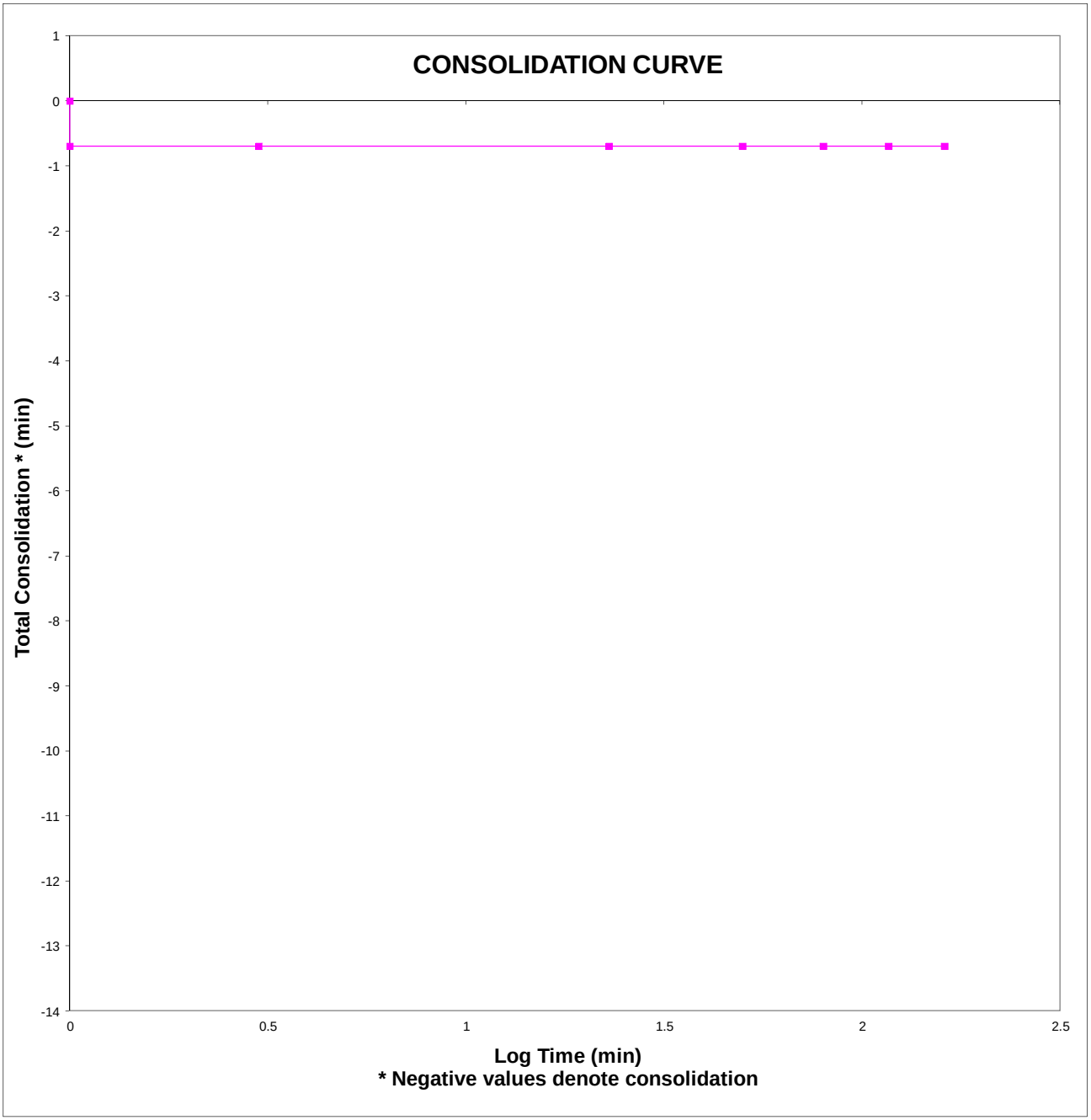
CELL PRESSURE: 85 psi **BACK PRESSURE:** 75 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
10 / 3 / 12	RJB	9 : 17	0	0	0	24.0	24.0	0.0
10 / 3 / 12	RJB	9 : 18	1	1	0.00	23.5	23.8	0.7
10 / 3 / 12	RJB	9 : 20	2	3	0.48	23.5	23.8	0.7
10 / 3 / 12	RJB	9 : 40	20	23	1.36	23.5	23.8	0.7
10 / 3 / 12	RJB	10 : 7	27	50	1.70	23.5	23.8	0.7
10 / 3 / 12	RJB	10 : 37	30	80	1.90	23.5	23.8	0.7
10 / 3 / 12	RJB	11 : 14	37	117	2.07	23.5	23.8	0.7
10 / 3 / 12	RJB	11 : 59	45	162	2.21	23.5	23.8	0.7

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8410_PM
SAMPLE No.:	14A(28 DAY)	EQUIPMENT No.:	2
TEST DATE:	10/2/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8410_PM
SAMPLE No.:	14A (28 DAY)	EQUIPMENT No.:	2
TEST DATE:	10/2/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
10 / 3 / 12	RJB	12 : 2	0	0.0	25.0	20.0	85.0	75.0	75.0
10 / 3 / 12	RJB	12 : 7	5	0.5	24.5	20.0	85.0	75.0	75.0
10 / 3 / 12	RJB	12 : 38	31	3.3	21.7	20.0	85.0	75.0	75.0
10 / 3 / 12	RJB	12 : 53	15	4.4	20.6	20.0	85.0	75.0	75.0
10 / 3 / 12	RJB	13 : 17	24	5.8	19.2	20.0	85.0	75.0	75.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8410_PM
SAMPLE No.:	14A(28 DAY)	EQUIPMENT No.:	2
TEST DATE:	10/2/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				5.822		
5	0.5	0.5	1.00	5.589	6.61E-06	6.64E-06
31	2.8	2.8	1.00	4.285	6.94E-06	6.97E-06
15	1.1	1.1	1.00	3.772	6.87E-06	6.90E-06
24	1.4	1.4	1.00	3.120	6.40E-06	6.43E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8410_PM
SAMPLE No.:	14A(28 DAY)	EQUIPMENT No.:	2
TEST DATE:	10/2/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	120.3 lb/ft³	119.9 lb/ft³
DRY UNIT WEIGHT	95.7 lb/ft³	95.3 lb/ft³
MOISTURE CONTENT	25.7 %	25.8 %
PERMEABILITY @ 20°C	6.7E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0247-14A (28 day)		
TESTING DATE:	3-Oct-12	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8410

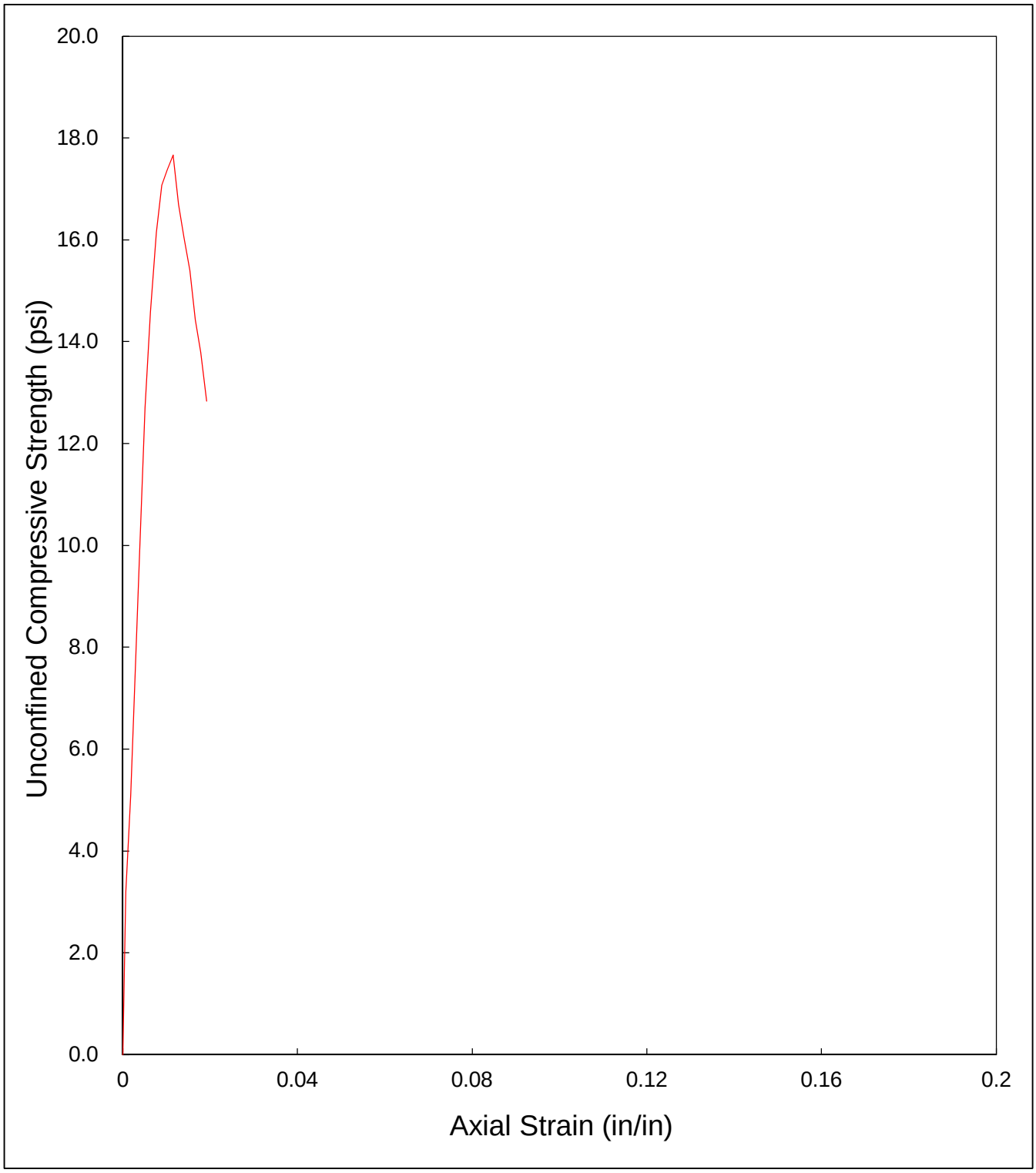
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	168.17	g
3. WT WET SOIL + TARE	341.77	g
4. WT DRY SOIL + TARE	310.61	g
5. WT WATER, Ww	31.16	g
6. WT DRY SOIL, Ws	142.44	g
7. MOISTURE CONTENT, W	**21.88**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.91	in.
No. 2	2.00	in.	3.91	in.
No. 3	1.99	in.	3.91	in.
Average	**2.00**	**in.**	**3.91**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***374.16***	***g***
Initial Area, Ac	3.13	in^2
Initial Volume, Vc	12.26	in^3
Initial Bulk Unit Weight,	116.3	lb/ft^3
Initial Dry Unit Weigh	95.4	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	17.7	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.134	0.0000	0.0
10	0.003	0.003	3.137	0.0008	3.2
13	0.005	0.005	3.138	0.0013	4.1
16	0.007	0.007	3.140	0.0018	5.1
21	0.010	0.010	3.142	0.0026	6.7
31	0.015	0.015	3.146	0.0038	9.9
40	0.020	0.020	3.150	0.0051	12.7
46	0.025	0.025	3.154	0.0064	14.6
51	0.030	0.030	3.158	0.0077	16.1
54	0.035	0.035	3.163	0.0089	17.1
55	0.040	0.040	3.167	0.0102	17.4
56	0.045	0.045	3.171	0.0115	17.7
53	0.050	0.050	3.175	0.0128	16.7
51	0.055	0.055	3.179	0.0141	16.0
49	0.060	0.060	3.183	0.0153	15.4
46	0.065	0.065	3.187	0.0166	14.4
44	0.070	0.070	3.191	0.0179	13.8
41	0.075	0.075	3.196	0.0192	12.8

UNCONFINED COMPRESSION TESTING
Sample No. 0247-14A (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0247-14A (28 day)		
TESTING DATE:	10/3/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8410

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	21.9	**%**
BULK UNIT WEIGHT	116.3	lb/ft^3
DRY UNIT WEIGHT	95.4	lb/ft^3
UCS *	17.7	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	10/3/2012
TESTED BY:	TNR
TRACKING CODE:	8411

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-15A		11.95
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	11.95

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8411_PM
SAMPLE No.:	15A (28 DAY)	EQUIPMENT No.:	6B
TEST DATE:	10/3/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	211.66 ***g***
3. WT WET SOIL + TARE	639.50 ***g***	839.90 ***g***
4. WT DRY SOIL + TARE	481.24 ***g***	692.90 ***g***
5. WT WATER, Ww	158.26 g	147.00 g
6. WT DRY SOIL, Ws	481.24 g	481.24 g
7. MOISTURE CONTENT, W	32.89 %	30.55 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.96 in.***	***2.91 in.***	***3.15 in.***	***3.09 in.***
No. 2	***2.98 in.***	***2.92 in.***	***3.12 in.***	***2.95 in.***
No. 3	***2.96 in.***	***2.90 in.***	***3.10 in.***	***3.01 in.***
Average	2.97 in.	2.91 in.	3.12 in.	3.02 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***639.50 g***	***628.60 g***
Area, Ao	6.91 in^2	6.65 in^2
Volume, Vo	21.57 in^3	20.05 in^3
Bulk Unit Weight	112.9 lb/ft^3	119.4 lb/ft^3
Dry Unit Weight	85.0 lb/ft^3	91.5 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8411_PM
SAMPLE No.:	15A (28 DAY)	EQUIPMENT No.:	6B
TEST DATE:	10/3/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
10/03/12	9 : 33	RJB	7.0	5.0	6.0	*	*	*	*
10/03/12	10 : 9	RJB	17.0	15.0	15.9	10.0	10.0	4.0	0.40
10/03/12	11 : 7	RJB	27.0	25.0	25.9	22.1	10.0	6.2	0.62
10/03/12	11 : 50	RJB	37.0	35.0	35.9	33.3	10.0	7.4	0.74
10/03/12	12 : 43	RJB	47.0	45.0	45.8	43.9	10.0	8.0	0.80
10/03/12	13 : 37	RJB	57.0	55.0	55.8	54.7	10.0	8.9	0.89
10/03/12	14 : 25	RJB	67.0	65.0	65.8	65.2	10.0	9.4	0.94
10/03/12	14 : 58	RJB	77.0	75.0	*	75.6	10.0	9.8	0.98
10/03/12	14 : 59	RJB	67.0	65.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8411_PM
SAMPLE No.:	15A (28 DAY)	6B
TEST DATE:	10/3/2012	

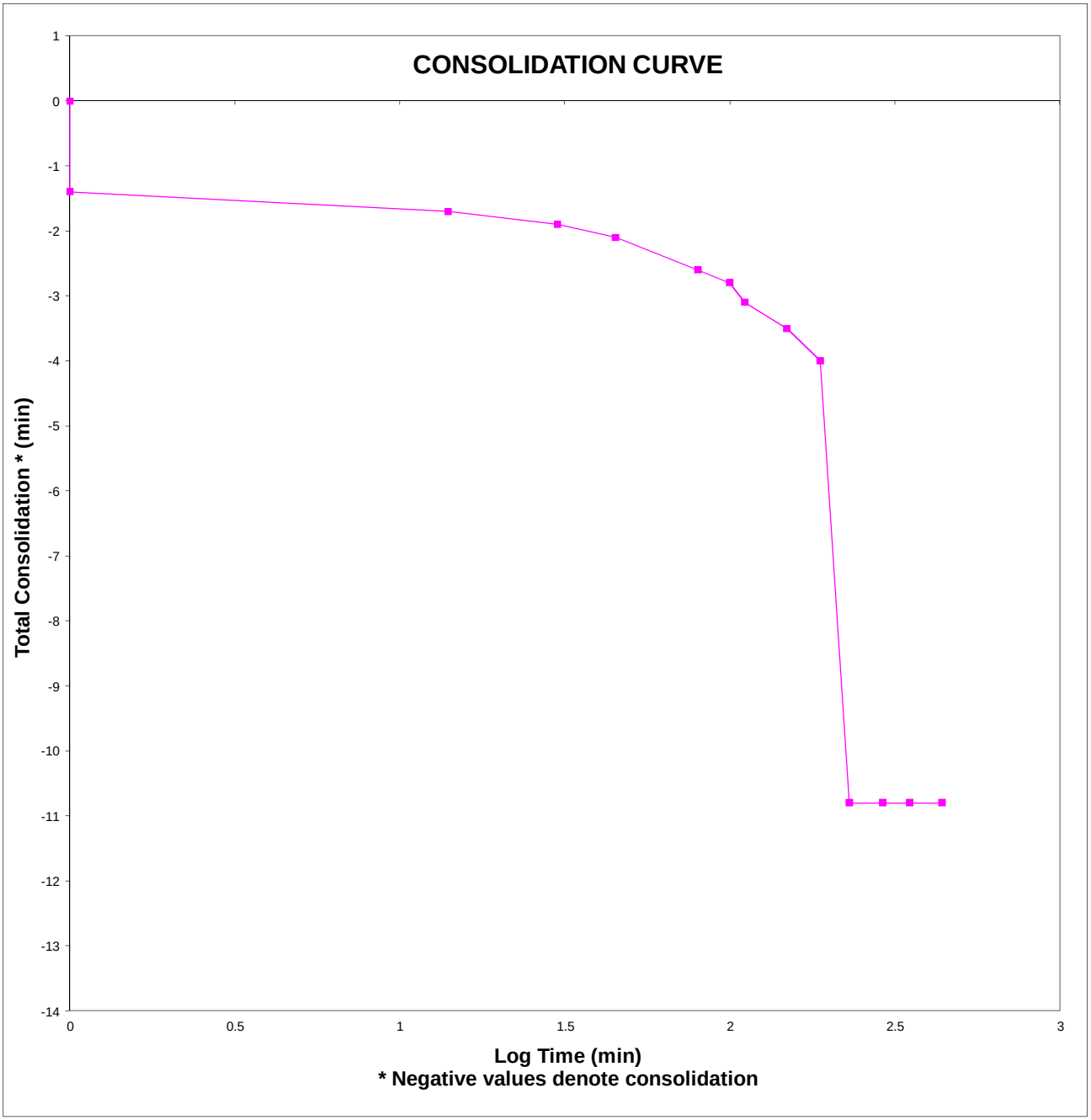
CELL PRESSURE: 75 psi **BACK PRESSURE:** 65 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
10 / 4 / 12	RJB	8 : 40	0	0	0	25.0	25.0	0.0
10 / 4 / 12	RJB	8 : 41	1	1	0.00	24.3	24.3	1.4
10 / 4 / 12	RJB	8 : 54	13	14	1.15	24.2	24.1	1.7
10 / 4 / 12	RJB	9 : 10	16	30	1.48	24.2	23.9	1.9
10 / 4 / 12	RJB	9 : 25	15	45	1.65	24.2	23.7	2.1
10 / 4 / 12	RJB	10 : 0	35	80	1.90	24.2	23.2	2.6
10 / 4 / 12	RJB	10 : 20	20	100	2.00	24.2	23.0	2.8
10 / 4 / 12	RJB	10 : 31	11	111	2.05	24.1	22.8	3.1
10 / 4 / 12	RJB	11 : 9	38	149	2.17	24.1	22.4	3.5
10 / 4 / 12	RJB	11 : 48	39	188	2.27	24.0	22.0	4.0
10 / 4 / 12	RJB	12 : 30	42	230	2.36	21.3	17.9	10.8
10 / 4 / 12	RJB	13 : 30	60	290	2.46	21.3	17.9	10.8
10 / 4 / 12	RJB	14 : 30	60	350	2.54	21.3	17.9	10.8
10 / 4 / 12	RJB	16 : 0	90	440	2.64	21.3	17.9	10.8

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8411_PM
SAMPLE No.:	15A (28 DAY)	EQUIPMENT No.:	6B
TEST DATE:	10/3/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8411_PM
SAMPLE No.:	15A (28 DAY)	EQUIPMENT No.:	6B
TEST DATE:	10/3/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
10 / 5 / 12	RJB	8 : 4	0	0.0	25.0	20.0	75.0	65.0	65.0
10 / 5 / 12	RJB	8 : 35	31	0.5	24.3	20.0	75.0	65.0	65.0
10 / 5 / 12	RJB	9 : 11	36	1.0	23.6	20.0	75.0	65.0	65.0
10 / 5 / 12	RJB	10 : 2	51	1.7	22.7	20.0	75.0	65.0	65.0
10 / 5 / 12	RJB	11 : 20	78	2.7	21.4	20.0	75.0	65.0	65.0
10 / 5 / 12	RJB	13 : 19	RESET	0.0	25.0	20.0	75.0	65.0	65.0
10 / 5 / 12	RJB	13 : 48	29	0.5	24.5	20.0	75.0	65.0	65.0
10 / 5 / 12	RJB	14 : 19	31	1.0	24.0	20.0	75.0	65.0	65.0
10 / 5 / 12	RJB	15 : 23	64	1.8	23.2	20.0	75.0	65.0	65.0
10 / 5 / 12	RJB	16 : 6	43	2.3	22.4	20.0	75.0	65.0	65.0
10 / 8 / 12	RJB	9 : 1	RESTE	0.0	25.0	20.0	75.0	65.0	65.0
10 / 8 / 12	RJB	9 : 28	27	0.5	24.5	20.0	75.0	65.0	65.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8411_PM
SAMPLE No.:	15A (28 DAY)	EQUIPMENT No.:	6B
TEST DATE:	10/3/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.153		
31	0.5	0.7	1.40	3.002	2.35E-06	2.36E-06
36	0.5	0.7	1.40	2.851	2.13E-06	2.14E-06
51	0.7	0.9	1.29	2.649	2.13E-06	2.14E-06
78	1.0	1.3	1.30	2.359	2.20E-06	2.21E-06
RESET				3.153		
29	0.5	0.5	1.00	3.027	2.09E-06	2.10E-06
31	0.5	0.5	1.00	2.901	2.03E-06	2.04E-06
64	0.8	0.8	1.00	2.699	1.67E-06	1.68E-06
43	0.5	0.8	1.60	2.535	2.16E-06	2.17E-06
RESET				3.153		
27	0.5	0.5	1.00	3.027	2.24E-06	2.25E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8411_PM
SAMPLE No.:	15A (28 DAY)	EQUIPMENT No.:	6B
TEST DATE:	10/3/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	112.9 lb/ft³	119.4 lb/ft³
DRY UNIT WEIGHT	85.0 lb/ft³	91.5 lb/ft³
MOISTURE CONTENT	32.9 %	30.5 %
PERMEABILITY @ 20°C	2.0E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-15A (28 day)		
TESTING DATE:	3-Oct-12	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8411

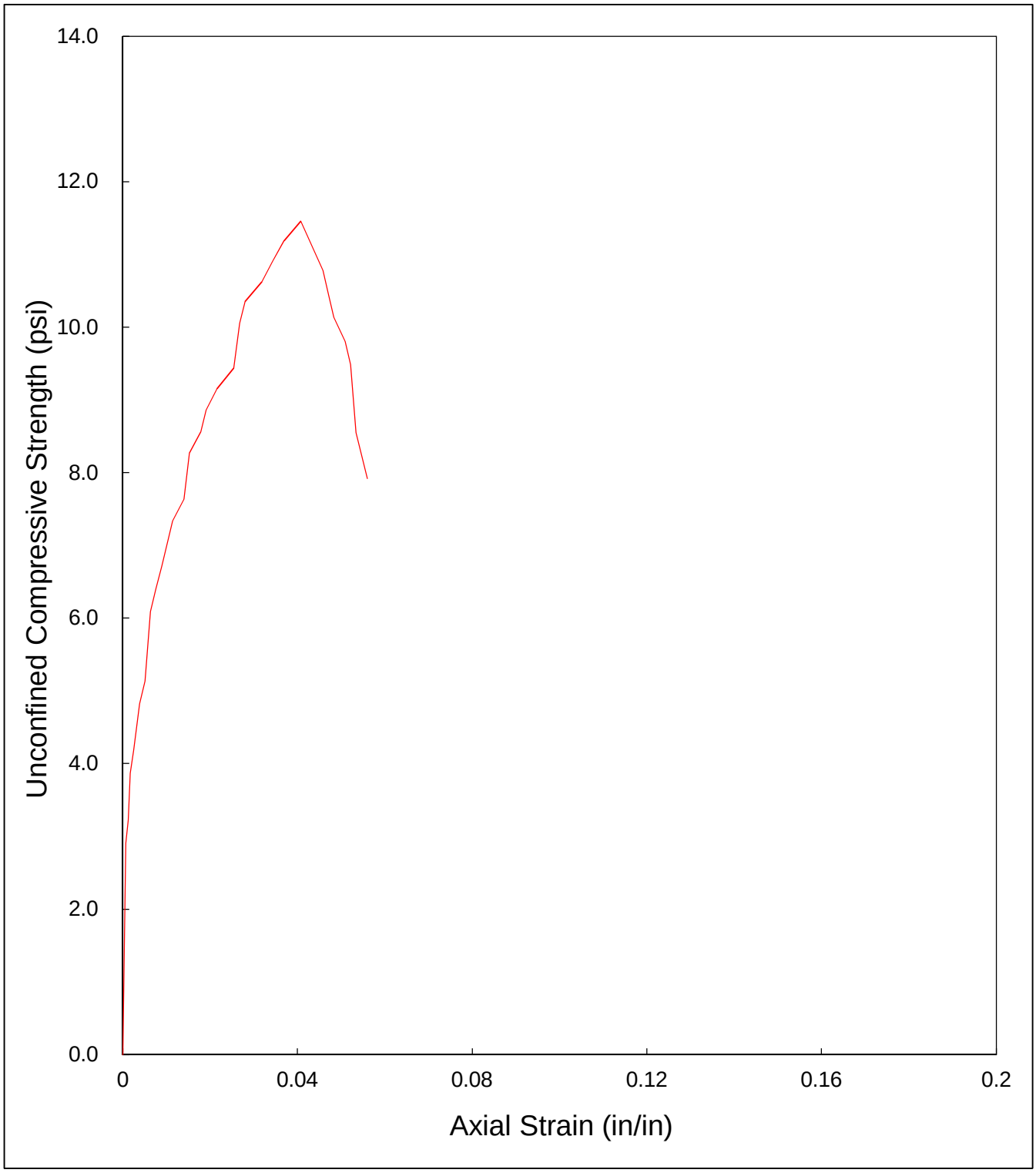
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	162.00	g
3. WT WET SOIL + TARE	319.26	g
4. WT DRY SOIL + TARE	278.88	g
5. WT WATER, Ww	40.38	g
6. WT DRY SOIL, Ws	116.88	g
7. MOISTURE CONTENT, W	**34.55**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.93	in.
No. 2	1.99	in.	3.92	in.
No. 3	1.97	in.	3.94	in.
Average	**1.99**	**in.**	**3.93**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***354.81***	***g***
Initial Area, Ac	3.10	in²
Initial Volume, Vc	12.17	in³
Initial Bulk Unit Weight,	111.0	lb/ft³
Initial Dry Unit Weigh	82.5	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	11.5	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.099	0.0000	0.0
9	0.003	0.003	3.101	0.0008	2.9
10	0.005	0.005	3.103	0.0013	3.2
12	0.007	0.007	3.104	0.0018	3.9
13	0.010	0.010	3.107	0.0025	4.2
15	0.015	0.015	3.111	0.0038	4.8
16	0.020	0.020	3.115	0.0051	5.1
19	0.025	0.025	3.119	0.0064	6.1
20	0.030	0.030	3.123	0.0076	6.4
21	0.035	0.035	3.127	0.0089	6.7
22	0.040	0.040	3.131	0.0102	7.0
23	0.045	0.045	3.135	0.0115	7.3
24	0.055	0.055	3.143	0.0140	7.6
26	0.060	0.060	3.147	0.0153	8.3
27	0.070	0.070	3.155	0.0178	8.6
28	0.075	0.075	3.159	0.0191	8.9
29	0.085	0.085	3.167	0.0216	9.2
30	0.100	0.100	3.180	0.0255	9.4
32	0.105	0.105	3.184	0.0267	10.1
33	0.110	0.110	3.188	0.0280	10.4
34	0.125	0.125	3.201	0.0318	10.6
35	0.135	0.135	3.209	0.0344	10.9
36	0.145	0.145	3.218	0.0369	11.2
37	0.160	0.160	3.230	0.0407	11.5
35	0.180	0.180	3.248	0.0458	10.8
34	0.185	0.185	3.252	0.0471	10.5
33	0.190	0.190	3.256	0.0484	10.1
32	0.200	0.200	3.265	0.0509	9.8
31	0.205	0.205	3.269	0.0522	9.5
28	0.210	0.210	3.274	0.0535	8.6
26	0.220	0.220	3.283	0.0560	7.9

UNCONFINED COMPRESSION TESTING
Sample No. 0427-15A (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-15A (28 day)		
TESTING DATE:	10/3/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8411

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	34.5	**%**
BULK UNIT WEIGHT	111.0	lb/ft^3
DRY UNIT WEIGHT	82.5	lb/ft^3
UCS *	11.5	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	10/3/2012
TESTED BY:	TNR
TRACKING CODE:	8412

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-16A		11.98
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	11.98

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8412_PM
SAMPLE No.:	16A (28 DAY)	EQUIPMENT No.:	6A
TEST DATE:	10/3/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	232.26 ***g***
3. WT WET SOIL + TARE	592.14 ***g***	825.50 ***g***
4. WT DRY SOIL + TARE	486.44 ***g***	718.70 ***g***
5. WT WATER, Ww	105.70 g	106.80 g
6. WT DRY SOIL, Ws	486.44 g	486.44 g
7. MOISTURE CONTENT, W	21.73 %	21.96 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.97 in.***	***2.95 in.***	***2.64 in.***	***2.66 in.***
No. 2	***2.98 in.***	***2.98 in.***	***2.73 in.***	***2.67 in.***
No. 3	***2.98 in.***	***2.98 in.***	***2.61 in.***	***2.62 in.***
Average	2.98 in.	2.97 in.	2.66 in.	2.65 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***592.14 g***	***593.99 g***
Area, Ao	6.96 in^2	6.92 in^2
Volume, Vo	18.52 in^3	18.34 in^3
Bulk Unit Weight	121.8 lb/ft^3	123.4 lb/ft^3
Dry Unit Weight	100.0 lb/ft^3	101.2 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8412_PM
SAMPLE No.:	16A (28 DAY)	EQUIPMENT No.:	6A
TEST DATE:	10/3/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
10/03/12	8 : 55	RJB	7.0	5.0	6.0	*	*	*	*
10/03/12	9 : 35	RJB	17.0	15.0	16.0	8.2	10.0	2.2	0.22
10/03/12	10 : 11	RJB	27.0	25.0	26.0	19.5	10.0	3.5	0.35
10/03/12	11 : 8	RJB	37.0	35.0	36.0	31.4	10.0	5.4	0.54
10/03/12	11 : 50	RJB	47.0	45.0	46.0	42.6	10.0	6.6	0.66
10/03/12	12 : 45	RJB	57.0	55.0	55.8	53.5	10.0	7.5	0.75
10/03/12	13 : 35	RJB	67.0	65.0	65.8	64.1	10.0	8.3	0.83
10/03/12	14 : 23	RJB	77.0	75.0	75.9	74.7	10.0	8.9	0.89
10/03/12	14 : 57	RJB	87.0	85.0	86.0	85.2	10.0	9.3	0.93
10/03/12	15 : 35	RJB	97.0	95.0	*	95.7	10.0	9.7	0.97
10/03/12	15 : 36	RJB	107.0	105.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8412_PM
SAMPLE No.:	16A (28 DAY)	6A
TEST DATE:	10/3/2012	

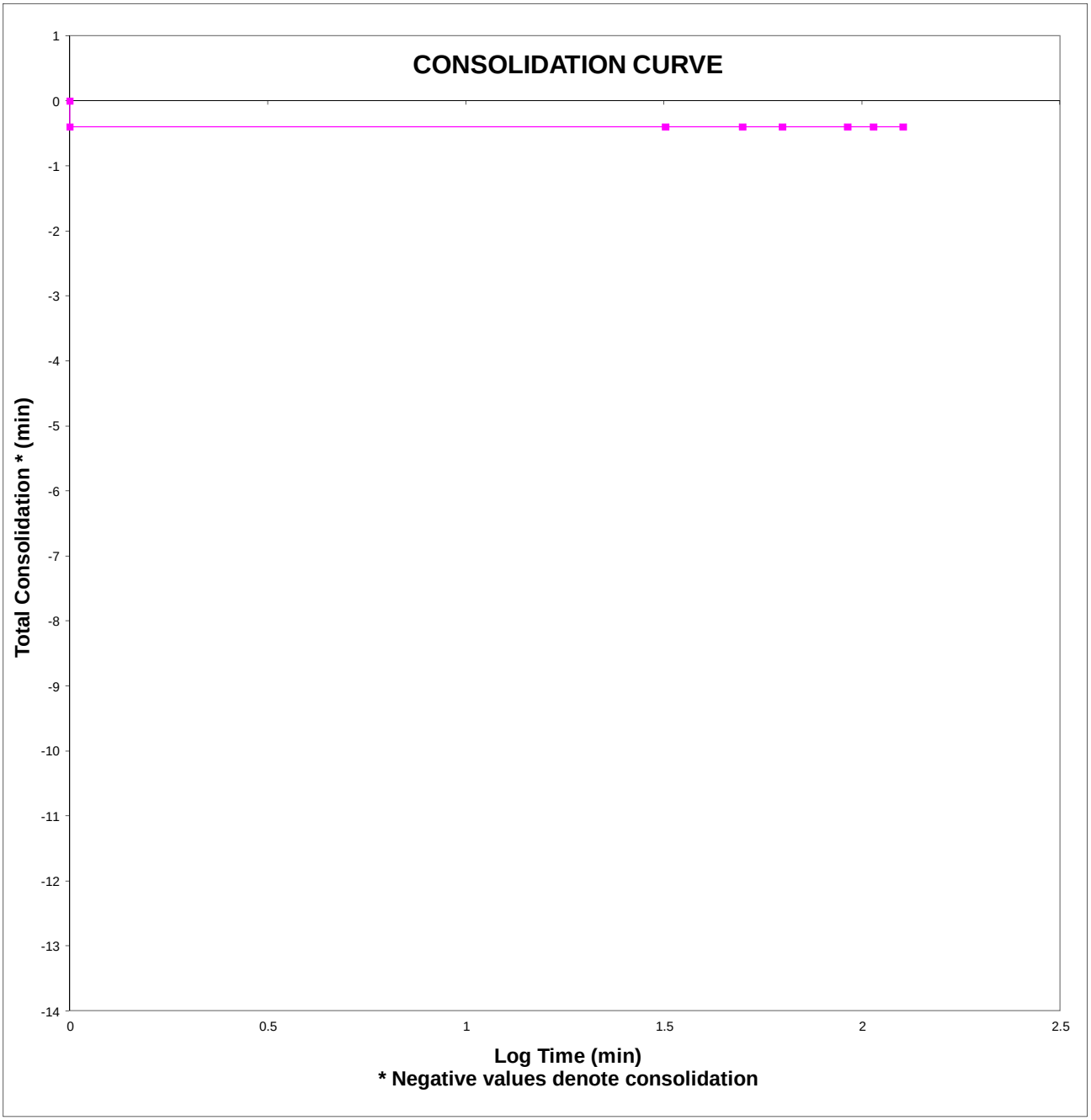
CELL PRESSURE: 95 psi **BACK PRESSURE:** 85 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
10 / 4 / 12	RJB	9 : 28	0	0	0	25.0	25.0	0.0
10 / 4 / 12	RJB	9 : 29	1	1	0.00	24.8	24.8	0.4
10 / 4 / 12	RJB	10 : 0	31	32	1.51	24.8	24.8	0.4
10 / 4 / 12	RJB	10 : 18	18	50	1.70	24.8	24.8	0.4
10 / 4 / 12	RJB	10 : 31	13	63	1.80	24.8	24.8	0.4
10 / 4 / 12	RJB	11 : 0	29	92	1.96	24.8	24.8	0.4
10 / 4 / 12	RJB	11 : 15	15	107	2.03	24.8	24.8	0.4
10 / 4 / 12	RJB	11 : 35	20	127	2.10	24.8	24.8	0.4

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8412_PM
SAMPLE No.:	16A (28 DAY)	EQUIPMENT No.:	6A
TEST DATE:	10/3/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8412_PM
SAMPLE No.:	16A (28 DAY)	EQUIPMENT No.:	6A
TEST DATE:	10/3/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
10 / 4 / 12	RJB	13 : 23	0	0.0	25.0	20.0	95.0	85.0	85.0
10 / 4 / 12	RJB	13 : 24	1	0.9	24.1	20.0	95.0	85.0	85.0
10 / 4 / 12	RJB	13 : 33	9	6.2	18.9	20.0	95.0	85.0	85.0
10 / 4 / 12	RJB	13 : 35	2	7.0	18.1	20.0	95.0	85.0	85.0
10 / 4 / 12	RJB	13 : 38	3	8.0	17.0	20.0	95.0	85.0	85.0
10 / 4 / 12	RJB	13 : 40	2	8.6	16.5	20.0	95.0	85.0	85.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8412_PM
SAMPLE No.:	16A (28 DAY)	EQUIPMENT No.:	6A
TEST DATE:	10/3/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.698		
1	0.9	0.9	1.00	3.432	9.37E-05	9.42E-05
9	5.3	5.2	0.98	1.879	8.40E-05	8.44E-05
2	0.8	0.8	1.00	1.642	8.45E-05	8.48E-05
3	1.0	1.1	1.10	1.331	8.77E-05	8.81E-05
2	0.6	0.5	0.83	1.169	8.18E-05	8.21E-05

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8412_PM
SAMPLE No.:	16A (28 DAY)	EQUIPMENT No.:	6A
TEST DATE:	10/3/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	121.8 lb/ft³	123.4 lb/ft³
DRY UNIT WEIGHT	100.0 lb/ft³	101.2 lb/ft³
MOISTURE CONTENT	21.7 %	22.0 %
PERMEABILITY @ 20°C	8.8E-05 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-16A (28 day)		
TESTING DATE:	3-Oct-12	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8412

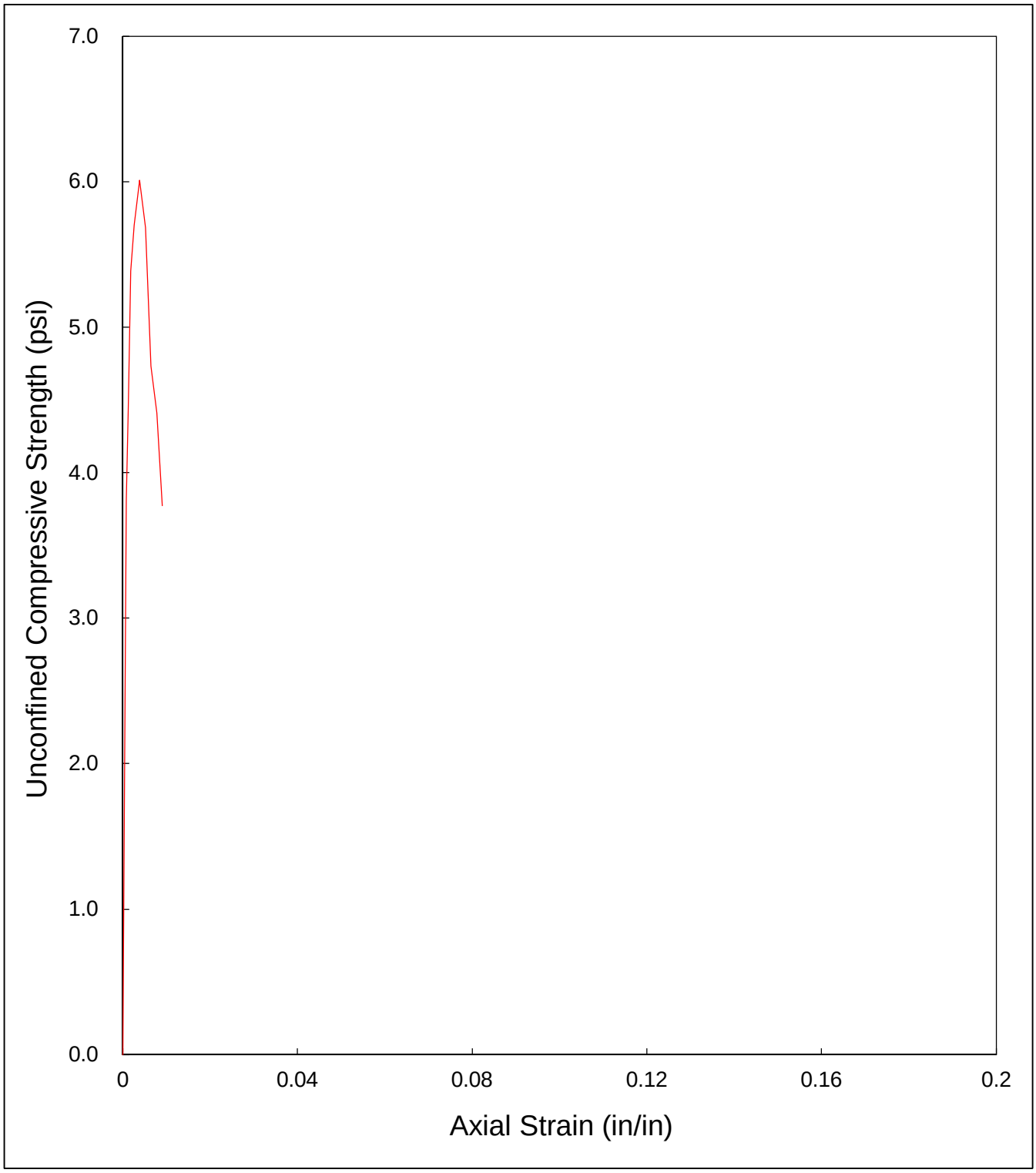
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	166.10	g
3. WT WET SOIL + TARE	327.39	g
4. WT DRY SOIL + TARE	302.77	g
5. WT WATER, Ww	24.62	g
6. WT DRY SOIL, Ws	136.67	g
7. MOISTURE CONTENT, W	**18.01**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.02	in.	3.84	in.
No. 2	2.01	in.	3.86	in.
No. 3	1.98	in.	3.87	in.
Average	**2.00**	**in.**	**3.86**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***383.63***	***g***
Initial Area, Ac	3.15	in²
Initial Volume, Vc	12.15	in³
Initial Bulk Unit Weight,	120.3	lb/ft³
Initial Dry Unit Weigh	101.9	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	6.0	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.150	0.0000	0.0
12	0.003	0.003	3.152	0.0008	3.8
14	0.005	0.005	3.154	0.0013	4.4
17	0.007	0.007	3.156	0.0018	5.4
18	0.010	0.010	3.158	0.0026	5.7
19	0.015	0.015	3.162	0.0039	6.0
18	0.020	0.020	3.166	0.0052	5.7
15	0.025	0.025	3.171	0.0065	4.7
14	0.030	0.030	3.175	0.0078	4.4
12	0.035	0.035	3.179	0.0091	3.8

UNCONFINED COMPRESSION TESTING
Sample No. 0427-16A (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-16A (28 day)		
TESTING DATE:	10/3/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8412

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	18.0	**%**
BULK UNIT WEIGHT	120.3	lb/ft^3
DRY UNIT WEIGHT	101.9	lb/ft^3
UCS *	6.0	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	10/3/2012
TESTED BY:	TNR
TRACKING CODE:	8413

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-17A		12.08
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.08

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8413_PM
SAMPLE No.:	17A (28 DAY)	EQUIPMENT No.:	7B
TEST DATE:	10/3/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	227.64 ***g***
3. WT WET SOIL + TARE	596.23 ***g***	828.60 ***g***
4. WT DRY SOIL + TARE	479.06 ***g***	706.70 ***g***
5. WT WATER, Ww	117.17 g	121.90 g
6. WT DRY SOIL, Ws	479.06 g	479.06 g
7. MOISTURE CONTENT, W	24.46 %	25.45 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.97 in.***	***2.98 in.***	***2.79 in.***	***2.71 in.***
No. 2	***2.98 in.***	***2.98 in.***	***2.80 in.***	***2.80 in.***
No. 3	***2.98 in.***	***2.94 in.***	***2.80 in.***	***2.79 in.***
Average	2.97 in.	2.97 in.	2.79 in.	2.76 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***596.23 g***	***602.36 g***
Area, Ao	6.95 in^2	6.91 in^2
Volume, Vo	19.40 in^3	19.10 in^3
Bulk Unit Weight	117.1 lb/ft^3	120.1 lb/ft^3
Dry Unit Weight	94.1 lb/ft^3	95.8 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8413_PM
SAMPLE No.:	17A (28 DAY)	EQUIPMENT No.:	7B
TEST DATE:	10/3/12		

TEST	TIME	TESTED	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
DATE	(military)	BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
10/03/12	9 : 48	RJB	7.0	5.0	6.0	*	*	*	*
10/03/12	11 : 10	RJB	17.0	15.0	16.4	8.4	10.0	2.4	0.24
10/03/12	11 : 53	RJB	27.0	25.0	26.1	19.9	10.0	3.5	0.35
10/03/12	12 : 47	RJB	37.0	35.0	36.1	31.0	10.0	4.9	0.49
10/03/12	13 : 35	RJB	47.0	45.0	46.0	42.1	10.0	6.0	0.60
10/03/12	14 : 20	RJB	57.0	55.0	56.1	53.1	10.0	7.1	0.71
10/03/12	14 : 55	RJB	67.0	65.0	66.1	64.0	10.0	7.9	0.79
10/03/12	15 : 36	RJB	77.0	75.0	76.2	74.5	10.0	8.4	0.84
10/03/12	8 : 6	RJB	87.0	85.0	*	85.9	10.0	9.7	0.97
10/03/12	8 : 7	RJB	97.0	95.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8413_PM
SAMPLE No.:	17A (28 DAY)	7B
TEST DATE:	10/3/2012	

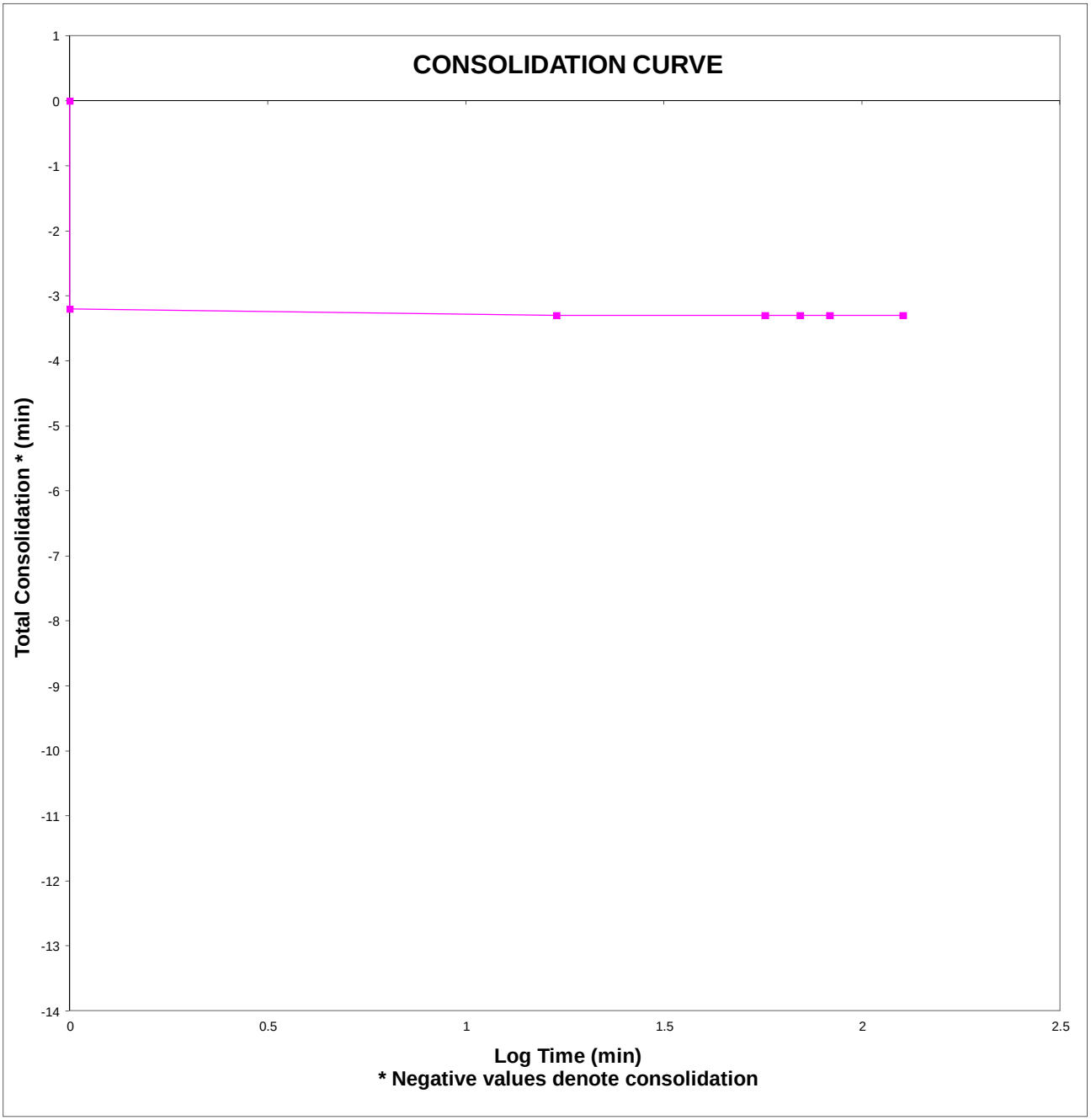
CELL PRESSURE: 85 psi **BACK PRESSURE:** 75 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
10 / 4 / 12	RJB	9 : 8	0	0	0	25.0	25.0	0.0
10 / 4 / 12	RJB	9 : 9	1	1	0.00	23.2	23.6	3.2
10 / 4 / 12	RJB	9 : 25	16	17	1.23	23.2	23.5	3.3
10 / 4 / 12	RJB	10 : 5	40	57	1.76	23.2	23.5	3.3
10 / 4 / 12	RJB	10 : 18	13	70	1.85	23.2	23.5	3.3
10 / 4 / 12	RJB	10 : 31	13	83	1.92	23.2	23.5	3.3
10 / 4 / 12	RJB	11 : 15	44	127	2.10	23.2	23.5	3.3

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8413_PM
SAMPLE No.:	17A (28 DAY)	EQUIPMENT No.:	7B
TEST DATE:	10/3/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8413_PM
SAMPLE No.:	17A (28 DAY)	EQUIPMENT No.:	7B
TEST DATE:	10/3/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
10 / 4 / 12	RJB	11 : 25	0	0.0	25.0	20.0	85.0	75.0	75.0
10 / 4 / 12	RJB	11 : 35	10	1.5	23.5	20.0	85.0	75.0	75.0
10 / 4 / 12	RJB	11 : 48	13	3.0	22.0	20.0	85.0	75.0	75.0
10 / 4 / 12	RJB	12 : 9	21	5.2	19.8	20.0	85.0	75.0	75.0
10 / 4 / 12	RJB	12 : 38	29	7.5	17.6	20.0	85.0	75.0	75.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8413_PM
SAMPLE No.:	17A (28 DAY)	EQUIPMENT No.:	7B
TEST DATE:	10/3/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.524		
10	1.5	1.5	1.00	3.101	1.69E-05	1.69E-05
13	1.5	1.5	1.00	2.678	1.49E-05	1.49E-05
21	2.2	2.2	1.00	2.058	1.65E-05	1.66E-05
29	2.3	2.2	0.96	1.424	1.68E-05	1.68E-05

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8413_PM
SAMPLE No.:	17A (28 DAY)	EQUIPMENT No.:	7B
TEST DATE:	10/3/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	117.1 lb/ft³	120.1 lb/ft³
DRY UNIT WEIGHT	94.1 lb/ft³	95.8 lb/ft³
MOISTURE CONTENT	24.5 %	25.4 %
PERMEABILITY @ 20°C	1.6E-05 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-17A (28 day)		
TESTING DATE:	3-Oct-12	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8413

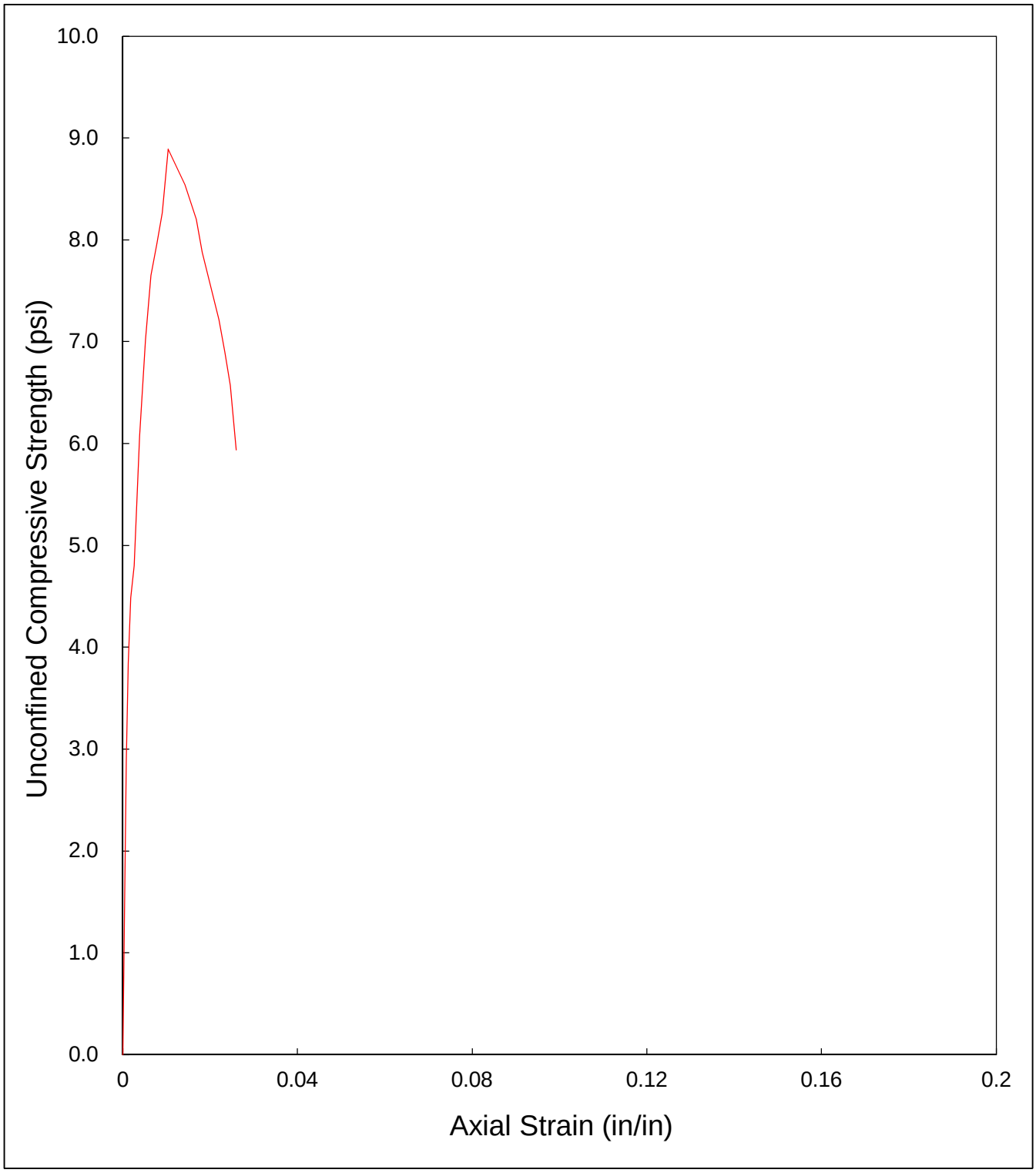
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	160.91	g
3. WT WET SOIL + TARE	297.72	g
4. WT DRY SOIL + TARE	271.85	g
5. WT WATER, Ww	25.87	g
6. WT DRY SOIL, Ws	110.94	g
7. MOISTURE CONTENT, W	**23.32**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.85	in.
No. 2	2.00	in.	3.84	in.
No. 3	1.98	in.	3.86	in.
Average	**1.99**	**in.**	**3.85**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***353.95***	***g***
Initial Area, Ac	3.12	in^2
Initial Volume, Vc	12.01	in^3
Initial Bulk Unit Weight,	112.3	lb/ft^3
Initial Dry Unit Weigh	91.0	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	8.9	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.117	0.0000	0.0
9	0.003	0.003	3.119	0.0008	2.9
12	0.005	0.005	3.121	0.0013	3.8
14	0.007	0.007	3.122	0.0018	4.5
15	0.010	0.010	3.125	0.0026	4.8
19	0.015	0.015	3.129	0.0039	6.1
22	0.020	0.020	3.133	0.0052	7.0
24	0.025	0.025	3.137	0.0065	7.7
25	0.030	0.030	3.141	0.0078	8.0
26	0.035	0.035	3.145	0.0091	8.3
28	0.040	0.040	3.149	0.0104	8.9
27	0.055	0.055	3.162	0.0143	8.5
26	0.065	0.065	3.170	0.0169	8.2
25	0.070	0.070	3.174	0.0182	7.9
23	0.085	0.085	3.187	0.0221	7.2
22	0.090	0.090	3.191	0.0234	6.9
21	0.095	0.095	3.195	0.0247	6.6
19	0.100	0.100	3.200	0.0260	5.9

UNCONFINED COMPRESSION TESTING
Sample No. 0427-17A (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-17A (28 day)		
TESTING DATE:	10/3/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8413

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	23.3	**%**
BULK UNIT WEIGHT	112.3	lb/ft^3
DRY UNIT WEIGHT	91.0	lb/ft^3
UCS *	8.9	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	10/3/2012
TESTED BY:	TNR
TRACKING CODE:	8414

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-18A		12.01
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.01

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8414_PM
SAMPLE No.:	18A (28 DAY)	EQUIPMENT No.:	7A
TEST DATE:	10/3/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	206.78 ***g***
3. WT WET SOIL + TARE	549.28 ***g***	749.80 ***g***
4. WT DRY SOIL + TARE	422.92 ***g***	629.70 ***g***
5. WT WATER, Ww	126.36 g	120.10 g
6. WT DRY SOIL, Ws	422.92 g	422.92 g
7. MOISTURE CONTENT, W	29.88 %	28.40 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.99 in.***	***2.87 in.***	***2.74 in.***	***2.73 in.***
No. 2	***2.96 in.***	***2.91 in.***	***2.79 in.***	***2.68 in.***
No. 3	***2.98 in.***	***2.91 in.***	***2.77 in.***	***2.67 in.***
Average	2.98 in.	2.90 in.	2.77 in.	2.69 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***549.28 g***	***544.03 g***
Area, Ao	6.95 in^2	6.59 in^2
Volume, Vo	19.24 in^3	17.74 in^3
Bulk Unit Weight	108.8 lb/ft^3	116.8 lb/ft^3
Dry Unit Weight	83.7 lb/ft^3	91.0 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8414_PM
SAMPLE No.:	18A (28 DAY)	EQUIPMENT No.:	7A
TEST DATE:	10/3/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
10/03/12	9 : 55	RJB	7.0	5.0	5.5	*	*	*	*
10/03/12	11 : 12	RJB	17.0	15.0	15.6	8.3	10.0	2.8	0.28
10/03/12	11 : 55	RJB	27.0	25.0	25.6	18.2	10.0	2.6	0.26
10/03/12	12 : 48	RJB	37.0	35.0	35.6	30.1	10.0	4.5	0.45
10/03/12	13 : 33	RJB	47.0	45.0	45.5	41.2	10.0	5.6	0.56
10/03/12	14 : 20	RJB	57.0	55.0	55.6	52.0	10.0	6.5	0.65
10/03/12	14 : 55	RJB	67.0	65.0	65.6	62.9	10.0	7.3	0.73
10/03/12	15 : 35	RJB	77.0	75.0	75.7	73.6	10.0	8.0	0.80
10/03/12	8 : 40	RJB	87.0	85.0	*	85.2	10.0	9.5	0.95
10/03/12	8 : 41	RJB	77.0	75.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8414_PM
SAMPLE No.:	18A (28 DAY)	7A
TEST DATE:	10/3/2012	

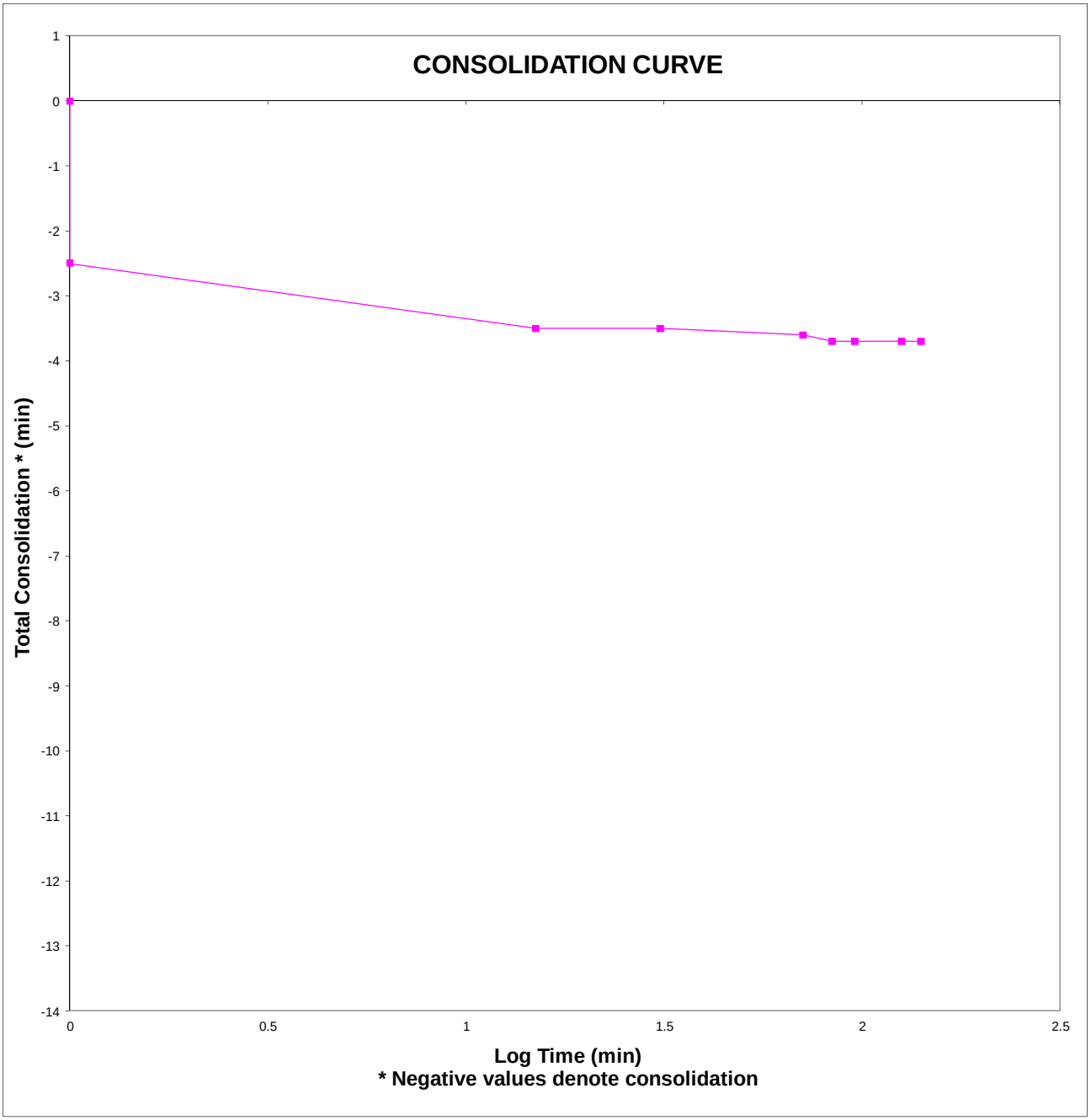
CELL PRESSURE: 85 psi **BACK PRESSURE:** 75 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
10 / 4 / 12	RJB	8 : 54	0	0	0	25.0	25.0	0.0
10 / 4 / 12	RJB	8 : 55	1	1	0.00	23.8	23.7	2.5
10 / 4 / 12	RJB	9 : 9	14	15	1.18	23.3	23.2	3.5
10 / 4 / 12	RJB	9 : 25	16	31	1.49	23.3	23.2	3.5
10 / 4 / 12	RJB	10 : 5	40	71	1.85	23.3	23.1	3.6
10 / 4 / 12	RJB	10 : 18	13	84	1.92	23.3	23.0	3.7
10 / 4 / 12	RJB	10 : 30	12	96	1.98	23.3	23.0	3.7
10 / 4 / 12	RJB	11 : 0	30	126	2.10	23.3	23.0	3.7
10 / 4 / 12	RJB	11 : 15	15	141	2.15	23.3	23.0	3.7

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8414_PM
SAMPLE No.:	18A (28 DAY)	EQUIPMENT No.:	7A
TEST DATE:	10/3/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8414_PM
SAMPLE No.:	18A (28 DAY)	EQUIPMENT No.:	7A
TEST DATE:	10/3/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
10 / 4 / 12	RJB	11 : 22	0	0.0	25.0	20.0	85.0	75.0	75.0
10 / 4 / 12	RJB	11 : 34	12	0.6	24.4	20.0	85.0	75.0	75.0
10 / 4 / 12	RJB	11 : 47	13	1.3	23.8	20.0	85.0	75.0	75.0
10 / 4 / 12	RJB	12 : 8	21	2.2	22.9	20.0	85.0	75.0	75.0
10 / 4 / 12	RJB	12 : 37	29	3.4	21.7	20.0	85.0	75.0	75.0
10 / 5 / 12	RJB	7 : 38	RESET	0.0	25.0	20.0	85.0	75.0	75.0
10 / 5 / 12	RJB	7 : 49	11	0.6	24.4	20.0	85.0	75.0	75.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8414_PM
SAMPLE No.:	18A (28 DAY)	EQUIPMENT No.:	7A
TEST DATE:	10/3/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.556		
12	0.6	0.6	1.00	3.385	5.36E-06	5.38E-06
13	0.7	0.6	0.86	3.200	5.64E-06	5.67E-06
21	0.9	0.9	1.00	2.944	5.19E-06	5.21E-06
29	1.2	1.2	1.00	2.603	5.55E-06	5.58E-06
RESET				3.556		
11	0.6	0.6	1.00	3.385	5.84E-06	5.87E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8414_PM
SAMPLE No.:	18A (28 DAY)	EQUIPMENT No.:	7A
TEST DATE:	10/3/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	108.8 lb/ft³	116.8 lb/ft³
DRY UNIT WEIGHT	83.7 lb/ft³	91.0 lb/ft³
MOISTURE CONTENT	29.9 %	28.4 %
PERMEABILITY @ 20°C	5.5E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-18A (28 day)		
TESTING DATE:	3-Oct-12	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8414

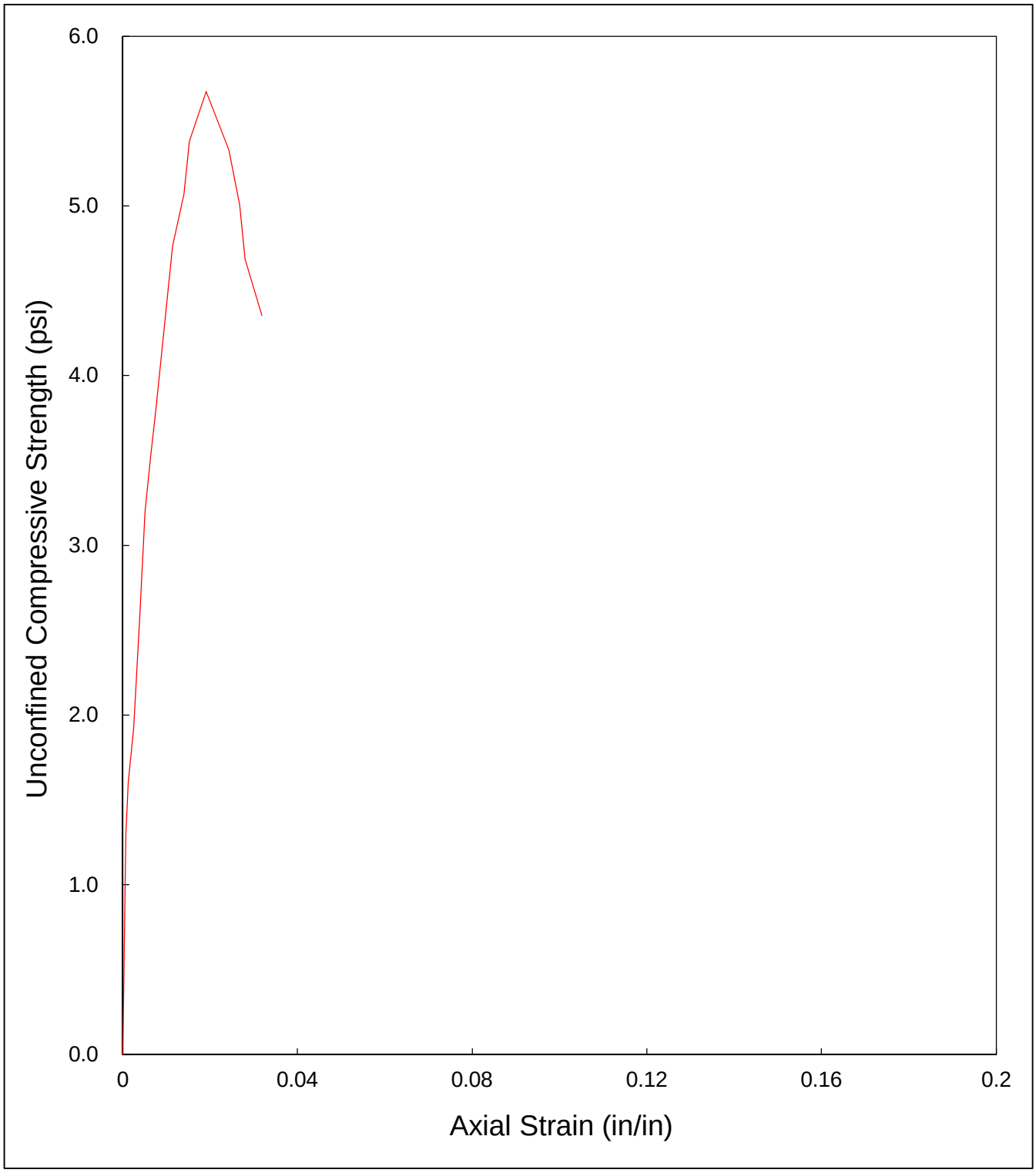
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	165.34	g
3. WT WET SOIL + TARE	327.82	g
4. WT DRY SOIL + TARE	289.51	g
5. WT WATER, Ww	38.31	g
6. WT DRY SOIL, Ws	124.17	g
7. MOISTURE CONTENT, W	**30.85**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.93	in.
No. 2	2.00	in.	3.91	in.
No. 3	1.98	in.	3.92	in.
Average	**1.99**	**in.**	**3.92**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***335.43***	***g***
Initial Area, Ac	3.11	in^2
Initial Volume, Vc	12.19	in^3
Initial Bulk Unit Weight,	104.8	lb/ft^3
Initial Dry Unit Weigh	80.1	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	5.7	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.111	0.0000	0.0
4	0.003	0.003	3.114	0.0008	1.3
5	0.005	0.005	3.115	0.0013	1.6
6	0.010	0.010	3.119	0.0026	1.9
8	0.015	0.015	3.123	0.0038	2.6
10	0.020	0.020	3.127	0.0051	3.2
11	0.025	0.025	3.131	0.0064	3.5
12	0.030	0.030	3.135	0.0077	3.8
13	0.035	0.035	3.139	0.0089	4.1
14	0.040	0.040	3.143	0.0102	4.5
15	0.045	0.045	3.147	0.0115	4.8
16	0.055	0.055	3.156	0.0140	5.1
17	0.060	0.060	3.160	0.0153	5.4
18	0.075	0.075	3.172	0.0191	5.7
17	0.095	0.095	3.189	0.0242	5.3
16	0.105	0.105	3.197	0.0268	5.0
15	0.110	0.110	3.201	0.0281	4.7
14	0.125	0.125	3.214	0.0319	4.4

UNCONFINED COMPRESSION TESTING
Sample No. 0427-18A (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-18A (28 day)		
TESTING DATE:	10/3/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8414

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	30.9	**%**
BULK UNIT WEIGHT	104.8	lb/ft^3
DRY UNIT WEIGHT	80.1	lb/ft^3
UCS *	5.7	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	10/3/2012
TESTED BY:	TNR
TRACKING CODE:	8415

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-21A		12.22
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.22

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8415_PM
SAMPLE No.:	21A (28 DAY)	EQUIPMENT No.:	2
TEST DATE:	10/4/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	230.67 ***g***
3. WT WET SOIL + TARE	675.70 ***g***	930.00 ***g***
4. WT DRY SOIL + TARE	557.73 ***g***	788.40 ***g***
5. WT WATER, Ww	117.97 g	141.60 g
6. WT DRY SOIL, Ws	557.73 g	557.73 g
7. MOISTURE CONTENT, W	21.15 %	25.39 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.97 in.***	***2.97 in.***	***3.12 in.***	***3.14 in.***
No. 2	***2.97 in.***	***3.00 in.***	***3.20 in.***	***3.13 in.***
No. 3	***2.96 in.***	***3.00 in.***	***3.20 in.***	***3.20 in.***
Average	2.97 in.	2.99 in.	3.18 in.	3.15 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***675.70 g***	***699.40 g***
Area, Ao	6.91 in^2	7.02 in^2
Volume, Vo	21.93 in^3	22.13 in^3
Bulk Unit Weight	117.4 lb/ft^3	120.4 lb/ft^3
Dry Unit Weight	96.9 lb/ft^3	96.0 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8415_PM
SAMPLE No.:	21A (28 DAY)	EQUIPMENT No.:	2
TEST DATE:	10/4/12		

TEST	TIME	TESTED	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
DATE	(military)	BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
10/04/12	13 : 45	RJB	7.0	5.0	4.9	*	*	*	*
10/04/12	14 : 44	RJB	17.0	15.0	15.5	7.2	10.0	2.3	0.23
10/04/12	15 : 40	RJB	27.0	25.0	25.3	21.1	10.0	5.6	0.56
10/05/12	8 : 0	RJB	37.0	35.0	35.2	30.9	10.0	5.6	0.56
10/05/12	8 : 37	RJB	47.0	45.0	45.1	42.0	10.0	6.8	0.68
10/05/12	9 : 13	RJB	57.0	55.0	55.0	53.4	10.0	8.3	0.83
10/05/12	10 : 2	RJB	67.0	65.0	65.2	64.0	10.0	9.0	0.90
10/05/12	10 : 33	RJB	77.0	75.0	75.3	74.2	10.0	9.0	0.90
10/05/12	11 : 5	RJB	87.0	85.0	85.6	84.6	10.0	9.3	0.93
10/05/12	11 : 50	RJB	97.0	95.0	*	95.1	10.0	9.5	0.95
10/05/12	11 : 51	RJB	87.0	85.0	*	*	*	*	*
	:								

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	5415_PM
SAMPLE No.:	21A (28 DAY)	2
TEST DATE:	10/4/2012	

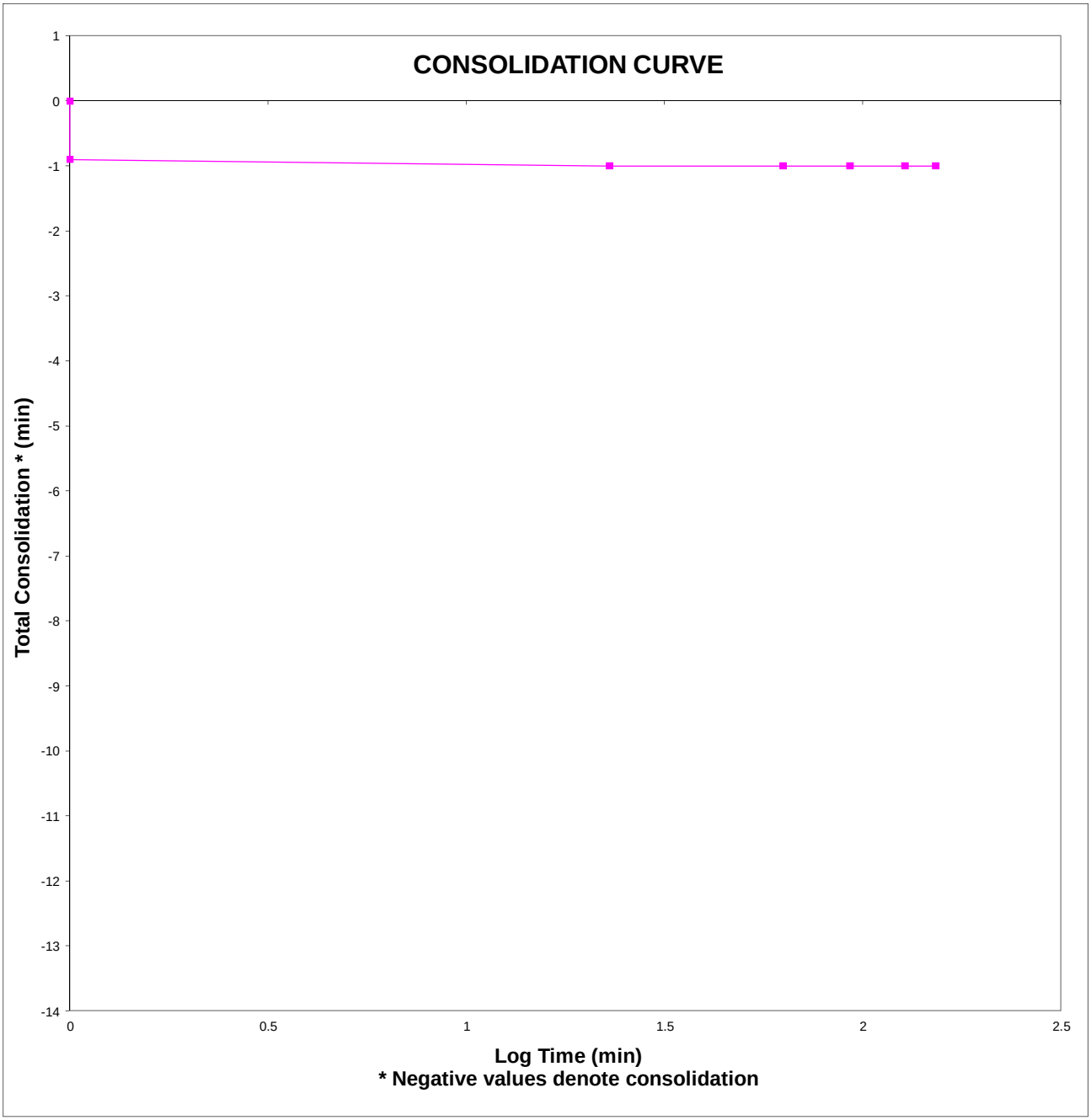
CELL PRESSURE: 95 psi **BACK PRESSURE:** 85 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
10 / 5 / 12	RJB	11 : 57	0	0	0	24.0	24.0	0.0
10 / 5 / 12	RJB	11 : 58	1	1	0.00	23.2	23.9	0.9
10 / 5 / 12	RJB	12 : 20	22	23	1.36	23.2	23.8	1.0
10 / 5 / 12	RJB	13 : 0	40	63	1.80	23.2	23.8	1.0
10 / 5 / 12	RJB	13 : 30	30	93	1.97	23.2	23.8	1.0
10 / 5 / 12	RJB	14 : 5	35	128	2.11	23.2	23.8	1.0
10 / 5 / 12	RJB	14 : 30	25	153	2.18	23.2	23.8	1.0

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8415_PM
SAMPLE No.:	21A (28 DAY)	EQUIPMENT No.:	2
TEST DATE:	10/4/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8415_PM
SAMPLE No.:	21A (28 DAY)	EQUIPMENT No.:	2
TEST DATE:	10/4/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
10 / 8 / 12	RJB	9 : 50	0	0.0	25.0	20.0	95.0	85.0	84.0
10 / 8 / 12	RJB	10 : 44	54	0.6	24.5	20.0	95.0	85.0	84.0
10 / 8 / 12	RJB	11 : 38	54	1.1	24.0	20.0	95.0	85.0	84.0
10 / 8 / 12	RJB	12 : 27	49	1.6	23.5	20.0	95.0	85.0	84.0
10 / 8 / 12	RJB	13 : 19	52	2.1	23.0	20.0	95.0	85.0	84.0
10 / 8 / 12	RJB	14 : 10	51	2.6	22.5	20.0	95.0	85.0	84.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8415_PM
SAMPLE No.:	21A (28 DAY)	EQUIPMENT No.:	2
TEST DATE:	10/4/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				11.821		
54	0.6	0.5	0.83	11.685	3.24E-07	3.26E-07
54	0.5	0.5	1.00	11.561	2.98E-07	2.99E-07
49	0.5	0.5	1.00	11.437	3.32E-07	3.33E-07
52	0.5	0.5	1.00	11.313	3.16E-07	3.18E-07
51	0.5	0.5	1.00	11.189	3.26E-07	3.27E-07

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8415_PM
SAMPLE No.:	21A (28 DAY)	EQUIPMENT No.:	2
TEST DATE:	10/4/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	117.4 lb/ft³	120.4 lb/ft³
DRY UNIT WEIGHT	96.9 lb/ft³	96.0 lb/ft³
MOISTURE CONTENT	21.2 %	25.4 %
PERMEABILITY @ 20°C	3.2E-07 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-21A		
TESTING DATE:	3-Oct-12	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8415

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	165.85	g
3. WT WET SOIL + TARE	285.27	g
4. WT DRY SOIL + TARE	265.77	g
5. WT WATER, Ww	19.50	g
6. WT DRY SOIL, Ws	99.92	g
7. MOISTURE CONTENT, W	**19.52**	**%**

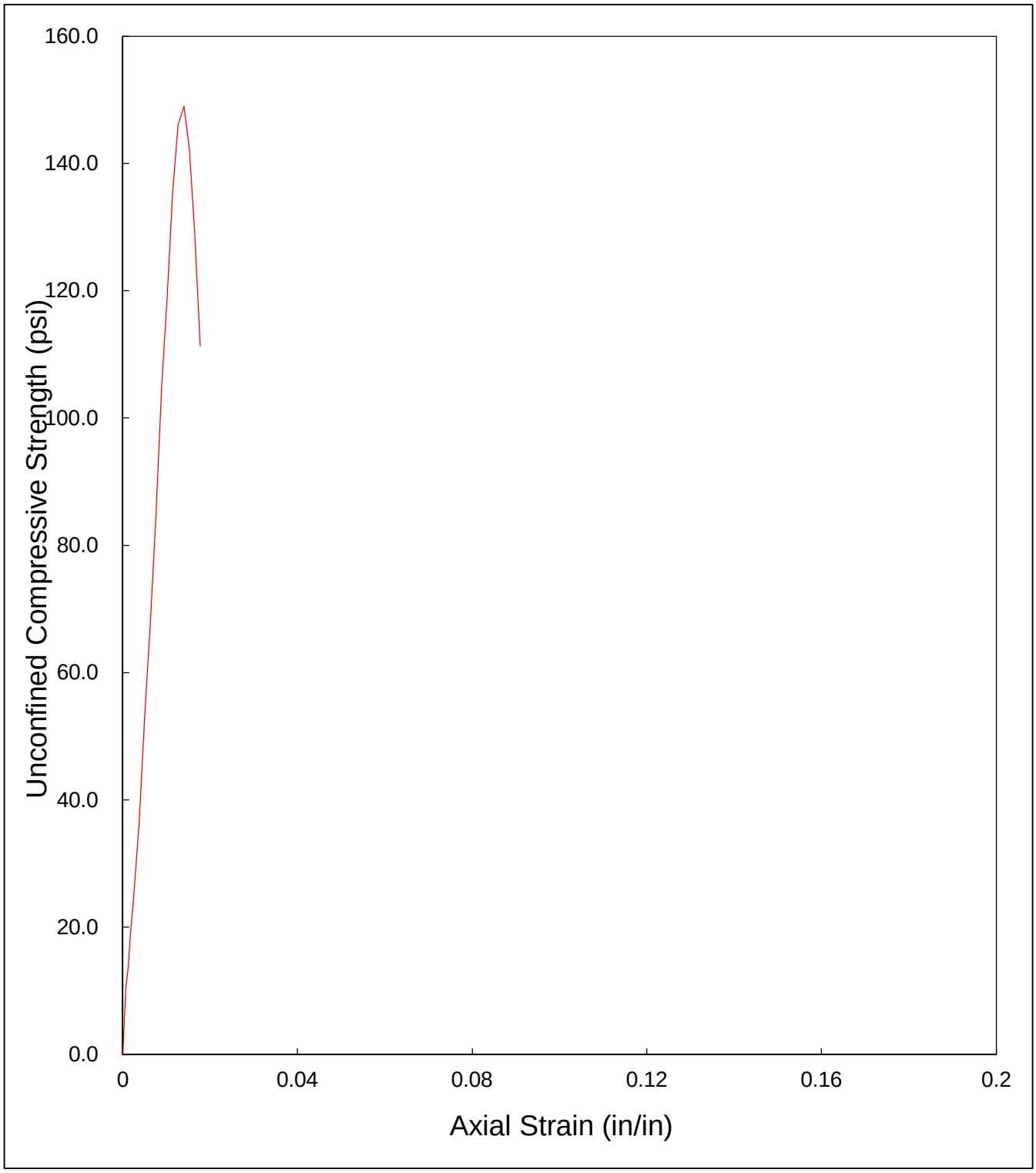
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.03	in.	3.94	in.
No. 2	2.02	in.	3.92	in.
No. 3	1.99	in.	3.94	in.
Average	**2.01**	**in.**	**3.93**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***378.57***	***g***
Initial Area, Ac	3.18	in²
Initial Volume, Vc	12.53	in³
Initial Bulk Unit Weight,	115.1	lb/ft³
Initial Dry Unit Weigh	96.3	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	149.0	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.184	0.0000	0.0
33	0.003	0.003	3.186	0.0008	10.4
44	0.005	0.005	3.188	0.0013	13.8
59	0.007	0.007	3.189	0.0018	18.5
79	0.010	0.010	3.192	0.0025	24.8
116	0.015	0.015	3.196	0.0038	36.3
173	0.020	0.020	3.200	0.0051	54.1
218	0.025	0.025	3.204	0.0064	68.0
271	0.030	0.030	3.208	0.0076	84.5
338	0.035	0.035	3.212	0.0089	105.2
383	0.040	0.040	3.216	0.0102	119.1
436	0.045	0.045	3.220	0.0114	135.4
471	0.050	0.050	3.225	0.0127	146.1
481	0.055	0.055	3.229	0.0140	149.0
460	0.060	0.060	3.233	0.0153	142.3
417	0.065	0.065	3.237	0.0165	128.8
361	0.070	0.070	3.241	0.0178	111.4

UNCONFINED COMPRESSION TESTING

Sample No. 0427-21A



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-21A		
TESTING DATE:	10/3/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8415

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	19.5	**%**
BULK UNIT WEIGHT	115.1	lb/ft^3
DRY UNIT WEIGHT	96.3	lb/ft^3
UCS *	149.0	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	10/3/2012
TESTED BY:	TNR
TRACKING CODE:	8416

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-22A		12.00
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.00

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8416_PM
SAMPLE No.:	22A (28 DAY)	EQUIPMENT No.:	3
TEST DATE:	10/4/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	208.58 ***g***
3. WT WET SOIL + TARE	727.30 ***g***	957.80 ***g***
4. WT DRY SOIL + TARE	605.02 ***g***	813.60 ***g***
5. WT WATER, Ww	122.28 g	144.20 g
6. WT DRY SOIL, Ws	605.02 g	605.02 g
7. MOISTURE CONTENT, W	20.21 %	23.83 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***3.00 in.***	***2.98 in.***	***3.39 in.***	***3.37 in.***
No. 2	***2.99 in.***	***2.96 in.***	***3.40 in.***	***3.36 in.***
No. 3	***2.96 in.***	***2.93 in.***	***3.38 in.***	***3.34 in.***
Average	2.98 in.	2.96 in.	3.39 in.	3.36 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***727.30 g***	***749.60 g***
Area, Ao	6.98 in^2	6.87 in^2
Volume, Vo	23.68 in^3	23.06 in^3
Bulk Unit Weight	117.0 lb/ft^3	123.8 lb/ft^3
Dry Unit Weight	97.3 lb/ft^3	100.0 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8416_PM
SAMPLE No.:	22A (28 DAY)	EQUIPMENT No.:	3
TEST DATE:	10/4/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
10/04/12	10 : 3	RJB	7.0	5.0	5.4	*	*	*	*
10/04/12	10 : 35	RJB	17.0	15.0	15.6	7.8	10.0	2.4	0.24
10/04/12	11 : 10	RJB	27.0	25.0	25.1	19.4	10.0	3.8	0.38
10/04/12	11 : 50	RJB	37.0	35.0	35.4	28.8	10.0	3.7	0.37
10/04/12	13 : 20	RJB	47.0	45.0	45.4	41.0	10.0	5.6	0.56
10/04/12	14 : 7	RJB	57.0	55.0	55.6	51.5	10.0	6.1	0.61
10/04/12	14 : 45	RJB	67.0	65.0	65.4	62.7	10.0	7.1	0.71
10/04/12	15 : 40	RJB	77.0	75.0	75.7	73.5	10.0	8.1	0.81
10/05/12	7 : 42	RJB	87.0	85.0	86.0	85.0	10.0	9.3	0.93
10/05/12	9 : 15	RJB	97.0	95.0	95.6	95.1	10.0	9.1	0.91
10/05/12	10 : 10	RJB	107.0	105.0	*	105.1	10.0	9.5	0.95
10/05/12	10 : 1	RJB	97.0	95.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8416_PM
SAMPLE No.:	22A (28 DAY)	3
TEST DATE:	10/4/2012	

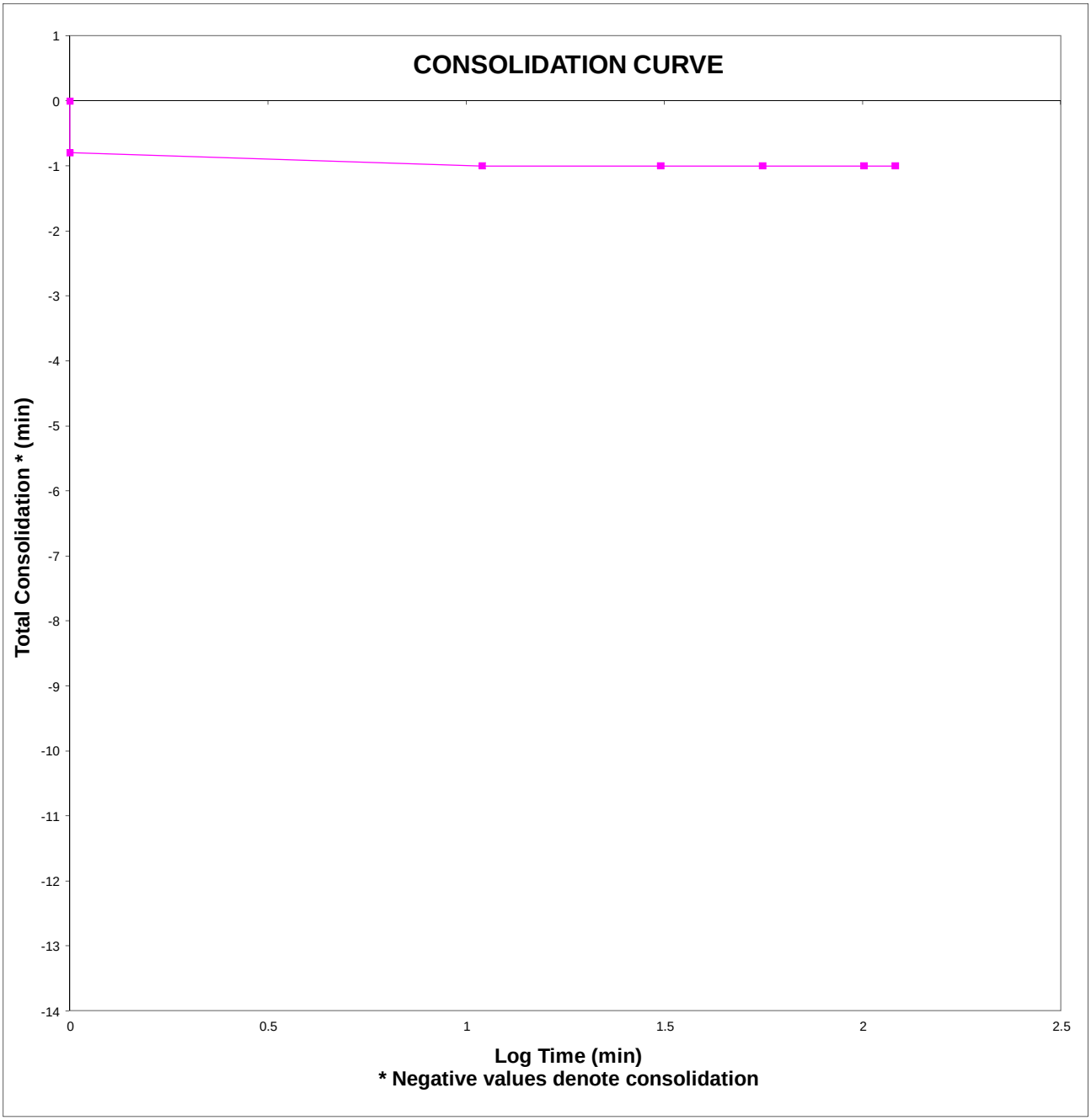
CELL PRESSURE: 105 psi **BACK PRESSURE:** 95 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
10 / 5 / 12	RJB	10 : 4	0	0	0	24.0	24.0	0.0
10 / 5 / 12	RJB	10 : 5	1	1	0.00	23.6	23.6	0.8
10 / 5 / 12	RJB	10 : 15	10	11	1.04	23.4	23.6	1.0
10 / 5 / 12	RJB	10 : 35	20	31	1.49	23.4	23.6	1.0
10 / 5 / 12	RJB	11 : 0	25	56	1.75	23.4	23.6	1.0
10 / 5 / 12	RJB	11 : 45	45	101	2.00	23.4	23.6	1.0
10 / 5 / 12	RJB	12 : 5	20	121	2.08	23.4	23.6	1.0

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8416_PM
SAMPLE No.:	22A (28 DAY)	EQUIPMENT No.:	3
TEST DATE:	10/4/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8416_PM
SAMPLE No.:	22A (28 DAY)	EQUIPMENT No.:	3
TEST DATE:	10/4/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
10 / 8 / 12	RJB	9 : 43	0	0.0	24.0	20.0	105.0	95.0	94.0
10 / 8 / 12	RJB	10 : 3	20	0.6	23.4	20.0	105.0	95.0	94.0
10 / 8 / 12	RJB	10 : 26	23	1.3	22.7	20.0	105.0	95.0	94.0
10 / 8 / 12	RJB	10 : 43	17	1.9	22.1	20.0	105.0	95.0	94.0
10 / 8 / 12	RJB	11 : 18	35	3.0	21.0	20.0	105.0	95.0	94.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8416_PM
SAMPLE No.:	22A (28 DAY)	EQUIPMENT No.:	3
TEST DATE:	10/4/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				10.952		
20	0.6	0.6	1.00	10.813	1.02E-06	1.02E-06
23	0.7	0.7	1.00	10.650	1.05E-06	1.05E-06
17	0.6	0.6	1.00	10.511	1.23E-06	1.24E-06
35	1.1	1.1	1.00	10.255	1.12E-06	1.13E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8416_PM
SAMPLE No.:	22A (28 DAY)	EQUIPMENT No.:	3
TEST DATE:	10/4/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	117.0 lb/ft³	123.8 lb/ft³
DRY UNIT WEIGHT	97.3 lb/ft³	100.0 lb/ft³
MOISTURE CONTENT	20.2 %	23.8 %
PERMEABILITY @ 20°C	1.1E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-22A (28 day)		
TESTING DATE:	3-Oct-12	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8416

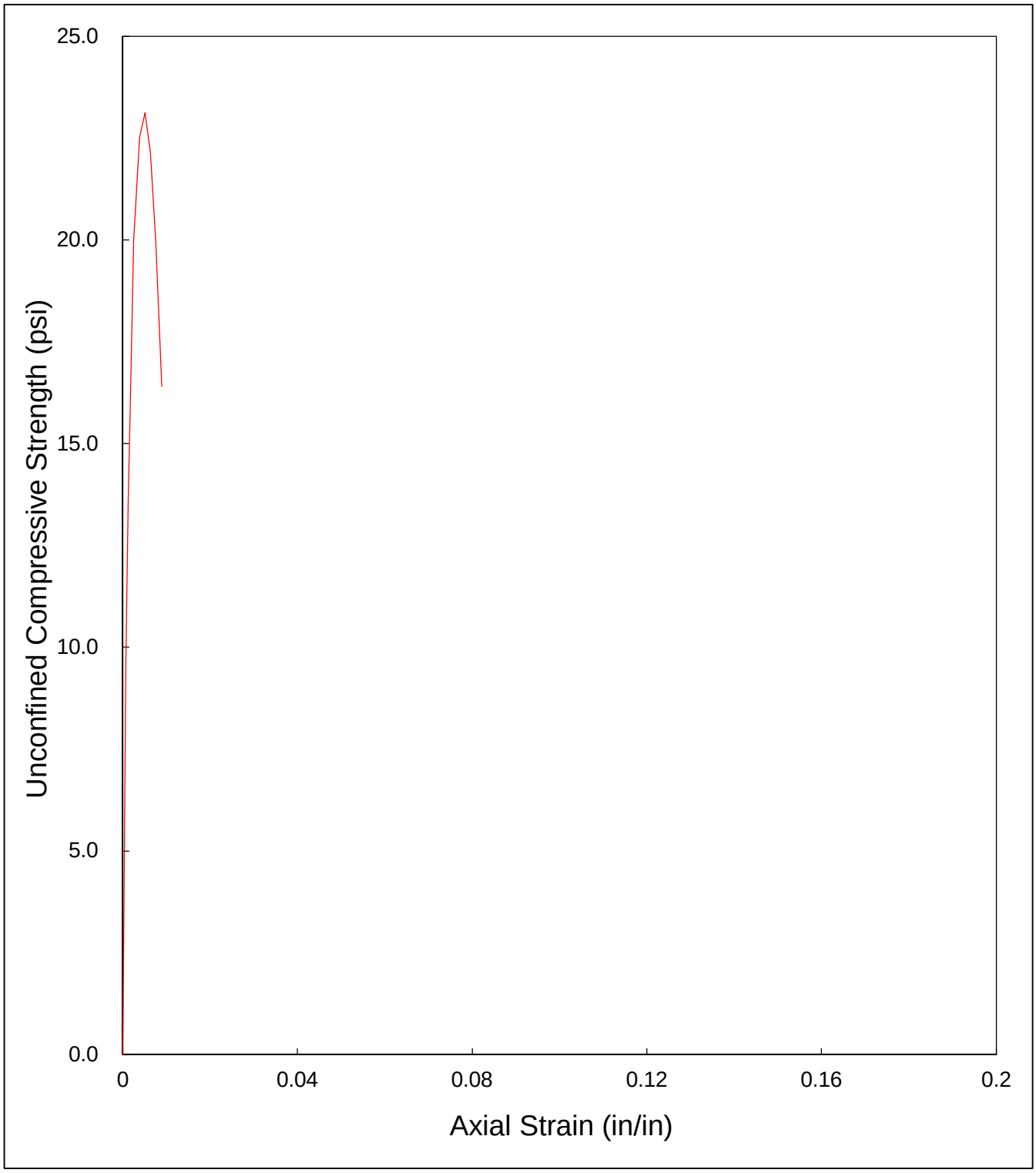
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	170.53	g
3. WT WET SOIL + TARE	345.97	g
4. WT DRY SOIL + TARE	317.10	g
5. WT WATER, Ww	28.87	g
6. WT DRY SOIL, Ws	146.57	g
7. MOISTURE CONTENT, W	**19.70**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.01	in.	3.91	in.
No. 2	2.01	in.	3.93	in.
No. 3	1.99	in.	3.92	in.
Average	**2.00**	**in.**	**3.92**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***370.20***	***g***
Initial Area, Ac	3.14	in^2
Initial Volume, Vc	12.33	in^3
Initial Bulk Unit Weight,	114.4	lb/ft^3
Initial Dry Unit Weigh	95.6	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	23.1	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.142	0.0000	0.0
30	0.003	0.003	3.144	0.0008	9.5
43	0.005	0.005	3.146	0.0013	13.7
50	0.007	0.007	3.147	0.0018	15.9
63	0.010	0.010	3.150	0.0025	20.0
71	0.015	0.015	3.154	0.0038	22.5
73	0.020	0.020	3.158	0.0051	23.1
70	0.025	0.025	3.162	0.0064	22.1
63	0.030	0.030	3.166	0.0076	19.9
52	0.035	0.035	3.170	0.0089	16.4

UNCONFINED COMPRESSION TESTING
Sample No. 0427-22A (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-22A (28 day)		
TESTING DATE:	10/3/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8416

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	19.7	**%**
BULK UNIT WEIGHT	114.4	lb/ft^3
DRY UNIT WEIGHT	95.6	lb/ft^3
UCS *	23.1	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	10/3/2012
TESTED BY:	TNR
TRACKING CODE:	8417

KEMRON SAMPLE No.		MATERIAL pH
1.	0427-23A	11.84
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	11.84

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8417_PM
SAMPLE No.:	23A (28 DAY)	EQUIPMENT No.:	6A
TEST DATE:	10/5/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	213.62 ***g***
3. WT WET SOIL + TARE	376.06 ***g***	595.18 ***g***
4. WT DRY SOIL + TARE	311.52 ***g***	525.14 ***g***
5. WT WATER, Ww	64.54 g	70.04 g
6. WT DRY SOIL, Ws	311.52 g	311.52 g
7. MOISTURE CONTENT, W	20.72 %	22.48 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.97 in.***	***2.98 in.***	***1.79 in.***	***1.78 in.***
No. 2	***2.99 in.***	***2.95 in.***	***1.72 in.***	***1.77 in.***
No. 3	***2.90 in.***	***2.90 in.***	***1.72 in.***	***1.66 in.***
Average	2.95 in.	2.94 in.	1.74 in.	1.73 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***376.06 g***	***381.86 g***
Area, Ao	6.86 in^2	6.80 in^2
Volume, Vo	11.95 in^3	11.80 in^3
Bulk Unit Weight	119.9 lb/ft^3	123.3 lb/ft^3
Dry Unit Weight	99.3 lb/ft^3	100.6 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8417_PM
SAMPLE No.:	23A (28 DAY)	EQUIPMENT No.:	6A
TEST DATE:	10/5/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
10/05/12	11 : 5	RJB	7.0	5.0	6.0	*	*	*	*
10/05/12	12 : 10	RJB	17.0	15.0	16.0	7.8	10.0	1.8	0.18
10/05/12	12 : 55	RJB	27.0	25.0	26.0	19.7	10.0	3.7	0.37
10/05/12	13 : 50	RJB	37.0	35.0	36.1	31.8	10.0	5.8	0.58
10/05/12	14 : 20	RJB	47.0	45.0	46.1	43.1	10.0	7.0	0.70
10/05/12	14 : 50	RJB	57.0	55.0	56.1	53.9	10.0	7.8	0.78
10/05/12	15 : 20	RJB	67.0	65.0	66.0	64.5	10.0	8.4	0.84
10/05/12	15 : 53	RJB	77.0	75.0	76.0	75.0	10.0	9.0	0.90
10/08/12	8 : 0	RJB	87.0	85.0	*	85.5	10.0	9.5	0.95
10/08/12	8 : 1	RJB	87.0	85.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8417_PM
SAMPLE No.:	23A (28 DAY)	6A
TEST DATE:	10/5/2012	

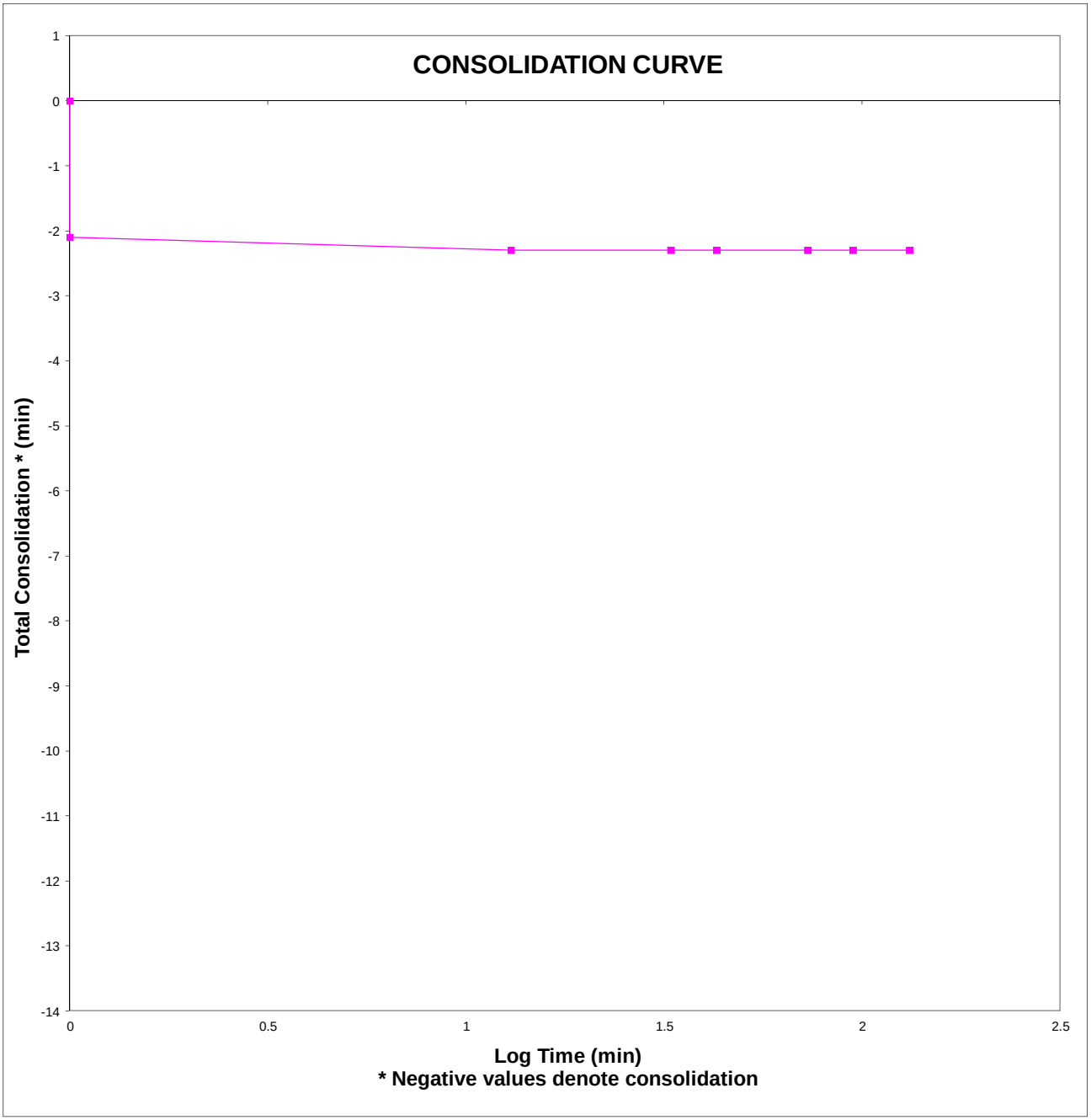
CELL PRESSURE: 85 psi **BACK PRESSURE:** 75 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
10 / 8 / 12	RJB	8 : 37	0	0	0	25.0	25.0	0.0
10 / 8 / 12	RJB	8 : 38	1	1	0.00	23.9	24.0	2.1
10 / 8 / 12	RJB	8 : 50	12	13	1.11	23.8	23.9	2.3
10 / 8 / 12	RJB	9 : 10	20	33	1.52	23.8	23.9	2.3
10 / 8 / 12	RJB	9 : 20	10	43	1.63	23.8	23.9	2.3
10 / 8 / 12	RJB	9 : 50	30	73	1.86	23.8	23.9	2.3
10 / 8 / 12	RJB	10 : 12	22	95	1.98	23.8	23.9	2.3
10 / 8 / 12	RJB	10 : 49	37	132	2.12	23.8	23.9	2.3

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8417_PM
SAMPLE No.:	23A (28 DAY)	EQUIPMENT No.:	6A
TEST DATE:	10/5/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8417_PM
SAMPLE No.:	23A (28 DAY)	EQUIPMENT No.:	6A
TEST DATE:	10/5/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
10 / 8 / 12	RJB	10 : 50	0	0.0	25.0	20.0	85.0	75.0	75.0
10 / 8 / 12	RJB	11 : 19	29	2.0	23.0	20.0	85.0	75.0	75.0
10 / 8 / 12	RJB	11 : 39	20	3.1	22.8	20.0	85.0	75.0	75.0
10 / 8 / 12	RJB	12 : 2	23	4.2	21.6	20.0	85.0	75.0	75.0
10 / 8 / 12	RJB	12 : 28	26	5.4	20.4	20.0	85.0	75.0	75.0
10 / 8 / 12	RJB	13 : 27	RESET	0.0	25.0	20.0	85.0	75.0	75.0
10 / 8 / 12	RJB	13 : 36	9	0.6	24.4	20.0	85.0	75.0	75.0
10 / 8 / 12	RJB	13 : 51	15	1.3	23.7	20.0	85.0	75.0	75.0
10 / 8 / 12	RJB	14 : 11	20	2.3	22.7	20.0	85.0	75.0	75.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8417_PM
SAMPLE No.:	23A (28 DAY)	EQUIPMENT No.:	6A
TEST DATE:	10/5/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				5.649		
29	2.0	2.0	1.00	4.745	5.01E-06	5.04E-06
20	1.1	0.2	0.18	4.451	2.66E-06	2.68E-06
23	1.1	1.2	1.09	3.932	4.50E-06	4.52E-06
26	1.2	1.2	1.00	3.389	4.76E-06	4.78E-06
RESET				5.649		
9	0.6	0.6	1.00	5.378	4.56E-06	4.58E-06
15	0.7	0.7	1.00	5.062	3.37E-06	3.39E-06
20	1.0	1.0	1.00	4.610	3.90E-06	3.92E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8417_PM
SAMPLE No.:	23A (28 DAY)	EQUIPMENT No.:	6A
TEST DATE:	10/5/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	119.9 lb/ft³	123.3 lb/ft³
DRY UNIT WEIGHT	99.3 lb/ft³	100.6 lb/ft³
MOISTURE CONTENT	20.7 %	22.5 %
PERMEABILITY @ 20°C	4.4E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-23A (28 day)		
TESTING DATE:	3-Oct-12	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8417

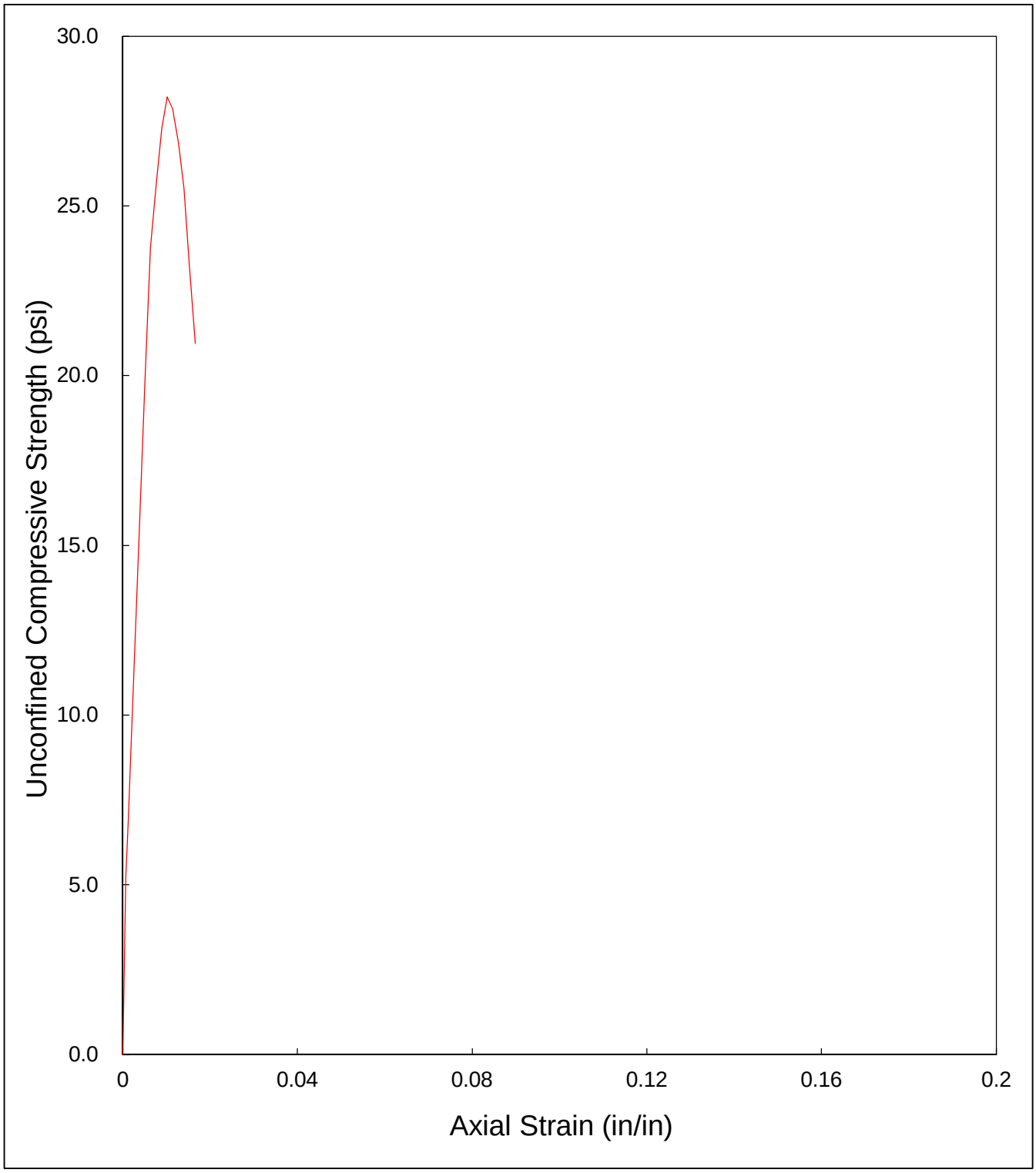
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	162.66	g
3. WT WET SOIL + TARE	360.34	g
4. WT DRY SOIL + TARE	330.68	g
5. WT WATER, Ww	29.66	g
6. WT DRY SOIL, Ws	168.02	g
7. MOISTURE CONTENT, W	**17.65**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.96	in.	3.92	in.
No. 2	1.98	in.	3.91	in.
No. 3	1.97	in.	3.93	in.
Average	**1.97**	**in.**	**3.92**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***382.52***	***g***
Initial Area, Ac	3.05	in²
Initial Volume, Vc	11.96	in³
Initial Bulk Unit Weight,	121.8	lb/ft³
Initial Dry Unit Weigh	103.6	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	28.2	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.052	0.0000	0.0
16	0.003	0.003	3.055	0.0008	5.2
21	0.005	0.005	3.056	0.0013	6.9
27	0.007	0.007	3.058	0.0018	8.8
34	0.010	0.010	3.060	0.0026	11.1
48	0.015	0.015	3.064	0.0038	15.7
61	0.020	0.020	3.068	0.0051	19.9
73	0.025	0.025	3.072	0.0064	23.8
79	0.030	0.030	3.076	0.0077	25.7
84	0.035	0.035	3.080	0.0089	27.3
87	0.040	0.040	3.084	0.0102	28.2
86	0.045	0.045	3.088	0.0115	27.9
83	0.050	0.050	3.092	0.0128	26.8
79	0.055	0.055	3.096	0.0140	25.5
72	0.060	0.060	3.100	0.0153	23.2
65	0.065	0.065	3.104	0.0166	20.9

UNCONFINED COMPRESSION TESTING
Sample No. 0427-23A (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-23A (28 day)		
TESTING DATE:	10/3/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8417

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	17.7	**%**
BULK UNIT WEIGHT	121.8	lb/ft^3
DRY UNIT WEIGHT	103.6	lb/ft^3
UCS *	28.2	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	10/3/2012
TESTED BY:	TNR
TRACKING CODE:	8418

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-24A		12.08
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	12.08

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8418_PM
SAMPLE No.:	24A (28 DAY)	EQUIPMENT No.:	5
TEST DATE:	10/5/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	228.51 ***g***
3. WT WET SOIL + TARE	637.00 ***g***	878.10 ***g***
4. WT DRY SOIL + TARE	522.49 ***g***	751.00 ***g***
5. WT WATER, Ww	114.51 g	127.10 g
6. WT DRY SOIL, Ws	522.49 g	522.49 g
7. MOISTURE CONTENT, W	21.92 %	24.33 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.99 in.***	***2.95 in.***	***3.08 in.***	***3.03 in.***
No. 2	***2.99 in.***	***2.94 in.***	***3.07 in.***	***3.04 in.***
No. 3	***2.98 in.***	***2.94 in.***	***3.06 in.***	***2.95 in.***
Average	2.99 in.	2.94 in.	3.07 in.	3.01 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***637.00 g***	***649.60 g***
Area, Ao	7.00 in^2	6.80 in^2
Volume, Vo	21.48 in^3	20.43 in^3
Bulk Unit Weight	113.0 lb/ft^3	121.2 lb/ft^3
Dry Unit Weight	92.7 lb/ft^3	97.5 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8418_PM
SAMPLE No.:	24A (28 DAY)	EQUIPMENT No.:	5
TEST DATE:	10/5/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
10/05/12	10 : 0	RJB	7.0	5.0	5.1	*	*	*	*
10/05/12	10 : 32	RJB	17.0	15.0	15.5	7.2	10.0	2.1	0.21
10/05/12	11 : 6	RJB	27.0	25.0	24.7	18.6	10.0	3.1	0.31
10/05/12	11 : 50	RJB	37.0	35.0	35.4	28.2	10.0	3.5	0.35
10/05/12	13 : 0	RJB	47.0	45.0	45.3	40.7	10.0	5.3	0.53
10/05/12	13 : 46	RJB	57.0	55.0	55.1	52.3	10.0	7.0	0.70
10/05/12	14 : 17	RJB	67.0	65.0	65.0	62.3	10.0	7.2	0.72
10/05/12	14 : 52	RJB	77.0	75.0	75.2	72.6	10.0	7.6	0.76
10/05/12	15 : 23	RJB	87.0	85.0	84.9	83.8	10.0	8.6	0.86
10/05/12	15 : 54	RJB	97.0	95.0	95.3	93.2	10.0	8.3	0.83
10/08/12	9 : 0	RJB	107.0	105.0	*	105.2	10.0	9.9	0.99
10/08/12	9 : 1	RJB	97.0	95.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8418_PM
SAMPLE No.:	24A (28 DAY)	5
TEST DATE:	10/5/2012	

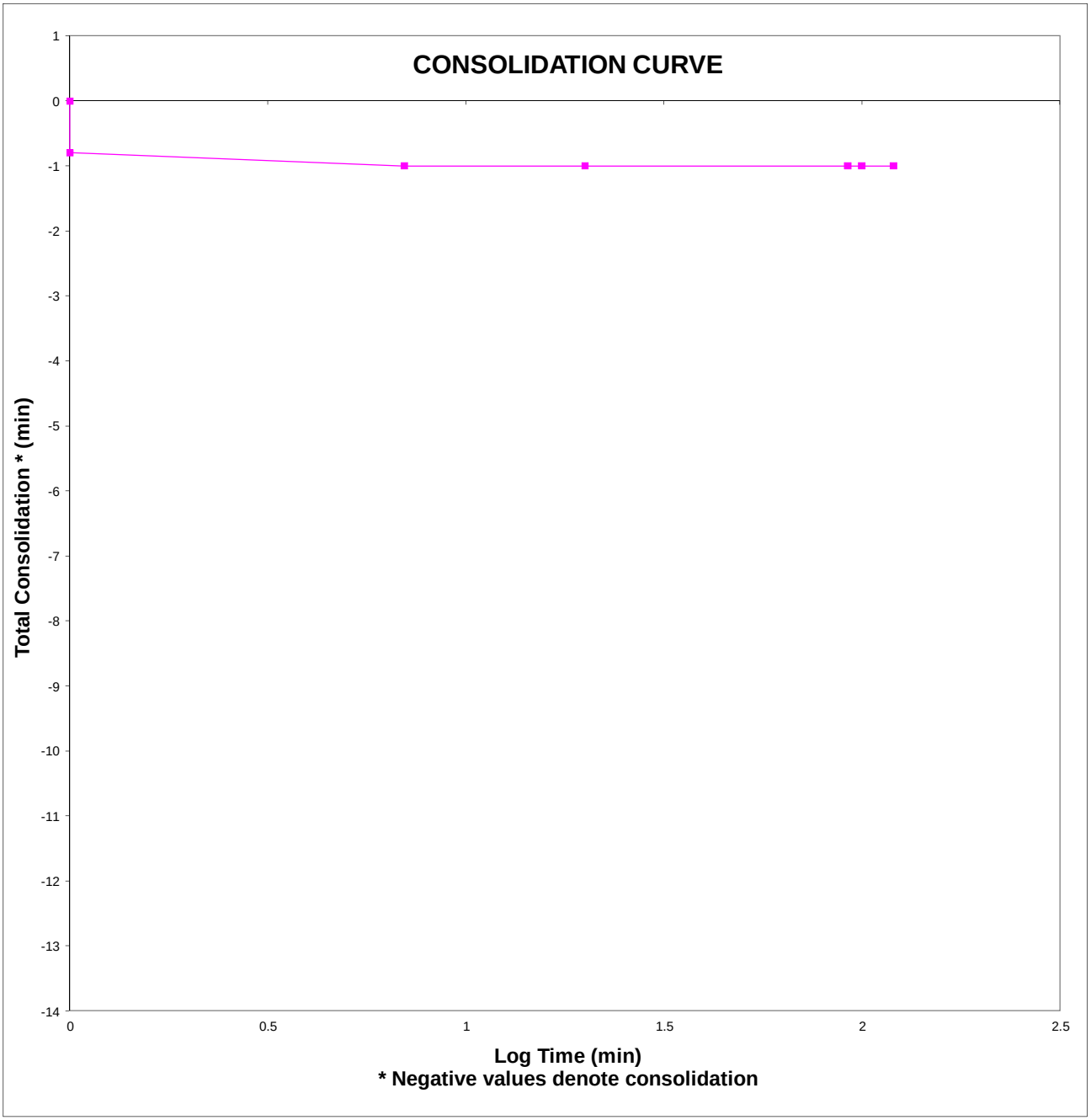
CELL PRESSURE: 105 psi **BACK PRESSURE:** 95 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
10 / 8 / 12	RJB	9 : 5	0	0	0	25.0	25.0	0.0
10 / 8 / 12	RJB	9 : 6	1	1	0.00	24.6	24.6	0.8
10 / 8 / 12	RJB	9 : 12	6	7	0.85	24.5	24.5	1.0
10 / 8 / 12	RJB	9 : 25	13	20	1.30	24.5	24.5	1.0
10 / 8 / 12	RJB	10 : 37	72	92	1.96	24.5	24.5	1.0
10 / 8 / 12	RJB	10 : 45	8	100	2.00	24.5	24.5	1.0
10 / 8 / 12	RJB	11 : 5	20	120	2.08	24.5	24.5	1.0

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8418_PM
SAMPLE No.:	24A (28 DAY)	EQUIPMENT No.:	5
TEST DATE:	10/5/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8418_PM
SAMPLE No.:	24A (28 DAY)	EQUIPMENT No.:	5
TEST DATE:	10/5/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
10 / 8 / 12	RJB	12 : 6	0	0.0	25.0	20.0	105.0	95.0	95.0
10 / 8 / 12	RJB	12 : 34	28	0.5	24.5	20.0	105.0	95.0	95.0
10 / 8 / 12	RJB	13 : 10	36	1.1	23.9	20.0	105.0	95.0	95.0
10 / 8 / 12	RJB	13 : 50	40	1.7	23.2	20.0	105.0	95.0	95.0
10 / 8 / 12	RJB	14 : 29	39	2.2	22.7	20.0	105.0	95.0	95.0
10 / 9 / 12	RJB	7 : 44	RESET	0.0	25.0	20.0	105.0	95.0	95.0
10 / 9 / 12	RJB	8 : 10	26	0.5	24.5	20.0	105.0	95.0	95.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8418_PM
SAMPLE No.:	24A (28 DAY)	EQUIPMENT No.:	5
TEST DATE:	10/5/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.208		
28	0.5	0.5	1.00	3.079	2.10E-06	2.11E-06
36	0.6	0.6	1.00	2.925	2.05E-06	2.06E-06
40	0.6	0.7	1.17	2.759	2.11E-06	2.12E-06
39	0.5	0.5	1.00	2.630	1.76E-06	1.76E-06
RESET				3.208		
26	0.5	0.5	1.00	3.079	2.26E-06	2.27E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8418_PM
SAMPLE No.:	24A (28 DAY)	EQUIPMENT No.:	5
TEST DATE:	10/5/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	113.0 lb/ft³	121.2 lb/ft³
DRY UNIT WEIGHT	92.7 lb/ft³	97.5 lb/ft³
MOISTURE CONTENT	21.9 %	24.3 %
PERMEABILITY @ 20°C	2.0E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-24A (28 day)		
TESTING DATE:	3-Oct-12	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8418

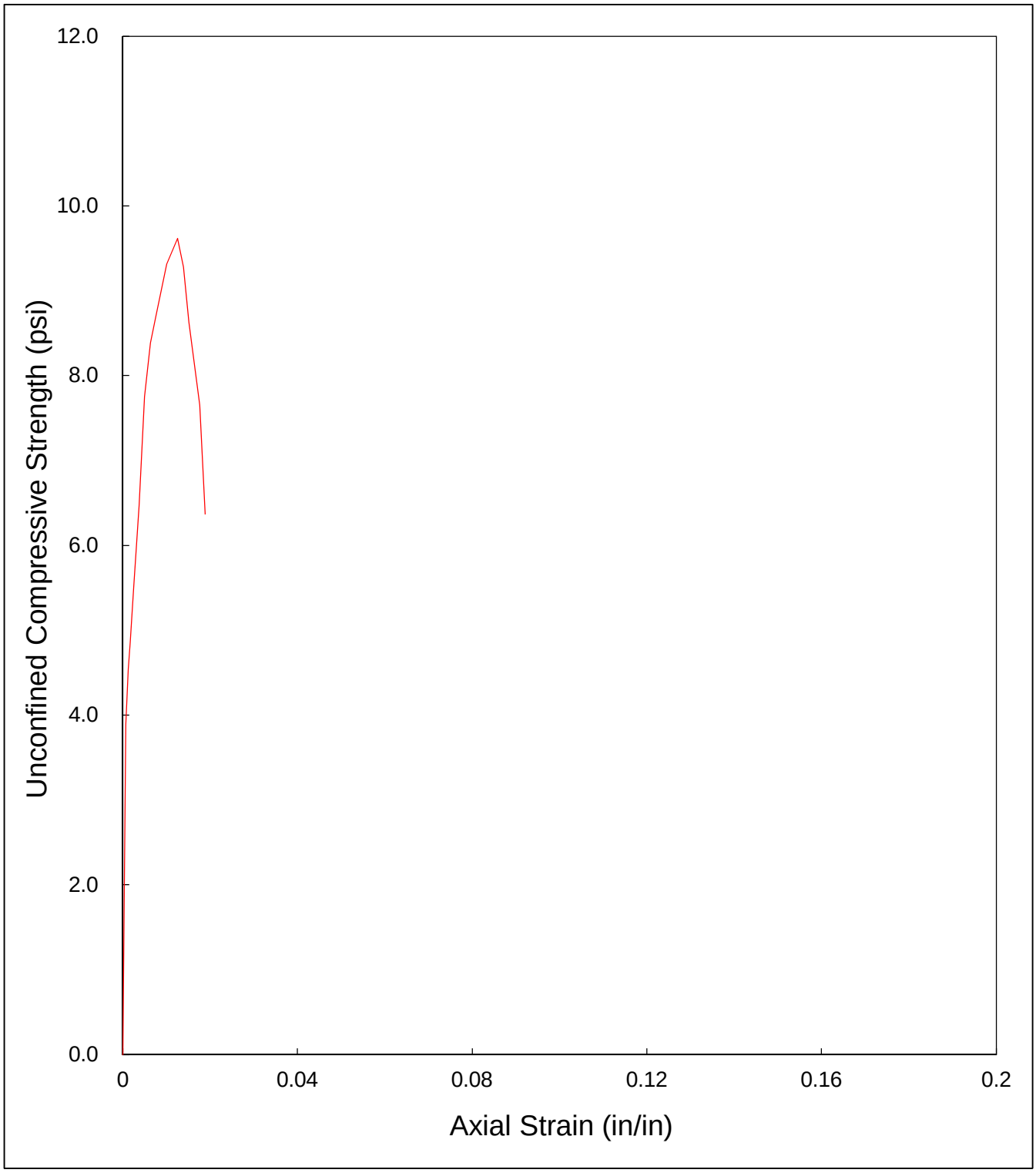
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	162.88	g
3. WT WET SOIL + TARE	330.22	g
4. WT DRY SOIL + TARE	303.78	g
5. WT WATER, Ww	26.44	g
6. WT DRY SOIL, Ws	140.90	g
7. MOISTURE CONTENT, W	**18.77**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.97	in.
No. 2	1.98	in.	3.97	in.
No. 3	1.98	in.	3.95	in.
Average	**1.98**	**in.**	**3.96**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***356.66***	***g***
Initial Area, Ac	3.08	in^2
Initial Volume, Vc	12.21	in^3
Initial Bulk Unit Weight,	111.3	lb/ft^3
Initial Dry Unit Weigh	93.7	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	9.6	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.081	0.0000	0.0
12	0.003	0.003	3.083	0.0008	3.9
14	0.005	0.005	3.085	0.0013	4.5
15	0.007	0.007	3.087	0.0018	4.9
17	0.010	0.010	3.089	0.0025	5.5
20	0.015	0.015	3.093	0.0038	6.5
24	0.020	0.020	3.097	0.0050	7.7
26	0.025	0.025	3.101	0.0063	8.4
27	0.030	0.030	3.105	0.0076	8.7
28	0.035	0.035	3.109	0.0088	9.0
29	0.040	0.040	3.113	0.0101	9.3
30	0.050	0.050	3.121	0.0126	9.6
29	0.055	0.055	3.125	0.0139	9.3
27	0.060	0.060	3.129	0.0151	8.6
24	0.070	0.070	3.137	0.0177	7.7
20	0.075	0.075	3.141	0.0189	6.4

UNCONFINED COMPRESSION TESTING
Sample No. 0427-24A (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-24A (28 day)		
TESTING DATE:	10/3/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8418

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	18.8	**%**
BULK UNIT WEIGHT	111.3	lb/ft^3
DRY UNIT WEIGHT	93.7	lb/ft^3
UCS *	9.6	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	Patchogue
PROJECT No.:	SH0427
TESTING DATE:	10/3/2012
TESTED BY:	TNR
TRACKING CODE:	8419

KEMRON SAMPLE No.		MATERIAL pH
1. 0427-25A		11.91
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	11.91

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8419_PM
SAMPLE No.:	25A (28 DAY)	EQUIPMENT No.:	7B
TEST DATE:	10/5/12		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	206.78 ***g***
3. WT WET SOIL + TARE	633.10 ***g***	855.40 ***g***
4. WT DRY SOIL + TARE	501.72 ***g***	708.50 ***g***
5. WT WATER, Ww	131.38 g	146.90 g
6. WT DRY SOIL, Ws	501.72 g	501.72 g
7. MOISTURE CONTENT, W	26.19 %	29.28 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.96 in.***	***2.93 in.***	***3.18 in.***	***3.15 in.***
No. 2	***2.95 in.***	***2.94 in.***	***3.13 in.***	***3.05 in.***
No. 3	***2.95 in.***	***2.88 in.***	***3.04 in.***	***3.04 in.***
Average	2.95 in.	2.92 in.	3.12 in.	3.08 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***633.10 g***	***648.70 g***
Area, Ao	6.85 in^2	6.67 in^2
Volume, Vo	21.35 in^3	20.56 in^3
Bulk Unit Weight	113.0 lb/ft^3	120.2 lb/ft^3
Dry Unit Weight	89.5 lb/ft^3	93.0 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8419_PM
SAMPLE No.:	25A (28 DAY)	EQUIPMENT No.:	7B
TEST DATE:	10/5/12		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
10/05/12	11 : 18	RJB	7.0	5.0	5.9	*	*	*	*
10/05/12	12 : 12	RJB	17.0	15.0	15.8	8.7	10.0	2.8	0.28
10/05/12	12 : 55	RJB	27.0	25.0	25.8	19.3	10.0	3.5	0.35
10/05/12	13 : 55	RJB	37.0	35.0	35.6	30.6	10.0	4.8	0.48
10/05/12	14 : 28	RJB	47.0	45.0	45.6	41.0	10.0	5.4	0.54
10/05/12	15 : 20	RJB	57.0	55.0	55.5	52.2	10.0	6.6	0.66
10/05/12	15 : 51	RJB	67.0	65.0	65.3	62.8	10.0	7.3	0.73
10/08/12	8 : 30	RJB	77.0	75.0	76.3	73.3	10.0	8.0	0.80
10/08/12	9 : 10	RJB	87.0	85.0	*	86.1	10.0	9.8	0.98
10/08/12	9 : 11	RJB	77.0	75.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	PATCHOGUE MGP	RJB
PROJECT No.:	SH0427	8419_PM
SAMPLE No.:	25A (28 DAY)	7B
TEST DATE:	10/5/2012	

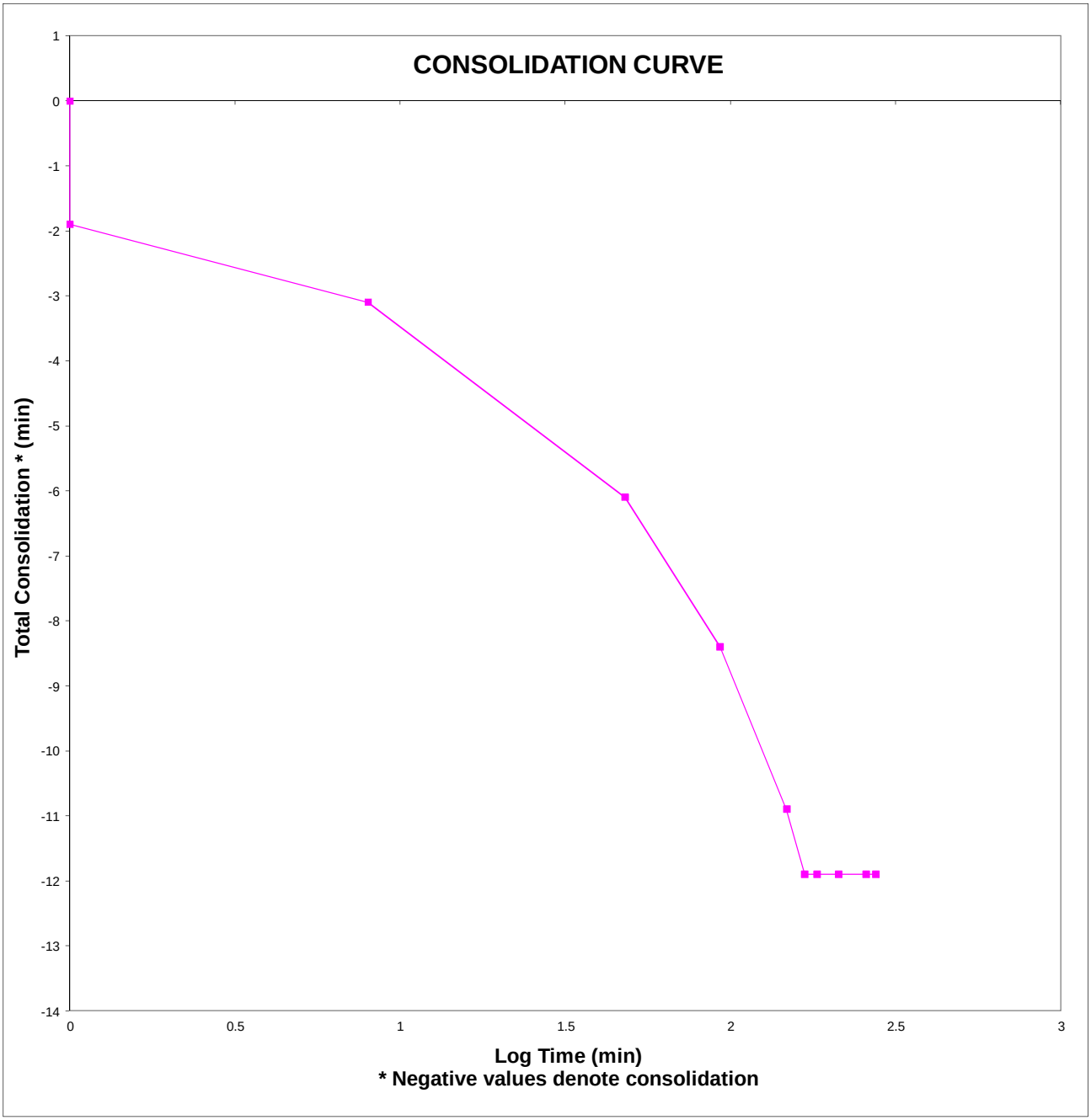
CELL PRESSURE: 85 psi **BACK PRESSURE:** 75 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
10 / 8 / 12	RJB	9 : 12	0	0	0	25.0	25.0	0.0
10 / 8 / 12	RJB	9 : 13	1	1	0.00	24.1	24.0	1.9
10 / 8 / 12	RJB	9 : 20	7	8	0.90	23.9	23.0	3.1
10 / 8 / 12	RJB	10 : 0	40	48	1.68	23.8	20.1	6.1
10 / 8 / 12	RJB	10 : 45	45	93	1.97	23.8	17.8	8.4
10 / 8 / 12	RJB	11 : 40	55	148	2.17	23.7	15.4	10.9
10 / 8 / 12	RJB	12 : 0	20	168	2.23	23.6	14.5	11.9
10 / 8 / 12	RJB	12 : 15	15	183	2.26	23.6	14.5	11.9
10 / 8 / 12	RJB	12 : 45	30	213	2.33	23.6	14.5	11.9
10 / 8 / 12	RJB	13 : 30	45	258	2.41	23.6	14.5	11.9
10 / 8 / 12	RJB	13 : 48	18	276	2.44	23.6	14.5	11.9

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8419_PM
SAMPLE No.:	25A (28 DAY)	EQUIPMENT No.:	7B
TEST DATE:	10/5/12		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8419_PM
SAMPLE No.:	25A (28 DAY)	EQUIPMENT No.:	7B
TEST DATE:	10/5/2012		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
10 / 9 / 12	RJB	8 : 41	0	0.0	25.0	20.0	85.0	75.0	75.0
10 / 9 / 12	RJB	9 : 7	26	0.5	24.5	20.0	85.0	75.0	75.0
10 / 9 / 12	RJB	9 : 34	27	1.1	23.9	20.0	85.0	75.0	75.0
10 / 9 / 12	RJB	9 : 59	25	1.6	23.4	20.0	85.0	75.0	75.0
10 / 9 / 12	RJB	10 : 40	41	2.4	22.6	20.0	85.0	75.0	75.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8419_PM
SAMPLE No.:	25A (28 DAY)	EQUIPMENT No.:	7B
TEST DATE:	10/5/12		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.158		
26	0.5	0.5	1.00	3.032	2.34E-06	2.35E-06
27	0.6	0.6	1.00	2.880	2.84E-06	2.85E-06
25	0.5	0.5	1.00	2.754	2.68E-06	2.69E-06
41	0.8	0.8	1.00	2.552	2.78E-06	2.79E-06

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	PATCHOGUE MGP	TESTED BY:	RJB
PROJECT No.:	SH0427	TRACKING CODE:	8419_PM
SAMPLE No.:	25A (28 DAY)	EQUIPMENT No.:	7B
TEST DATE:	10/5/12		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	113.0 lb/ft³	120.2 lb/ft³
DRY UNIT WEIGHT	89.5 lb/ft³	93.0 lb/ft³
MOISTURE CONTENT	26.2 %	29.3 %
PERMEABILITY @ 20°C	2.7E-06 cm/sec	

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-25A (28 day)		
TESTING DATE:	3-Oct-12	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8419

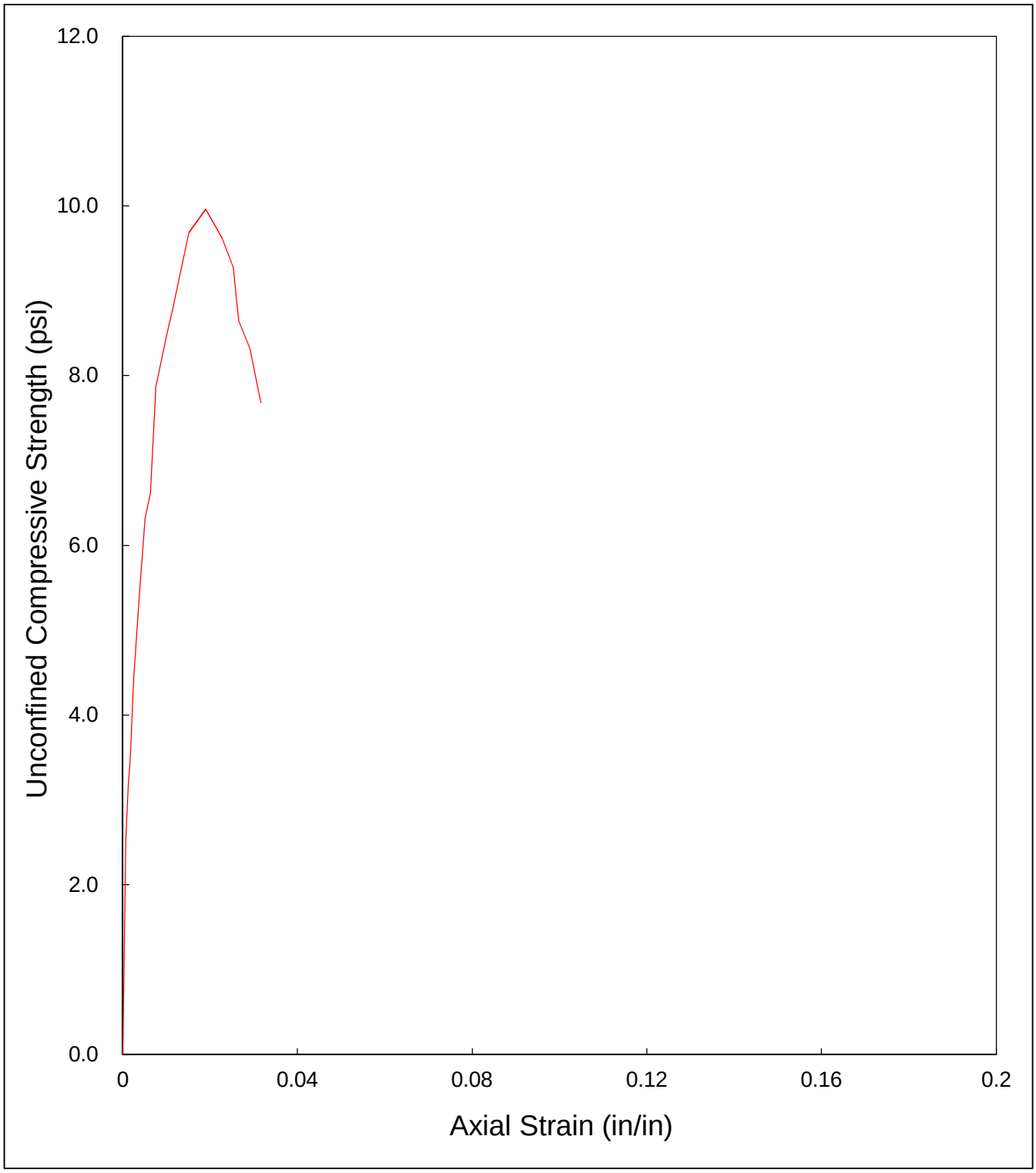
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	174.57	g
3. WT WET SOIL + TARE	353.88	g
4. WT DRY SOIL + TARE	319.73	g
5. WT WATER, Ww	34.15	g
6. WT DRY SOIL, Ws	145.16	g
7. MOISTURE CONTENT, W	**23.53**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.03	in.	3.95	in.
No. 2	2.01	in.	3.95	in.
No. 3	1.97	in.	3.96	in.
Average	**2.00**	**in.**	**3.95**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***358.18***	***g***
Initial Area, Ac	3.15	in²
Initial Volume, Vc	12.46	in³
Initial Bulk Unit Weight,	109.5	lb/ft³
Initial Dry Unit Weigh	88.7	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	10.0	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.152	0.0000	0.0
8	0.003	0.003	3.154	0.0008	2.5
10	0.005	0.005	3.156	0.0013	3.2
11	0.007	0.007	3.158	0.0018	3.5
14	0.010	0.010	3.160	0.0025	4.4
17	0.015	0.015	3.164	0.0038	5.4
20	0.020	0.020	3.168	0.0051	6.3
21	0.025	0.025	3.172	0.0063	6.6
25	0.030	0.030	3.176	0.0076	7.9
26	0.035	0.035	3.180	0.0089	8.2
27	0.040	0.040	3.184	0.0101	8.5
28	0.045	0.045	3.188	0.0114	8.8
29	0.050	0.050	3.192	0.0127	9.1
30	0.055	0.055	3.197	0.0139	9.4
31	0.060	0.060	3.201	0.0152	9.7
32	0.075	0.075	3.213	0.0190	10.0
31	0.090	0.090	3.226	0.0228	9.6
30	0.100	0.100	3.234	0.0253	9.3
28	0.105	0.105	3.238	0.0266	8.6
27	0.115	0.115	3.247	0.0291	8.3
26	0.120	0.120	3.251	0.0304	8.0
25	0.125	0.125	3.255	0.0316	7.7

UNCONFINED COMPRESSION TESTING
Sample No. 0427-25A (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Patchogue		
PROJECT No.:	SH0427		
SAMPLE No.:	0427-25A (28 day)		
TESTING DATE:	10/3/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	TNR	TRACKING CODE:	8419

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	23.5	**%**
BULK UNIT WEIGHT	109.5	lb/ft^3
DRY UNIT WEIGHT	88.7	lb/ft^3
UCS *	10.0	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

Appendix F: Pre-Design Investigation Soil Boring Logs

BORING LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:**	**Boring No.** GI-1A **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
N. Batarags/Allendale, NJ	RLO	8"	NA	N/A"	24.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Split Spoon	Development Method:
3/27/12 - 3/27/12	ADT	Hammer Type: 140lb Auto	N/A

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255203.2 ft.
Shawn Miller	HSA	CME 1500	Vert Datum: NAVD88	Northing: 219321.8 ft.
			Ground Surface Elev: --	TOC Elev: N/A ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int / Recovery / Lithology / Backfill	ppm Readings (ppm)	Remarks
		SW	**FILL**	12-31-18-9			0.0	*Boring was re-drilled due to running sand on initial boring. A column of water was added to hollow stem augers to stabilize borehole.*
		GP	Brown mfc SAND trace (-) Organics.					
			Black mfc SAND and GRAVEL					
		SW	(composed of angular cinders).	3-5-1-2			2.5	
			Crushed/pulverized Blue-grey concrete.					
			Crushed/pulverized red brick.					
		SW	Black mfc SAND, little (-) Gravel (angular).	2-3-2-2			117	2.0' BGS: NAPL odor. Sheen on large grains.
5		SW	Saturated with water.					4-4.6' BGS: Heavy NAPL coating on organics (branches/wood). Strong odor.
			ALLUVIAL DEPOSITS					
		SW	Black mfc SAND, some Gravel, trace Organics.	2-2-8-8			73.1	4.6-6' BGS: Saturated w/ reddish-brown NAPL. Strong odor.
			Brown-black mfc SAND.					
		SW	Piece of wood in spoon @ 5.3'	3-8-13-10			11.5	6-8' BGS: Strong odor. Heavy staining (reddish-black). Sheen on water.
		SP	**OUTWASH DEPOSITS**					
		GP	Brown mfc SAND, little Gravel.					
10		SW	Brown-black mfc SAND.	3-6-10-7			39.7	8-10' BGS: Black staining. Strong odor. Sheen on water and grains.
			Brown-black mc SAND and f GRAVEL.					
			Brown mfc SAND, trace (+) Gravel					
		SW	(rounded quartz).	5-5-6-7			12.5	10-14' BGS: Saturated w/ NAPL. Strong odor. Rainbow sheen across spoon.
			Reddish- brown mfc SAND, some (-) Gravel (rounded quartz).					
		SW	Tan mfc SAND.	3-4-6-4			2.7	14.3' BGS: 1/4" thick NAPL lens across spoon.
15		SW	Orange-tan mfc SAND. @17.1' BGS: Band of Iron staining (1" thick).					
				1-3-5-5			1.5	16-18' BGS: Slight odor.
				2-3-3-4			3.9	
20			No recovery.	3-1-2-2				
		SW	Orange-brown-tan mfc SAND.	3-3-4-5			12.9	

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BORING LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:**	**Boring No.** GI-2 **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
N. Batarags/Allendale, NJ	RLO	8"	NA	N/A"	24.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Split Spoon	Development Method:
3/23/12 - 3/23/12	ADT	Hammer Type: 140lb Auto	N/A

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255218.8 ft.
Shawn Miller	HSA	CME 1500	Vert Datum: NAVD88	Northing: 219268.3 ft.
			Ground Surface Elev: --	TOC Elev: N/A ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int / Recovery / Lithology / Backfill	ppm Readings (ppm)	Remarks
		SW	**FILL** Brown-grey fmc SAND, little Gravel, little (-) Silt, trace Organics.	9-10-10-7			0.0	
		SW	Pulverized concrete.	4-5-5-2			53.5	2-2.6' BGS: Black staining. Strong odor. 2.6-4' BGS: Saturated with tacky NAPL.
		SW PT	Dark grey mfc SAND. Includes pieces of red brick. Slightly moist. @1.2' BGS: Piece of red brick in shoe of sampler.	5-4-1-1				
5			Brown fmc SAND, little Gravel.					
		SW	**ALLUVIAL DEPOSITS** Organics. Saturated w/ water @ 2.6'.	4-6-3-1			55.0	6-7' BGS: Heavy NAPL staining. Strong odor. 6.7' BGS: Thin NAPL lens across core.
		SW	No recovery.	6-6-5-7			30	7-8' BGS: Slight NAPL staining.
		SW	**OUTWASH DEPOSITS** Brown mfc SAND, trace (+) Gravel.					
		GW	Tan-brown mfc SAND, trace (+) Gravel.					
10		SW GW	Tan-grey mfc SAND and mfc GRAVEL (rounded). Tan-orange mfc SAND and GRAVEL.	4-7-6-6			4.0	
			No Recovery. Cobble in shoe of sampler.	5-5-7-6				
		SP	Tan-orange mf SAND.	6-5-2-3			1.0	
15				4-6-10-11			1.0	16-17.2' BGS: Slight NAPL sheen on larger grains. 17.2' BGS: 1/4" thick NAPL lens across core. Tacky, viscous consistency.
				12-5-5-4			0.0	
20				1-1-3-3			1.5	
				5-3-5-6			0	
			@22.8' BGS: Piece of rounded quartz cobble in spoon.					

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BORING LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:**	**Boring No.** GI-3 **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
N. Batarags/Allendale, NJ	RLO	8"	NA	N/A"	30.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Split Spoon	Development Method:
3/23/12 - 3/23/12	ADT	Hammer Type: 140lb Auto	N/A

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255108.9 ft.
Shawn Miller	HSA	CME 1500	Vert Datum: NAVD88	Northing: 219367.5 ft.
			Ground Surface Elev: --	TOC Elev: N/A ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int / Recovery / Lithology / Backfill	ppm Readings (ppm)	Remarks
		ML	**FILL**	2-3-6-5			0.0	
		ML	Brown SILT, little Sand, trace Organics. Moist.					
		SW	Pulverized concrete.	5-3-4-18			0.0	
		SW	Grey SILT, little SAND, trace Organics. Includes misc. fill (glass). Moist.					
		SW	Brown mfc SAND, saturated w/ water.	16-50/3			0.0	
5			Brown mfc SAND.					
			Wood, concrete in spoon.					
			Brown mfc SAND.	12-9-4-3			0.0	
		SW	Crushed concrete.					
			OUTWASH DEPOSITS					
			Tan-beige mfc SAND.	9-1-2-3			0.0	
10				15-3-3-2			0.0	
				9-2-3-3			0.0	
		SW	Beige mfc SAND, trace (-) Gravel (rounded quartz).	10-3-2-5			0.0	
15				12-5-4-4			0.0	
				5-5-5-5			0.0	
20				17-3-3-3			0.0	
		GW	Beige mfc GRAVEL, little Beige mfc Sand.	1-2-2-2			0.0	22-24' BGS: Sand may have been removed from sample when borehole flushed w/ water to remove collapsing cuttings.
		SW	Beige mfc SAND, some mf Gravel.	7-3-5-9			0.0	
25		SW	Beige mfc SAND, trace Gravel. @26.8' BGS: Color change to tan-beige.	9-14-14-15			0.0	
		SW	Tan-beige mfc SAND, trace (-) Gravel.	5-7-9-12			0.0	
30								

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BORING LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:**	**Boring No.** GI-4 **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
N. Batarags/Allendale, NJ	RLO	8"	NA	N/A"	30.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Split Spoon	Development Method:
5/24/12 - 5/24/12	ADT	Hammer Type: 140lb Auto	N/A

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255295.6 ft.
Chris Miglione	HSA	CME 1500	Vert Datum: NAVD88	Northing: 219292.5 ft.
			Ground Surface Elev: --	TOC Elev: N/A ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int	Graphic Log: Recovery	Graphic Log: Lithology	Graphic Log: Backfill	ppm Readings (ppm)	Remarks
			FILL Crushed pavement/concrete.	4-7-8-5						0.0	
		SW	Grey-black mfc SAND	4-3-2-2						0.0	
		SM	Black stained mfc SAND, little Silt, trace Gravel (fill). Moist.								
		SM		1-1-1-1						0.0	
5		SM	Brown-black mf SAND, some Silt, little (+) Gravel.								
		SP	Wood in spoon.	3-5-9-12						0.0	
		OH	Grey-black mf SAND, trace (+) Gravel.								
		SW	Brown decomposing organics.								
		SW	Beige-grey mfc SAND, little Gravel.	12-7-8-11						0.0	
		GW	Tan-orange mfc SAND and GRAVEL								
		SW	(rounded qtz)								
10			Black-grey mfc SAND, trace f Gravel (composed of pieces of crushed red brick).	3-7-7-6							
			No recovery.								
		SW	**OUTWASH DEPOSITS**	5-5-5-8						0.0	
		SP	Tan-orange mfc SAND.								
		SW	Tan-orange c SAND.								
		SP	Tan-orange mfc SAND, trace Gravel (rounded quartz).	1-2-6-9						0.0	
15			Orange mf SAND.								
		SW	Tan-grey mfc SAND, little (-) f Gravel.	5-4-7-10						0.0	
		SW	Orange mfc SAND.	2-4-3-4						0.0	
20		SW	Orange mfc SAND, trace (+) Gravel (rounded quartz).	5-9-12-11						0.0	
			No recovery.	4-4-5-7							
				5-6-4-7							
25		SP	Orange-tan mf SAND. @ 27' BGS: 1/4" band of iron staining.	20-11-14-14						0.0	
			No recovery.	4-5-12-18							
30											

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BORING LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:**	**Boring No.** GI-5 **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
N. Batarags/Allendale, NJ	RLO	8"	NA	N/A"	30.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Split Spoon	Development Method:
5/24/12 - 5/24/12	ADT	Hammer Type: 140lb Auto	N/A

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255326.5 ft.
Chris Miglione	HSA	CME 1500	Vert Datum: NAVD88	Northing: 219273.8 ft.
			Ground Surface Elev: --	TOC Elev: N/A ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int / Recovery / Lithology / Backfill	ppm Readings (ppm)	Remarks
		SM	**FILL** Brown-black mfc SAND, little (+) Silt, little Gravel (composed of rounded quartz, crushed concrete, and misc. fill- glass, cinders). @0.3' BGS: Piece of wood in spoon. @2.3' BGS Moist.	6-6-7-4			0.0	
				3-7-14-11			0.0	
		SM	Same as above. Color change to black-red-grey @3.4' BGS: Wet.	2-1-1-1			9.3	
5		SW	Black mfc SAND, little (+) Silt, little (-) mfc Gravel (composed of quartz & crushed fill). @4.7' BGS: Saturated with water.	3-7-10-11			8.2	5.2-6.5' BGS: Black oily sheen on water. Black staining on grains. Slight to moderate tar-like odor.
		GP SW	Black stained mfc SAND, little Gravel (composed of crushed red brick), little (-) Silt.					6.5-7' BGS: Slight NAPL staining on glass when soil placed in jar.
		GW	Tan-grey mfc SAND.	5-7-6-4			0.0	
10		SW	Grey-tan mfc SAND and GRAVEL (quartz).	4-6-13-18			0.0	8-10' BGS: Slight sheen on water.
		GP	Grey-tan mfc SAND, some Gravel (composed of rounded quartz & few cinders).					
			No recovery.	3-7-17-35				
		SW	**OUTWASH DEPOSITS** Beige-grey mfc SAND, trace Gravel (rounded quartz).	2-5-6-6			0.0	
15				2-5-15-21			0.0	
				16-35-19-14			0.0	
20				6-12-75/2			0.0	
		SW	Tan-orange mfc SAND, little (-) Gravel.	15-14-14-27			0.0	
				22-25-43-50/3			0.0	24-26' BGS: Slight sheen on water.
25				14-18-34-50/3			0.0	
			No recovery.	2-2-3-6				
30								

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BORING LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:**	**Boring No.** GI-6 **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
N. Batarags/Allendale, NJ	RLO	8"	NA	N/A"	30.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Split Spoon	Development Method:
5/25/12 - 5/25/12	ADT	Hammer Type: 140lb Auto	N/A

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255296.9 ft.
Chris Miglione	HSA	CME 1500	Vert Datum: NAVD88	Northing: 219254.8 ft.
			Ground Surface Elev: --	TOC Elev: N/A ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int / Recovery / Lithology / Backfill	ppm Readings (ppm)	Remarks
		SW	**FILL** Crushed asphalt.	7-5-3-2			0.0	
			Black mfc SAND little (+) Gravel (crushed concrete) little Silt. Moist. @1.3' BGS: 1" thick wood in spoon.	2-3-3-7			9.8	
		SM	Green black mfc SAND some Silt, trace Gravel (misc. fill- Glass). @3.3' BGS: Saturated with water.	2-3-3-1			34.4	2.8-4.7' BGS: Slight to moderate tar-like odor. Slight sheen on water.
5		SW	Tan-grey mfc SAND.	1-1-1-1			1.1	4.7-4.9' BGS: Reddish brown NAPL coating on grains. Moderate odor. 6-8' BGS: Sheen on water and slight odor.
		SW	Tan-beige mfc SAND. @8.7' BGS: 2" band of color change to dark grey.	9-10-11-12			0.2	
		GW SP SW	Tan-beige mc SAND and GRAVEL (rounded qtz) **OUTWASH DEPOSITS**	6-6-6-8			0.0	
10			Orange mfc SAND trace (-) Gravel (rounded qtz). @11' BGS: 1" Granite cobble in shoe.	6-3-5-4			0.0	
			No recovery.					
		SW	Beige-grey mfc SAND, trace Gravel (rounded quartz).	6-5-5-6			0.0	
15		SW	Orange mfc SAND.	2-2-3-1			0.0	
			No recovery. Piece of rubber in spoon.	3-6-7-11				
20		SW	Orange mfc SAND.	3-2-3-4			0.0	
				4-6-9-7			0.0	
				2-2-4-7			0.0	
25		SW	Orange mfc Sand trace (-) Gravel (rounded qtz).	9-6-6-7			0.0	
			No recovery.	7-7-10-4				
30								

P:\National_Grid\Patchogue\Addl_Inv\patchogue_logs_5_2010

BORING LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:** N/A	**Boring No.** SB-137 **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
T. Chaturgan/Allendale, NJ	RLO	3"	NA	N/A"	10.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Macrocore®	Development Method:
1/10/12 - 1/10/12	ADT	Hammer Type: N/A	N/A

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83 Vert Datum: NAVD88 Ground Surface Elev: 5.3 ft.	Easting: 1255121.2 ft. Northing: 219367.6 ft. TOC Elev: N/A ft.
A. Larkin	Direct-push	Geoprobe® 6620DT		

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int	Graphic Log: Recovery	Graphic Log: Lithology	Graphic Log: Backfill	ppm Readings (ppm)	Remarks
		SW	**FILL** Concrete	NA	1					0.0	*Borehole backfilled with bentonite chips.* 1.4-3.4' BGS: Slight tar-like odor.
		GW	Grey fmc SAND and mfc GRAVEL.								
		SW	Grey-brown-tan fmc SAND, trace (+) f Gravel. Saturated @ 3.0'								
		SW	**OUTWASH DEPOSITS** Beige-tan fmc SAND, little (-) fm Gravel. Saturated.								
5	0			NA	2					0.0	4.7' BGS: Specks of black hard tar, tacky. 5-5.4' BGS: Gravel-sized pieces of brittle tar, moderate tar-like odor.
		SW	Beige-tan fmc SAND, trace (+) f Gravel. Saturated.								
10											**Note:** *Soil Sample from 0-3' bgs collected with a post hole digger or hand auger during utility clearance.*

P:\National_Grid\Patchogue\Addl_Inv\patchogue_logs_5_2010

BORING LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:** N/A	**Boring No.** SB-138 **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
T. Chaturgan/Allendale, NJ	RLO	3"	NA	N/A"	10.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Macrocore®	Development Method:
1/10/12 - 1/10/12	ADT	Hammer Type: N/A	N/A

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255118.0 ft.
A. Larkin	Direct-push	Geoprobe® 6620DT	Vert Datum: NAVD88	Northing: 219360.8 ft.
			Ground Surface Elev: 5.4 ft.	TOC Elev: N/A ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int / Recovery / Lithology / Backfill	ppm Readings (ppm)	Remarks
	5	SW	**FILL** Concrete.		1		0.0	*Borehole backfilled with bentonite chips.*
		GW	Grey mfc SAND and mfc GRAVEL, trace Silt.					1.25 - 2.85' bgs: Black stained soils, faint tar-like odor.
		SW	Black stained mf SAND, trace (+) Silt.					
		SW	Black-yellow-beige mf SAND, little (+) fm Gravel, trace Silt. Saturated @ 3'.		2		0.0	2.85 - 3.7' bgs: Faint tar-like odor.
		SW						
5	0	SW	Beige-tan-grey fmc SAND, trace (+) fm Gravel. Saturated.					4.8' bgs: Stringy/tacky tar observed within soils.
		SW	Pulverized concrete.					
			OUTWASH DEPOSITS Tan cmf SAND, some (-) fm Gravel, trace Silt.		3		0.0	
			Beige-tan iron-stained fm SAND, trace (+) f Gravel. Saturated @ 8'.					
10								**Note:** *Soil Sample from 0-3' bgs collected with a post hole digger or hand auger during utility clearance.*

P:\National_Grid\Patchogue\Addl_Inv\patchogue_logs_5_2010

BORING LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:** N/A	**Boring No.** SB-139 **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
T. Chaturgan/Allendale, NJ	RLO	3"	NA	N/A"	23.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Macrocore®	Development Method:
1/10/12 - 1/10/12	ADT	Hammer Type: N/A	N/A

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255164.9 ft.
A. Larkin	Direct-push	Geoprobe® 6620DT	Vert Datum: NAVD88	Northing: 219314.0 ft.
			Ground Surface Elev: 5.5 ft.	TOC Elev: N/A ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int	Graphic Log: Recovery	Graphic Log: Lithology	Graphic Log: Backfill	ppm Readings (ppm)	Remarks
	5	SW	**FILL** Black-brown fmc SAND, some mf Gravel, trace (+) Organics. Wet @ 1.4'.	NA	1					0.0	*Borehole backfilled with bentonite chips.* 1.6 - 3.5' bgs: Black stained soils, slight tar-like odor.
		SW	Black stained mfc SAND, some (-) mf Gravel, trace (+) Silt w/ pieces of wood and red brick. Saturated @ 3'.								
		SW	Black-stained mfc SAND, little (+) fm Gravel, trace (+) Silt w/ wood and pieces of glass. Saturated.	NA	2					0.0	3.5 - 4.45' bgs: Black stained soils, slight to moderate tar-like odor.
5	0	SW	Iron-stained mfc SAND, trace (+) f Gravel.								
			OUTWASH DEPOSITS Tan-beige mf SAND, trace (+) Gravel. Saturated.								
		SW	Brown-tan/grey fmc SAND, trace (+) f Gravel. Saturated.	NA	3					0.0	
10	-5	SW	Tan-beige iron-stained cmf SAND, trace (-) f Gravel.								**Note:** *Soil Sample from 0-3' bgs collected with a post hole digger or hand auger during utility clearance.*
		SW	Tan-beige mf SAND, trace (+) f Gravel.								
				NA	4						
15	-10										
		SW	Saturated, tan-beige fmc SAND, trace (+) f Gravel.	NA	5					0.0	
20	-15										

P:\National_Grid\Patchogue\Addl_Inv\patchogue_logs_5_2010

BORING LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:** N/A	**Boring No.** SB-140 **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
T. Chaturgan/Allendale, NJ	RLO	3"	NA	N/A"	23.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Macrocore®	Development Method:
1/10/12 - 1/10/12	ADT	Hammer Type: N/A	N/A

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255173.6 ft.
A. Larkin	Direct-push	Geoprobe® 6620DT	Vert Datum: NAVD88	Northing: 219281.6 ft.
			Ground Surface Elev: 5.3 ft.	TOC Elev: N/A ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int / Recovery / Lithology / Backfill	ppm Readings (ppm)	Remarks
		SW	**FILL** Black-grey fmc SAND, some (-) mf Gravel, trace (+) Organics, trace Silt w/ pieces of red brick and glass/wood. Black staining @ 0.9'.	NA	1		0.0	*Borehole backfilled with bentonite chips.* 0.9' bgs: Black stained soils. 2-3.7' bgs: Black stained soils, faint tar-like odor. 3.7-4.8' bgs: Black stained soils, moderate tar-like odor.
		SW	Black stained cmf SAND, little (-) fm Gravel, trace (+) Silt. @3' Saturated.	NA	2		0.7	
		SW	Pulverized red brick.					
5	0	SW	Black stained cmf SAND, little (+) fm Gravel, trace (+) Silt.					
			OUTWASH DEPOSITS Grey-tan fmc SAND, little (+) mf Gravel (rounded), trace (+) Silt.					
		SW	Tan-beige fmc SAND, little (+) mf Gravel. Saturated.	NA	3		0.1	
10	-5							**Note:** *Soil Sample from 0-3' bgs collected with a post hole digger or hand auger during utility clearance.*
		SW	Tan-beige fmc SAND, trace (+) f Gravel. Saturated.	NA	4		0.0	
15	-10							
				NA	5		0.0	
20	-15	SW	Tan-beige iron-stained cmf SAND, little (-) mf Gravel.					

P:\National_Grid\Patchogue\Addl_Inv\patchogue_logs_5_2010

BORING LOG

Brown AND Caldwell	**Project Name:** Patchogue Former MGP Site **Project Number:** 138893 **Project Location:** Patchogue, NY	**Permit Number:** N/A	**Boring No.** SB-141 **Page** 1 **of** 1

Geologist/Office	Checked By:	Borehole Diameter:	Screen Diameter and Type:	Slot Size:	Total Boring Depth (ft)
T. Chaturgan/Allendale, NJ	RLO	3"	NA	N/A"	13.0 ft.

Start/Finish Date	Drilling Contractor:	Sampling: Macrocore®	Development Method:
1/10/12 - 1/10/12	ADT	Hammer Type: N/A	N/A

Driller:	Drilling Method:	Drilling Equipment:	Horiz Datum/Proj: NYS Plane NAD83	Easting: 1255135.7 ft.
A. Larkin	Direct-push	Geoprobe® 6620DT	Vert Datum: NAVD88	Northing: 219364.2 ft.
			Ground Surface Elev: 5.5 ft.	TOC Elev: N/A ft.

Depth (feet)	Elevation (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Sample Int / Recovery / Lithology / Backfill	ppm Readings (ppm)	Remarks
	5		**FILL**	NA	1		50.2	*Borehole backfilled with bentonite chips.*
		SW	Concrete					1 - 2.6' bgs: Black stained soils, moderate tar-like odor.
		GW	Grey fmc SAND and mfc GRAVEL.					
		SW	Black-stained fm SAND, little (-) fm Gravel, trace Silt.					
		SW	Black-stained fm SAND.	NA	2		47.8	2.6 - 3.0' bgs: Black NAPL coating soil grains, thin bands of NAPL, strong tar-like odor, abundant sheen.
		SW	Grey-black fm SAND, little (-) Silt. Saturated.					3 - 3.9' bgs Soils heavily coated with NAPL, strong tar-like odor, abundant sheen.
5	0	GW	Grey-white fm SAND and fm GRAVEL (possible pulverized concrete).					4.8' bgs: Black stained soils, moderate tar-like odors.
		SW	**OUTWASH DEPOSITS**					4.9 - 5.1' bgs: Moderate tar-like odor.
		SW	Beige-tan fm SAND, trace (+) f Gravel. Saturated.	NA	3		0.7	5.1 - 6.7' bgs: Slight tar-like odor.
			Beige-tan fmc SAND, trace f Gravel. Saturated.					8 - 10.6' bgs: Very slight tar-like odor.
10	-5		Beige-tan fm SAND, trace (-) Silt. Saturated.					

Note: *Soil Sample from 0-3' bgs collected with a post hole digger or hand auger during utility clearance.*

P:\National_Grid\Patchogue\Addl_Inv\patchogue_logs_5_2010

Appendix G: Geotechnical Laboratory Report

GeoTesting EXPRESS

Client:	Brown & Caldwell				
Project:	NG Patchogue UCWP-RDWP-RDR				
Location:	Patchogue, NY			Project No:	GTX-300060
Boring ID:	---	Sample Type:	---	Tested By:	jek
Sample ID:	---	Test Date:	12/07/12	Checked By:	jdt
Depth :	---	Test Id:	256102		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
GI-4	---	8-10 ft.	Moist, mottled very dark brown and yellowish brown sand	16.7
GI-4	---	20-22 ft	Moist, yellowish brown sand	20.3
GI-5	---	2-4 ft	Moist, dark brown silty sand	40.4
GI-5	---	16-18 ft	Moist, olive brown sand	18.2
GI-6	---	8-10 ft	Moist, olive brown sand with gravel	16.7
GI-6	---	26-28 ft	Moist, dark yellowish brown sand	20.3

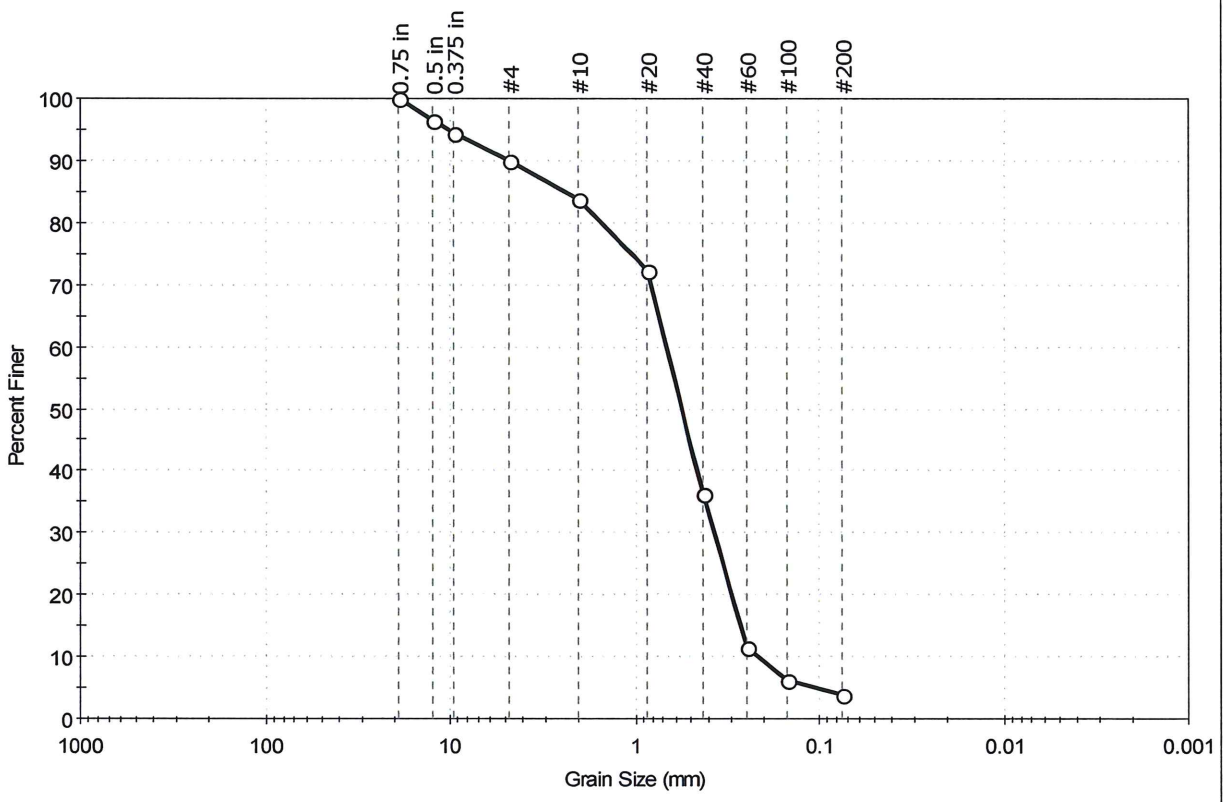
Notes: Temperature of Drying : 110º Celsius

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GeoTesting EXPRESS

Client:	Brown & Caldwell				
Project:	NG Patchogue UCWP-RDWP-RDR				
Location:	Patchogue, NY			Project No:	GTX-300060
Boring ID:	GI-4	Sample Type:	jar	Tested By:	jbr
Sample ID:	---	Test Date:	12/07/12	Checked By:	jdt
Depth :	8-10 ft.	Test Id:	256091		
Test Comment:	---				
Sample Description:	Moist, mottled very dark brown and yellowish brown sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	10.0	86.3	3.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	96		
0.375 in	9.50	94		
#4	4.75	90		
#10	2.00	84		
#20	0.85	72		
#40	0.42	36		
#60	0.25	12		
#100	0.15	6		
#200	0.075	4		

Coefficients

D_{85} = 2.3899 mm D_{30} = 0.3711 mm
D_{60} = 0.6713 mm D_{15} = 0.2690 mm
D_{50} = 0.5534 mm D_{10} = 0.2157 mm
C_u = 3.112 C_c = 0.951

Classification

ASTM Poorly graded sand (SP)

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

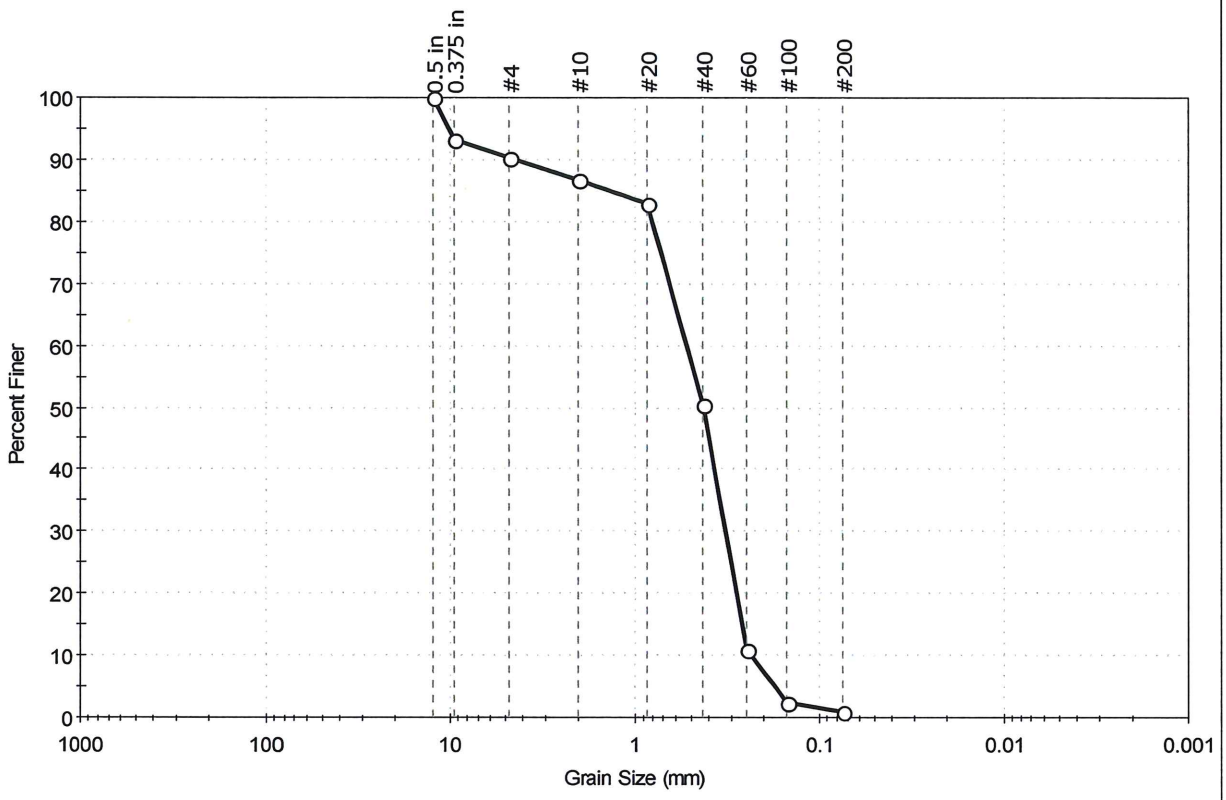
Sand/Gravel Hardness : HARD

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GeoTesting EXPRESS

Client:	Brown & Caldwell				
Project:	NG Patchogue UCWP-RDWP-RDR				
Location:	Patchogue, NY			Project No:	GTX-300060
Boring ID:	GI-4	Sample Type:	jar	Tested By:	jbr
Sample ID:	---	Test Date:	12/07/12	Checked By:	jdt
Depth :	20-22 ft	Test Id:	256092		
Test Comment:	---				
Sample Description:	Moist, yellowish brown sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	9.6	89.5	0.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	93		
#4	4.75	90		
#10	2.00	87		
#20	0.85	83		
#40	0.42	50		
#60	0.25	11		
#100	0.15	2		
#200	0.075	1		

Coefficients

D_{85} = 1.3587 mm D_{30} = 0.3230 mm
D_{60} = 0.5225 mm D_{15} = 0.2637 mm
D_{50} = 0.4233 mm D_{10} = 0.2354 mm
C_u = 2.220 C_c = 0.848

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

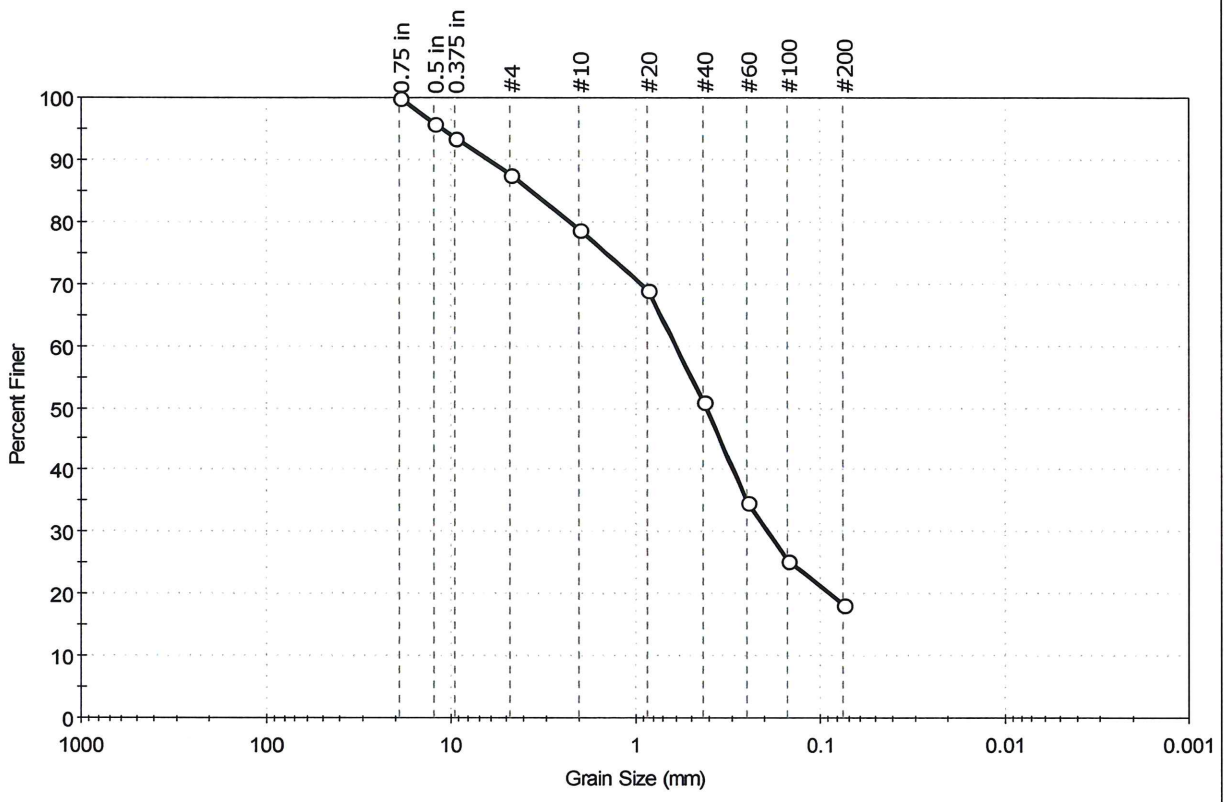
Sand/Gravel Hardness : HARD

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GeoTesting EXPRESS

Client:	Brown & Caldwell				
Project:	NG Patchogue UCWP-RDWP-RDR				
Location:	Patchogue, NY			Project No:	GTX-300060
Boring ID:	GI-5	Sample Type:	jar	Tested By:	jbr
Sample ID:	---	Test Date:	12/07/12	Checked By:	jdt
Depth :	2-4 ft	Test Id:	256093		
Test Comment:	---				
Sample Description:	Moist, dark brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	12.5	69.3	18.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	96		
0.375 in	9.50	94		
#4	4.75	87		
#10	2.00	79		
#20	0.85	69		
#40	0.42	51		
#60	0.25	35		
#100	0.15	25		
#200	0.075	18		

Coefficients

D_{85} =3.7042 mm D_{30} =0.1927 mm
D_{60} =0.6018 mm D_{15} =N/A
D_{50} =0.4118 mm D_{10} =N/A
C_u =N/A C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

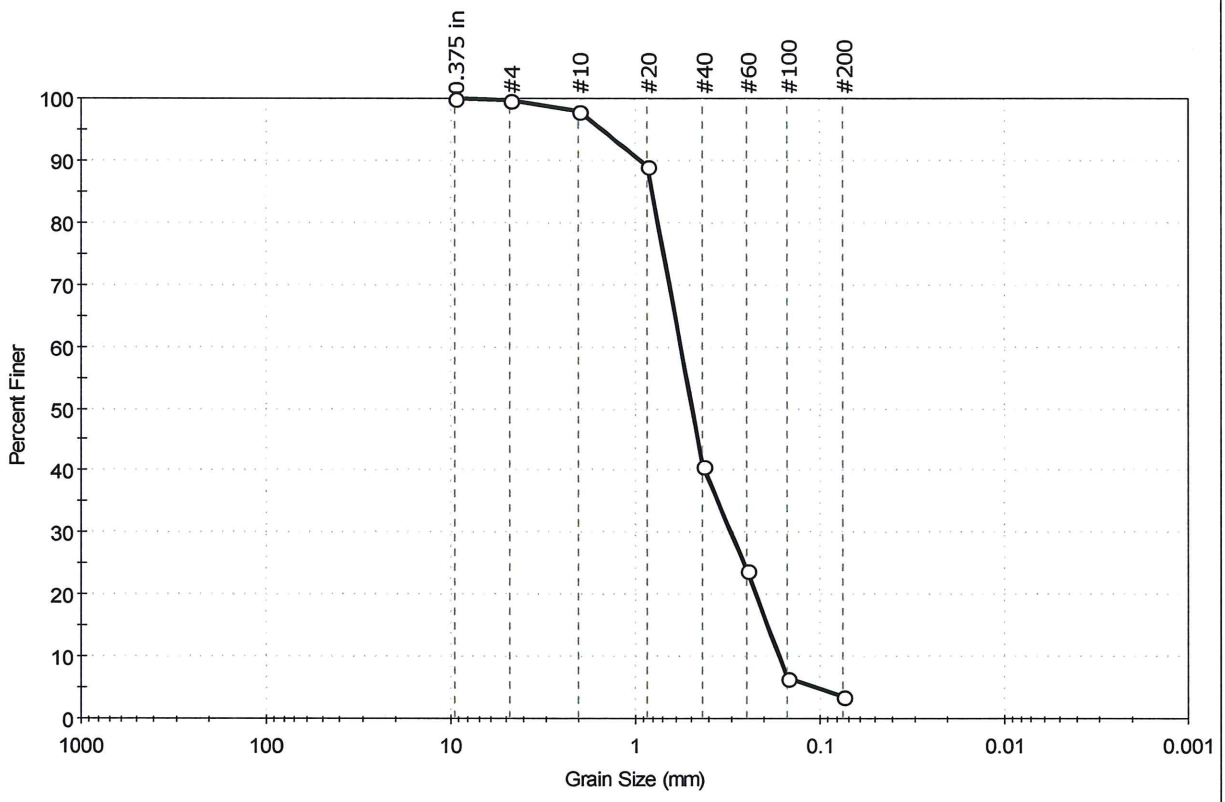
Sand/Gravel Hardness : HARD

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GeoTesting EXPRESS

Client:	Brown & Caldwell				
Project:	NG Patchogue UCWP-RDWP-RDR				
Location:	Patchogue, NY			Project No:	GTX-300060
Boring ID:	GI-5	Sample Type:	jar	Tested By:	jbr
Sample ID:	---	Test Date:	12/07/12	Checked By:	jdt
Depth :	16-18 ft	Test Id:	256094		
Test Comment:	---				
Sample Description:	Moist, olive brown sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.3	96.2	3.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	98		
#20	0.85	89		
#40	0.42	41		
#60	0.25	24		
#100	0.15	7		
#200	0.075	4		

Coefficients

D_{85} = 0.8010 mm D_{30} = 0.3027 mm
D_{60} = 0.5606 mm D_{15} = 0.1921 mm
D_{50} = 0.4861 mm D_{10} = 0.1661 mm
C_u = 3.375 C_c = 0.984

Classification

ASTM Poorly graded sand (SP)

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

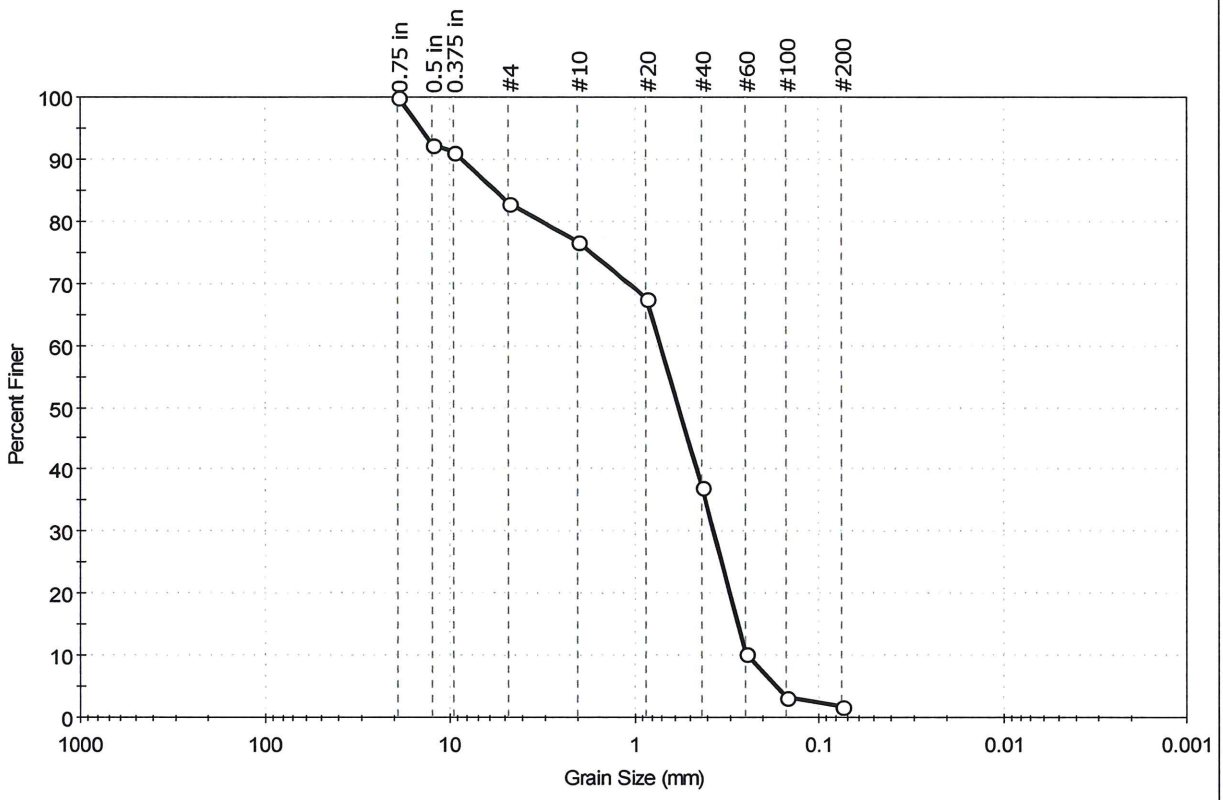
Sand/Gravel Hardness : ---

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GeoTesting EXPRESS

Client:	Brown & Caldwell				
Project:	NG Patchogue UCWP-RDWP-RDR				
Location:	Patchogue, NY			Project No:	GTX-300060
Boring ID:	GI-6	Sample Type:	jar	Tested By:	jbr
Sample ID:	---	Test Date:	12/07/12	Checked By:	jdt
Depth :	8-10 ft	Test Id:	256095		
Test Comment:	---				
Sample Description:	Moist, olive brown sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	17.1	81.3	1.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	92		
0.375 in	9.50	91		
#4	4.75	83		
#10	2.00	77		
#20	0.85	68		
#40	0.42	37		
#60	0.25	10		
#100	0.15	3		
#200	0.075	2		

Coefficients

D_{85} =5.6275 mm	D_{30} =0.3683 mm
D_{60} =0.7138 mm	D_{15} =0.2738 mm
D_{50} =0.5684 mm	D_{10} =0.2428 mm
C_u =2.940	C_c =0.783

Classification

ASTM: Poorly graded sand with gravel (SP)

AASHTO: Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

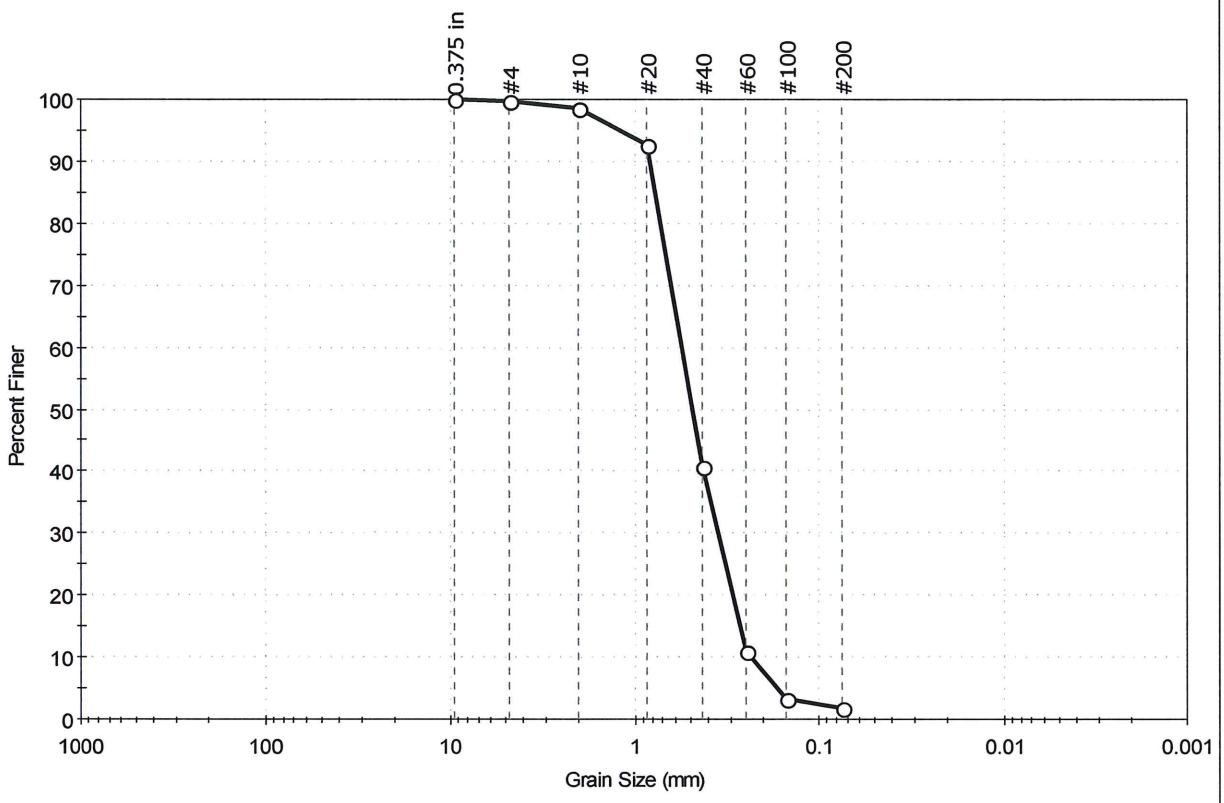
Sand/Gravel Hardness : HARD

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GeoTesting EXPRESS

Client:	Brown & Caldwell				
Project:	NG Patchogue UCWP-RDWP-RDR				
Location:	Patchogue, NY			Project No:	GTX-300060
Boring ID:	GI-6	Sample Type:	jar	Tested By:	jbr
Sample ID:	---	Test Date:	12/07/12	Checked By:	jdt
Depth :	26-28 ft	Test Id:	256096		
Test Comment:	---				
Sample Description:	Moist, dark yellowish brown sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.4	97.9	1.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#20	0.85	93		
#40	0.42	41		
#60	0.25	11		
#100	0.15	3		
#200	0.075	2		

Coefficients

D_{85} =0.7686 mm	D_{30} =0.3517 mm
D_{60} =0.5503 mm	D_{15} =0.2694 mm
D_{50} =0.4815 mm	D_{10} =0.2368 mm
C_u =2.324	C_c =0.949

Classification

ASTM Poorly graded sand (SP)

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

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Appendix H: Community Air Monitoring Plan (CAMP)

DRAFT

Community Air Monitoring Plan
Patchogue (West Main Street) Former Manufactured Gas Plant (MGP) Site

Prepared for

National Grid
175 East Old Country Road
Hicksville, New York 11801

November 2012

Project Number: 142128.550

This is a draft and is not intended to be a final representation of the work done or recommendations made by Brown and Caldwell. It should not be relied upon; consult the final report.

Brown and Caldwell Associates
2 Park Way, Suite 2A
Upper Saddle River, New Jersey 07458

Table of Contents

Appendices i
List of Figures ii
1. Introduction and Purpose 1-1
1.1 Community Air Monitoring Plan (CAMP) Purpose 1-1
1.2 Potential Air Emission Sources 1-1
2. Community Air Monitoring Program 2-1
2.1 Continuous Air Monitoring 2-1
2.1.1 Station Layout 2-1
2.1.2 Analytical Instrumentation 2-2
2.1.3 Meteorological System 2-2
2.2 Action Levels 2-2
2.2.1 Volatile Organic Compound Action Levels 2-3
2.2.2 Particulate Matter (PM10) Action Levels 2-4
3. Procedures 3-1
3.1 Community Air Monitoring Program Schedule 3-1
3.1.1 Baseline Monitoring 3-1
3.1.2 Weekly Monitoring 3-1
3.2 Routine Procedures 3-1
3.3 Response Procedures 3-2
3.3.1 VOCs 3-3
3.3.2 Particulates 3-3
3.4 Communication Plan 3-3

Appendices

Appendix A New York State Department of Health Generic Community Air Monitoring Plan

List of Figures

Figure 2-1. Proposed Station Locations
Figure 2-2a. Wind Rose (January)
Figure 2-2b. Wind Rose (February)
Figure 2-2c. Wind Rose (March)
Figure 2-2d. Wind Rose (April)
Figure 2-2e. Wind Rose (May)
Figure 2-2f. Wind Rose (June)
Figure 2-2g. Wind Rose (July)
Figure 2-2h. Wind Rose (August)
Figure 2-2i. Wind Rose (September)
Figure 2-2j. Wind Rose (October)
Figure 2-2k. Wind Rose (November)
Figure 2-2l. Wind Rose (December)

Section 1

Introduction and Purpose

This Community Air Monitoring Plan (CAMP) has been prepared on behalf of National Grid for use at the Patchogue (West Main Street) Former Manufactured Gas Plan (MGP) Site located at 234 West Main Street in the Village of Patchogue, Town of Brookhaven, Suffolk County, New York (the "Site") during implementation of remedial activities. The Site is the location of a former MGP facility (owned by a predecessor of National Grid) where manufactured gas was produced. A remedy has been selected for the Site by the New York State Department of Environmental Conservation (NYSDEC) to address contaminated media resulting from these operations. The contaminated media is generally the result of byproducts and wastes associated with the former MGP operations such as coal tar and spent purifier wastes. Contaminated media are present primarily within certain subsurface portions of the Site and in some adjacent off-site area.

Efforts were initiated in 1999 by KeySpan (a predecessor to National Grid) to assess the presence and extent of MGP-contaminated media to achieve conditions that are protective of human health and the environment. In December 2009, KeySpan submitted a Remedial Investigation (RI) Report to the NYSDEC and New York State Department of Health (NYSDOH On September 30, 1999, KeySpan (a predecessor company to National Grid) entered into Order on Consent D1-001-99-05 with NYSDEC to conduct a preliminary site assessment (PSA) of the Former Patchogue MGP Site. The PSA was conducted in 2001 and the results were documented and submitted to the NYSDEC in March 2002 in the PSA Report (VHB, 2002). In 2008 and 2009, remedial investigation activities were performed and the results were documented and submitted to the NYSDEC in the RIR (TetraTech EC, December 2009).

1.1 Community Air Monitoring Plan (CAMP) Purpose

The community air monitoring program will generate data to document that the quality of the air leaving the Site during the implementation of the remedy does not exceed applicable criteria as a result of the release of MGP-related contaminants. Further, the data will be used to confirm that the air quality in adjacent neighborhoods is not being adversely impacted. This CAMP conforms with the requirements of the New York State Department of Health (NYSDOH) "Generic Community Air Monitoring Plan, Revision 1, June 2000" guidelines as presented in Appendix 1A of the NYSDEC, Final DER-10, "Technical Requirements for Site Remediation", dated May 2010. This CAMP will also provide a basis for implementation of response actions to mitigate potential air emissions that may result from the implementation of the remedy.

In addition, a Site-specific Health and Safety Plan (HASP), included in the RDR, has been prepared which addresses potential exposures to on-Site personnel implementing the CAMP. The HASP specifies air monitoring requirements within the work zone.

1.2 Potential Air Emission Sources

As detailed in the RDR, the remedial activities for the Site include:

- Site Preparation;
- Excavation and Shoring;
- Dewatering;

- In-Situ Solidification;
- Construction of an Environmental Cap; and
- Site Restoration

The primary air quality concern during implementation of the remedy is the generation and migration of particulates (i.e., dust), and volatile organic compounds (VOC). Potential activities which could impact air quality at the Site perimeter include excavation, dewatering (and/or treatment, if required), materials handling, grading and vehicular traffic, amongst other remedial activities.

Section 2

Community Air Monitoring Program

The NYSDOH Generic CAMP protocol requires continuous perimeter air monitoring during all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities are defined in the NYSDOH Generic CAMP protocol as including, but not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

The NYSDOH Generic CAMP protocol requires periodic monitoring for VOCs during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Examples of "periodic" monitoring presented in the NYSDOH Generic CAMP include collection of air quality data upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and prior to leaving a sample location. The NYSDOH Generic CAMP protocol further states that in some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities.

This community air monitoring program will consist primarily of continuous air monitoring with the use of periodic monitoring on an as needed basis for non-intrusive activities. For the continuous air monitoring, a minimum of four air monitoring stations will be established and monitored for five to seven days before the start of remedial activities to establish background conditions. Continuous monitoring will continue for the duration of the remedial activities.

2.1 Continuous Air Monitoring

Continuous monitoring of particulates and VOCs will be conducted at each of the air monitoring stations. Real-time data will be recorded in 15-minute intervals. Continuous monitoring will be conducted prior to commencement of work to establish baseline conditions, and throughout the duration of the remedial activities. Monitoring will occur continuously during working hours at each of the stations. Data will be downloaded once every 24 hours by on-site oversight personnel. Alarms will sound when recorded levels exceed action levels.

2.1.1 Station Layout

The initial location of the air monitoring stations, a minimum of two upwind and a minimum of two downwind, is based on prevailing wind directions and the direction of potential off-site receptors. Figure 2-1 presents the proposed station locations. Wind roses[1] for Patchogue, New York appear in Figures 2-2a through 2-2l. When comparing the ART wind rose for each month of the year, the following observations can be made:

[1] Wind rose obtained from the Eastern Region Headquarters (ERH) National Oceanic and Atmospheric Administration (NOAA), Aviation Familiarization Page for NWS New York, NY website: http://www.wcc.nrcs.usda.gov/ftpref/downloads/climate/windrose/new_york/new_york/ , Accessed August 28, 2012.

- The primary wind direction across Patchogue, NY is from the North/Northwest.
- During the summer months, the wind direction is mostly from the South
- During the winter months, the wind direction is mostly from the Northwest
- There is a very strong Northeast component to the wind during summer months

The layout depicted on Figure 2-1 encompasses the work zones in which the remedial activities will be implemented. The station layout may be modified prior to the initiation of the remedial activities based upon the prevailing wind direction measured during the baseline monitoring period as well as the portion(s) of the Site actually being subject to remedial activities. Any adjustments to the station layout will be recorded in the daily field reports generated during documentation of the implementation of the remedial activities.

Meteorological instrumentation will be installed at the Site to measure wind speed and direction, ambient temperature, and relative humidity.

2.1.2 Analytical Instrumentation

Each monitoring station will be equipped with a particulate meter and a photoionization detector (PID) for continuous measurement of air quality parameters in the ambient air. The particulate meters and the PIDs will each be configured to provide 15-minute time-weighted average (TWA) values. Both pieces of instrumentation will be housed in weather tight enclosures.

2.1.3 Meteorological Instrumentation

Instrumentation will be installed at the Site to measure wind speed, direction, ambient temperature, and relative humidity. Wind direction which will be used to identify which of the monitoring stations is upwind, downwind, or crosswind. Wind direction may also be used as the basis for potential re-location of air monitoring stations prior to or during the initiation of remedial activities at a particular portion of the Site.

2.2 Action Levels

Action levels are designated with either a “Green,” “Yellow,” “Orange,” or “Red” status. These color-coded levels correspond to points at which the Construction Manager/Remedial Contractor will be notified that the activities being performed are having an impact on air quality and that immediate mitigation is necessary (e.g., control measures are to be implemented). The mitigation/control measures shall be determined by the Remedial Contractor. The types of mitigation measures which the Remedial Contractor may choose to use include, but are not limited to:

- Application of suppressant foams;
- Wetting of soil and other media or other means to control dust; and
- Modification of work activities.

Due to the industrial nature of the area surrounding the Site, elevated levels of ambient (background) suspended particulates and VOCs may occur. The presence of upwind and downwind monitoring is critical to assess whether action level conditions are the result of remedial activities or are the result of ambient (background) conditions (i.e., migration from upgradient or localized conditions).

Section 3.3 outlines the response procedures for action level conditions.

2.2.1 Volatile Organic Compound Action Levels

In accordance with the NYSDOH Generic CAMP, if the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

To mitigate the chance that remedial activities will generate air impacts at or in excess of five (5) ppm above background, a tiered approach to alarm levels consisting of a lower (yellow) action level and a mid action level (orange) will be established. Mitigation/control measures will be implemented based on the level of the alarm, progressively becoming more urgent until a halt work is required. The alarm will be triggered based on total levels, but work would not be halted or any mitigation measures implemented unless the differential between background and downwind readings exceeds the action levels.

VOC data from continuous monitoring will be used to calculate 15-minute time-weighted average (TWA) values for comparison to the action level.

The following are the action levels for VOCs:

Action Level	Response
Below 2.5 ppm above background for the 15-minute average	Continue and/or resume work activities
> 2.5 ppm to <3.7 ppm above background (15-minute average) or if odors are observed	Notify contractor of need to implement mitigation measures. Employ dust suppression techniques or modify work activities.
>3.7 to <5 ppm above background (15-minute average) or if odors are observed	Notify contractor of need to implement more aggressive mitigation measures. Work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions and continue monitoring.
> 5 ppm above background (15-minute average) or if odors are observed	Work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring. Contact NG PM immediately. Notify NYSDEC and NYDOH about exceedance and corrective measures implemented
>5 ppm to <25 ppm above background (15-minute average)	Work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15 minute average. Contact NG PM immediately. Notify NYSDEC and NYDOH about exceedance and corrective measures implemented
>25 ppm above background (15-minute average)	Activities must be shutdown. Contact NG PM immediately. Notify NYSDEC and NYDOH about exceedance and corrective measures implemented

The 15-minute readings will be recorded and be maintained. Instantaneous readings, if any, used for decision making purposes will also be recorded.

2.2.1.1 Odor Complaints

Community complaints regarding odors and the response taken will be documented. Response actions taken will depend on the number and/or magnitude of the complaints. At a minimum the response action will consist of documenting the date and time the complaint is received. In accordance with the Volatile Organic Compound Action Levels presented above, response actions will progressively become more urgent until a halt work is required. NYSDEC and NYDOH will be notified about the complaints and the corrective measures implemented.

2.2.2 Particulate Matter (PM10) Action Levels

In accordance with the NYSDOH Generic CAMP protocol, the action level for perimeter air monitoring at the Site is 150 micrograms per cubic meter (µg/m^3) of respirable particulate matter above background for the 15-minute average. Particulates that are 10 microns or smaller and are considered respirable are known as PM10. No visible dust can be seen migrating from the work area. Particulate data from continuous monitoring will be used to calculate 15-minute TWA values for comparison to the action level.

To mitigate the chance that remedial activities will generate visible dust or air impacts at or above 150 µg/m^3 above background, a tiered approach to alarm levels consisting of a lower (yellow) action level and a mid action level (orange) will be established. Mitigation/control measures will be implemented based on the level of the alarm progressively becoming more urgent until a halt work is required. The alarm will be triggered based on total levels, but work would not be halted or any mitigation measures implemented unless the differential between background and downwind readings exceeded the action levels.

The following are the action levels for particulates:

Action Level	Response
Below 75 µg/m^3 above background for the 15-minute average	Continue and/or resume work activities
> 75 to < 100 µg/m^3 above background for the 15-minute average or if airborne dust is observed leaving the work area	Dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.
>100 to <150 µg/m^3 above background for the 15-minute average or if airborne dust is observed leaving the work area	Notify contractor of need to implement more aggressive mitigation measures. Work may continue with dust suppression techniques provided downwind PM-10 particulate levels do not exceed 150 µg/m^3 above background for the 15-minute average and airborne dust is not observed leaving the work area.
If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level	Work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration. Contact NG PM immediately. Notify NYSDEC and NYDOH about exceedance and corrective measures implemented

The 15-minute readings will be recorded and be maintained.

Section 3

Procedures

This section outlines the routine and contingency procedures for implementation of the CAMP. The air monitoring activities will be directed by the Air Monitoring Manager.

3.1 Community Air Monitoring Program Schedule

The CAMP is anticipated to consist of one week of baseline monitoring and weekly monitoring for the duration of the remedial activities.

3.1.1 Baseline Monitoring

Prior to commencement of remedial activities, monitoring will be conducted to establish baseline conditions and evaluate the potential range of background concentrations that may be present during implementation of the remedy. To establish baseline conditions, continuous monitoring will conducted at the monitoring stations for three to five days for a minimum of eight (8) hour periods.

3.1.2 Weekly Monitoring

Continuous air monitoring will be executed for the duration of remedial activities when there is the potential for exposure to MGP-related contaminants. Particulates and VOC data will be monitored via the monitoring stations at the locations proposed in Figure 2-1 for the entire work day.

3.2 Routine Procedures

Routine air monitoring procedures will consist of the following:

- Daily inspection of the monitoring stations to confirm that they are secure and operating properly. Check for damage, loss of air flow, dirt or moisture buildup, and replace inlet filters, as necessary, or as prescribed by the manufacturer of the monitoring equipment.
- Daily calibration of PIDs in accordance with manufacturer specifications. Calibration frequency may be modified, as appropriate, based on communication with manufacturer/vendor.
- Daily calibration of particulate meters in accordance with manufacturer specifications. Calibration frequency may be modified, as appropriate, based on communication with manufacturer/vendor.
- Daily inspection of operational set points on PIDs.
- Daily inspection of operational set points on particulate meters.
- Daily inspection of the meteorological station for proper operation.
- Troubleshooting of potential system issues.
- Observe baseline conditions, including particulate levels and meteorological data. Based on wind direction, adjust location of air monitoring stations, as appropriate.
- Monitor each station throughout the workday for action level conditions. Section 3.3 outlines response procedures to action level conditions.
- Generate daily field reports. Document system troubleshooting, station layout adjustments, action level conditions and corresponding response actions, if any.

3.3 Response Procedures

As detailed in Section 2.2, the "red" action level for community air monitoring at the Site is five (5) ppm and above for VOCs and 150 µg/m^3 for PM10. The system will be monitored for potential exceedances of the established yellow/orange/red action level(s). The lower action levels have been established to implement control measures before reaching the stop work ("Red") action level. No audible or visible alarms will be utilized at the Site.

As discussed in Section 2.2, due to the active commercial/industrial operations surrounding the Site, elevated levels of ambient VOCs and suspended particulates are anticipated. As a result, the presence of upwind and work zone monitoring is critical to assess whether action level conditions are the result of remedial activities or ambient (background) conditions (i.e., migration from upgradient or localized conditions). Work would not be halted or control measures implemented until upwind and work zone readings are compared to the continuous monitoring readings, with the exception of visible dust or odoriferous conditions.

The following steps outline the procedures the Air Monitoring Manager shall follow in response to action level conditions:

1. Identify whether the station is upwind, downwind, or crosswind to the work area.
   a. If station is upwind, then continue work with air monitoring. Note the condition and response in the Daily Field Report.
   b. If station is downwind or crosswind, then proceed to Step 2.
2. Compare the reading to upwind readings.
   a. If the upwind reading is above action levels, then continue work with air monitoring. Note the condition and response in the Daily Field Report.
   b. If the upwind reading is below action levels, then proceed to Step 3.
3. Determine the difference between the readings obtained at the upwind and downwind stations. Based on visual determination, assess whether the exceedance is due to a localized ambient (background) condition (i.e., dust from upwind sites or roadways) in the vicinity of the station:
   a. If it is suspected that the reading is not the result of a localized ambient (background) condition, then inform the Construction Manager/Remedial Contractor to take corrective action. Note the condition, response and corrective actions implemented by Construction Manager/Remedial Contractor in the Daily Field Report.
   b. If it is suspected that the reading is the result of a localized background condition, then obtain readings from the downwind boundary of the work zone with a handheld instrument and compare to the station reading.
      i. If the work zone reading is less than station reading, then continue work with air monitoring. Note the condition and response in the Daily Field Report.
      ii. If work zone reading is greater than station reading, then inform the Construction Manager/Remedial Contractor to take corrective action. Note the condition, response and corrective actions implemented by the Construction Manager/Remedial Contractor in the Daily Field Report.

Visible dust emanating from the work area will require immediate implementation of dust control measures without progressing through the steps outlined above.

3.3.1 VOCs

If remedial activities result in a concentration of total VOCs at the downwind perimeter of the work area in excess of five (5) ppm over background, activities will be managed in accordance with the NYSDOH Generic CAMP guidance as follows:

- If the concentration of total VOCs at the downwind perimeter of the work area exceeds five (5) ppm over background, but less than 25 ppm, for a 15-minute average, work activities will be temporarily halted and monitoring continued. If concentrations drop rapidly, work activities can resume with continued monitoring.
- If concentrations between 5 ppm and 25 ppm above background persist, work must be stopped and the source of the vapors identified and mitigated. Mitigation measures may include engineering controls such as application of foam or the use of temporary enclosures and modification of work protocols (e.g., excavation procedures). After work activities resume, the total VOC concentration at the contingency location (defined as 200 feet downwind of the work area or half the distance to the nearest receptor, whichever is less) must remain below five (5) ppm on a 15-minute-averaged basis.
- If the concentrations exceed 25 ppm at the perimeter of the work areas, the remedial activities will be halted. Air sampling in accordance with this CAMP will continue in the event that elevated PID levels are detected, so that this information will be available to assess the potential impacts to off site receptors or to develop mitigation measures.

3.3.2 Particulates

The tiered action levels presented in Section 2.2.2 are more conservative than those prescribed in the NYSDOH Generic CAMP protocol. Dust suppression levels are implemented at the yellow action level (initially 75 µg/m^3 of PM10). The NYSDOH CAMP provides the following guidance:

- If the concentration of total PM10 particulates at the downwind perimeter of the work area exceeds 100 µg/m^3 over background for a 15-minute average, dust suppression techniques must be instituted.
- Work may continue after employment of dust suppression as long as the downwind perimeter PM10 levels are below 150 µg/m^3 over background and there is no visible dust emanating from the Site.
- If levels below 150 µg/m^3 cannot be achieved, work must stop and can only resume when additional controls are successful in keeping perimeter dust levels less than 150 µg/m^3 above background.

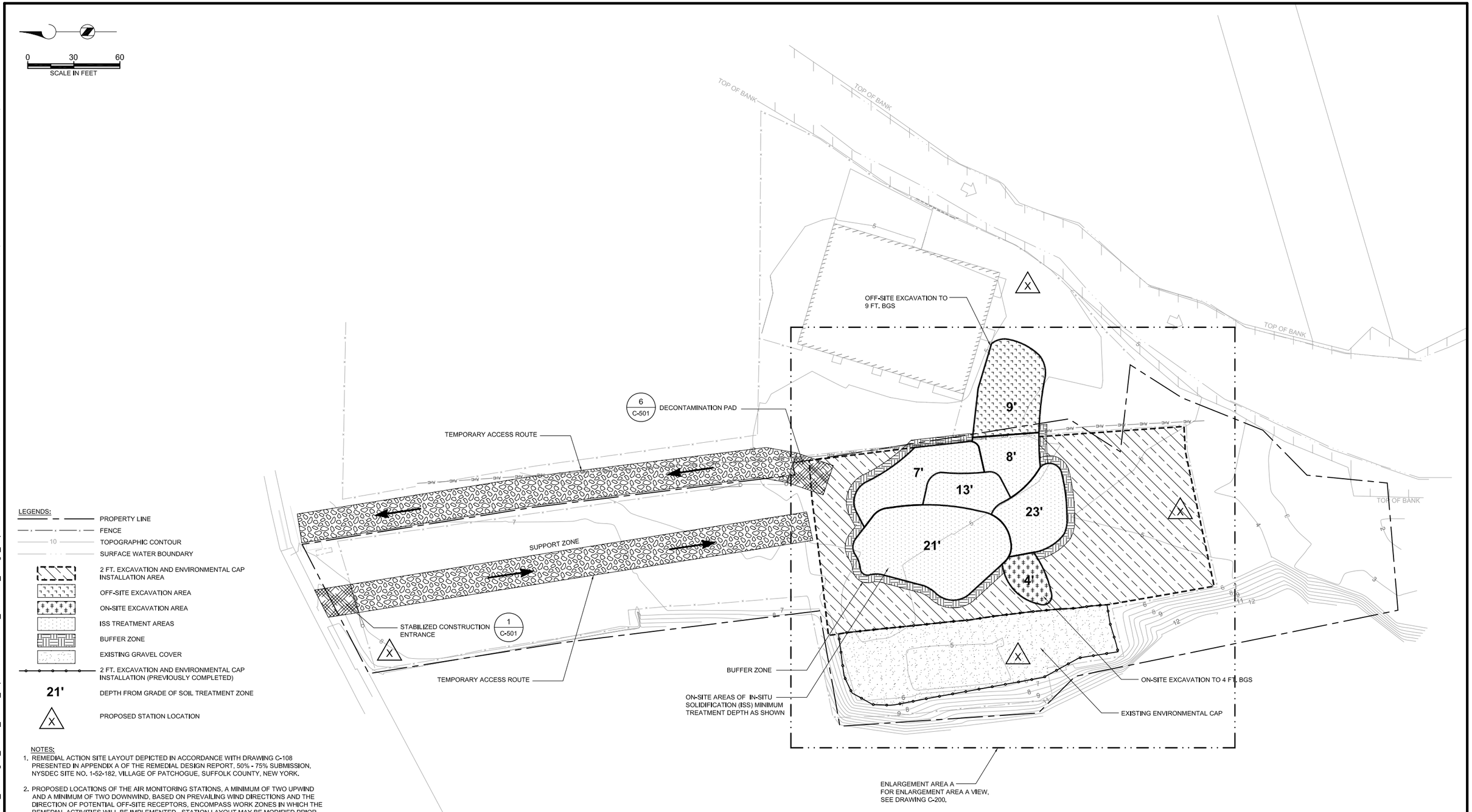
3.4 Communication Plan

Any “Red” stop-work condition, the associated control measures taken by the Construction Manager/Remedial Contractor and the recommencement of remedial activities will each be immediately communicated to the National Grid Project Manager upon occurrence. The National Grid Project Manager will also be notified if response actions are not implemented according to this plan.

A weekly report summarizing the results of the Daily Air Monitoring Field Reports, including any action level conditions and the actions taken to control emissions from the Site, will be discussed at the Weekly Progress Meetings. A copy of the weekly summary will be provided to the NYSDEC and NYSDOH.

Figures

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NOTES:

1. REMEDIAL ACTION SITE LAYOUT DEPICTED IN ACCORDANCE WITH DRAWING C-108 PRESENTED IN APPENDIX A OF THE REMEDIAL DESIGN REPORT, 50% - 75% SUBMISSION, NYSDEC SITE NO. 1-52-182, VILLAGE OF PATCHOGUE, SUFFOLK COUNTY, NEW YORK.
2. PROPOSED LOCATIONS OF THE AIR MONITORING STATIONS, A MINIMUM OF TWO UPWIND AND A MINIMUM OF TWO DOWNWIND, BASED ON PREVAILING WIND DIRECTIONS AND THE DIRECTION OF POTENTIAL OFF-SITE RECEPTORS, ENCOMPASS WORK ZONES IN WHICH THE REMEDIAL ACTIVITIES WILL BE IMPLEMENTED. STATION LAYOUT MAY BE MODIFIED PRIOR TO THE INITIATIO OF THE REMEDIAL ACTIVITIES BASED UPON THE PREVAILING WIND DIRECTION MEASURED DURING THE BASELINE MONITORING PERIOD, AS WELL AS THE PORTIONS(s) OF THE SITE ACTUALLY BEING SUBJECT TO REMEDIAL ACTIVITIES. ANY ADJUSTMENTS TO THE STATION LAYOUT WILL BE RECORDED IN THE DAILY FIELD REPORTS.

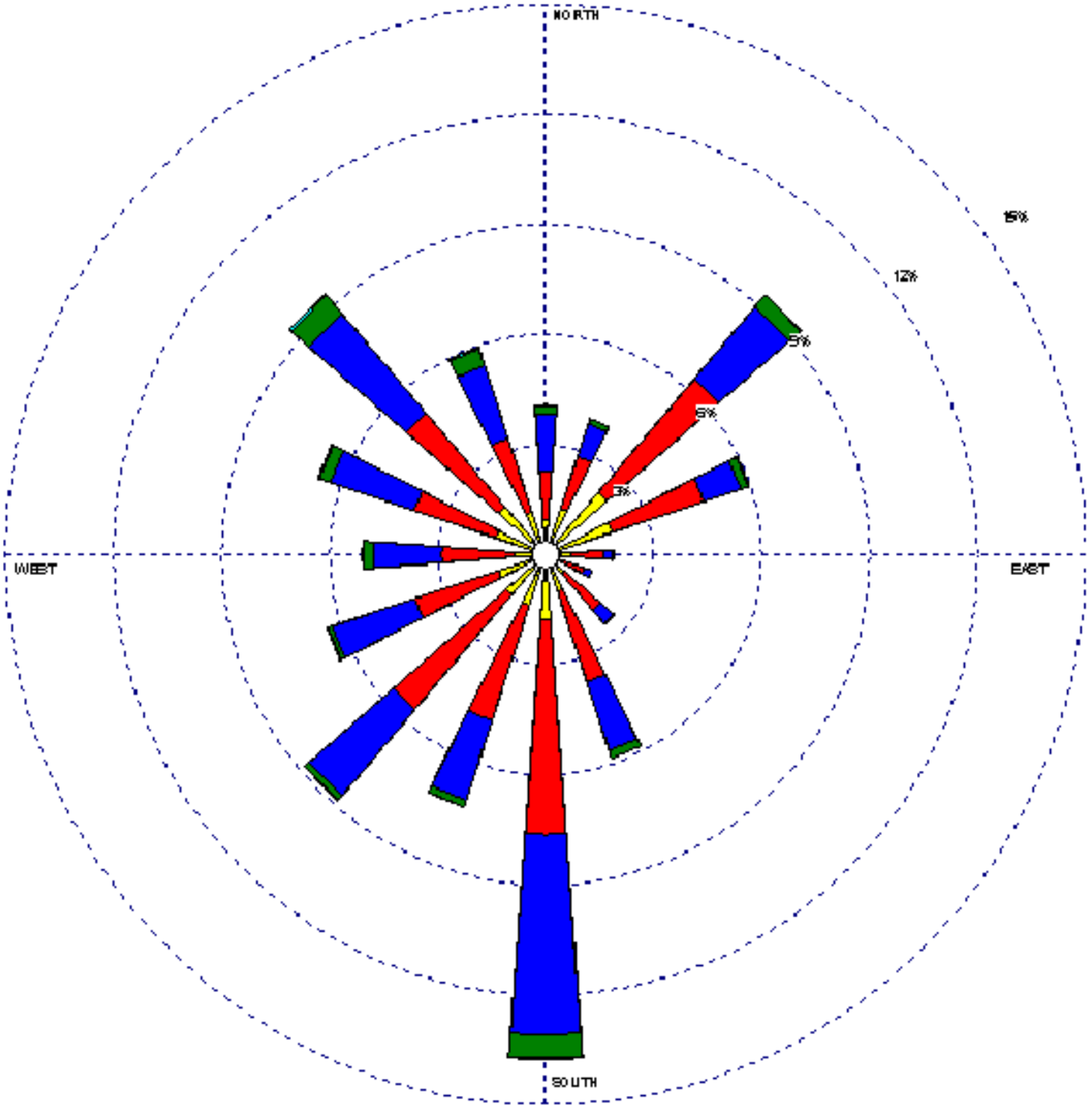
Brown AND Caldwell

DATE: November 30, 2012

PROPOSED AIR MONITORING STATION LOCATION

FIGURE
2-1

Path: P:\National_Grid\Patchogue\142128_Patchogue_UCWP_RDWP_Implement\50%-75%_Remedial_Design_Report\AppendixH_CAMP\Figures File Name: Figure-2-2a Plot Date: November 28, 2012 9:01



SOURCE:
WIND ROSE OBTAINED FROM THE EASTERN REGION HEADQUARTERS (ERH) NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), AVIATION FAMILIARIZATION PAGE FOR NWS NEW YORK, NY WEBSITE: HTTP://WWW.WCC.NRCS.USDA.GOV/FTPREF/DOWNLOADS/CLIMATE/WINDROSE/NEW_YORK/NEW_YORK/ , ACCESSED AUGUST 28, 2012.

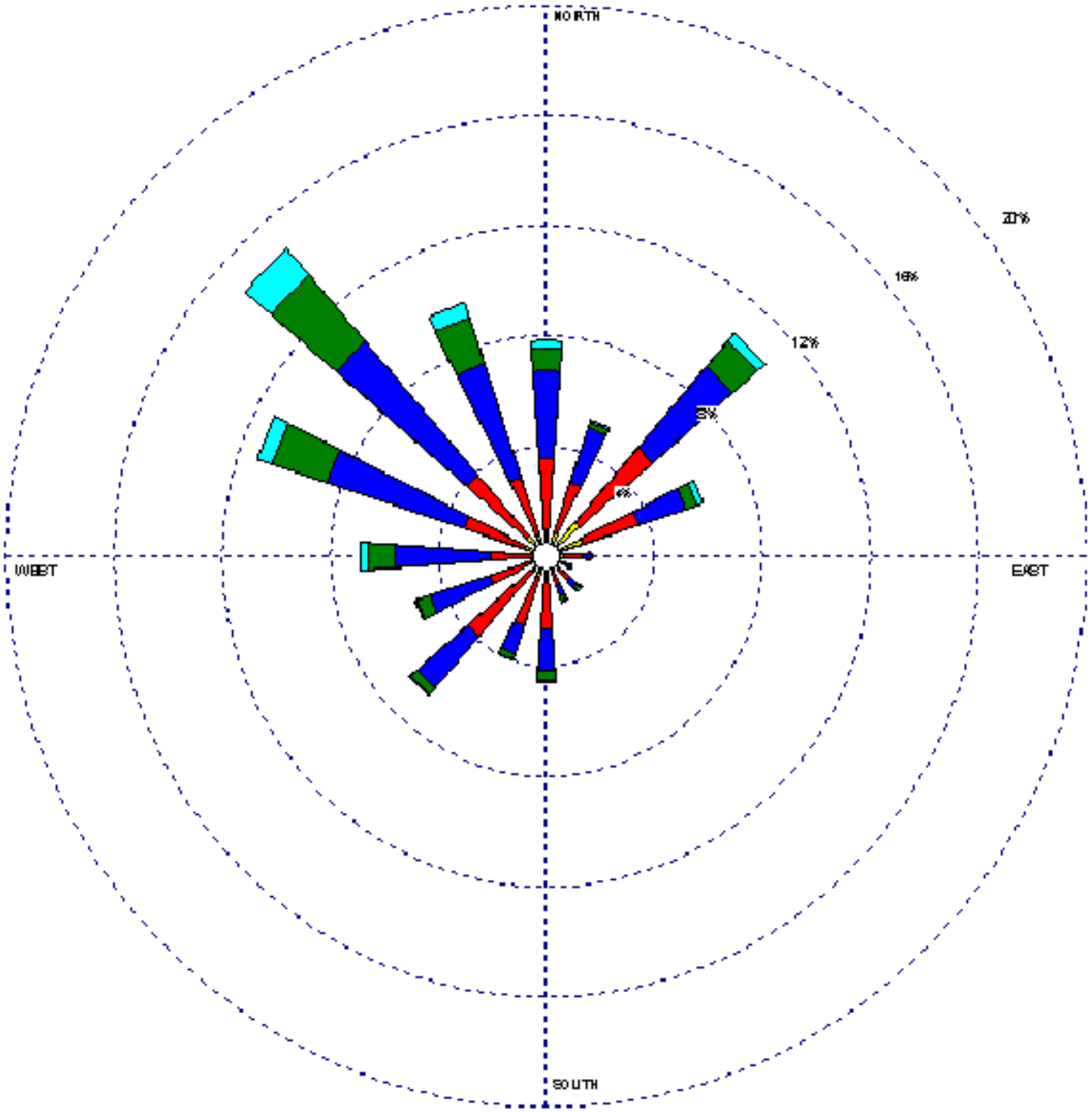
Brown AND Caldwell

SCALE: N.T.S.
JOB NUMBER:
DATE: November 28, 2012

WIND ROSE
(JANUARY)

FIGURE
2-2a

Path: P:\National_Grid\Patchogue\142128_Patchogue_UCWP_RDWP_Implement\50%-75%_Remedial_Design_Report\AppendixH_CAMP\Figures File Name: Figure-2-2b Plot Date: November 28, 2012 9:02



SOURCE:
WIND ROSE OBTAINED FROM THE EASTERN REGION HEADQUARTERS (ERH) NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), AVIATION FAMILIARIZATION PAGE FOR NWS NEW YORK, NY WEBSITE: HTTP://WWW.WCC.NRCS.USDA.GOV/FTPREF/DOWNLOADS/CLIMATE/WINDROSE/NEW_YORK/NEW_YORK/ , ACCESSED AUGUST 28, 2012.

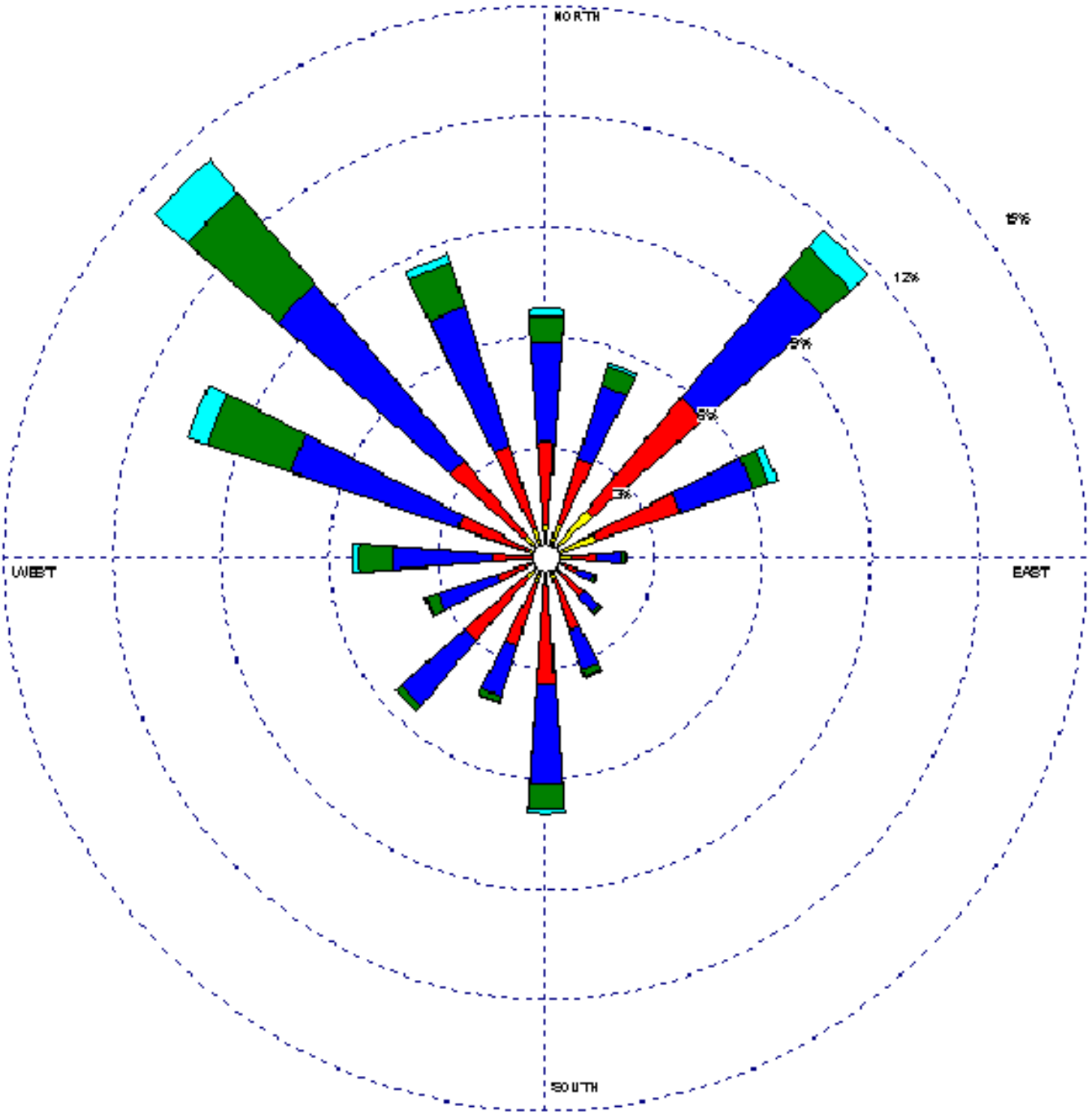
Brown AND Caldwell

SCALE: N.T.S.
JOB NUMBER:
DATE: November 28, 2012

WIND ROSE
(FEBRUARY)

FIGURE
2-2b

Path: P:\National_Grid\Patchogue\142128_Patchogue_UCWP_RDWP_Implement\50%-75%_Remedial_Design_Report\AppendixH_CAMP\Figures File Name: Figure-2-2c Plot Date: November 28, 2012 9:02



SOURCE:
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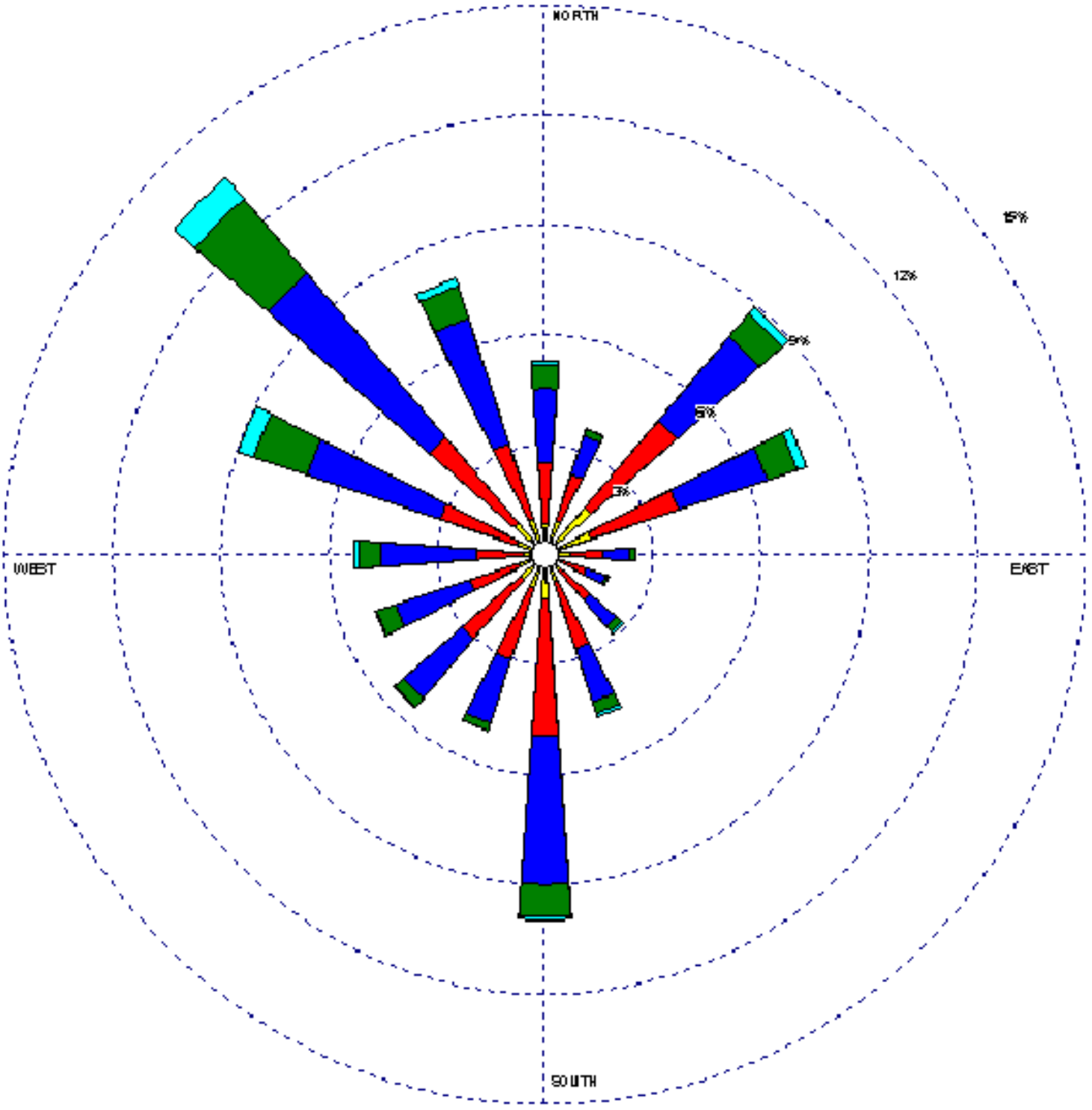
Brown AND Caldwell

SCALE: N.T.S.
JOB NUMBER:
DATE: November 28, 2012

WIND ROSE
(MARCH)

FIGURE
2-2c

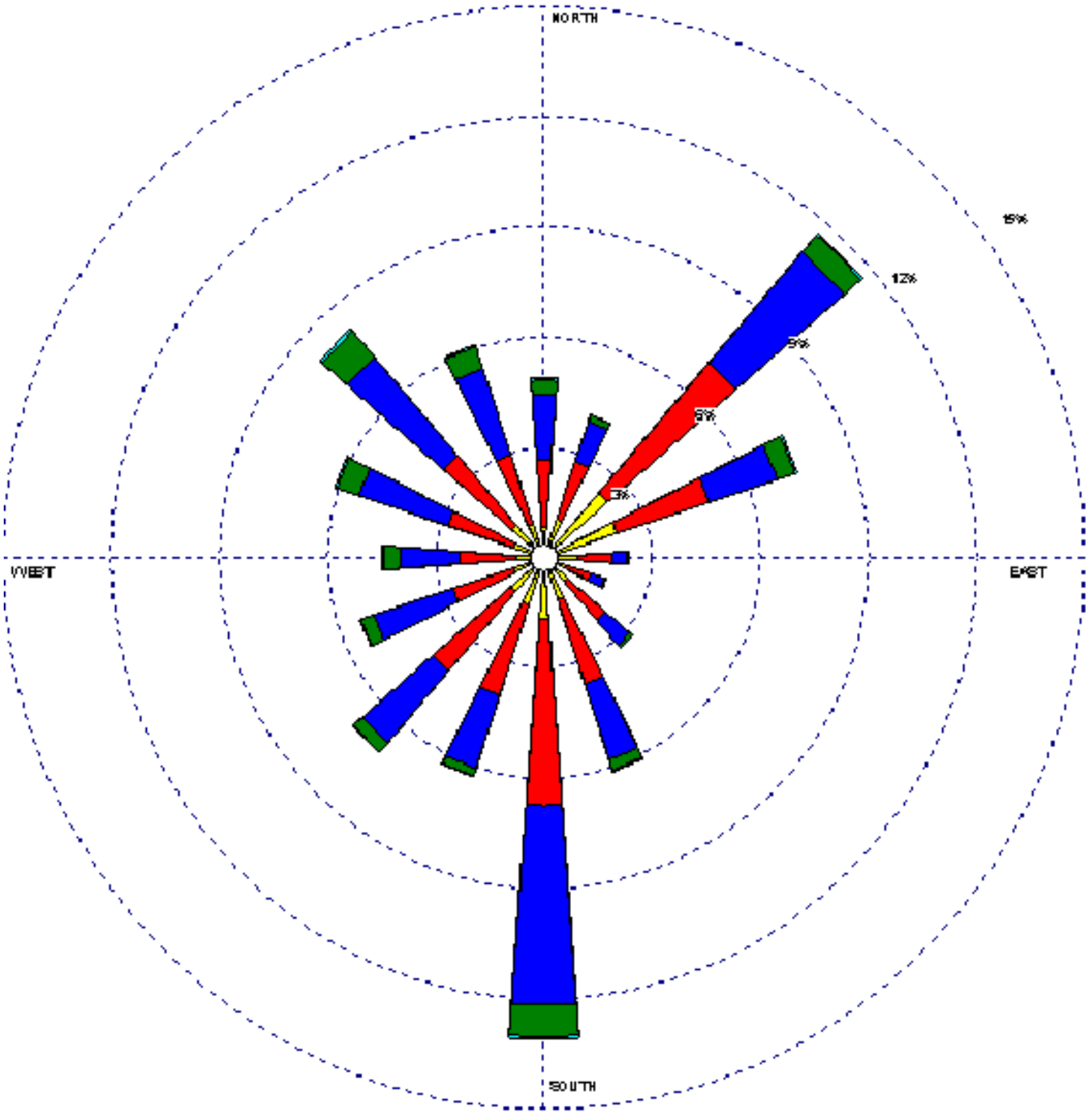
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Brown AND Caldwell	SCALE: N.T.S. JOB NUMBER: DATE: November 28, 2012	WIND ROSE (APRIL)	FIGURE 2-2d

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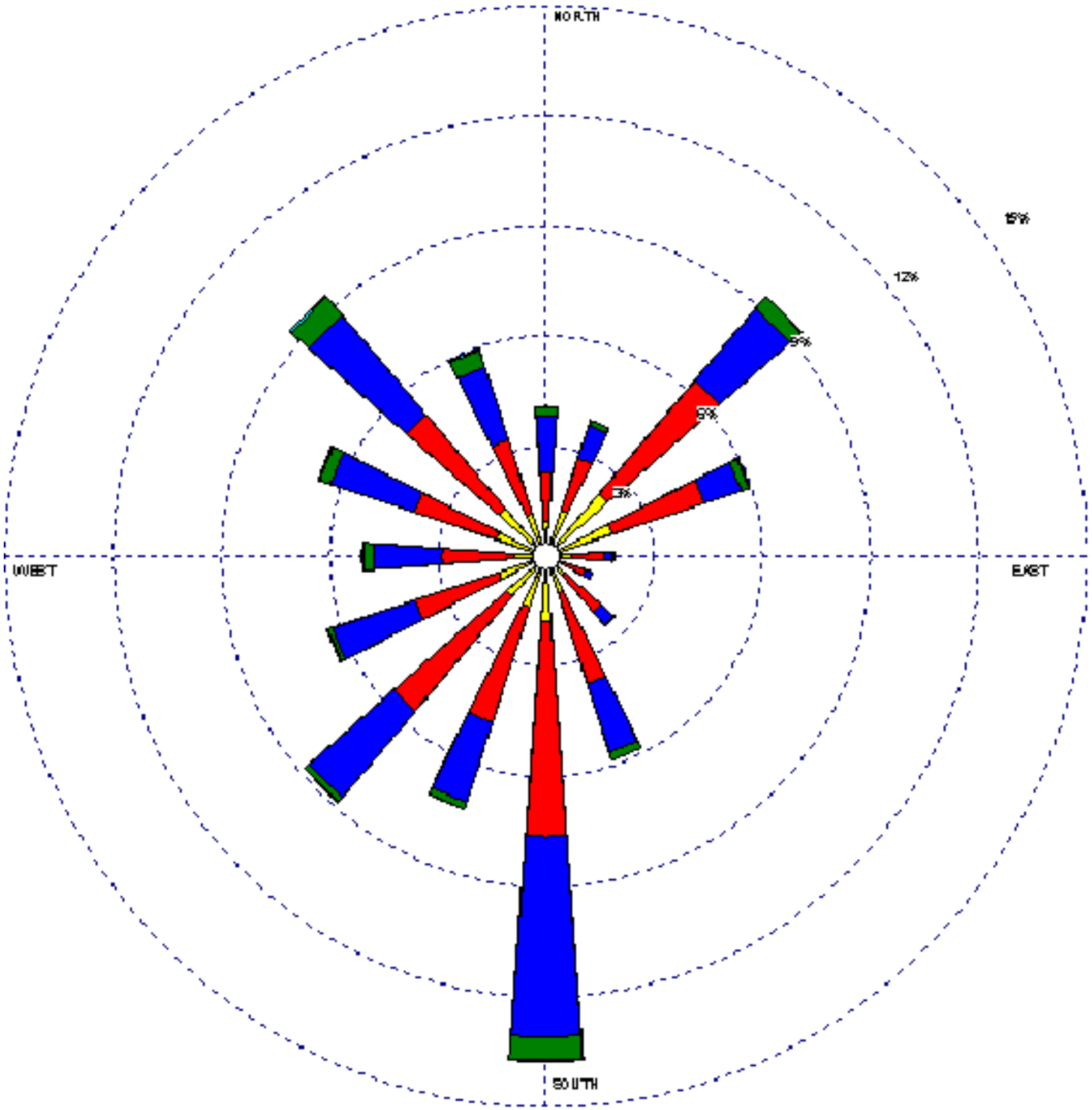
Brown AND Caldwell

SCALE: N.T.S.
JOB NUMBER:
DATE: November 28, 2012

WIND ROSE
(MAY)

FIGURE
2-2e

Path: P:\National_Grid\Patchogue\142128_Patchogue_UCWP_RDWP_Implement\50%-75%_Remedial_Design_Report\AppendixH_CAMP\Figures File Name: Figure-2-2f Plot Date: November 28, 2012 9:04 A



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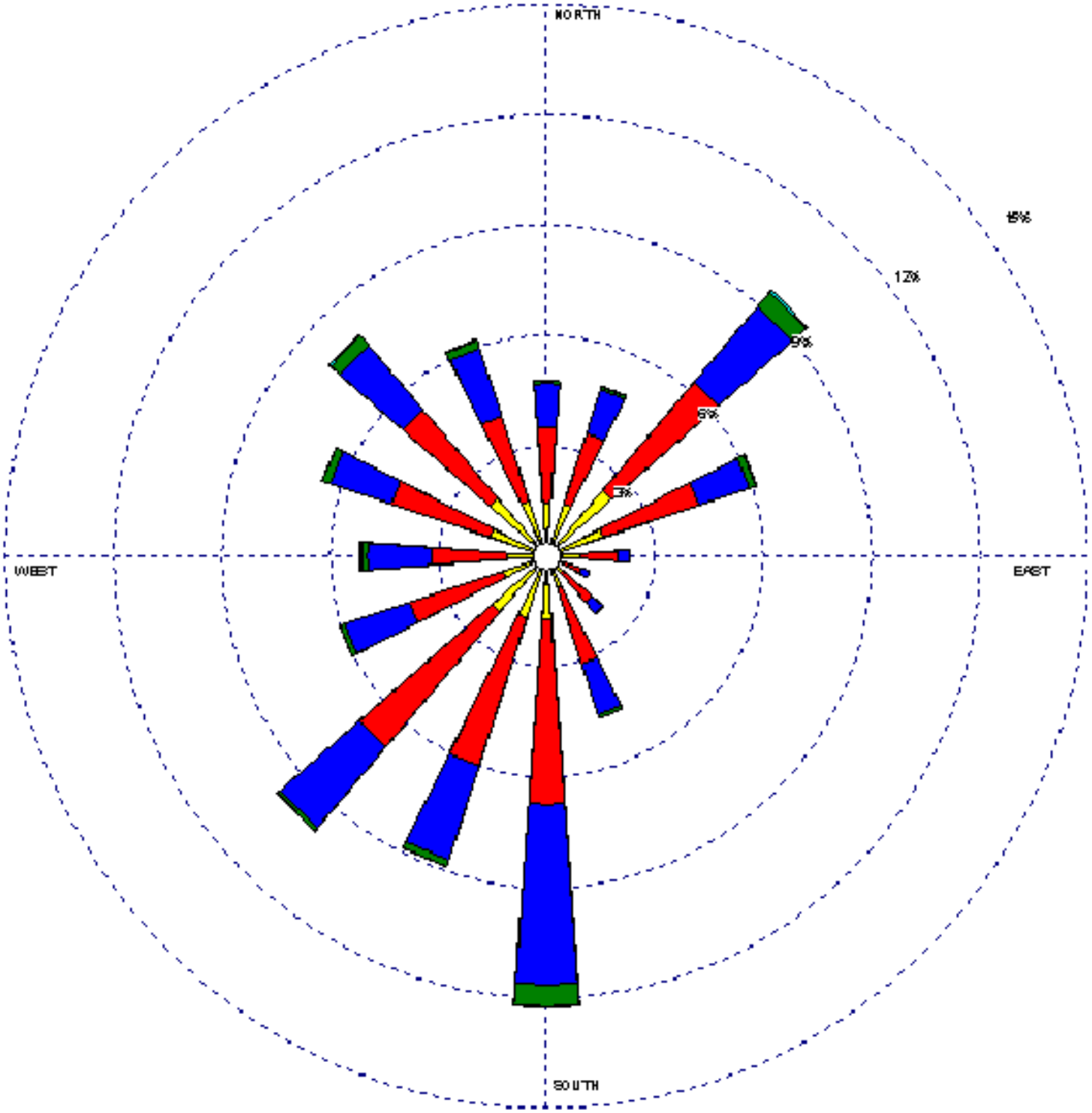
Brown AND Caldwell

SCALE: N.T.S.
JOB NUMBER:
DATE: November 28, 2012

WIND ROSE
(JUNE)

FIGURE
2-2f

Path: P:\National_Grid\Patchogue\142128_Patchogue_UCWP_RDWP_Implement\50%-75%_Remedial_Design_Report\AppendixH_CAMP\Figures File Name: Figure-2-2g Plot Date: November 28, 2012 9:06



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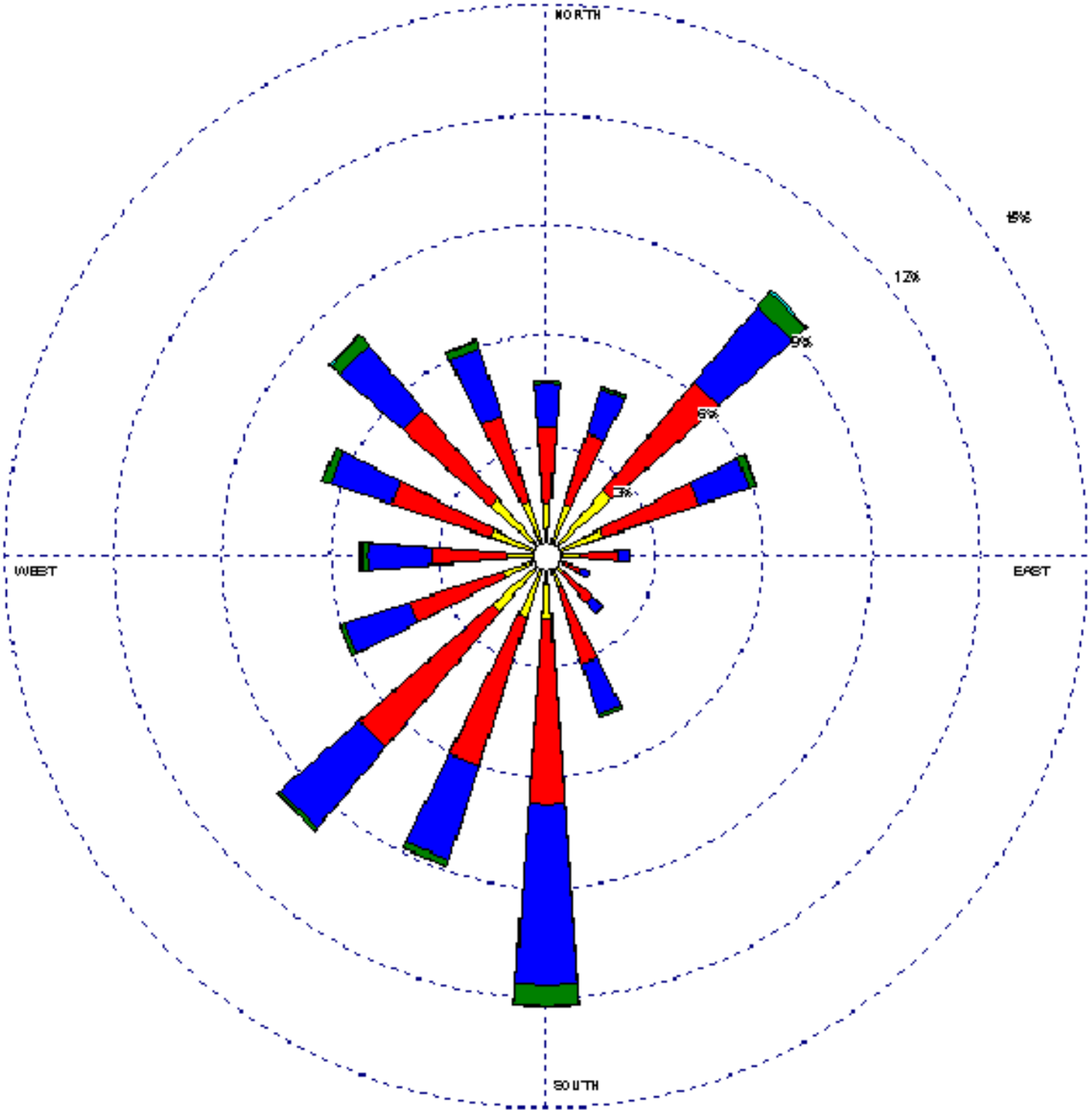
Brown AND Caldwell

SCALE: N.T.S.
JOB NUMBER: Field
DATE: November 28, 2012

WIND ROSE
(AUGUST)

FIGURE
2-2g

Path: P:\National_Grid\Patchogue\142128_Patchogue_UCWP_RDWP_Implement\50%-75%_Remedial_Design_Report\AppendixH_CAMP\Figures File Name: Figure-2-2h Plot Date: November 28, 2012 9:06



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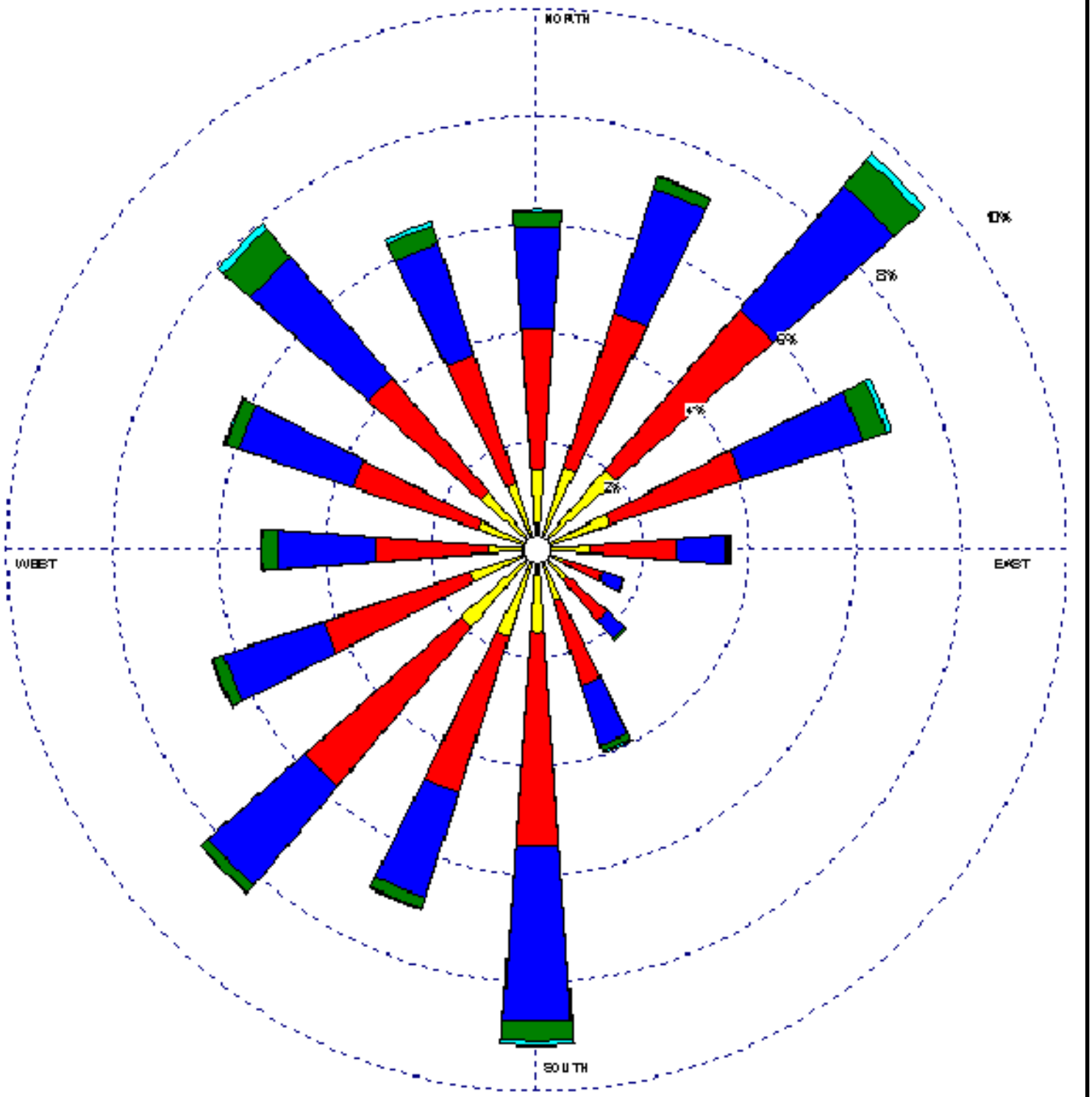
Brown AND Caldwell

SCALE: N.T.S.
JOB NUMBER: Field
DATE: November 28, 2012

WIND ROSE
(AUGUST)

FIGURE
2-2h

Path: P:\National_Grid\Patchogue\142128_Patchogue_UCWP_RDWP_Implement\50%-75%_Remedial_Design_Report\AppendixH_CAMP\Figures File Name: Figure-2-2i Plot Date: November 28, 2012 9:07 A



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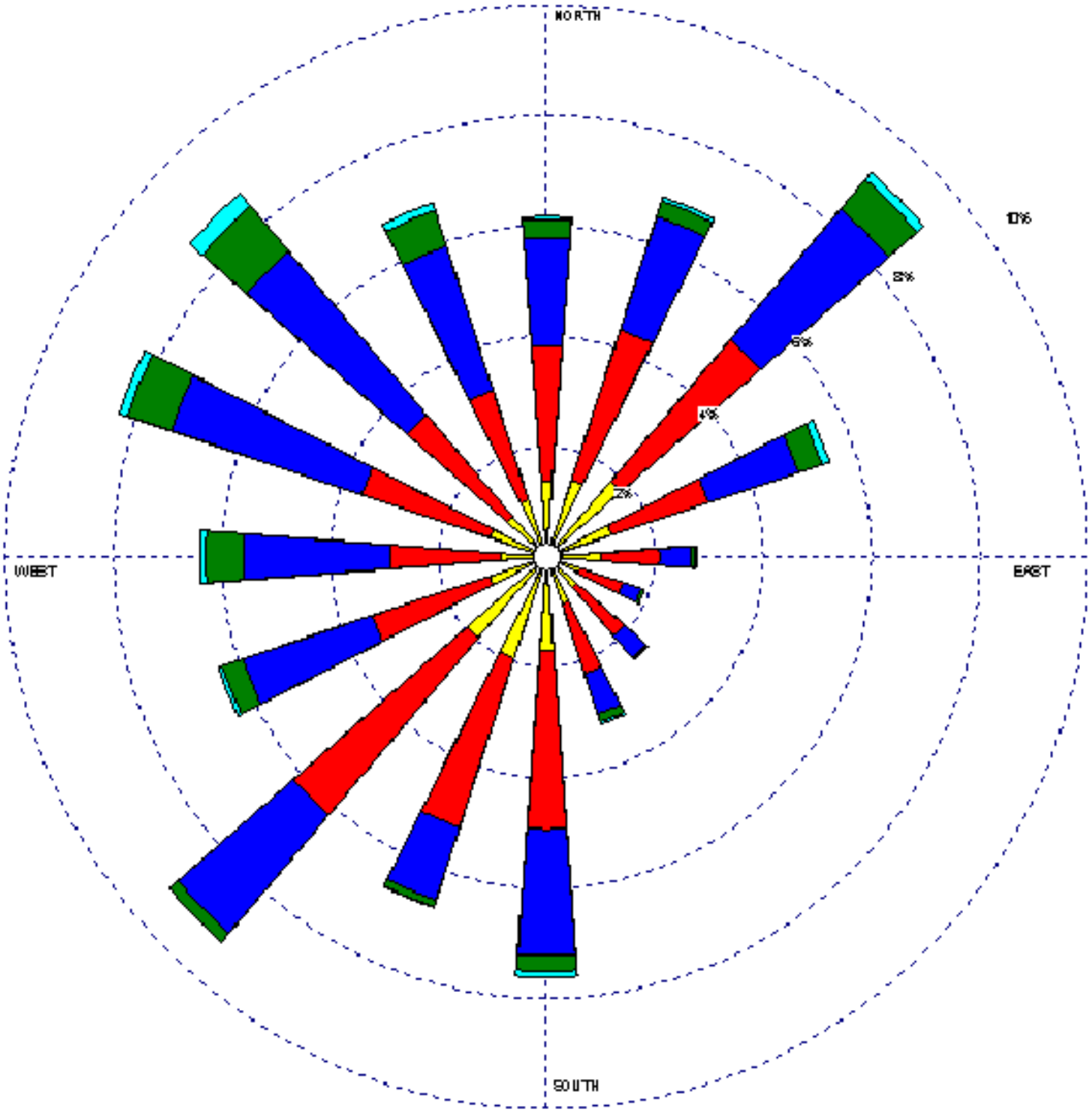
Brown AND Caldwell

SCALE: N.T.S.
JOB NUMBER: Field
DATE: November 28, 2012

WIND ROSE
(SEPTEMBER)

FIGURE
2-2i

Path: P:\National_Grid\Patchogue\142128_Patchogue_UCWP_RDWP_Implement\50%-75%_Remedial_Design_Report\AppendixH_CAMP\Figures File Name: Figure-2-2J Plot Date: November 28, 2012 9:08



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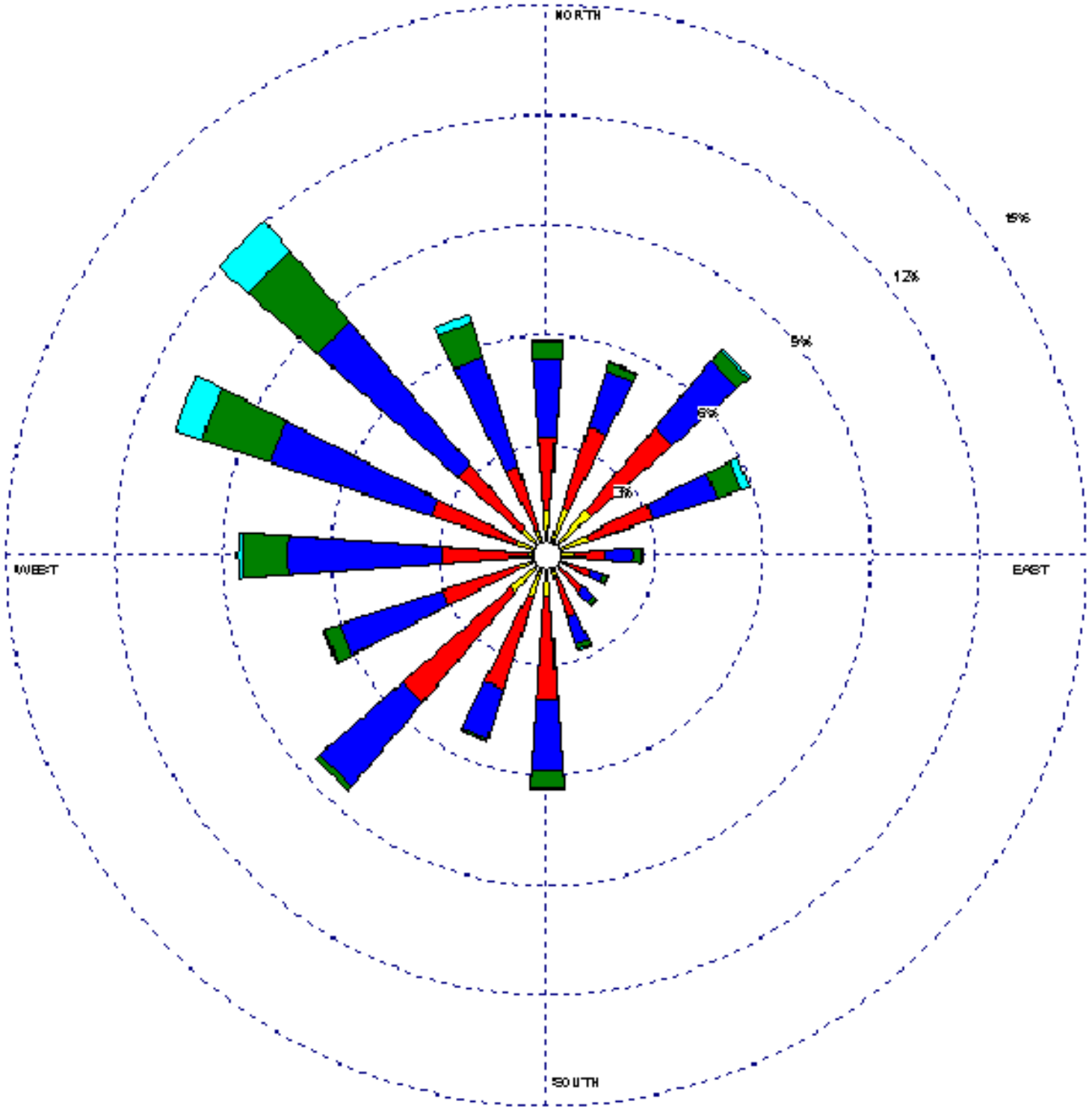
Brown AND Caldwell

SCALE: N.T.S.
JOB NUMBER: Field
DATE: November 28, 2012

WIND ROSE
(OCTOBER)

FIGURE
2-2J

Path: P:\National_Grid\Patchogue\142128_Patchogue_UCWP_RDWP_Implement\50%-75%_Remedial_Design_Report\AppendixH_CAMP\Figures File Name: Figure-2-2k Plot Date: November 28, 2012 9:09



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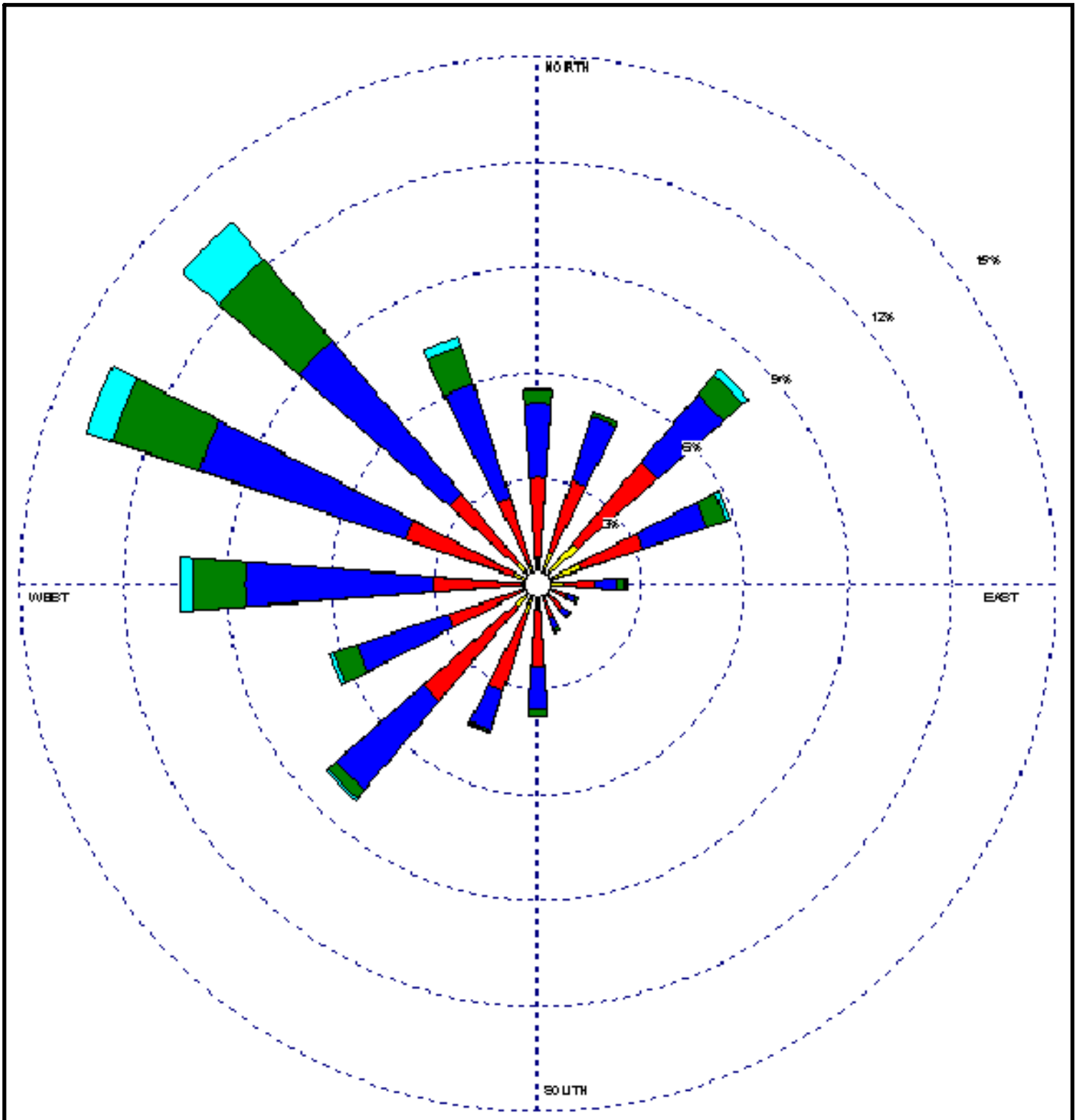
Brown AND Caldwell

SCALE: N.T.S.
JOB NUMBER:
DATE: November 28, 2012

WIND ROSE
(NOVEMBER)

FIGURE
2-2k

Path: P:\National_Grid\Patchogue\142128_Patchogue_UCWP_RDWP_Implement\50%-75%_Remedial_Design_Report\AppendixH_CAMP\Figures File Name: Figure-2-2-I Plot Date: November 28, 2012 9:08



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Brown AND Caldwell

SCALE: N.T.S.
JOB NUMBER:
DATE: November 28, 2012

WIND ROSE
(DECEMBER)

FIGURE
2-2I

Appendix A: New York State Department of Health

Generic Community Air Monitoring Plan

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

Appendix I: Health and Safety Plan (HASP)

Health and Safety Plan for Pre-Design Investigation and Quarterly Groundwater Sampling And Utility Corridor Work Plan Implementation

at

Patchogue Former MGP Site

234 West Main Street

Village of Patchogue, Suffolk County, NY 11772

April 2012

Revision 4

BC Project Number: 142128

Prepared by:

Brown and Caldwell Associates

110 Commerce Drive

Allendale, New Jersey 07401

Prepared for:

NATIONAL GRID

175 East Old Country Road

Hicksville, NY 11801

Brown and Caldwell Associates

110 Commerce Drive

Allendale, New Jersey 07401

Approval Page

for

Health and Safety Plan for Pre-Design Investigation and Quarterly Groundwater Sampling

and Utility Corridor Work Plan Implementation

at

Patchogue Former MGP Site

(Revision 4)

This Health and Safety Plan (HASP) has been prepared and reviewed by the following Brown and Caldwell (BC) personnel for use at: Patchogue Former MGP Site (BC Project Number: 142128).

	Name	Signature	Title	Date
Prepared By:	Catherine E. Trent	Catherine E. Trent	HS Specialist/ Senior Engineer	5/1/12
Reviewed By:	Thakur Chaturgan		Site Safety Officer	5/1/12
	Keith Bogatch		Project Manager	5/1/12
Reviewed By:	James Marolda		PDI Task Manager	5/1/12
Reviewed By:	Jim Bucha, CIH, CSP		Director of Health and Safety	5/1/12
Effective Dates:	April 2012	through	March 2013	

THE AMERICAN BOARD OF INDUSTRIAL HYGIENE
INCORPORATED
CERTIFICATION NUMBER
6738 CP
EXPIRES
6-1-2012
PENNSYLVANIA - 1998
JAMES A. BUCHA, CIH

Table of Contents

1. Introduction 1-1
   - 1.1 Site History 1-2
     - 1.1.1 Site History 1-2
     - 1.1.2 Site Description 1-2
   - 1.2 Scope of Work 1-2
2. Key BC Project Personnel and Responsibilities 2-1
   - 2.1 BC Project Manager 2-1
   - 2.2 BC Site Safety Officer 2-1
   - 2.3 BC Regional Unit Safety Manager 2-2
   - 2.4 BC Team Members 2-2
   - 2.5 BC Subcontractors 2-3
3. Hazard Analysis 3-1
   - 3.1 Chemical Hazards 3-1
     - 3.1.1 Benzene 3-2
     - 3.1.2 Toluene 3-2
     - 3.1.3 Ethylbenzene 3-2
     - 3.1.4 Xylene 3-2
     - 3.1.5 Polycyclic Aromatic Hydrocarbons (PAHs) 3-3
     - 3.1.6 Cyanide 3-3
   - 3.2 Hazard Communication 3-3
   - 3.3 Opening Wells and Well Vaults 3-3
   - 3.4 Physical Hazards 3-4
     - 3.4.1 Slip, Trips and Falls 3-4
     - 3.4.2 Housekeeping 3-4
     - 3.4.3 Heavy Equipment 3-5
     - 3.4.4 Materials and Equipment Handling - Lifting 3-5
     - 3.4.5 Excavations 3-5
     - 3.4.6 Drilling 3-6
     - 3.4.7 Noise 3-6
     - 3.4.8 Underground Utilities 3-6
     - 3.4.9 Overhead Utilities 3-7
     - 3.4.10 Equipment Refueling 3-7
     - 3.4.11 Electrical Hazards 3-7

3.4.12 Lockout/Tagout 3-8
3.4.13 Confined Spaces 3-9
3.4.14 Fire/Explosion 3-10
3.4.15 Sharp Objects/Cutting Utensils 3-10
3.4.16 Cutting Acetate Sample Sleeves 3-10
3.4.17 Elevated Platforms / Working Surfaces 3-11
3.4.18 Ladder Use 3-12
3.4.19 Traffic 3-12
3.4.20 Driving 3-13
3.4.21 Arc Flash Protection 3-13
3.4.22 Boating Safety 3-15
3.4.23 Water Hazards (non-boating activities) 3-15
3.4.24 Building Collapse 3-16
3.4.25 Removing/Replacing Manhole Covers 3-17
3.4.26 Personal Safety - Urban Setting 3-18
3.5 Natural Phenomena 3-19
3.5.1 Sunburn 3-19
3.5.2 Heat Stress 3-19
3.5.3 Cold Stress 3-20
3.5.4 Lightning/Electrical Storms 3-21
3.5.5 Hurricanes/Nor' Easters 3-21
3.5.6 Tornados and Strong/Straight Line Winds 3-22
3.5.7 Earthquakes 3-23
3.5.8 Flooding 3-23
3.6 Biological Hazards 3-24
3.6.1 Bloodborne Pathogens/Sanitary Waste 3-24
3.6.2 Rodents/Mammals 3-24
3.6.3 Reptiles/Snakes 3-24
3.6.4 Venomous Insects 3-25
3.6.5 Mosquitoes 3-26
3.6.6 Fire Ants 3-26
3.6.7 Spiders/Scorpions 3-26
3.6.8 Ticks 3-26
3.6.9 Poisonous Plants 3-27
4. Personal Protective Equipment 4-1
4.1 Conditions Requiring Level D Protection 4-1
4.2 Conditions Requiring Level C Protection 4-2

4.3 Stop Work Conditions 4-2
5. Air Monitoring Plan 5-1
5.1 Monitoring Instruments 5-1
5.1.1 Photoionization Detector and Flame ionization Detector 5-1
5.1.2 Real-Time Aerosol Monitor 5-1
5.1.3 Colorimetric Tubes 5-1
5.1.4 Combustible Gas and Hydrogen Sulfide Gas Monitoring 5-2
5.2 Site Specific Action Levels 5-2
5.2.1 Action Levels for Volatile Organic Compounds 5-2
5.2.2 Action Levels for Airborne Dust 5-3
5.2.3 Action Levels for Cyanide 5-3
5.2.4 Action Levels for Hydrogen Sulfide and LEL 5-3
5.3 Community Air Monitoring Plan 5-4
5.3.1 CAMP VOC Action Levels 5-4
5.3.2 CAMP Particulate Action Levels 5-4
6. Site Control Measures 6-1
7. Decontamination Procedures 7-1
8. Training Requirements 8
9. Medical Surveillance Requirements 9-1
10. Contingency Procedures 10-1
10.1 Injury or Illness 10-1
10.2 Vehicle Collision or Property Damage 10-1
10.3 Fire 10-2
10.4 Underground Utilities 10-2
10.5 Site Evacuation 10-2
10.6 Spill of Hazardous Materials 10-2
11. Documentation 11-1
Appendix A: ..... A
Air Monitoring Form ..... A
Appendix B: ..... B
Site Safety Checklist ..... B
Appendix C: C
H&S Plan Acknowledgement Form C
Appendix D: ..... D
Daily Tailgate Meeting Form ..... D
Appendix E: ..... E

Incident Investigation Report ..... E
Appendix F: ..... F
Miscellaneous Health and Safety Information ..... F

CRITICAL PROJECT INFORMATION

This HASP was developed consistent with requirements in National Grid's generic HASP, entitled "Generic Environmental Health and Safety Plan for Site Investigations at Non-Owned Former MGP Sites" (Foster Wheeler, November 2002), referred herein to as the "Generic HASP".

Primary Known Compound(s) of Concern:

Compounds of Concern and Materials of Concern as identified in "Final Remedial Investigation Report for the Patchogue Former MGP Site, Patchogue, Suffolk County, New York" (Tetra Tech EC, Inc, December 2009) are as follows:

- Benzene
- Toluene
- Ethylbenzene
- Xylenes
- PAHs
- Cyanide
- NAPL/Tar
- Purifier Waste

Minimum Level of Personal Protective Equipment: ☒ Level D ☐ Level C

Note: Upgrade to Level C is allowed on this project with the exception of Cyanide. If cyanide is measured via colorimetric tube, or direct-reading instrument, to be above 2.5 ppm, then work stoppage will occur.

Standard PPE for Level D for this project consists of:

- Work shirt and long pants;
- ANSI- or ASTM-approved steel-toed boots or safety shoes,
- ANSI-approved safety glasses;
- ANSI-approved hard hat (where required on-site or when overhead hazards are present);
- Outer nitrile gloves (11 mil or thicker) and inner nitrile surgical gloves when direct contact with chemically affected soils or groundwater is anticipated (nitrile surgical gloves may be used for collecting or classifying samples as long as they are removed and disposed of immediately after each sampling event);
- Full-body Tyvek suits (non-chemical resistant) to prevent exposure to ticks, chiggers and other insects; and
- High-visibility traffic safety vest.

SEE SECTION 10 FOR SITE EMERGENCY CONTINGENCY PROCEDURES

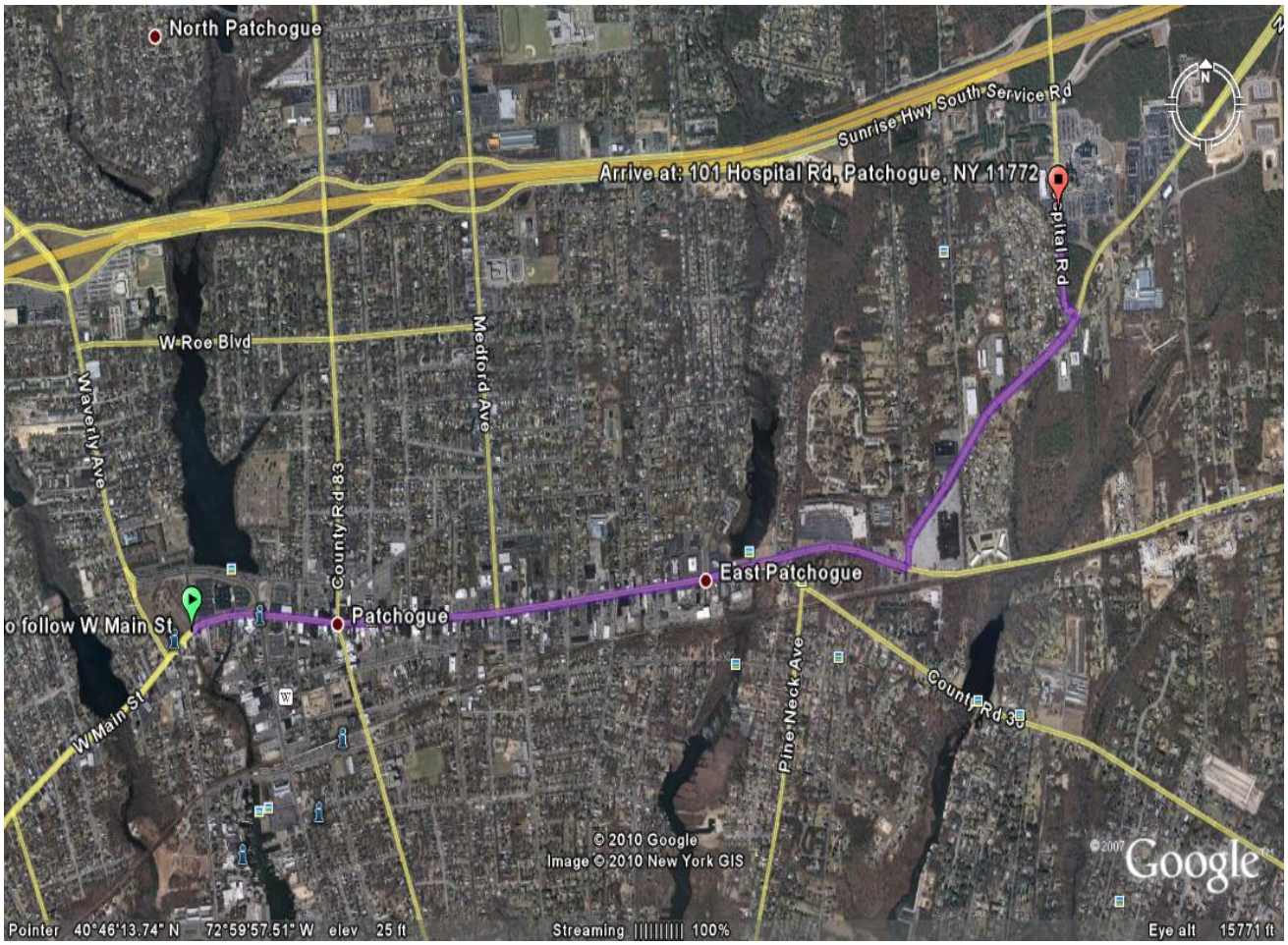
Do not endanger your own life. Survey the situation before taking any action.

BC Office	**110 Commerce Drive Allendale, NJ 07401 Phone: 201-574-4700**
Site Location Address	**234 West Main Street Patchogue, New York 11772**

EMERGENCY PHONE NUMBERS: In the event of emergency, contact the Project Manager and/or Regional Safety Unit Manager.

Emergency Services (Ambulance, Fire, Police)	911
Poison Control	(800) 876-4766 or (800) 222-1222
Hospital Name	**Brookhaven Memorial Hospital** **101 Hospital Road** **Patchogue, NY**
Hospital Phone Number	**(631) 654-7100**
BC Project Manager (PM): Keith Bogatch	Office: 201-574-4765 Cell: 201-739-2320
BC PDI Task Manager: Patricia Petrino	Office: 201-574-4761 Cell: 862-377-9645
BC Field Operations Leader: Thakur Chaturgan	Office: 201-574-4752 Cell: 201-841-1801
BC Site Safety Officer (SSO): Teresa Caputi	Office: 201-574-4782 Cell: 201-819-7614
BC Director of Health and Safety Jim Bucha, CIH, CSP	Office: (916) 853-5308 Cell: (916) 216-6374
BC Regional Safety Unit Manager (RSUM): Lydia Crabtree, CSP	Office: 615-250-1236 Cell: 615-202-1311
Corporate Risk Management	Property Loss Blythe Buetzow: (925) 210-2470 Injury Angela Hale: (925) 210-2218
Client Contact: William Ryan	Office: 516-545-2586 Cell: 516-790-1660
Subcontractors:	
Drilling Company: Aquifer Drilling & Testing (ADT) William Poupis 75 East 2nd Street Mineola, New York 11510	Office: 516.616.6026 Fax: 516.616. 6194
Remedial Subcontractor for UCWP: (Contracted by National Grid) TBD	Phone: Cell: FOR INFORMATIONAL PURPOSES ONLY
OTHER CONTACT(s)	None identified at this time.

HOSPITAL LOCATION MAP



HOSPITAL DIRECTIONS:

1. Head northeast on County Road 85/ West Main Street toward West Ave
2. go 2 miles
3. Turn left at East Patchogue Yaphank Road/ Sills Road
4. go 0.7 mi
5. Turn left at Hospital Road
6. go 0.3 mi
7. Destination will be on the right

HOSPITAL INFORMATION:

Brookhaven Memorial Hospital and Medical Center
101 Hospital Road
Patchogue,

Phone: (631) 654-7100

Est. Travel Distance: 3 miles
Est. Travel Time: 7 minutes

EMERGENCY FIRST AID PROCEDURES

THE RESPONDER SHOULD HAVE APPROPRIATE TRAINING TO ADMINISTER FIRST AID OR CPR

1. Survey the situation. Do not endanger your own life. DO NOT ENTER A CONFINED SPACE TO RESCUE SOMEONE WHO HAS BEEN OVERCOME. FOLLOW PROTOCOLS INCLUDING THAT A STANDBY PERSON IS PRESENT. IF APPLICABLE, REVIEW MSDSs TO EVALUATE RESPONSE ACTIONS FOR CHEMICAL EXPOSURES.
2. Call 911 (if available) or the fire department **IMMEDIATELY**. Explain the physical injury, chemical exposure, fire, or release.
3. Decontaminate the victim if it can be done without delaying life-saving procedures or causing further injury to the victim.
4. If the victim's condition appears to be non-critical, but seems to be more severe than minor cuts, he/she should be transported to the nearest hospital by the SSO or designated personnel: let the doctor assume the responsibility for determining the severity and extent of the injury. If the condition is obviously serious, contact emergency medical services (EMS) for transport or appropriate actions.

Notify the PM and Regional Safety Unit Manager immediately and complete the appropriate incident investigation reports as soon as possible.

STOP BLEEDING AND CPR GUIDELINES	
To Stop Bleeding	**CPR**
1. Give medical statement by indicating you are trained in First Aid. 2. Assure: airway, breathing and circulation. 3. Use **DIRECT PRESSURE** over the wound with clean dressing or your hand (use non-permeable gloves). Direct pressure will control most bleeding. 4. Bleeding from an artery or several injury sites may require **DIRECT PRESSURE** on a **PRESSURE POINT**. Use pressure points for 30 -60 seconds to help control severe bleeding. 5. Continue primary care and seek medical aid as needed.	1. Give medical statement by indicating you are trained in CPR. 2. Arousal: Check for consciousness. 3. Call out for help, either call 911 yourself or instruct someone else to do so. It is very important to call for emergency assistance prior to initiating CPR. 4. Open airway with chin-lift. 5. Look, listen and feel for breathing. 6. If breathing is absent, give 2 slow, full rescue breaths, 1 second per breath. 7. If breathing remains absent, initiate CPR; 30 compressions for each two breaths. Repeat for 5 cycles before re-analyzing patient or until help arrives. 8. If an automated external defibrillator (AED) is available, use it in accordance with the AED instructions.

REVISION HISTORY

Revision No.	Revision Date	Reason	Editor
0	May 2010	New Project	N. Lordan/ J. Bucha
1	December 2010	Addition of Quarterly GW Sampling to SOW	C. Trent/ J. Bucha
2	June 2011	Addition of Hollow Stem Augers to SOW	C. Trent/ J. Bucha
3	August 2011	NG near-miss incident report	C. Trent/ J. Bucha
4	April 2012	Addition to SOW – Utility Corridor Work Plan Implementation	C. Trent/ J. Bucha
5			
6			

Section 1

Introduction

Brown and Caldwell (BC) has prepared this Health and Safety Plan (HASP) for use during the Pre-Design Investigation and Utility Corridor Work Plan implementation activities to be conducted at the Patchogue Former MGP Site located at West Main Street, Patchogue, Suffolk County, NY 11772 ("the Site"). Activities conducted under BC's direction at the Site will be in compliance with applicable Occupational Safety and Health Administration (OSHA) regulations, particularly those in Title 29 of the Code of Federal Regulations, Part 1910.120 (29 CFR 1910.120), and other applicable federal, state, and local laws, regulations, and statutes. A copy of this HASP will be kept on site during scheduled field activities.

This HASP addresses the identified hazards associated with planned field activities at the Site. It presents the minimum health and safety requirements for establishing and maintaining a safe working environment during the course of work. In the event of conflicting requirements, the procedures or practices that provide the highest degree of personnel protection will be implemented. If scheduled activities change or if site conditions encountered during the course of the work are found to differ substantially from those anticipated, the Regional Safety Unit Manager and Project Manager will be informed immediately upon discovery, and appropriate changes will be made to this HASP.

BC's health and safety programs and procedures, including medical monitoring, respiratory protection, injury and illness prevention, hazard communication, and personal protective equipment (PPE), are documented in the BC Health & Safety Manual. The Health & Safety Manual is readily accessible to BC employees via the BC Pipeline. These health and safety procedures are incorporated herein by reference, and BC employees will adhere to the procedures specified in the manual.

BC's HASP has been prepared specifically for this project and is intended to address health and safety issues solely with respect to the activities of BC's own employees at the site. A copy of BC's HASP may be provided to subcontractors in an effort to help them identify expected conditions at the site and general site hazards. The subcontractor shall remain responsible for identifying and evaluating hazards at the site as they pertain to their activities and for taking appropriate precautions. For example, BC's HASP does not address specific hazards associated with tasks and equipment that are particular to the subcontractor's scope of work and site activities (e.g., operation of a drill rig, excavator, crane or other equipment). Subcontractors are not to rely on BC's HASP to identify all hazards that may be present at the Site.

Subcontractors are responsible for developing, maintaining, and implementing their own health and safety programs, policies, procedures and equipment as necessary to protect their workers, and others, from their activities. Subcontractors shall operate equipment in accordance with their standard operating procedures as well as manufacturer's specifications. Any project monitoring activities conducted by BC at the Site shall not in any way relieve subcontractors of their critical obligation to monitor their operations and employees for the determination of exposure to hazards that may be present at the Site and to provide required guidance and protection. If requested, subcontractors will provide BC with a copy of their own HASP for this project or other health and safety program documents for review.

1.1 Site History

The Site description and history below is as presented in the Final Remedial Investigation Report, Patchogue Former MGP Site (Tetra Tech EC, Inc., December 2009).

1.1.1 Site History

The following is a brief summary of operations conducted at the site from 1904 until present based on the available records:

- 1904: Earliest records of site use for coal gasification
- 1904 – 1926: Site owned and operated by Patchogue Gas Company
- 1914: Site converted into a high pressure gas distribution facility
- 1915 – 1918: Site used to store and distribute high pressure gas produced off-site
- 1922 – 1925: Site used to produce emergency water gas
- 1926: Eight gas aboveground storage tanks (ASTs) installed on-site
- 1976: Long Island Lighting Company sold the site and MGP and gas distribution operations eased. Site sold to third party.
- 1976 – 2006: Site used as a refrigeration-scrap storage yard
- 2005: Site re-acquired by KeySpan
- 2006: KeySpan demolished a warehouse and detached garage
- Present: Inactive and vacated site with concrete slabs remaining at the ground surface.

1.1.2 Site Description

The Patchogue Former MGP Site is located at 234 West Main Street south of Main Street, east of River Avenue, and adjacent to Patchogue River in the Village of Patchogue, Town of Brookhaven, Suffolk County, New York. The site is approximately 3.6 acres with a maximum length (north-south) of approximately 680 feet and a maximum width (east-west) of 180 feet. The average elevation of the site is 10 feet above mean sea level (msl) and the site has a relatively flat topography. The site is located along the Patchogue River just south of where the river exits Patchogue Lake. An overflow pond is also located south/southwest of the site. The site is currently vacant and the southern area of the property is overgrown with brush and trees. Two concrete slabs are located adjacent to one another in the northern area of the site and are approximately 240 feet by 60 feet in combination. The site is secured by locked perimeter fencing, and private properties border the site.

The site is bordered to the east by the Patchogue River and small industrial properties. The surrounding area is primarily used for commercial and residential purposes. A commercial/industrial area is located north of the site and a residential area lies south of the site. Above All Store Fronts and the Patchogue River border the site to the east, while Costanza Marine Contractors is situated to the west. The River Avenue Elementary School is located approximately one-tenth of a mile southwest and upgradient of the site, with residential homes between the site and the school. The Village of Patchogue's waste water treatment plant (WWTP) is located upstream of the site on the eastern side of the Patchogue River.

1.2 Scope of Work

Brown and Caldwell personnel will be observing and documenting subcontractor activities. Brown and Caldwell personnel will also be conducting media sampling (i.e. soil, water and vapors).

Soil Borings

Pre-design investigation activities are to be performed, via the implementation of the soil boring program, to collect information from the MGP impacted areas identified near the center of the Site and the off-site petroleum impacted areas on the adjacent property (to the east). Initially, soil borings will be advanced and sampled at approximately eight to 10 locations. In addition, approximately two to four borings will be advanced on the adjacent property to the east of the Site to collect additional information regarding the petroleum impacts in this area.

The pre-design investigation activities being performed to confirm the previously recorded observations and to further assess the nature of the MGP and petroleum-related impacts. This assessment will include visible observations as recorded in the field using the standard National Grid "Field Descriptions of Samples for Former Manufactured Gas Plant (MGP) Sites". No analytical samples will be collected during the proposed field investigation.

The soil borings will be advanced using direct-push technology (e.g., GeoProbe®) and/or hollow stem augers. Samples from cores will be field screened for indications of MGP-related, or other, impacts based on appearance, incidental odors or organic vapor concentration measurements using a properly calibrated photoionization detector (PID). Upon completion, the soil borings will be backfilled with cement-bentonite grout.

If needed, additional borings may be advanced in an effort to collect information regarding the characteristics of the impacts. Locations of these potential additional borings will be field determined. The field screening methodology will be consistent with the approach described above.

Monitoring of Surface Water and Groundwater Levels

Continuous monitoring of water levels in the Patchogue River and monitoring wells located on the Site will be conducted to monitor water level fluctuations in the Patchogue River adjacent to the site and in groundwater beneath the site over time, as described under the description for Phase 302. This will be accomplished using In-Situ Level-TROLLS® installed in monitoring wells located near the river channel, wells located upland from river, and in a staff gauge (equipped with PVC stilling tube) that will be installed in the river. Manual water level measurements will be made in all monitoring wells and the staff gauge at the beginning and end of this monitoring period.

Results obtained from this water level monitoring effort are intended to provide data that will indicate whether the river is tidally influenced and, if applicable, assess the influence of river levels on groundwater levels.

Slug Tests

In-situ hydraulic conductivity tests (i.e., slug tests) will be performed on up to 6 of the existing site monitoring wells. Rising head slug tests will be conducted and the data generated will be input into AQTESOLV® software for hydraulic conductivity calculations.

The slug test results would be used to estimate time-of-travel of groundwater from the "source area" to the Patchogue River (as requested by the NYSDEC) and would also be used for estimating excavation dewatering rates/volumes in our evaluation of remedial alternatives.

Groundwater Monitoring and NAPL Gauging

Four (4) rounds of groundwater sampling, water level measurements, and NAPL gauging will be conducted as part of quarterly groundwater monitoring activities at the Site. Field activities for each groundwater monitoring event will be conducted by a two-person field crew from BC. Each groundwater monitoring event will be completed in approximately three (3) days. Depth to water measurements and NAPL

gauging will be conducted prior to groundwater sampling. In the event that NAPL is detected in a monitoring well, a groundwater sample will not be collected from that well.

Groundwater samples will be collected according to the United States Environmental Protection Agency (USEPA) low-flow sampling protocol, 2010, and in accordance with procedures outlined in the Generic Field Sampling Plan for Site Investigations at Non-Owned Former MGP Sites (Foster Wheeler, November 2002) (referred to as "FSP").

Utility Corridor Work Plan (UCWP) Implementation

BC will observe and document field activities performed by the client-selected Remedial Contractor during implementation of the UCWP. In addition, BC will implement the community air monitoring requirements contained in the UCWP. Field activities related to the community air monitoring will include but may not be limited to performing routine air monitoring procedures, monitoring the system for the potential exceedances of the established action level(s), evaluating whether conditions are the result of construction activities or ambient (background) conditions (i.e., migration from upgradient or localized conditions), and performing supplemental monitoring with hand-held instrumentation, as required. Community air monitoring is separate and different from personal breathing zone monitoring.

Section 2

Key BC Project Personnel and Responsibilities

Keith Bogatch is the Project Manager (PM). Patricia Petrino is the Pre-Design Investigation (PDI) Task Manager. Jim Bucha, CIH, CSP is the BC Director of Health and Safety. Lydia Crabtree, CSP is the Regional Safety Unit Manager (RSUM). Thakur Chaturgan has been designated as the BC Site Safety Officer (SSO) for this project. An onsite SSO will be designated from the field staff implementing the PDI or conducting the quarterly groundwater sampling. The BC project field staff have completed 40 hours of comprehensive health and safety training, which meets the requirements of 29 CFR 1910.120.

The responsibilities of key BC project personnel are presented below.

2.1 BC Project Manager

The PM is responsible for evaluating hazards anticipated at the Site and working with designated field staff and the RSUM to prepare this HASP to address the identified hazards. The PM is also responsible for the following.

- Informing project participants of safety and health hazards identified at the Site.
- Providing a copy of and requiring that each BC project team member, including subcontractors, reads or is briefed on the HASP.
- Checking that the BC project team is adequately trained and perform safety briefings in accordance with this HASP.
- Providing the resources necessary for maintaining a safe and healthy work environment for BC personnel.
- Communicating project safety concerns to the RSUM for determining corrective actions.

2.2 BC Site Safety Officer

The SSO has on-Site responsibility for verifying that BC team members, including subcontractors, comply with the provisions of this HASP. The SSO has the authority to monitor and correct health and safety issues as noted on-Site. The SSO is responsible for the following.

- Reporting unforeseen or unsafe conditions or work practices at the Site to the PM or RSUM.
- Stopping operations that threaten the health and safety of BC field team or members of the surrounding community.
- Monitoring the safety performance of Site personnel to evaluate the effectiveness of health and safety procedures.
- Performing air monitoring, as necessary, as prescribed in this HASP.
- Documenting field team compliance with this HASP by completing the appropriate BC forms contained in the Appendices of this document.

- Conducting daily tailgate safety meetings and assuring that project personnel understand the requirements of this HASP (as documented by each BC field team member's signature on the Signature Page).
- Limiting access to BC work areas on the Site to BC field team members and authorized personnel.
- Enforcing the "buddy system" or minimum 2-person teams as appropriate for Site activities.
- Performing periodic inspections to evaluate safety practices at the Site.
- Identifying the location and route to nearby medical facility and emergency contact information and coordinating appropriate responses in the event of emergency.

2.3 BC Regional Unit Safety Manager

The RSUM is responsible for final review and modification of this HASP. Modifications to this HASP that result in less protective measures than those specified may not be employed by the PM or SSO without the approval of the RSUM. In addition, the RSUM has the following responsibilities.

- Developing and coordinating the overall BC health and safety program.
- Advising the PM and SSO on matters relating to health and safety on this project.
- Recommending appropriate safeguards and procedures.
- Modifying this HASP, if necessary, and approving changes in health and safety procedures at the Site.

2.4 BC Team Members

BC employees and subcontractors are responsible for familiarizing themselves with health and safety aspects of the project and for conducting their activities in a safe manner. This includes attending site briefings, communicating health and safety observations and concerns to the SSO, maintaining current medical and training status and maintaining and using proper tools, equipment and PPE. Proper work practices are part of ensuring a safe and healthful working environment. Safe work practices are essential and it is the responsibility of BC employees and team members to follow safe work practices when conducting scheduled activities. Safe work practices to be employed during the entire duration of fieldwork include, but are not limited to, the following.

- Following the provisions of this HASP, company health and safety procedures and regulatory requirements.
- Reviewing safety-related information from other parties (i.e., client or contractors) as it relates to BC's activities.
- Inspecting personal protective equipment (PPE) before on-site use, using only intact protective clothing and related gear, and changing suits, gloves, etc. if they are damaged or beyond their useful service life.
- Set up, assemble, and check out all equipment and tools for integrity and proper function before starting work activities.
- Assisting in and evaluating the effectiveness of Site procedures (including decontamination) for personnel, protective equipment, sampling equipment and containers, and heavy equipment and vehicles.
- Practice the "buddy system" as appropriate for site activities.
- Do not use faulty or suspect equipment.
- Do not use hands to wipe sweat away from face. Use a clean towel or paper towels.

- Practice contamination avoidance whenever possible.
- Do not smoke, eat, drink, or apply cosmetics while in chemically-affected areas of the site or before proper decontamination.
- Wash hands, face and arms before taking rest and lunch breaks and before leaving the site at the end of the workday.
- Check in and out with the SSO upon arrival and departure from the site.
- Perform decontamination procedures as specified in this HASP.
- Notify the SSO immediately if there is an incident that causes an injury, illness or property loss. Incidents that could have resulted in injury, illness or property loss (close call) will also be reported to the SSO.
- Do not approach or enter an area where a hazardous environment (i.e., oxygen deficiency, toxic or explosive) may exist without employing necessary engineering controls, proper PPE and appropriate support personnel.
- Use respirators correctly and as required for the Site; check the fit of the respirator with a negative or positive pressure test; do not wear respirator with facial hair or other conditions that prevent a face-to-face piece seal.
- Confined spaces will not be entered without appropriate evaluation, equipment, training and support personnel.

2.5 BC Subcontractors

Subcontractor personnel are expected to comply fully with subcontractor's HASP and to observe the minimum safety guidelines applicable to their activities which may be identified in the BC HASP. Failure to do so may result in the removal of the subcontractor or any of the subcontractor's workers from the job site.

Section 3

Hazard Analysis

Hazards at the Site may include physical hazards, chemical hazards or biological hazards. Each type of identified hazard is addressed in the following sections. Hazards that are the specialty of a subcontractor (i.e., operation of a drill rig or excavator) are not addressed in this HASP. Subcontractors are responsible for identifying potential hazards associated with their activities and implementing proper controls.

3.1 Chemical Hazards

Exposure pathways of concern for chemical compounds that may be present at the Site are inhalation of airborne contaminants, direct skin contact with contaminated materials, and incidental ingestion of affected media. Wearing protective equipment and following decontamination procedures listed in Section 7 can minimize dermal contact and incidental ingestion. To minimize inhalation hazards, dust or vapor control measures will be implemented, where necessary, and action levels will be observed during scheduled activities. Site-specific action levels and air monitoring requirements are presented in Section 5.

Site Specific Chemical Concerns			
Known or Suspected Compounds	Source (soil/water/sludge, etc.)	Known Concentration Range	
		Lowest	Highest
Benzene	Soil	Not detected (ND)	6.3 mg/kg
	Groundwater	ND	46 µg/l
Toluene	Soil	ND	22 mg/kg
	Groundwater	ND	120 µg/l
Ethylbenzene	Soil	ND	130 mg/kg
	Groundwater	ND	390 µg/l
Xylene, Total	Soil	ND	195 mg/kg
	Groundwater	ND	460 µg/l
Total Polycyclic Aromatic Hydrocarbons (PAHs)	Soil	ND	16,410 mg/kg
	Groundwater	ND	2,041 µg/l
Cyanide, Total (Typically present at MGP sites as iron cyanide complexes)	Soil	ND	3.95 mg/kg
	Groundwater	ND	15 µg/l

Chemical descriptions of select chemicals of concern, including health effects and exposure limits, are presented in the following paragraphs. Each chemical description includes physical and odor recognition characteristics, the health effects associated with exposure, and exposure limits expressed as an 8-hour time-weighted average (TWA). Provided are federal OSHA (OSHA) permissible exposure limits (PELs;

located in 29 CFR 1910.1000) and the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs).

3.1.1 Benzene

Benzene is a clear, volatile liquid. It is colorless, highly flammable, and toxic, with a characteristic odor. It is a severe eye and moderate skin irritant. Human effects by inhalation and ingestion include euphoria, changes in sleep and motor activity, nausea and vomiting, other blood effects, dermatitis, and fever. In industry, inhalation is the primary route of chronic benzene poisoning. If the liquid is aspirated into the lung it may cause pulmonary edema. Poisoning by skin contact has also been reported. Exposure to high concentrations (3,000 ppm) may result in acute poisoning, which is characterized by the narcotic action of benzene on the central nervous system. Chronic poisoning occurs most commonly through inhalation and dermal absorption. Benzene is a known human carcinogen that can cause leukemia.

- The OSHA PEL is listed as 1 ppm.
- The TLV is listed as 0.5 ppm.

Note: Published exposure limits designate a skin notation indicating that dermal contact can contribute to the overall exposure.

3.1.2 Toluene

Toluene is a colorless liquid with a benzol-like odor. Human systemic effects of exposure to toluene include central nervous system changes, hallucinations or distorted perceptions, motor activity changes, psychophysiological changes, and bone marrow changes. It is a severe eye irritant and an experimental teratogen. Inhalation of high vapor concentrations may cause impairment of coordination and reaction time, headaches, nausea, eye irritation, loss of appetite, a bad taste in the mouth, and lassitude.

- The OSHA PEL is listed as 200 ppm.
- The TLV is listed as 20 ppm.

Note: Published exposure limits designate a skin notation indicating that dermal contact can contribute to the overall exposure.

3.1.3 Ethylbenzene

Ethylbenzene is a clear, colorless liquid. It is mildly toxic by inhalation and skin contact. Inhalation can cause eye, sleep, and pulmonary changes. It is an eye and skin irritant at levels as low as 0.1% (1,000 ppm) of the vapor in air. At higher concentrations, it is extremely irritating at first, then can cause dizziness, irritation of the nose and throat, and a sense of constriction in the chest. Exposure to high concentrations of ethylbenzene vapor may result in irritation of the skin and mucous membranes, dizziness, irritation of the nose and throat, and a sense of constriction of the chest.

- The OSHA PEL is listed as 100 ppm.
- The TLV is listed as 20 ppm.

3.1.4 Xylene

Xylene is a clear, colorless liquid. It exhibits the general chlorinated hydrocarbon central nervous system effects, olfactory (smell) changes, eye irritation and pulmonary changes. It is a severe skin irritant. There are three isomers: ortho, meta, and para. Exposure to high concentrations of xylene vapor may result in eye and skin irritation. Eye irritation may occur at concentrations of about 200 ppm.

- The OSHA PEL is listed as 100 ppm.
- The TLV is listed as 100 ppm.

3.1.5 Polycyclic Aromatic Hydrocarbons (PAHs)

Polycyclic Aromatic Hydrocarbons (PAHs) also known as Polynuclear Aromatic Hydrocarbons (PNAs) constitute a class of materials of which benzo[a]pyrene (BaP) is one of the most common and also the most hazardous. In general, PNAs can be formed in any hydrocarbon combustion process. The less efficient the combustion process, the higher the PNA emission factor is likely to be. The major sources are stationary sources, such as heat and power generation, refuse burning, industrial activity, such as coke ovens, and coal refuse heaps. PNAs may also be released from oil spills. Because of the large number of sources, people are exposed to very low levels of PNAs every day.

Certain PNAs, such as the more common BaP, have been demonstrated to be carcinogenic at relatively high exposure levels in laboratory animals. BaP is a yellowish crystalline solid that consists of five benzene rings joined together. It is highly soluble in fat tissue and has been shown to produce tumors in the stomachs of laboratory mice. In addition, skin cancers have been induced in a variety of animals at very low levels and unspecified lengths of application.

It is important to recognize the PNAs' ability to adhere to soil and other particulates. Therefore, good particulate emission controls and the use of air purifying respirators with particulate filters are required for protection against airborne PNA hazards.

- The OSHA PEL is listed as 0.2 mg/m^3 (as coal tar pitch volatiles).
- The TLV is listed as 0.2 mg/m^3 (coal tar pitch volatiles, as benzene soluble aerosol).

3.1.6 Cyanide

Hydrogen cyanide (HCN) is a colorless or pale blue liquid or gas (above 78° F) with a bitter, almond-like odor. It is a deadly human poison by all routes of exposure. Symptoms of mild exposure include cyanosis, headache, dizziness, unsteadyness of gait, a feeling of suffocation, and nausea. In cases of acute cyanide poisoning, death is extremely rapid (exposure to concentrations of 100 to 200 ppm for periods of up to 60 minutes can cause death).

HCN is a very dangerous fire hazard when exposed to heat, flame, or oxidizers. When heated to decomposition or in reaction with water, steam, or acid, it produces highly toxic fumes of CN-.

- The OSHA PEL is listed as 10 ppm (11 mg/m3).
- The TLV Ceiling Limit is listed as 4.7 ppm for hydrogen cyanide and 5 mg/m3 as a ceiling level for cyanide salts.

Note: Published exposure limits designate a skin notation indicating that dermal contact can contribute to the overall exposure.

3.2 Hazard Communication

In accordance with the Hazard Communication standard, material safety data sheets (MSDSs) will be maintained on site for chemical products used by BC personnel at the Site (i.e., spray paint, PVC cement, etc.). Subcontractors will be responsible for maintaining MSDSs for chemical products they bring on Site. In addition, containers will be clearly labeled in English to indicate their contents and appropriate hazard warnings. Please note that labeling containers includes, but is not limited to, any waste, used PPE, and/or decontamination materials collected.

3.3 Opening Wells and Well Vaults

Direct-reading instrumentation specified in Section 5 will be used to monitor any work in a well vault at the site where VOCs are a concern. The well vault will be opened carefully with the BC employee staying upwind as much as possible and then left open for a minimum of three minutes to allow the vault to

vent. If the well cap is then removed, allow another three minutes for the well head to vent before proceeding. Please note that if there are other established protocols that differ from 3 minutes; the more protective time increment will be followed. Personnel should stay upwind as much as possible while working in and around the vault.

When removing a well cap, personnel will remain upwind as much as possible and will carefully remove the cap by opening it away from them in order to minimize the likelihood of exposure to vapors. Personnel will wait a minimum of three minutes to allow the well to vent before proceeding.

3.4 Physical Hazards

The following physical hazards, as marked below, have been identified and may be encountered during scheduled field activities.

- ☒ Slips, Trips and Falls
- ☒ Heavy Equipment
- ☒ Excavations
- ☒ Noise
- ☒ Overhead Utilities
- ☐ Electrical Hazards
- ☐ Confined Spaces
- ☒ Sharp Objects/Cutting Utensils
- ☐ Elevated Platforms/Working Surfaces
- ☒ Traffic
- ☐ Arc Flash Protection
- ☐ Water Hazards (non-boating)
- ☐ Removing Manhole Covers
- ☒ Housekeeping
- ☒ Materials and Equipment Handling - Lifting
- ☒ Drilling
- ☒ Underground Utilities
- ☒ Equipment Refueling
- ☐ Lockout/Tagout
- ☐ Fire/Explosion
- ☒ Cutting Acetate Sleeves
- ☐ Ladder Use
- ☒ Driving
- ☐ Boating Safety
- ☐ Building Collapse
- ☐ Personal Safety – Urban Setting

Actions to be taken to protect against the hazards identified are provided in the sections below.

3.4.1 Slip, Trips and Falls

Slipping hazards may exist due to uneven terrain, wet or slick surfaces, leaks or spills. Tripping hazards may be present from elevation changes, debris, poor housekeeping or tools and equipment. Some specific hazards may include: climbing/descending ladders, scaffolding, berms or curbing. Collectively, these types of injuries account for nearly 50 percent of all occupational injuries and accepted disabling claims. Prevention requires attention and alertness on the part of each worker, following and enforcing proper procedures, including good housekeeping practices, and wearing appropriate protective equipment.

3.4.2 Housekeeping

Personnel shall maintain a clean and orderly work environment. Make sure that all materials stored in tiers are stacked, racked, blocked, interlocked, or secured to prevent sliding, falling, collapse, or overturning. Keep aisles and passageways clear and in good repair to provide for free and safe movement of employees and material-handling equipment. Do not allow materials to accumulate to a degree that it creates a safety or fire hazard.

During construction activities, scrap and form lumber with protruding nails and other items shall be kept clear from work areas, passageways, and stairs. Combustible scrap and debris shall be removed at regular intervals. Safe means must be provided to facilitate removal of debris.

Containers must be provided for collecting and separating waste, used rags and other debris. Containers used for garbage and other oily flammable or hazardous waste such as caustics, acids, harmless dusts, etc., must be separated and equipped with covers. Garbage and other waste shall be disposed of at frequent and regular intervals.

3.4.3 Heavy Equipment

Equipment, including earth-moving equipment, drill rigs, or other heavy machinery, will be operated in compliance with the manufacturer's instructions, specifications, and limitations, as well as any applicable regulations. The operator is responsible for inspecting the equipment prior to use each work shift to verify that it is functioning properly and safely.

The following precautions should be observed whenever heavy equipment is in use:

- PPE, including steel-toed boots, safety glasses, high visibility vests, and hard hats must be worn.
- Personnel must be aware of the location and operation of heavy equipment and take precautions to avoid getting in the way of its operation. Workers must never assume that the equipment operator sees them; eye contact and hand signals should be used to inform the operator of the worker's intent.
- Personnel should not walk directly in back of, or to the side of, heavy equipment without the operator's knowledge. Workers should avoid entering the swing radius of equipment and be aware of potential pinch points.
- Nonessential personnel will be kept out of the work area.

3.4.4 Materials and Equipment Handling - Lifting

The movement and handling of equipment and materials on the Site pose a risk to workers in the form of muscle strains and minor injuries. These injuries can be avoided by using safe handling practices, proper lifting techniques, and proper personal safety equipment such as steel-toed boots and sturdy work gloves. Where practical, mechanical devices will be utilized to assist in the movement of equipment and materials. Workers will not attempt to move heavy objects by themselves without using appropriate mechanical aids such as drum dollies or hydraulic lift gates.

Proper lifting techniques include the following:

- Lift with the strength of your knees, not your back.
- Firmly plant your feet approximately shoulder-width apart.
- Turn your whole body, don't bend or twist at the waist.
- Be sure that the path is clear of obstructions or tripping hazards; avoid carrying objects that will obstruct your vision.
- Use caution when holding an object from the bottom to prevent crushing of the hands or fingers when lowering.

3.4.5 Excavations

The client-selected contractor will be responsible for excavation safety. **BC personnel will not enter into excavations**. A competent person who is capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them, will be present during excavation activities.

The atmosphere will be tested in excavations, before employees are permitted to enter and begin work, greater than 4 feet in depth or where oxygen deficiency or toxic or flammable gases are likely to be present. The atmosphere shall be ventilated and re-tested until flammable gas concentrations less than 5 percent of the lower explosive limit (LEL) and site-specific action levels are obtained. Worker entry will not be allowed if the oxygen concentration is less than 20 percent. In addition, a safe means of access and egress (i.e., a ladder, stairs or ramp) must be provided so that no more than 25 feet of lateral travel is required by employees.

Workers will not enter unstable excavations or excavations greater than 5 feet in depth without appropriate protective systems such as benching, sloping, or shoring. If shoring or shielding systems are not used, side slopes will not be steeper than 1½:1 without written confirmation from the competent person that the slope is safe for the soil conditions. Excavations will be constructed in accordance with the OSHA Excavation Safety Standard (29CFR1926 Subpart P).

The competent person will inspect excavations daily. If there is evidence that a cave-in or slide is possible, work will cease until the necessary safeguards have been taken. Excavated material will be placed far enough from the edge of the excavation (a minimum of 2 feet) so that it does not fall back into the opening or affect the integrity of the sidewall. At the end of each day's activities, open excavations will be clearly marked and secured to prevent nearby workers or unauthorized personnel from entering them. Remote sampling techniques will be the preferred method of sample collection in excavations.

3.4.6 Drilling

During all drilling activities, the operator must verify that the appropriate level of protection and appropriate safety procedures are utilized. The operator will verify that equipment "kill switches" are functioning properly at the start of each day's use. Hard hats, steel-toed boots, and ear and eye protection will be required at all times when working around drill rigs. The proximity of underground and overhead utilities must be identified before any drilling is attempted. The rig may not be moved with the mast in the upright position.

Workers can effectively manage hazards associated with working around heavy equipment if a constant awareness of these hazards is maintained. These hazards include the risk of becoming physically entangled in rotating machinery, slipping and falling, impact injury to eyes, head and body, and injury from machinery operations. Never work or walk on piles of well casings. Make sure all high-pressure lines and hoses have whip checks attached. Constant visual or verbal contact with the equipment operator will facilitate such awareness. In addition, when a drill rig is in operation, the equipment operator must maintain contact with the drill rig controls with both hands. The equipment operator may not attempt to help the assistant or assume the tasks of the assistant while also operating the drill rig.

3.4.7 Noise

Noise may result primarily from the operation of heavy equipment, process machinery or other mechanical equipment. Hearing protection with the appropriate noise reduction rating (NRR) shall be worn in areas with high noise levels. A good rule of thumb to determine if hearing protection is needed is the inability to have a conversation at arms length without raising voice levels. If loud noise is present or normal conversation becomes difficult, hearing protection in the form of ear plugs, or equivalent, will be required.

3.4.8 Underground Utilities

Reasonable efforts will be made to identify the location(s) of underground utilities (e.g., pipes, electrical conductors, fuel lines, and water and sewer lines) before intrusive soil work is performed. The state underground utility notification authority (e.g., USA, Dig Alert, Blue Stake, etc.) will be contacted prior to the start of intrusive field activities in accordance with local notification requirements. In areas not

evaluated or serviced by the underground utility notification authority, and a reasonable potential for underground utilities exists, one or more of the following techniques will be employed to determine the location of subsurface structures.

- Contracting the services of a qualified private utility locator.
- Having a survey of the subject area conducted by staff trained in the use of subsurface utility locating equipment.
- Subsurface testing (i.e., hand digging or potholing) to the expected depth of probable utilities (not less than 5 feet).

If utilities cannot be located or if unlocated utilities are suspected to be present, subsurface activities (i.e., borings, excavation) should not be conducted before the location(s) or absence of underground utilities is confirmed.

Typical subsurface location marks are as follows:

- Red – electrical,
- Yellow – gas/oil/steam,
- Blue – water,
- Green – sanitary/storm drains/culverts,
- Orange – communications, and
- White – proposed excavation or boring.

Intrusive work should be limited to the area 3.3 feet (1 meter) on either side of the location marks. In some special cases such as fiber optics and high-pressure pipelines this area should be expanded to 16.5 feet (5 meters) on either side of the utility.

3.4.9 Overhead Utilities

If work is to be conducted in the vicinity of overhead electrical utilities, the owner of the overhead line will be contacted to determine the maximum voltage. Any overhead utility will be considered to be energized unless and until the person owning or operating such line verifies that the line is not energized, and the line is visibly grounded at the work site.

Workers will not perform work in proximity to energized high-voltage lines (including scaffolding, well drilling, pile driving, or hoisting equipment) until danger from accidental contact with high-voltage lines has been effectively guarded against.

Equipment with articulated upright booms or masts are not permitted to operate within 15 feet of an overhead utility line (less than 50kV) while the boom is in the upright position. For transmission lines in excess of 50kV, an additional distance of 4 inches for each 10 kV over 50kV will be used.

3.4.10 Equipment Refueling

Care shall be exercised while refueling generators, pumps, vehicles, and other equipment to prevent fire and spills. Personnel shall eliminate static electricity by grounding themselves (touching metal) prior to using refueling hoses and or containers of petroleum liquids. Items being refueled shall be grounded or be located on the ground and not on a trailer, work bench or inside a truck bed. Equipment that is hot must be allowed to cool prior to refueling. Spill response materials shall be available when conducting refueling operations.

3.4.11 Electrical Hazards

Electrical equipment to be used during field activities will be suitably grounded and insulated. Ground-fault circuit interrupters (GFCI), or equivalent, will be used with electrical equipment to reduce

the potential for serious electrical shock. Electrical equipment including batteries, generators, panels and extension cords shall be kept dry during use. Extension cords may not be used as a permanent means of providing power and will be removed from service if they are worn, frayed, or if the grounding prong is missing.

Extension cord precautions include the following:

- Be aware of exposed or bare wires, especially on metal grating. Warning: Electrical contact with metal can cause fatal electrocution.
- Prior to use, inspect cords for exposed or bare wires, worn or frayed cords, and incorrect splices. Splices are permitted, but there must be insulation equal to the cable, including flexibility.
- Cables and extension cords in passageways, steps or any area where there may be foot traffic should be secured so as to not create a tripping hazard. Overhead cables and extension cords shall be rigged to a height greater than 6 feet.
- Shield extension cords that must run across driveways or areas where vehicle traffic is present.
- Do not run cords across doorways or windows where they can be frayed or cut by a closed door or window.
- Do not run wires through wet or puddled areas.
- Flexible cord sets that are used on construction sites or in damp locations shall be of hard usage or extra hard usage type.

Observation of energized machinery will take place from a safe distance. Only qualified personnel will remove guards, hatch covers, or other security devices if necessary. Equipment lockout procedures and the appropriate facility work permit requirements will be followed. Lockout/tagout procedures will be conducted before activities begin on or near energized or mechanical equipment that may pose a hazard to site personnel. Workers conducting the operation will positively isolate the piece of equipment, lock/tag the energy source, and verify effectiveness of the isolation. Only employees who perform the lockout/tagout procedure may remove their own tags/locks. Employees shall complete lockout/tagout training before initiating this procedure.

Only qualified personnel will remove covers of electrical equipment to expose energized electrical parts. Entering electrical rooms/vaults or areas with live exposed electrical part by BC employees shall be permitted only when accompanied by a qualified personnel after notification and approval of the appropriate facility personnel.

3.4.12 Lockout/Tagout

Lockout/tagout (LO/TO) procedures in accordance with 29 CFR 1910.147 will be performed before activities begin on or near energized or mechanical equipment that may pose a hazard to site personnel. The purpose of the lockout/tagout (LO/TO) system is to safeguard exposure from machinery, energized electrical circuits, piping under pressure, or any type of energy source from unexpected energization or start up that could cause harm to an individual. Workers conducting the operation will positively isolate the piece of equipment, lock/tag the energy source, and verify effectiveness of the isolation. Only employees who perform the lockout/tagout procedure may remove their own tags/locks. Employees must be thoroughly trained before initiating this procedure.

Whenever multiple personnel (or multiple employers are working on the same worksite) are to be engaged in activities requiring LO/TO, employees/employers shall inform each other of their activities and coordinate their respective LO/TO procedures. When applicable, BC shall request an owner's representative to initiate the LO/TO procedure and apply the first lock. When initiated by others, BC will remove their locks prior to leaving a facility. Whenever a group lockout/tagout procedure must be performed, they shall utilize a procedure that affords the same level of protection as that provided by the

implementation of a personal lockout or tagout device. Group LO/TO devices shall meet the requirements of 29 CFR 1910.145(f)(3).

Basic Lockout/Tagout Procedures

1. Each person will maintain their own lock, key, and lockout device so that no one else can remove the lock.
2. Always notify the operator when work is to be done.
3. Use your own lock to lock out electrical power. Attach a tag or sign to the power disconnect to indicate that maintenance work is in progress. Use the wording "Do Not Operate."
4. Bleed all pressure from pneumatic, hydraulic, or other fluid lines, or safely isolate them from the area where work is being done.
5. Drain contents of lines or tanks as needed. Lock valves open or closed to prevent buildup of pressure.
6. Ground electrical systems as needed.
7. Secure any device under tension or compression so as to prevent accidental movement. Move suspended parts that could drop or cycle to a safe position and block, clamp, or chain them in place.
8. Verify (test) that the mechanism has been isolated from the source of energy.
9. Ensure that all workers remove their individual locks after work is completed. The last worker should remove the locking devices.
10. Ensure that the last person double-checks that all is clear and safe before start-up.

Portable Equipment

Portable electrical equipment such as hand drills, computers, and power saws that use plug type connectors must be unplugged prior to any task that may expose the employee to energized portions of the equipment. Removal of the plug from the power source, such as the generator or wall socket, may be combined with a tagout system, particularly if the plug is at a distance from the equipment being repaired

3.4.13 Confined Spaces

Entry into confined spaces will be conducted in strict accordance with 29 CFR 1910.146. Confined spaces will be evaluated prior to entry to determine if hazards are present that could pose a risk to entrants. Before workers may enter a permit-required confined space, an entry permit must be completed by the PM or SSO, approved by the RSUM and, all requirements for entry must be met.

- Confined spaces may be described as having, but not being limited to, the following characteristics:
- is large enough to permit an employee to enter and perform work; and
- has limited or restricted means of entry and exit; and
- is not equipped, designed, or intended for continuous human occupancy.

If there is any serious health and safety hazard present in the confined space, the space is considered a permit-required confined space (permit space). A permit-space is a confined space that has one or more of the following characteristics:

- contains or has the potential to contain a hazardous atmosphere; or
- contains or has the potential to contain a material with the potential to engulf or entrap an employee; or

- is so configured that an employee may become trapped, disoriented, or asphyxiated by wall configurations or floors that taper to smaller cross sections; or
- contains any other established safety or health hazard (examples may include sources of energy, moving parts or thermal considerations).

All fluid, electrical, and steam lines and other sources of energy that could harm entrants must be completely isolated before entry. The following atmospheric conditions must be met before entry is permissible (air monitoring may be necessary to verify these conditions are met):

- flammable vapor or dust must be at a concentration less than 5 percent of the lower explosive limit (LEL); and
- oxygen must be at a concentration greater than 20 percent and less than 22 percent; and
- hydrogen sulfide concentration must be less than 5 parts per million (ppm); and
- toxic substances must be at a concentration less than half their respective permissible exposure limits or specified action limits.

In addition, the following roles must be designated before entry into permit-required confined spaces is allowed: Entry Supervisor; Attendant; and Authorized Entrant(s). Confined space entry for each project also requires training for the project team on written operating procedures, including the use of the Confined Space Entry Permit form.

BC employees are not trained in rescue services. Such services are to be arranged locally, prior to entry operations, by the PM. Rescue services can typically be provided by the local fire department or contracted service provider.

3.4.14 Fire/Explosion

Site workers should have an increased awareness concerning fire and explosion hazards whenever working with or near flammable materials, especially when performing any activity that may generate sparks, flame, or other source of ignition. Intrinsically safe equipment is required when working in or near environments with the potential for an explosive or flammable atmosphere. The SSO will verify facility requirements for a “hot work” permit before activities that may serve as a source of ignition are conducted.

Flammable materials will be kept away from sources of ignition. In the event of fire, work will cease, the area will be evacuated, and the local fire response team will be notified immediately. Only trained, experienced fire fighters should attempt to extinguish substantial fires at the Site. Site personnel should not attempt to fight fires, unless properly trained and equipped to do so. A fully charged ABC dry chemical fire extinguisher will be readily available for use during all scheduled activities at the Site.

3.4.15 Sharp Objects/Cutting Utensils

Frequently field tasks require the cutting of items such as rope, packaging or containers. Care should be exercised in using knives and/or cutting implements while performing such cutting tasks. Personnel should cut down and away from their body and other personnel. The item being cut should be braced or secured from movement while cutting. When slicing open acetate liners, such as those utilized in direct push drilling, personnel should use a hook blade cutting implement designed for this task versus a straight blade knife.

3.4.16 Cutting Acetate Sample Sleeves

The cutting of acetate sleeves presents a potential hazard to sampling personnel. By following proper procedures, the risk associated with this activity can be effectively minimized. To remove the soil sample the acetate liner must be cut with a bladed tool or knife. Knives are more frequently the source

of disabling injuries than any other hand tool. The principal hazard in the use of knives is the hand slipping from the handle onto the blade or the blade strikes another part of the body. To prevent this, the following safety procedures should be followed:

- Provide a safety blade holder with a retraction spring on a track where blade mounts. Use a hook type linoleum blade which has a reduced cutting edge. When the hook of the blade is cutting the acetate liner it keeps the blade extended. If the blade breaks or the operator's hand slips the blade automatically retracts into the handle of the safety blade holder.
- Replace blades when they become dull. If material becomes hard to cut then the blade is dull.
- Wear leather cut-resistant (such as Kevlar) gloves.
- Wear safety glasses.
- The cutting stroke should be away from the body. If that is not possible, then the hands and body should be in the clear.
- Provide an angle iron device to place the liner in when cutting. This gives a holder for the liner.
- If you drop the knife, just let it fall to the ground and DO NOT try to catch it.
- If you lay the knife down, make sure the blade is retracted into the holder or the knife is placed in a protective holder.

3.4.17 Elevated Platforms / Working Surfaces

When working at heights that expose employees to falls greater than 6 feet, especially on sloping roofs and elevated platforms, the requirements of 29 CFR 1926.502 shall be observed. In such instances, a safety harness shall be worn and the lanyard secured at a level not lower than the employee's waist, limiting the free-fall distance to a maximum of 6 feet.

Elevated work platforms shall be constructed, used, and maintained in accordance with Subpart L of the OSHA Construction Safety Orders. Scaffolds and hoisting lines shall be inspected daily by a competent person to verify the integrity of the components. If a material is determined to be defective, it may not be used for any purpose and will be replaced immediately.

A standard railing shall consist of top rail, intermediate rail, toe board, and post. It shall have a vertical height of approximately 42 inches (±3 inches) from the top surface of the top rail to the floor, platform, runway, or ramp. The top rail shall have a smooth surface throughout. The intermediate rail shall be set half way between the top rail and the floor, platform, runway, or ramp.

A cover of standard strength and construction that is secured against accidental displacement shall guard floor holes, hatchways, or any other openings into which a person can walk. When the cover is not in place, the openings shall be guarded with a standard railing (equipped with a toe board) on all exposed sides. Any cover on floor openings shall be properly labeled or stenciled with letters at least one inch high or greater stating "OPENING – DO NOT REMOVE".

<u>Personal Fall Protection Equipment</u>

Full body harness is the only acceptable means of fall arrest for personnel working over surfaces greater than six feet in height. A Fall Arrest System consisting of safety harness and anchor lanyard must be worn by anyone working on elevated surfaces that lack "general" fall protection such as railings, etc.

Lanyards must be tied off at a point above the worker's head and to a firm structure or a portion thereof designed to hold a weight of 5,000 lbs. Only hooks with locking snaps that operate in "as new" condition will be used. These hooks are also referred to as "double action lanyard hooks".

When other possible means of fall protection (railings, etc.) are not available, individuals working at heights of less than 6 feet must tie-off if there is danger of impalement, especially if the impalement hazard cannot be mitigated in accordance with OSHA standards.

All workers must perform routine inspection of belts/harnesses and lanyards prior to their use. The employer shall conduct regular inspections (every three months) of all fall protection equipment. In addition, there shall be an inspection of all workers' personal tools and equipment prior to the employees using them on the job.

Lanyards are to be used for tie-off purposes only, and damaged belts, harnesses, and lanyards must be retired and discarded.

3.4.18 Ladder Use

Ladders are to be maintained in good condition at all times, with tight joints, hardware, and fittings securely attached, and moveable parts freely operating without binding or undo play. Defective ladders must be "tagged" out of service. Safety "feet" shall be kept in good condition. Ladders are to be visually inspected for possible signs of damage or defects daily, before each use.

Where possible, portable straight rung ladders shall be set up so that the horizontal distance from the top support to the foot of the ladder is ¼ of the working length of the ladder. The ladder shall be secured by tying it off to a firm point, or held in place by another worker while in use. If the ladder is used to gain access to a roof or platform, the side rails shall extend at least 3 feet beyond the point of support at the edge of the roof or platform.

Step ladders shall always be set up properly, so that they are in the "A" frame position, level and with all four feet on firm ground, and fully opened with the spreaders locked in place. Personnel are forbidden to stand on the top cap or on the last step of a step ladder, or to stand on the hinged back of a step ladder. A step ladder shall never be used at a straight ladder.

3.4.19 Traffic

Vehicular traffic presents opportunities for serious injury to persons or property. Traffic may consist of street traffic or motor vehicles operated by facility employees or visitors to the Site. Workers and other pedestrians are clearly at risk during periods of heavy traffic. Risk from motor vehicle operations may be minimized by good operating practices and alertness, and care on the part of workers and pedestrians.

Site personnel will wear high-visibility traffic safety vests whenever activities are conducted in areas of heavy traffic. Work vehicles will be arranged to be used as a barrier between site workers and nearby traffic. If required by local ordinances or site location, a traffic control plan will be developed and implemented. Consider using amber/yellow warning lights to alert traffic to the work zone. Note that amber/yellow warning lights may be required by specific clients or ordinances.

It is important to be conscious of all vehicular traffic that may be present during conduct of field operations. Use caution tape, barricades, or safety cones to denote the boundaries of the work area and to alert vehicle operators to the presence of operations which are non-routine to them. Be careful when exiting the work area and especially when walking out from between parked vehicles to avoid vehicular traffic.

Never turn your Back on Traffic. When working in or near a roadway, walk and work with your face to the oncoming traffic. If you must turn your back to traffic, have a coworker watch oncoming traffic for you.

Vehicle and Worksite Position. Whenever possible, place a vehicle between your worksite and oncoming traffic. Not only is the vehicle a large, visible warning sign, but if an oncoming car should fail to yield or deviate, the parked vehicle, rather than your body, would absorb the first impact of a crash. Turn the wheels so that if the vehicle were struck, it would swing away from the worksite. Even though the vehicle would protect you in a crash, it might be knocked several feet backward. Always leave some room between the rear of the vehicle and the work area.

Use of Signs and Cones to Direct Traffic. Traffic signs and cones are used to inform drivers and direct traffic away from and around you. Cones and signs are only effective if they give oncoming drivers enough time to react and make it clear how traffic should react.

Cone Positioning. The most common coning situation is setting a taper of cones that creates a visual barrier for oncoming motorists and gradually closes a lane.

The position of the taper depends on the road width, position and size of the work area, and also on the characteristics of the traffic.

3.4.20 Driving

A lot of driving is required to get to, from, and between project Sites. Safe vehicle maintenance and operation must be a priority. It requires knowledge of directions to (and conditions of) the Site in advance, careful exiting and merging into traffic, anticipating the unexpected, remaining alert to one's physical and mental condition, resisting distractions such as cell phone use, other car activities and contacting assistance when needed. Report all vehicle colllisions/incidents to BC's Risk Manager.

3.4.21Arc Flash Protection

An arc flash is a short circuit through the air when insulation or isolation between electrified conductors is breached or can no longer withstand the applied voltage. Statistics show that there are 5 to 10 arc flash explosions a day near electrical equipment that result in hospitalization of a burn victim. An arc flash can be caused by common occurrences such as dropping tools, accidental contact with electrical systems, and build up of dirt or corrosion.

The temperature of an arc can reach more than 35,000 F as it creates a brilliant flash of light and a loud noise. Concentrated energy explodes outward from the electrical equipment, spreading hot gases, molten metal, causing death or severe burns, and creating pressure waves that can damage hearing or brain function and a flash that can damage eyesight. The fast-moving pressure wave also can send loose material such as pieces of equipment, metal tools, and other objects flying, injuring anyone standing nearby.

Regulations require the calculation of the "flash protection boundary" inside which qualified workers must be protected when working. This boundary is an imaginary sphere surrounding the potential arc point, "within which a person could receive a second-degree burn if an electrical arc flash were to occur," according to the National Fire Protection Association (NFPA) 70E standard. Brown and Caldwell's Health and Safety Manual gives direction of when and where to establish this boundary.

BC's Electrical Safety/Arc Flash Policy provides information and instruction for BC employees who work on or near energized power circuits, electrical distribution equipment, electrical utilization equipment and those who inspect energized equipment, where a phase-to-ground or phase-to-phase short or fault occurrence may cause an Arc Flash event.

BC employees must comply with BC's Electrical Safety and Lock-Out/Tag-Out Policy in the Health and Safety Manual and treat electrical equipment and circuits as energized until:

1. Lock-Out/Tag-Out protection is in place and the equipment or circuit has been tested to verify "no voltage" present, by a trained and qualified electrical worker, or
2. The equipment or circuit has been physically isolated from every power source, tested, and clearly labeled.

For those BC employees involved with energized electrical work (i.e. design verification, equipment check-out, or start-up adjustments), the following ordered approach must be used:

1. BC employees will seek to have a trained and qualified electrical worker perform all energized electrical hands-on work (i.e. switching, metering, testing, etc.) while BC employees remain outside the flash protection boundary, with the exception of those BC employees who have completed NFPA 70 E and have appropriately planned, including appropriate PPE, for the task.
2. BC employees that closely supervise work within the flash protection boundary should document the possible electrical hazards, appropriate PPE, and mitigation techniques to be implemented during the project with a detailed project work plan attached to this plan's appendicies. The Electrical Safety Officer (ESO) or similarly qualified person must approve all project work plans with identified shock or arc flash hazards.
3. Prior to performing this work, the Project Manager (PM) will verify that the above-mentioned project work plan is prepared and approved and reviewed by the PM, the project field team, the SSO, and cognizant Health and Safety Manager.
4. Only BC employees with NFPA 70E Qualified Person training shall enter the flash protection boundary wearing the proper Personal Protective Equipment (PPE) and only for Hazard/Risk Categories 0-2 – see the 'Warning' section below.

WARNING

Qualified BC personnel are limited to work in Hazard/Risk Categories 0-2, and therefore only require PPE meeting the requirements of Hazard/Risk Categories 0-2.

Only qualified electricians may conduct work categorized as a Hazard/Risk Category of 3 or 4.

Qualified BC personnel are NOT to cross a flash protection boundary which involves a Hazard/Risk Category 3 or 4 situation.

BC employees and management shall review the Arc Flash policy in BC's Health and Safety Manual for detailed requirements.

Questions concerning this policy should be directed to the BC Electrical Safety Officer RSUM.

Definitions

Energized Electrical Work. Work performed on or near energized electrical systems or equipment with exposed components operating at 50 volts or greater. Electrical system testing, thought to be de-energized, but not yet proven to be (for example, a LO/TO effectiveness check).

Flash Protection Boundary. The distance from energized exposed electrical equipment at which an unprotected person will receive a curable burn: 2nd degree burn or blistering. Work performed inside this boundary requires that the person be a "qualified person" and the use of appropriate personal protective equipment (PPE) to protect against arc flash burns.

Newly installed/serviced electrical equipment may contain an Arc Flash Label that will identify the energy, hazard category and PPE requirements associated with the equipment. For all other unlabeled equipment, where the specific flash protection boundary (energy, hazard category, and applicable PPE) is not established or cannot be established first (prior to live electrical exposure), BC personnel must maintain a 4-foot minimum observation distance (10 feet is preferred) from the exposed (i.e. doors open, covers off) live electrical equipment rated 600V and below. In the event that the flash protection boundary must be crossed, qualified BC personnel will don PPE appropriate for Hazard/Risk Category 2. For equipment rated above 600V, BC personnel must maintain a 10-foot minimum observation distance and not enter the flash protection boundary unless qualified and approved to do so.

Qualified BC Employee. A person with the training and experience having knowledge of energized electrical equipment hazards from an operational standpoint and from the safety training standpoint.

Educational credentials alone do not make a person qualified. Determination of qualification must be established by the employee's supervisor or other designated knowledgeable management representative.

3.4.22 Boating Safety

Boating or similar activities on aerated water treatment ponds and/or tanks by BC personnel is not permitted. The aeration process affects the buoyancy of the liquid and therefore boats can not consistently stay afloat.

Performing work activities from a boat can present unique hazards to employees. The following guidelines can help mitigate the risk. The boat can become unstable if the weight in it is excessive or loaded improperly. Too much weight will reduce maneuverability and freeboard (the height of the boat sides above the water) and can increase the risk of sinking.

When boarding the boat, the operator must be sure that the boat is secure. With one hand on the boat, each employee should quickly lower themselves straight down into the center of the boat. A United States Coast Guard (USCG) certified personal floatation device will be worn by each BC employee in the boat. In addition, other USCG-required items (i.e., throwable cushion, retrieval line, etc.) will be present on the boat. To move around in a boat, one should step along the fore-and-aft centerline of the boat while the boat is held in place along the pier.

Do not board the boat while carrying equipment, rather first board the craft and then have someone hand in the equipment or place the equipment in the boat prior to launch The amount and location of weight is critical and can reduce the risk of capsizing. Weight should be kept towards the middle or centerline of the boat, both fore and aft and side to side, also the weight should be kept low to the bottom of the boat to reduce the center of gravity.

It is not anticipated that waves of substantial size will be encountered, however, if a wave approaches the boat, steer the bow towards the oncoming wave. Overloading the boat increases draw and the potential for swamping. Watercraft must be operated within the boat manufacturers weight limits.

Should the boat capsize, Brown and Caldwell personnel shall abandon the boat and return to shore as quickly as possible. It is important that the employees attempt to remove themselves from the water as soon as possible, and get inside and call for help. Hypothermia (cold stress) is a significant risk for anyone involved in a boating mishap due to the rapid conduction of body heat by cold water. Wet or dry suits are recommended for cold weather/cold water (less than 45° F) operations.

3.4.23 Water Hazards (non-boating activities)

Wading in streams poses a few natural hazards such as uneven terrain, and potentially dangerous water levels. Field work should be halted when there has been significant rainfall within the past 24 hours or during the course of a work day. The potential for rapidly rising water levels is present in many of these streams/rivers within the project area. SSO shall evaluate field conditions after a rainfall and halt field work if there is the possibility of the development of a hazardous condition.

Open Water

Streams or stormwater ditches may be located near freeways and highways. High stream flows commonly associated with storm events present a threat to workers. Slippery conditions, streamside vegetation, and unstable stream banks could cause a worker to fall into a stream. The risks of a fall include bodily injury, hypothermia and drowning. Work in and around streams will require the use of the buddy system for safety purposes. During storm events that cause streams and rivers to rise to dangerously high conditions, employees should discontinue their work until safe working conditions resume. Prior to entering water, employees must evaluate the need to wear PFDs, rubber boots, or

waders and use them as is deemed necessary based on conditions present. Some factors to consider when evaluating the need to wear a PFD are stream current speed, stream bed material (e.g. slippery stones vs. small gravel/sand), water depth, and how far out from the bank the employee will be required to go into the stream.

A TYPE III personal flotation device (PFD), or flotation aid is similar to a jacket in style and is designed so that wearers can put themselves in a face-up position in the water. The wearer may have to tilt their head back to avoid turning face down. Float coats, fishing vests, and vests designed for various water sports are examples of a TYPE III PFD. TYPE II PFD, a near-shore buoyant vest, is shaped like an upside down "U" with an open back. This type will turn some unconscious wearers to a face-up position.

A TYPE IV PFD, or throwable device, is intended for use in areas where help is always present. It is designed to be thrown to a person in the water and grasped and held by the user until rescued. It is not designed to be worn. Type IV devices include buoyant cushions, ring buoys, and horseshoe buoys. Ring buoys will be available in the truck and accessible by support personnel to address the hazard of slips, trips and/or falls that may occur.

Changing Water Levels

When precipitation falls in the area, water levels within the stream may change quickly. Rising water levels may be dangerous. All personnel should exit the stream once wet weather has occurred in the area. If the forecast calls for rain, the group should meet and discuss alternative activities that may be planned for the day. After a rain, the SSO must evaluate field conditions and halt field work if there is the possibility of the development of a hazardous condition. When walking in the stream, efforts will be made to walk in the shallow and/or slower moving parts of the stream whenever possible.

3.4.24 Building Collapse

Buildings collapse for a variety of reasons. Natural phenomena such as earthquakes, hurricanes, floods, mudslides, avalanches, and storms are the usual cause for building collapses. Vacant buildings may be at risk for collapse since maintenance-related activities have been often neglected thus resulting in structural damage.

Project personnel should attempt to answer the following questions whenever working near suspect building structures:

- Are there any vacant buildings present on site?
- Will it be necessary to enter or work next to the vacant building(s)?
- Are there any apparent hazards including external damage, falling objects, sticky doors, structural instability, or possible asbestos and/or lead paint?
    - External damage may include, but not necessarily be limited to, foundation cracks, damaged or missing porch roofs and overhangs, supports, gaps between steps and the structure, missing supports or portions of walls, and "washed away" ground.
    - Falling objects may include, but not necessarily be limited to, building cornices, gutters, bricks, and roofs/roofing materials.
- Be aware that when entering a building, if the door sticks at the top it could mean the ceiling is ready to fall. If you force the door open, stand outside the doorway clear of falling debris.
- Has the building(s) been inspected by a qualified professional and deemed safe for entry?
- Are there any viable alternatives for conducting work that preclude the need to enter or work next to the suspect building(s)?

If you have any concerns about entering the building after answering the above questions, speak with the PM immediately. The client will need to be informed that a proper building inspection or engineering controls may be needed before work can be performed.

If you don't feel safe entering a building, notify the PM and RSUM and stay outside the building at an appropriate distance to avoid falling debris.

3.4.25 Removing/Replacing Manhole Covers

Manhole structures are the principal means of access into wastewater collection systems and into other underground utilities and facilities. In general, manhole entries are conducted to determine the physical conditions of manholes and pipelines, collect data, and for maintenance activities.

Removing and replacing manhole covers can present potential hazards (overexertion, struck by, caught between, contaminated air, traffic, etc.) to personnel. Therefore, personnel should always first seek to have client or contractor personnel remove and install the manhole cover whenever possible. If this is not possible, then BC personnel need to plan and carefully consider all the potential hazards and controls associated with the removal and installation. Hard hat, safety glasses, safety boots, and leather/cut-resistant gloves must be used when attempting to remove manhole covers.

When working in the vicinity of an open sewer manhole, air monitoring must be performed to verify that the atmosphere is safe for work activities. At no time are personnel to break the plane of the manhole with any part of their body. Where entry must be made, the requirements of the Confined Spaces section of this HASP must be complied with at all times (i.e. training, air monitoring, ventilation, permitting, rescue, etc.).

General Procedures for Removing/Replacing Manhole Covers

The following are general guidelines for the removal and replacement of manhole covers. Use procedures as they apply to the specific covers to be removed. Additional tools or different procedures may be necessary for a particular location.

Freeing the Manhole Cover

When the cover is stuck in its frame, remove any encrustation with a cold chisel. Next, place a block of wood on the cover near the rim and hit the block of wood with a heavy hammer. Do this at different points around the rim until the cover has loosened.

Unseating the Manhole Cover

Lift the cover with the Hook and Lifter tool. Next, attach the hook and lifter tool to the outer edge/rib before trying to move the cover. Unseat the cover, about four inches, by pulling and lifting with a fluid motion.

Removing the Manhole Cover

Evaluate the area surrounding the manhole cover to be removed and verify conditions that could present a hazard during removal have been properly mitigated. Use proper body mechanics – using the leg and arm muscles to lift and pull the cover – don't use your back.

With your feet properly positioned evenly apart and footing secure, pull the cover clear of the frame. Once clear of the frame keep pulling the cover with a steady motion and remove it from the work area. Potential pinch points exist to the hands, fingers, and feet. Never place your hands, fingers, or feet under the manhole cover. Whenever possible, have someone assist with the removal and replacement of the manhole cover.

Replacing the Manhole Cover

Stand parallel to the desired direction of travel for moving the manhole and check the cover frame of the manhole to make sure it is free of any obstructions or debris.

Place the point of the Hook and Lifter tool under the edge of the cover, lift slightly, and drag the cover toward its frame.

Move to the opposite side of the cover and repeat the lifting and dragging motion.

Continue alternating the lifting and dragging until the cover is partially over the manhole frame.

With the hook, lift the edge that is farthest from the opening until the cover slides into the frame of the manhole.

Check the cover for proper seating in the manhole cover frame.

3.4.26 Personal Safety - Urban Setting

Working in a distressed neighborhood may present hazards associated with street violence or other crime. In these situations, mental preparation before going to the Site and awareness while on Site are of key importance. If in doubt, always ask Site or client personnel about the safety of a neighborhood. Forethought should be given to arranging to work during daylight hours if possible. Take advantage of any Site security measures (monitoring cameras, security guards) and investigate such measures prior to the field work. Once in the field, work in parties of two or more and stay within view of the general public. Keep a charged cell phone nearby or on your person at all times. Become familiar with your location so you can effectively communicate it over the phone.

In addition to these basic principals, the following is a list of common personal safety rules that apply not only to work at the Site, but to general safety practices while in the field and also between work shifts:

- If at all possible, work/travel in groups. Do not venture out alone.
- Be alert. Notice who passes you and who's behind you. Maintain distance between yourself and strangers. Know where you are, and note potential exit paths.
- If work has paused, do not appear slack or distracted. Do not sit in a vehicle with the doors unlocked.
- Walk in well-lighted areas. Don't walk close to bushes, alleys, and so on. In dark or deserted neighborhoods, walk down the middle of the street (be alert to vehicle traffic).
- If a car pulls up slowly, or the occupants of the vehicle bother you, cross the street and walk or run in the other direction. If you are pursued, dial 911.
- If you feel someone is following you, turn around and check. Proceed to the nearest lighted house or place of business.
- Don't overburden yourself with bags or packages, which might impede running or taking care of yourself.
- Be aware of loose clothing, packs/purses and hair. These give an assailant an easier method of grabbing and controlling you. Wear unrestrictive clothing for ease of movement (but not overly loose).
- Carry a non-weapon personal safety device (such as a whistle, panic button, or key light) - anything that could visually or audibly draw attention to your location.
- What you carry in your hand(s) is important. Valuables make you a potential target. Items such as a hand auger or tool may help you be perceived as a less-than-inviting victim.
- Carry as little cash as possible.

- Hold your purse tightly, close to your body. Keep your wallet in a front or in a buttoned, hip pocket. When at a fixed location, lock your valuable items away and out of site (i.e., in a trunk).
- Be careful when people stop you for directions or information. Always reply from a distance; never get too close to a stranger's car.
- If you feel that you are in danger, don't be afraid to scream and run.
- Toss wallet/keys away from direction of escape.
- Don't attach car keys to house keys.
- Leave large valuables (purse, laptop) locked and hidden in the vehicle.

3.5 Natural Phenomena

Natural phenomena such as weather-related emergencies and acts of nature can affect employees' safety. Natural phenomena can occur with little or no warning. If an emergency situation arises as a result of natural phenomena, adhere to the contingency procedures outlined in Section 10. The following natural phenomena have been identified and may be encountered during scheduled field activities.

- ☒ Sunburn
- ☒ Cold Stress
- ☒ Hurricanes/Nor' Easters
- ☐ Earthquakes
- ☒ Heat Stress
- ☒ Lightning/Electrical Storms
- ☐ Tornados and Strong/Straight Line Winds
- ☒ Flooding

3.5.1 Sunburn

Working outdoors with the skin unprotected for extended periods of time can cause sunburn to the skin. Excessive exposure to sunlight is associated with the development of skin cancer. Field staff should take precautions to prevent sunburn by using sunscreen lotion and/or wearing hats and long-sleeved garments.

3.5.2 Heat Stress

Climate conditions, particularly heat, are important considerations in planning and conducting site operations. Heat-related illnesses range from heat fatigue to heat stroke, with heat stroke being the most serious condition. Workers should be trained and aware of signs and symptoms of heat-related illnesses, as well as first aid for these conditions. These are summarized in the table below. The SSO and site workers will monitor each other for signs of heat stress. If an employee exhibits signs or symptoms of heat-related illness, the SSO, or designee, must be notified and the appropriate response procedures initiated.

Heat Related Illness			
Condition	**Signs**	**Symptoms**	**Response**
Heat Rash or Prickly Heat	Red rash on skin.	Intense itching and inflammation.	Increase fluid intake and observe affected worker.
Heat Cramps	Heavy sweating, lack of muscle coordination.	Muscle spasms, and pain in hands, feet, or abdomen.	Increase fluid uptake and rest periods. Closely observe affected worker for more serious symptoms.

Heat Related Illness			
Condition	**Signs**	**Symptoms**	**Response**
Heat Exhaustion	Heavy sweating; pale, cool, moist skin; lack of coordination; fainting.	Weakness, headache, dizziness, nausea.	Remove worker to a cool, shady area. Administer fluids and allow worker to rest until fully recovered. Increase rest periods and closely observe worker for additional signs of heat exhaustion. If symptoms of heat exhaustion recur, treat as above and release worker from the day's activities after he/she has fully recovered.
Heat Stroke	Red, hot, dry skin; disorientation; unconsciousness	Lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse.	Immediately contact emergency medical services by dialing emergency medical services. Remove the victim to a cool, shady location and observe for signs of shock. Attempt to comfort and cool the victim by administering small amounts of cool water (if conscious), loosening clothing, and placing cool compresses at locations where major arteries occur close to the body's surface (neck, underarms, and groin areas). Carefully follow instructions given by emergency medical services until help arrives.

The effects of ambient temperature can cause physical discomfort, loss of efficiency, and personal injury, and can increase the probability of mishaps. In particular, protective clothing that decreases the body's ventilation can be an important factor leading to heat-related illnesses.

To reduce the potential for heat-related illness, workers are encouraged to drink plenty of water/fluids to stay properly hydrated. in addition, a work schedule will be established that will provide sufficient rest periods for cooling down (at least five minutes when workers feel the need to do so) and have access to shade from the sun (which, in addition to natural shade or canopies, includes resting inside a vehicle with the air conditioner running). Personnel must maintain an adequate supply of non-caffeinated drinking fluids on site for personal hydration – a minimum of one quart of water per employee per hour.

3.5.3 Cold Stress

Workers performing activities during winter and spring months may encounter extremely cold temperatures, as well as conditions of snow and ice, making activities in the field difficult. Adequate cold weather gear, especially head and foot wear, is required under these conditions. Workers should be aware of signs and symptoms of hypothermia and frostbite, as well as first aid for these conditions. These are summarized in the table below.

Cold Stress Symptoms and Response			
Condition	**Signs**	**Symptoms**	**Response**
Hypothermia	Confusion, slurred speech, slow movement.	Sleepiness, confusion, warm feeling.	Remove subject to a non-exposed, warm area, such as truck cab; give warm fluids; warm body core; remove outer and wet clothing and wrap torso in blankets with hot water bottle or other heat source. Get medical attention immediately.
Frostbite	Reddish area on skin, frozen skin.	Numbness or lack of feeling on exposed skin.	Place affected extremity in warm, not hot, water, or wrap in warm towels. Get medical attention.
Trench Foot	Swelling and/or blisters of the feet	Tingling/itching sensation; burning; pain in the feet	Remove wet/constrictive clothing and shoes. Gently dry and warm feet with slight elevation. Seek medical attention.

3.5.4 Lightning/Electrical Storms

Lightning can be unpredictable and may strike many miles in front of, or behind, a thunderstorm. Workers will therefore cease field operations at the first sign of a thunderstorm and suspend activities until at least 30 minutes after the last observed occurrence of lightning or thunder. For purposes of this HASP, signs of a thunderstorm will include any visible lightning or audible thunder.

In the event of a thunderstorm, field personnel will take the following actions:

- Get inside a permanent building structure (not a shed or canopy) or fully enclosed metal vehicle (not a convertible or camper shell) with the windows fully up.
- If in a house or building, do not use the telephone or any electrical appliance that's connected to the building's electrical wiring.
- Stay away from tall isolated objects, such as trees, drill rigs, telephone poles, or flag poles.
- Avoid large open areas, such as fields or parking lots, where a person is the relatively highest object.
- Stay away from lakes, ponds, railroad tracks, fences, and other objects that could transmit current from a distant lightning strike.
- If caught out in the open without time to escape or find shelter, seek a low area (if time permits), crouch down, and bend forward holding the ankles. Tuck the head so that it's not the highest part of the body, without letting it touch the ground. Under no circumstances lay down.

If a person is struck by lightning contact emergency medical services, even if he/she appears only stunned or otherwise unhurt as medical attention may still be needed. Check for burns, especially at fingers and toes, and areas next to buckles and jewelry.

3.5.5 Hurricanes/Nor' Easters

The key to responding to hurricane conditions is being informed. Before taking to the roads to leave for or from a jobsite during suspect hurricane conditions, listen to the radio for current and forecast conditions. Know what the weather reports mean by "watch" and "warning." A hurricane watch means hurricane conditions are possible in the specified area of the watch, usually within 36 hours. A hurricane warning indicates hurricane conditions are expected in the specified area of the warning, usually within 24 hours.

If watch or warning conditions exist, employees will communicate with the project manager to determine the appropriate course of action. Travel to or from work is not recommended if the employee will travel in the vicinity of a hurricane warning area. Restrictions on travel during hurricane watches are largely dependent on the actual weather conditions at the time. Employees are discouraged from driving during weather conditions where visibility and vehicle control are severely limited.

Nor'easters have the potential to cause as much damage as hurricanes, with powerful winds, rain or snow and large waves. They can pound and erode beaches with heavy surf, affect inland areas with flooding, or coat the land with thick layers of ice and snow.

Nor'easters result from the counterclockwise rotation of a low pressure system and the clockwise rotation of a high pressure system, combining to bring wind and moisture to the northeast. The nor'easter's ferocity will depend on the strength of the two systems.

One reason nor'easters are so dangerous is that they tend to move much more slowly than hurricanes. That slow movement allows the storm's effects to accumulate in a given area.

A nor'easter's wind circulation can cause tidal waters in back bays to be held in place, and not allow the water to drain through inlets and into the ocean. The accumulation of more and more water in tidal areas can cause widespread flooding.

Nor'easters can occur all year long, but are primarily a risk between September and April.

In the event of a hurricane or nor' easter, be prepared by:

- Checking NOAA Weather Radio All Hazards, your local radio and TV stations (i.e, The Weather Channel) for updates, watches, warnings or emergency instructions.
- Know the Coastal Evacuation Route for coastal areas or an inland area with chronic flooding.

For long term projects with temporary or permanent office area, keep an emergency preparedness kit consisting of, but not limited to:

- Current project/office contacts list – (how to reach folks in an emergency),
- Blankets,
- Flashlights,
- Radio (operated by batteries),
- Batteries for flashlight and radio (note: batteries should be replaced annually to assure freshness) ,
- Water (unless there is a water bubbler that can be used with no electricity), and
- Snack crackers, dried fruit, etc. - a source of food that won't go bad.

3.5.6 Tornados and Strong/Straight Line Winds

Tornados and strong or straight line winds are potentially dangerous weather conditions because both have the ability to generate on very short notice (in some cases under one hour from clear weather conditions). Tornados and strong or straight line winds both have the same warning properties and recommendations. If a tornado "watch" is issued for your area, it means that a tornado is "possible". If a tornado "warning" is issued, it means that a tornado has actually been spotted, or is strongly indicated on radar, and it is time to go to a safe shelter immediately.

Be alert to what is happening outside, but do not place yourself in jeopardy by standing next to windows. Some common observations during a tornado include: a sickly greenish or greenish-black color to the sky; if there is a watch or warning announced or posted; an abrupt fall of hail (however, hail can occur in the absence of a tornado); a strange quiet that occurs within or shortly after a thunderstorm; clouds moving by very fast, especially in a rotating pattern or converging toward one area of the sky; a sound like a waterfall or rushing air at first, but turning into a roar as it comes closer (the sound of a tornado has been likened to that of both railroad trains and jets); debris dropping from the sky; an obvious "funnel-shaped" cloud that is rotating; or debris such as branches or leaves being pulled upwards, even if no funnel cloud is visible.

During a tornado warning or tornado occurrence, each employee is instructed to do the following:

- Proceed to interior rooms and halls on the lowest floor (do not use an elevator to exit an upper floor). Avoid halls that open to the outside in any direction. If there are no interior hallways, avoid those that open to the southwest, south, or west, since that is usually the direction from which the tornado will come.
- Stay away from glass, both windows and doors. Crouch down, and make as small a "target" as possible. If you have something with which to cover your head, do so, otherwise, use your hands.
- Exercise extreme caution when leaving your area of shelter. Be aware of potential hazards (i.e., natural gas smell, smoke, fire). In the event these hazards are encountered in your area of shelter, immediately evacuate the shelter. If the building/shelter has been damaged by a tornado, do not flush the toilets, as the sewer lines may have been damaged.

- If you are traveling in an automobile and can see a tornado, do not stay in your car and try to outrun a tornado. If possible, stop the car and enter the nearest business and seek shelter.
- If you are outside and it is not possible to get inside, seek a low lying ditch, culvert, etc. and keep your body as low to the ground and as braced as possible.

3.5.7 Earthquakes

Earthquakes strike suddenly, violently, and without warning. If your project is located near a fault line, earthquakes are an unpredictable possibility. For long term projects with temporary or permanent office area, keep an emergency preparedness kit consisting of, but not limited to:

- Current project/office contacts list - how to reach folks in an emergency,
- Blankets,
- Flashlights,
- Radio (operated by batteries),
- Batteries for flashlight and radio (note: batteries should be replaced as needed to assure freshness),
- Water (unless there is a water bubbler that can be used with no electricity), and
- Snack crackers, dried fruit, etc. - a source of food that won't go bad.

This kit is meant to serve as overnight survival in the event that it becomes unsafe to leave the project site. The kit's contents should be suited to meet the size and needs of your project. If you feel the earth shaking, consider the following tips:

- Drop down; take cover under a desk or table and hold on.
- Stay indoors until the shaking stops and you are sure it is safe to exit.
- Stay away from bookcases, shelves, or anything that could fall on you.
- Stay away from windows.
- If inside a building, expect fire alarms and sprinklers to go off during the quake.
- If you are outdoors, find a clear spot away from buildings, trees, and power lines. Drop to the ground and cover your head.
- If you are in a car, slow down and drive to a clear place, preferably away from power lines. Stay in the car until the shaking stops.

3.5.8 Flooding

Flooding may occur at or en-route to and from the Site and may be the result of weather conditions or due to thawing of ice and snow (especially in the Spring).

In the event flooding starts to occur:

- Stay tuned to NOAA Weather Radio All Hazards, your local radio and TV stations (i.e., The Weather Channel) for updates, watches, warnings or emergency instructions.
- Know the Coastal Evacuation Route for coastal area or an inland area with chronic flooding
- If the waters start to rise inside before you have evacuated, retreat to higher ground, including the roof. Use cell phone or land line to call for help. Take a flashlight and a portable radio. Then, wait for help. Don't try to swim to safety; wait for rescuers to come to you.
- Avoid flooded areas. Do not attempt to cross any flooded areas in a vehicle or on foot. Flood waters may be deeper than they look.
- Avoid low-lying areas like ditches, creeks, and rivers.

- Before entering or re-entering a building, check for any signs of structural damage.
- When entering a building, do not use matches, lighters, or open flame. Use a flashlight only.
- After a flood, steps and floors are often slippery with mud and covered with debris, including nails and broken glass. Be careful walking around.

3.6 Biological Hazards

The following biological hazards have been identified and may be encountered during scheduled field activities.

- ☐ Bloodborne Pathogens/Sanitary Waste
- ☒ Rodents and Mammals
- ☒ Reptiles/Snakes
- ☒ Venomous Insects
- ☒ Mosquitoes
- ☐ Fire Ants
- ☒ Spiders/Scorpions
- ☒ Ticks
- ☒ Poisonous Plants

If any biological hazards are identified at the Site, workers in the area will immediately notify the SSO and nearby personnel.

3.6.1 Bloodborne Pathogens/Sanitary Waste

Potential exposure to bloodborne pathogens may occur during some work activities (e.g., sewer video surveys or source sampling), rendering first aid or CPR. Direct contact is an important route of exposure for bloodborne pathogens due to puncture injuries, contact with abraded skin, or contact with areas such as the eyes, without appropriate protection. While very few organisms can enter the body through normal intact skin, direct contact with sewage, blood and body fluids is to be avoided. Site personnel should thoroughly wash their hands and face before eating, drinking or smoking and before leaving the work site.

Exposure controls and Universal Precautions are required at suspect locations, in order to prevent contact with blood or other potentially infectious materials as specified in Brown and Caldwell's Bloodborne Pathogens Program. All blood or other potentially infectious material will be considered infectious regardless of the perceived status of the source individual. A Hepatitis B vaccination will be offered to BC personnel before the person participates in a task where direct exposure to potentially infectious materials is a possibility (i.e., first aid or CPR). For personnel who have potential exposure to sanitary wastes, a current tetanus/diphtheria inoculation or booster is recommended.

3.6.2 Rodents/Mammals

Animals may potentially carry the rabies virus or disease causing agents. Do not attempt to feed or touch animals. Feces from some small mammals may contain diseases such as Hanta Virus. Avoid generating dust in the vicinity of rodent feces. In addition, animals such as dogs or wild predators (i.e., cougars or coyotes) may pose an attack hazard. Persons should slowly back away in a non-threatening manner if an encounter with a threatening animal occurs. In order to avoid such encounters, use the buddy system and make noise when working in areas where such animals may be present.

3.6.3 Reptiles/Snakes

The primary reptiles of concern are venomous snakes (rattlesnake, water moccasin, and copperhead). Avoid contact and areas that may harbor snake populations including high grass, shrubs, and crevices.

In the event of a bite, immobilize the affected area and contact emergency medical services. If more than 30 minutes from emergency care, apply bandage wrap two to four inches above the bite (note: bandage should be loose enough to slip your finger underneath).

Wear shoes and heavy pants when walking and hiking in areas where snakes are likely found. Do not reach into rocky cracks, under logs, or large rocks. Even if a snake looks dead, do not touch it. A snake can still bite up to one hour after its death. Do not get near or tease a snake. Snakes are shy creatures and generally will not attack unless bothered.

Diamond Back Rattle Snake

Diamond backs are large snakes. They have a row of dark diamonds down the back and a rattle on their tail. These snakes have cat-like eyes and a pit between their nostril and eye. Eastern diamond backs like pine flat woods and scrub areas where palmetto thickets and gopher tortoise burrows are found. These snakes travel during the day and hide at night.

Timber Rattle Snake

Timber rattle snakes have a reddish-brown stripe running down the center of their back and black cross bands. Their tails are solid black with a rattle. These snakes have cat-like eyes and a pit between their nostril and eye. Timber rattlers live in damp river beds, pine flat woods, swamps, and cane thickets.

Pygmy Rattle Snake

These small snakes are light to dark grey in color. They have a tiny rattle. Pygmy rattle snakes have cat-like eyes and a pit between their nostril and eye. These snakes are found in lowland pine flat woods, prairies, around lakes, ponds, and swamps. Pygmy rattlers are aggressive and will strike anything within striking range.

Cottonmouth (Water Moccasin)

Young cottonmouths are often mistaken for copperheads because of their reddish-brown cross bands. As these snakes age, their cross bands darken until they become almost solid black. Cottonmouths live near water sources like lakes, streams, rivers, ponds, and swamps. When threatened, cottonmouths may coil and open their mouths as though ready to bite. The white inside of the mouth is what gives this snake its name, "cottonmouth".

Copperhead

Copperheads have dark coppery red-brown hourglass cross bands on a lighter brown color. The top of the head is covered with large plate-like scales. Copperheads have cat-like eyes and a pit between their nostril and eye. These snakes live in rocky, wooded areas and low, wet swampy areas. Copperheads are sluggish and rarely bite, unless stepped on or touched.

Coral Snake

The body of this snake is ringed with black, yellow and red bands. (Remember: Red on yellow can kill a fellow. Red on black, venom lack.) The head of a coral snake is black, while the tail is black and yellow.

3.6.4 Venomous Insects

Common examples include bees, fire ants and wasps. Avoid contact with insects and their hives. If stung, remove the stinger by gently scraping it out of the skin (do not use tweezers). If the worker is stung by an insect, immediately apply an ice pack to the affected area and wash area with soap and water and apply antiseptic. If an allergic reaction occurs, contact emergency medical services for appropriate treatment. Seek medical attention immediately if you are allergic to venomous stings such as bees or if anaphylaxis symptoms are present.

3.6.5 Mosquitoes

Mosquitoes may transmit diseases such as West Nile Virus. Symptoms of West Nile Virus include: fever, headache, tiredness, body aches, and occasional rash. Avoid mosquito bites by wearing long sleeved shirt and long pants. Apply insect repellent to clothes and/or skin (if FDA approved for topical use). Report any dead birds in the area to local health officials. Mosquitoes are most active from dusk to dawn.

3.6.6 Fire Ants

Red and Black Fire Ants are capable of inflicting numerous stings (7 to 9) per ant in a matter of seconds, and large numbers of fire ants will typically attack at the same time. Fire ants are very aggressive and will sting simply upon coming in contact with skin. Individuals who are allergic to bees should carry bee sting kits when there is the potential to come in contact with fire ants. Fire ants are predominantly located in the southern United States.

The best way to avoid fire ants is to avoid disturbing their mounds. Fire ant mounds are typically constructed in disturbed habitats such as open fields, along roadsides, lawns, and many other open sunny areas. The mounds are constructed of dirt and/or other organic materials. Mounds are typically 10" to 24" in diameter and approximately 18" in height. If you disturb a mound, get away from the mound immediately.

Fire ant stings typically leave tiny red blisters and sometimes white pustules. Symptoms of stings include blistering, burning, swelling, pain, and irritation of the affected area. Recommended treatment consists of antihistamines along with topical antibiotic cream. Anaphylaxis symptoms such as shortness of breath, discomfort, lowered heart rate, etc. may also accompany fire ant stings. Seek medical attention immediately if you are allergic to venomous stings such as bees or if anaphylaxis symptoms are present.

3.6.7 Spiders/Scorpions

The black widow and brown recluse spiders are the most venomous. Avoid contact with spiders and scorpions and areas where they may hide. They favor dark hiding places. Inspect clothing and shoes before getting dressed. Wear gloves and safety shoes when working with lumber, rocks, inspecting buildings, etc. Signs and symptoms of bites include: headache, cramping pain/muscle rigidity, rash and/or itching, nausea, dizziness, vomiting, weakness or paralysis, and convulsions or shock. Wash bite area with soap and water and apply antibiotic cream. Contact emergency medical services if allergic reaction or severe symptoms occur.

3.6.8 Ticks

Deer ticks may carry and transmit Lyme disease to humans. Signs of Lyme disease include a reddish "bulls-eye" around the affected area approximately a week after the bite. Symptoms include headache, fever, and muscle/joint pain. Persons suspecting infection should contact a health professional. Whenever possible, avoid areas likely to be infested with ticks during the spring and summer months.

Wear light-colored clothing so ticks can be easily spotted and removed. Wear long sleeves and pants and tuck pant legs into boots or socks. Apply insect repellents to clothing and skin (if FDA approved for topical application). Persons with long hair should tie their hair back to minimize the potential for ticks to nestle in the scalp.

Personnel should self perform tick checks once daily field work is completed. If a tick is embedded in the skin, use tweezers to grasp the tick's head (near the skin) and pull straight out. Consider saving the removed tick for laboratory analysis.

3.6.9 Poisonous Plants



Common examples include poison ivy, poison oak and poison sumac. Avoid contact. Long-sleeved shirts and pants will allow some protection against inadvertent contact. If contact occurs, immediately wash the affected area thoroughly with soap and water. If an allergic reaction occurs, seek the care of a medical professional.

Poison Ivy is a trailing or climbing woody vine or a shrub-like plant with leaves that are each divided into three broad, pointed leaflets. The leaflets are commonly dark glossy green on top and slightly hairy underneath. They produce small yellowish or greenish flowers followed by berry-like drupes.

Poison Oak is a member of the same family as poison ivy and has a very similar appearance. Poison oak has leaves divided into three leaflets and generally has three to seven distinct lobes. Typically they are a shrubby type plant that can grow to eight feet in height, or sometimes can be a climbing plant.

The best way to prevent exposure is the ability to recognize these plants. Conduct an initial survey of the area to determine if the plants are present in the work area, and avoid contact with them.



If plants are located and work must be conducted in that area, have the plants removed if possible. If this is not possible, wear long sleeved shirts, gloves, and a heavy material type pants. Remember not to touch contaminated clothing. There are products available that can be applied to exposed skin, (similar to sunscreen products) prior to working around the plants. Tyvek suits may be another option used at the wearer's discretion to keep poisonous plant oils from getting on clothing. Please note that using Tyvek suits may increase the risk of heat stress conditions so extra precautions should be taken such as more frequent breaks and drinking plenty of fluids

Section 4

Personal Protective Equipment

The purpose of PPE is to protect employees from hazards and potential hazards they are likely to encounter during site activities. The amount and type of PPE used will be based on the nature of the hazard encountered or anticipated. Respiratory protection will be utilized when an airborne hazard has been identified using real-time air monitoring devices, or as a precautionary measure in areas designated by the RSUM or SSO.

Dermal protection, primarily in the form of chemical-resistant gloves and coveralls, will be worn whenever contact with chemically affected materials (e.g., soil, groundwater, sludge) is anticipated, without regard to the level of respiratory protection required.

On the basis of the hazards identified for this project, the following levels of personal protective equipment (PPE) will be required and used. Changes to the specified levels of PPE will not be made without the approval of the SSO after consultation with the RSUM.

4.1 Conditions Requiring Level D Protection

In general, site activities will commence in Level D PPE unless otherwise specified, or if the SSO determines on site that a higher level of PPE is required. Air monitoring of employee breathing zones will be routinely conducted using real-time air monitoring devices to determine if upgrading to Level C PPE is necessary. Level D PPE will be permitted as long as air monitoring data indicate that airborne concentrations of chemicals of concern are maintained below the site-specific action levels defined in Section 5.2. Level A or B PPE is not anticipated and is therefore not addressed in this plan. If Level A or B PPE is necessary, this HASP will be revised to reflect changes as appropriate.

It is important to note that dermal protection is required whenever contact with chemically-affected materials is anticipated. The following equipment is specified as the minimum PPE required to conduct activities at the Site:

- Work shirt and long pants,
- ANSI- or ASTM-approved steel-toed boots or safety shoes,
- ANSI-approved safety glasses,
- ANSI-approved hard hat (where required on-site or when overhead hazards are present);
- Outer nitrile gloves (11 mil or thicker) and inner nitrile surgical gloves when direct contact with chemically affected soils or groundwater is anticipated (nitrile surgical gloves may be used for collecting or classifying samples as long as they are removed and disposed of immediately after each sampling event).
- Full-body Tyvek suits (non-chemical resistant) to prevent exposure to ticks, chiggers and other insects; and
- High-visibility traffic safety vest.

Other personal protection readily available for use, if necessary, includes the following items.

- Chemical goggles when in contact with chemical liquids can be reasonably expected or when handling corrosive chemicals. In addition, a face shield may be required to protect the face from splash hazards.

- Chemical-resistant clothing (e.g., Tyvek or polycoated Tyvek coveralls) when contact with chemically affected soils or groundwater is anticipated.
- Safety shoes/boots with protective overboots or knee-high PVC polyblend boots when direct contact with chemically affected soils is anticipated.
- Sturdy work gloves (when needed); and
- Hearing protection.

Work will cease and PPE upgraded if action levels specified in Section 5.2 are exceeded. The RSUM will be notified whenever PPE is upgraded or downgraded.

4.2 Conditions Requiring Level C Protection

If air monitoring indicates that the site-specific action levels defined in Section 5.2 are exceeded, workers in the affected area(s) will upgrade PPE to Level C. In addition to the protective equipment specified for Level D, Level C also includes the following items.

- NIOSH-approved half- or full-face air-purifying respirator (APR) equipped with appropriate cartridges (reference Section 5.2). Note: safety glasses are not required when wearing a full-face APR.

Respirators will be stored in clean containers (i.e., self-sealing bag) when not in use. Respirator cartridges will be replaced in accordance with the following change-out schedule.

Respirator Cartridge Replacement	
Type of Cartridge	**Cartridge Change-out Schedule**
Particulate (i.e., HEPA)	At least weekly or sooner the employee detects an increase in breathing resistance. This will occur as the filter becomes loaded with particulate matter.
Sorbent (i.e., organic vapor)	At the end of each day's use or sooner if the employee detects an abnormal odor or other indicator.

Personnel who wear air-purifying respirators must be trained in their use and must have successfully passed either a qualitative or quantitative respirator fit test, and medical evaluation within the last 12 months in accordance with and 29 CFR 1910.134.

4.3 Stop Work Conditions

If air monitoring indicates that the site-specific action levels defined in Section 5.2 are exceeded, activities will cease, and personnel must evacuate the designated Exclusion Zone. The PM and RSUM will be contacted immediately.

Work will also cease if unanticipated conditions or materials are encountered or if an imminent danger is identified. The SSO will immediately contact the RSUM for consultation.

Section 5

Air Monitoring Plan

Real-time air monitoring devices will be used to analyze airborne contaminant concentrations approximately every 15 minutes in the workers' breathing zones while workers are in the designated Exclusion Zone, or when task or exposure conditions change (whichever frequency is less). If elevated concentrations are indicated, the monitoring frequency will be increased, as appropriate.

Background concentrations will be determined at the beginning of each work shift by collecting several instrument readings upwind of the scheduled activities. Alternatively, background levels can be determined by collecting readings from a nearby (upwind) area that can reasonably be considered unaffected by Site activities.

Real-time measurements will be made as near as feasible to the breathing zone of the worker with the greatest exposure potential in each active work area. If authorized by the RSUM, real time measurements may cease being taken when sufficient historical data is generated to warrant its cessation. Air monitoring will be reinstated if potential exposure conditions change.

The equipment will be calibrated daily, and the results will be recorded on BC's Air Monitoring Form. The results of air monitoring will also be recorded on the Air Monitoring Form and will be retained in the project files following completion of field activities. A copy of the Air Monitoring Form is located in Appendix A.

5.1 Monitoring Instruments

On-site worker exposure to airborne contaminants will be monitored during intrusive site activities.

5.1.1 Photoionization Detector and Flame ionization Detector

A calibrated photoionization detector (PID) with a lamp strength of 10.6 eV or flame ionization detector (FID) will be used to monitor changes in personnel exposure to volatile organic compounds (VOCs). The SSO, or designee, will perform routine monitoring during site operations to evaluate concentrations of VOCs in employee breathing zones. If VOCs are detected above predetermined action levels specified in Section 5.2, the procedures found in Section 4 of this HASP will be followed.

5.1.2 Real-Time Aerosol Monitor

A miniature real-time aerosol monitor (mini-RAM or equivalent) will be used to monitor exposure to airborne dusts. The SSO, or designee, will perform routine monitoring during site operations to evaluate concentrations of airborne dusts in employee breathing zones. If airborne dusts are detected above predetermined action levels specified in Section 5.2, the procedures found in Section 4 of this HASP will be followed.

5.1.3 Colorimetric Tubes

A hand-held Draeger pump along with Cyanide 2/a colorimetric Draeger tubes will be used to monitor changes in exposure to cyanide during intrusive site activities if purifier wastes are encountered. Alternatively, a real-time cyanide detector (i.e., Draeger Pac III) may be used. The SSO, or designee, will perform routine monitoring during site operations to evaluate concentrations of cyanide in employee

breathing zones. If cyanide is detected above predetermined action levels specified in Section 5.2, the procedures found in Section 4 of this HASP will be followed.

In addition, Draeger tubes will be used to monitor for the presence of benzene per the action levels specified in the tables below.

5.1.4 Combustible Gas and Hydrogen Sulfide Gas Monitoring

A multi-gas detector will be used to monitor changes in levels/exposure to combustible gases (lower explosive limit; LEL) and hydrogen sulfide gas during intrusive site activities. The SSO, or designee, will perform routine monitoring during site operations to evaluate concentrations of target compound in the vicinity of boreholes, test pits, sewers, or elsewhere, as necessary. If target compounds are detected above predetermined action levels specified below, work will cease and the Regional Safety Unit Manager will be contacted immediately.

5.2 Site Specific Action Levels

The following action levels were developed for exposure monitoring with real-time air monitoring instruments. Air monitoring data will determine the required respiratory protection levels at the Site during scheduled intrusive activities. The action levels are based on sustained readings indicated by the instrument(s). Air monitoring will be performed and recorded at up to 15-minute intervals.

If elevated concentrations are indicated, the monitoring frequency will be increased, as appropriate. If during this time, sustained measurements are observed, the following actions will be instituted, and the PM and RSUM will be notified. For purposes of this HASP, sustained readings are defined as the average airborne concentration maintained for a period of one (1) minute above established background levels.

5.2.1 Action Levels for Volatile Organic Compounds

Draeger tubes will be used to determine the presence or absence of benzene when PID/FID readings exceed 1 ppm.

VOC – Action Levels		
Activity	**Action Level**	**Level of Respiratory Protection**
Soil-intrusive activities, including groundwater monitoring	< 5 ppm above background (**no benzene indicated**)	Level D: No respiratory protection required. **Note**: For PID/FID values above 1 ppm, benzene is to be analyzed for with a colorimetric tube.
	5 to 25 ppm above background (**no benzene indicated**) or **Benzene indicated** < 1.0 ppm (colorimetric tube)	Level C: Half- or full-face air-purifying respirator fitted with organic vapor cartridges: Increase engineering control efforts and re-monitor effectiveness. **Note**: For PID/FID values above 1 ppm, benzene is to be analyzed for with a colorimetric tube. **Contact Director and RSUM prior to respirator upgrade**.

VOC – Action Levels		
Activity	**Action Level**	**Level of Respiratory Protection**
	> 25 ppm above background (**no benzene indicated**) or **Benzene indicated** > 1.0 ppm (colorimetric tube)	Cease operations and evacuate work area. Contact **Director and RSUM and PM** immediately.

5.2.2 Action Levels for Airborne Dust

Dust – Action Levels		
Activity	**Action Level**	**Level of Respiratory Protection**
Soil-intrusive activities	< 0.5 mg/m^3 above background	Level D: No respiratory protection required.
	0.5 to 2.5 mg/m^3	Level C: Half- or full-face air-purifying respirator fitted with HEPA (P-100) cartridges: Increase engineering control efforts and re-monitor effectiveness. **Contact Director and RSUM prior to respirator upgrade**.
	> 2.5 mg/m^3	Cease operations and evacuate work area. Contact **Director and RSUM and PM** immediately.

5.2.3 Action Levels for Cyanide

Cyanide – Action Levels		
Activity	**Action Level**	**Level of Respiratory Protection**
Soil-intrusive activities if purifier wastes are encountered	< 2.5 ppm	Level D: No respiratory protection required.
	≥ 2.5 ppm	Cease operations and evacuate work area. Contact **Director and RSUM and PM** immediately.

5.2.4 Action Levels for Hydrogen Sulfide and LEL

Hydrogen Sulfide and LEL – Action Levels		
Activity	**Action Level**	**Level of Respiratory Protection**
Not Anticipated for this Project	< 5 ppm H_2S < 5% LEL	Level D: No respiratory protection required.

Hydrogen Sulfide and LEL – Action Levels		
Activity	**Action Level**	**Level of Respiratory Protection**
	< 5 ppm H_2S < 5% LEL	Cease operations and evacuate work area. Contact **Director and RSUM and PM** immediately.

5.3 Community Air Monitoring Plan

Community air monitoring will be performed in accordance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan, included in Appendix F. Air monitoring readings will be recorded in a logbook and will be available for review by the NYSDEC and NYSDOH. Real-time air monitoring will be conducted during work activities for VOCs and particulates (i.e., dust). Air monitoring will be performed continuously for all ground intrusive activities.

The Community Air Monitoring Plan (CAMP) is not intended for use in establishing action levels for worker respiratory protection.

5.3.1 CAMP VOC Action Levels

Based on monitoring at the downwind perimeter of the Exclusion Zone, the following action levels for VOCs are in accordance with the NYSDOH Generic Community Air Monitoring Plan:

CAMP VOC – Action Levels	
Action Level at Downwind Perimeter of Exclusion Zone	**Response**
Below 5 ppm above background for the 15-minute average	Continue and/or resume work activities
> 5 ppm above background for the 15-minute average	Temporarily halt work and continue monitoring
5 to < 25 ppm	Work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions and continue monitoring
> 25 ppm	Cease operations. Contact PM and BC Director of Health and Safety or designee immediately.

Upwind concentrations will be measured periodically to establish background concentrations.

The NYSDOH CAMP is provided in Appendix F for additional details associated with work stoppage and restart.

5.3.2 CAMP Particulate Action Levels

Based on monitoring at the downwind perimeter of the Exclusion Zone, the following action levels for particulates are in accordance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan:

CAMP Dust – Action Levels	
Action Level at Downwind Perimeter of Exclusion Zone	**Response**
> 0.1 mg/m^3 above background for the 15-minute average or if airborne dust is observed leaving the work area	Employ dust suppression techniques

CAMP Dust – Action Levels	
Action Level at Downwind Perimeter of Exclusion Zone	**Response**
0.1 to 0.15 mg/m^3	Work may continue with dust suppression techniques provided downwind PM-10 particulate levels do not exceed 0.15 mg/m^3 above background for the 15-minute average and airborne dust is not observed leaving the work area
> 0.15 mg/m^3 with dust suppression techniques implemented	Cease operations. Contact PM and BC Director of Health and Safety or designee immediately.

Upwind concentrations will be measured periodically to establish background concentrations.

The NYSDOH CAMP is provided in Appendix F for additional details associated with work stoppage and restart.

Section 6

Site Control Measures

The SSO will conduct a safety inspection of the work site before each day's activities begin to verify compliance with the requirements of the HASP. Results of the first day's inspection will be documented on the Site Safety Checklist. A copy of the checklist is included in Appendix B. Thereafter, the SSO should document unsafe conditions or acts, along with corrective action, in the project notes or field log book.

Procedures must be followed to maintain site control so that persons who may be unaware of site conditions are not exposed to hazards. The work area will be barricaded by tape, warning signs, or other appropriate means. Site equipment or machinery will be secured and stored safely.

Access to the specified work area will be limited to authorized personnel. Only BC employees and designated BC subcontracted personnel, as well as designated employees of the client, will be admitted to the work site. Personnel entering the work area are required to sign the signature page of this HASP, indicating they have read and accepted the health and safety practices outlined in this plan.

In some instances it may be necessary to define established work zones: an Exclusion Zone, a Contamination Reduction Zone, and a Support Zone. Work zones may be established based on the extent of anticipated contamination, projected work activities, and the presence or absence of non-project personnel. The physical dimensions and applicability of work zones will be determined for each area based on the nature of job activity and hazards present. Within these zones, prescribed operations will commence using appropriate PPE. Movement between zones will be controlled at checkpoints.

Considerable judgment is needed to maintain a safe working area for each zone, balanced against practical work considerations. Physical and topographical barriers may constrain ideal locations. Field measurements combined with climatic conditions may, in part, determine the control zone distances. Even when work is performed in an area that does not require the use of chemical-resistant clothing, work zone procedures may still be necessary to limit the movement of personnel and retain adequate site control.

Personnel entering the designated Exclusion Zone should exit at the same location. There must be an alternate exit established for emergency situations. In all instances, worker safety will take precedence over decontamination procedures. If decontamination of personnel is necessary, exiting the Site will include the decontamination procedures described in the following section.

Section 7

Decontamination Procedures

Decontamination will take place in the decontamination area identified on-Site. Workers, PPE, sampling equipment, and heavy equipment leaving the exclusion area will be inspected to determine the level of decontamination necessary to prevent the spread of potentially hazardous materials. Unnecessary equipment and support vehicles are to be left outside the designated Exclusion Zone so that decontamination will not be necessary.

Despite protective procedures, personnel may come in contact with potentially hazardous compounds while performing work tasks. If so, decontamination needs to take place using an Alconox or TSP wash, followed by a rinse with clean water. Standard decontamination procedures for levels C and D are as follows.

- equipment drop,
- boot cover and outer glove wash and rinse,
- boot cover and outer glove removal,
- suit removal,
- safety boot wash and rinse,
- inner glove wash and rinse,
- respirator removal,
- inner glove removal, and
- field wash of hands and face.

Site workers should employ only applicable steps in accordance with level of PPE worn and extent of contamination present. The SSO shall maintain adequate quantities of clean water to be used for personal decontamination (i.e., field wash of hands and face) whenever a suitable washing facility is not located in the immediate vicinity of the work area.

Disposable items will be disposed of in an appropriate container. Wash and rinse water generated from decontamination activities will be handled and disposed of properly. Non-disposable items (i.e., respirators) may need to be cleaned or sanitized before reuse. Each site worker is responsible for the maintenance, decontamination, and sanitizing of their own PPE.

Used equipment may be decontaminated as follows.

- Remove adhered materials (i.e., dirt or mud) to increase the effectiveness of the decontamination process.
- An Alconox or TSP and water solution may be used to wash the equipment.
- The equipment will then be rinsed with clean water until it is determined clean.

Each person must follow these procedures to reduce the potential for transferring chemically affected materials off site.

Section 8

Training Requirements

BC Site personnel, including subcontractors and visitors conducting work in controlled areas of the Site, must have completed the appropriate training as required by 29 CFR 1910.120. In addition, the SSO will have completed the 8-hour Site Supervisor course, have current training in first aid and CPR, and any additional training appropriate to the level of site hazards. Further site-specific training will be conducted by the SSO prior to the initiation of project activities. This training will include, but will not necessarily be limited to, emergency procedures, site control, personnel responsibilities, and the provisions of this HASP. Each employee will document that they have been briefed on the hazards identified at the site and that they have read and understand the requirements of this HASP by signing the H&S Plan Acknowledgement Form attached as Appendix C.

A daily morning briefing to cover safety procedures and contingency plans in the event of an emergency is to be included with a discussion of the day's activities. These daily meetings will be recorded on the Daily Tailgate Safety Meeting Form. A copy of the Daily Tailgate Safety Meeting Form is included in Appendix D.

Exception: When there is only one employee performing field activities for the project, a formal and documented daily tailgate safety meeting (or completion of the form) is not required. However, personnel are still expected to plan their work activities and attend any site specific safety meetings or training so that tasks are performed safely.

Section 9

Medical Surveillance Requirements

BC Site personnel, including subcontractors and site visitors, who will or may work in an area designated as an exclusion zone must have fulfilled the appropriate medical monitoring requirements in accordance with 29 CFR 1910.120(f). Each individual entering an exclusion zone must have successfully completed an annual surveillance examination and/or an initial baseline examination within the last 12 months.

Medical surveillance is conducted as a routine program for BC field staff in accordance with the requirements of 29 CFR 1910.120(f). There will not be any special medical tests or examinations required for staff involved in this project.

A Hepatitis B vaccination will be offered to BC personnel before the person participates in a task where direct exposure to potentially infectious materials is a possibility (i.e., first aid or CPR). For personnel who have potential exposure to sanitary wastes, a current tetanus/diphtheria inoculation or booster is recommended.

Section 10

Contingency Procedures

Minimum emergency equipment maintained on site will include a fully charged ABC dry chemical fire extinguisher, an adequately stocked first aid kit, and an emergency eyewash station (when corrosive chemicals are present). In addition, employees will consider maintaining the personal emergency supply items listed in Section 3: Natural Phenomena, as appropriate.

In the event of an emergency, site personnel will signal distress with three blasts of a horn (a vehicle horn will be sufficient), or other predetermined signal. Communication signals, such as hand signals, must be established where communication equipment is not feasible or in areas of loud noise.

It is the SSO's duty to evaluate the seriousness of the situation and to notify appropriate authorities. The first part of this plan contains emergency telephone numbers as well as directions to the hospital. Nearby telephone access must be identified and available to communicate with local authorities. If a nearby telephone is not available, a cellular telephone will be maintained on site during work activities. The operation of the cellular phone will be verified to confirm that a signal can be achieved at the work location.

The SSO, or designee, should contact local emergency services in the event of an emergency. After emergency services are notified, the PM and RSUM will be notified of the situation as soon as possible. If personal injury, property damage or equipment damage occurs, the PM and BC Risk Manager will be contacted as soon as practicable. An Incident Investigation Report will be completed within 24 hours by the SSO, or other designated person. A copy of the Incident Investigation Report is included in Appendix E.

10.1 Injury or Illness

If an exposure or injury occurs, work will be temporarily halted until an assessment can be made to determine it is safe to continue work. The SSO, in consultation with the RSUM, will make the decision regarding the safety of continuing work. The SSO will conduct an investigation to determine the cause of the incident and steps to be taken to prevent recurrence.

In the event of an injury, the extent and nature of the victim's injuries will be assessed and first aid/CPR will be rendered as appropriate. If necessary, emergency services will be contacted or the individual may be transported to the nearby medical center. The mode of transportation and the eventual destination will be based on the nature and extent of the injury. A hospital route map is presented at the front of this HASP.

In the event of a life-threatening emergency, the injured person will be given immediate first aid and emergency medical services will be contacted by dialing the number listed in the Critical Project Information section at the beginning of this plan. The individual rendering first aid will follow directions given by emergency medical personnel via telephone.

10.2 Vehicle Collision or Property Damage

If a vehicle collision or property damage event occurs, the SSO, or designee, will contact the BC Risk Manager for appropriate action.

10.3 Fire

In the event of fire, the alarm will be sounded and Site personnel will evacuate to a safe location (preferably upwind). The SSO, or designee, should contact the local fire department immediately by dialing 911. When the fire department arrives, the SSO, or designated representative, will advise the commanding officer of the location and nature of the fire, and identification of hazardous materials on site. Only trained, experienced fire fighters should attempt to extinguish substantial fires at the Site. Site personnel should not attempt to fight fires, unless properly trained and equipped to do so. Site personnel should not attempt to fight a fire if it poses a risk to their personal safety.

Note that smoking is not permitted in controlled areas (i.e., exclusion or contamination reduction zones), near flammable or combustible materials, or in areas designated by the facility as non-smoking areas.

10.4 Underground Utilities

In the event that an underground conduit is damaged during subsurface work, mechanized equipment will immediately be shut off and personnel will evacuate the area until the nature of the piping can be determined. Depending on the nature of the broken conduit (e.g., natural gas, water, or electricity), the appropriate local utility will be contacted.

10.5 Site Evacuation

The SSO will designate evacuation routes and refuge areas to be used in the event of a Site emergency. Site personnel will stay upwind from vapors or smoke and upgradient from spills. If workers are in an Exclusion or Contamination Reduction Zone at the start of an emergency, they should exit through the established decontamination corridors, if possible. If evacuation cannot be done through an established decontamination area, site personnel will go to the nearest safe location and remove chemically-affected clothing there or, if possible, leave it near the Exclusion Zone. Personnel will assemble at the predetermined refuge following evacuation and decontamination. The SSO, or designated representative, will count and identify site personnel to verify that all have been evacuated safely.

10.6 Spill of Hazardous Materials

If a hazardous material spill occurs, site personnel should locate the source of the spill and determine the hazard to the health and safety of site workers and the public. Attempts to stop or reduce the flow should only be performed if it can be done without risk to personnel.

Isolate the spill area and do not allow entry by unauthorized personnel. De-energize sources of ignition within 100 feet of the spill, including vehicle engines. Should a spill be of the nature or extent that it cannot be safely contained, or poses an imminent threat to human health or the environment, an emergency cleanup contractor will be called out as soon as possible. Spill containment measures listed below are examples of responses to spills.

- Right or rotate containers to stop the flow of liquids. This step may be accomplished as soon as the spill or leak occurs, providing it is safe to do so.
- Sorbent pads, booms, or adjacent soil may be used to dike or berm materials, subject to flow, and to solidify liquids.
- Sorbent pads, soil, or booms, if used, must be placed in appropriate containers after use, pending disposal.
- Contaminated tools and equipment shall be collected for subsequent cleaning or disposal.

Section 11

Documentation

The implementation of the HASP must be documented on the appropriate forms (see appendices) to verify employee participation and protection. In addition, the regulatory requirements must be met for recordkeeping on training, medical surveillance, injuries and illnesses, exposure monitoring, health risk information, and respirator fit-tests. Documentation of each BC employee's health and safety records is maintained by the Health and Safety Data Manager in Walnut Creek, California.

Health and safety documentation and forms completed, as specified by this plan, are to be retained in the project file.

Other relevant project-specific health and safety documents, such as MSDSs or client-specified procedures, will be attached to this HASP in Appendix F.

Appendix A:

Air Monitoring Form

Brown AND Caldwell

Air Monitoring Form

Instructions: Complete this form immediately prior to project start.
File in project folder when complete.

Name of Project/Site:	Project No:
Project/Site Location:	
Employee Performing Air Monitoring: (Print and Sign):	Date:

Instrument(s)

Manufacturer/Model:	Manufacturer/Model:
Manufacturer/Model:	Manufacturer/Model:

Does the instrument(s) have a current calibration per the manufacturer's instructions? ☐ Yes ☐ No

Was the instrument(s) field checked (i.e bump tested or field calibrated) per the manufacturer's instructions? ☐ Yes ☐ No

Remarks:

Monitoring Data

TIME	LOCATION AND ACTIVITY	P/FID (PPM)	COLORIMETRIC TUBES (PPM)	RAM (mg/m^3)	MULTI-GAS DETECTION			
					%LEL	H2S	O2	OTHER

Appendix B:

Site Safety Checklist

Brown AND Caldwell

Site Safety Checklist

Instructions: Complete this form immediately prior to project start.
File in project folder when complete.

Name of Project/Site:	Project No:
Project/Site Location:	
Employee Completing Checklist: (Print and Sign):	Date:

Yes	No	N/A		Yes	No	N/A	
☐	☐	☐	Written Health and Safety (H&S) Plan is on site?	☐	☐	☐	Respirators are available, properly cleaned, and stored?
☐	☐	☐	Addenda to the H&S Plan are documented on site?	☐	☐	☐	Overhead utilities do not present a hazard to equipt./personnel?
☐	☐	☐	H&S Plan information matches conditions/activities at the site?	☐	☐	☐	Traffic control measures have been implemented?
☐	☐	☐	H&S Plan read/signed by all site personnel, including visitors?	☐	☐	☐	Trenches and excavations are safe for entry?
☐	☐	☐	Daily tailgate H&S meetings have been held/documented?	☐	☐	☐	Soil Spoils are at least 2 feet from the edge of the excavation?
☐	☐	☐	Site personnel have required training and medical?	☐	☐	☐	Emergency/FA equipt. is on site as described in the H&S Plan?
☐	☐	☐	Air monitoring is performed/documented per the H&S Plan?	☐	☐	☐	Drinking water is readily available?
☐	☐	☐	Air monitoring equipment has been calibrated daily?	☐	☐	☐	Phone is readily available for emergency use?
☐	☐	☐	Site zones are set up and observed where appropriate?	☐	☐	☐	Utility locator has cleared subject locations?
☐	☐	☐	Access to the work area limited to authorized personnel?	☐	☐	☐	Proper drum and material handling techniques are used?
☐	☐	☐	Decontamination procedures followed/match the H&S Plan?	☐	☐	☐	Waste containers/drums are labeled appropriately?
☐	☐	☐	Decontamination stations (incl. hand/face wash) are set up and used?	☐	☐	☐	Ext. cords are grounded/protected from water/vehicle traffic?
☐	☐	☐	PPE used matches H&S Plan requirements?	☐	☐	☐	Tools and equipment are in good working order?
☐	☐	☐	Hearing protection used where appropriate?	☐	☐	☐	GFCIs used for portable electrical tools and equipment?

Notes

(All "no" answers must be addressed and corrected immediately. Note additional health and safety observations here):

Appendix C:

H&S Plan Acknowledgement Form

H&S Plan Acknowledgement Form

Instructions: Complete this form immediately prior to project start or as new personnel join the project.
File in project folder when complete.

Name of Project/Site:	Project No:
Project/Site Location:	
Employee Performing Briefing: (Print and Sign):	Date:

Employee Acknowledgement:

The following signatures indicate that these personnel have read and/or been briefed on this Health and Safety (H&S) Plan and understand the potential hazards/controls for the work to be performed.

Important Notice to Subcontractor(s):

Subcontractors are responsible for developing, maintaining, and implementing their own health and safety programs, policies, procedures and equipment as necessary to protect their workers, and others, from their activities. Subcontractors shall operate equipment in accordance with their standard operating procedures as well as manufacturer's specifications. Any project monitoring activities conducted by BC at the Site shall not in any way relieve subcontractors of their critical obligation to monitor their operations and employees for the determination of exposure to hazards that may be present at the Site and to provide required guidance and protection. If requested, subcontractors will provide BC with a copy of their own H&S Plan for this project or other health and safety program documents for review.

BC's Health and Safety Plan has been prepared specifically for this project and is intended to address health and safety issues solely with respect to the activities of BC's own employees at the site. A copy of BC's H&S Plan may be provided to subcontractors in an effort to help them identify expected conditions at the site and general site hazards. The subcontractor shall remain responsible for identifying and evaluating hazards at the site as they pertain to their activities and for taking appropriate precautions. For example, BC's H&S Plan does not address specific hazards associated with tasks and equipment that are particular to the subcontractor's scope of work and site activities. (e.g., operation of a drill rig, excavator, crane or other equipment). Subcontractors are not to rely on BC's H&S Plan to identify all hazards that may be present at the Site. Subcontractor personnel are expected to comply fully with subcontractor's Health and Safety Plan and to observe the minimum safety guidelines applicable to their activities which may be identified in the BC H&S Plan. Failure to do so may result in the removal of the subcontractor or any of the subcontractor's workers from the job site.

Print	Sign	Date	Print	Sign	Date

Appendix D:

Daily Tailgate Meeting Form

DAILY TAILGATE MEETING FORM

Name of Project/Site:	Project No:
Project/Site Location:	
Employee Completing Form (*print and sign*):	**Date:**

Employee Acknowledgement:

The following signatures indicate that these personnel have read and/or been briefed on this Health and Safety (H&S) Plan and understand the potential hazards/controls for the work to be performed.

Important Notice to Subcontractor(s):

Subcontractors are responsible for developing, maintaining, and implementing their own health and safety programs, policies, procedures and equipment as necessary to protect their workers, and others, from their activities. Subcontractors shall operate equipment in accordance with their standard operating procedures as well as manufacturer's specifications. Any project monitoring activities conducted by BC at the Site shall not in any way relieve subcontractors of their critical obligation to monitor their operations and employees for the determination of exposure to hazards that may be present at the Site and to provide required guidance and protection. If requested, subcontractors will provide BC with a copy of their own H&S Plan for this project or other health and safety program documents for review.

BC's Fieldwork Safety Plan has been prepared specifically for this project and is intended to address health and safety issues solely with respect to the activities of BC's own employees at the site. A copy of BC's H&S Plan may be provided to subcontractors in an effort to help them identify expected conditions at the site and general site hazards. The subcontractor shall remain responsible for identifying and evaluating hazards at the site as they pertain to their activities and for taking appropriate precautions. For example, BC's H&S Plan does not address specific hazards associated with tasks and equipment that are particular to the subcontractor's scope of work and site activities. (e.g., operation of a drill rig, excavator, crane or other equipment). Subcontractors are not to rely on BC's H&S Plan to identify all hazards that may be present at the Site. Subcontractor personnel are expected to comply fully with subcontractor's Fieldwork Safety Plan and to observe the minimum safety guidelines applicable to their activities which may be identified in the BC H&S Plan. Failure to do so may result in the removal of the subcontractor or any of the subcontractor's workers from the job site.

Print	Sign	Date	Print	Sign	Date

Plan of the Day

(Describe the activities that are planned to be performed today)

Potential Hazards and Topics Discussed

(Describe the potential hazards and controls that may be associated with planned activities)

☐ Physical ☐ Natural Phenomena ☐ Chemical ☐ Electrical ☐ Biological ☐ Radiological

☐ Other (specify):

Place a copy in the project file.

Appendix E:

Incident Investigation Report

Preliminary Incident Investigation Report Form

Privileged and Confidential
Do Not Distribute

Instructions:

If an incident occurs, complete all applicable information in this form, make a copy for your records, and immediately forward the original to the office Health and Safety Coordinator (HSC). If fields are not applicable, indicate with "N/A". Use separate sheet(s) if necessary and attach sketches, photographs, witness statements, or other information that may be helpful in understanding how the accident/incident occurred. For assistance in completing this form, contact your office H&S Coordinator/Specialist or your Regional Safety Unit Manager (RSUM).

HSC – Review and enter report into the BC Online Incident Reporting System within 3 workdays of receipt. File original in appropriate office health and safety file.

NOTE:

This report is important – please take the time necessary to properly complete it. Incomplete reports will be forwarded to appropriate management for review and action.

General Information

Date of Accident/Incident	**Time of Accident/Incident:**	**Date Accident/Incident Reported:**	**To Whom:**
Exact Location of Accident/Incident (Street, City, State)**:**			**BC Office:**
Name Project:			**Project Number:**
Employee Completing the Investigation (Print and Sign)**:**			**Date:**

Injured/Ill Employee/Property Damage Information

Employee Name:	**Employee No.**	**Department:**	**Phone Number:**
Job Title:		**Manager's Name and Phone Number:**	
Nature of Injury/Illness (laceration, contusion, strain, etc.)**:**		**Body Part Affected** (arm, leg, head, hand, etc.)**:**	
Describe Property Damage and Estimate Loss :			

Description of Accident/Incident

Describe the accident sequentially, beginning with the initiating event, and followed by secondary and tertiary events. End with the nature and extent of injury/damage. Name any object or substance and tell how they were included. Examples: 1) Employee was pulling utility cart that was loaded with wastepaper from office area to hallway. Wheel of utility cart caught against door casing. Bags of heavy wastepaper that were in cart fell to end of cart. Cart tipped over onto foot of employee. Right foot was crushed between utility cart and door casing, resulting in severe contusion to right foot of employee. 2) Employee was driving rental car from office to project site. Car struck icy section of road. Employee lost control of vehicle, which skidded across road into concrete abutment on side of road. Accident resulted in damage to right fender, tire, headlight, and grill.

Preliminary Incident Investigation Report Form

Privileged and Confidential
Do Not Distribute

Analysis of Accident Causes

Immediate Causes - Substandard Actions

What substandard actions caused or could have caused the accident/incident? State the actions on the part of the employee or others that contributed to the occurrence of the accident/incident. Examples: 1) Employee overloaded the utility cart with wastepaper. 2) Employee exceeded safe speed on icy road, and was inattentive to hazard.

Codes (check all that apply)

- ☐ Failure to recognize hazard(s)
- ☐ Failure to use equipment or use it properly
- ☐ Failure to use PPE or use it properly
- ☐ Failure to warn, secure, or barricade
- ☐ Horseplay
- ☐ Improper lifting
- ☐ Improper loading, placement, or position for task
- ☐ Performing excessive repetitive activities
- ☐ Operating equipment without authority
- ☐ Removing or making safety devices inoperable
- ☐ Servicing equipment in operation
- ☐ Using defective equipment
- ☐ Unclassified (not determined)
- ☐ Other (specify): _____

Immediate Causes - Substandard Conditions

What substandard conditions caused or could have caused the accident/incident? State the conditions that existed at the time of the accident (the specific control factors that were or may have been the direct or immediate cause or causes of the accident). Examples: 1) Wheel of utility cart was worn and would not roll properly; utility cart was overloaded with wastepaper. 2) Road was covered with icy spots; weather was foggy.

Codes (check all that apply)

- ☐ Congested or restricted area
- ☐ Defective tools, equipment, or materials
- ☐ Fire or explosion hazards
- ☐ Hazardous environmental conditions (vapors, dusts, etc.)
- ☐ High or low temperature exposures
- ☐ Inadequate guards or barriers
- ☐ Inadequate or excessive illumination
- ☐ Inadequate ventilation
- ☐ Inadequate walking/working surfaces
- ☐ Noise Exposures
- ☐ Poor housekeeping
- ☐ Radiation exposures
- ☐ Unclassified (not determined)
- ☐ Other (specify): _____

Basic Causes - Personal and Job Factors

What personal and/or job factors caused or could have caused the accident/incident? State the influencing factors or underlying causes, either conditions or actions or both, that contributed to the accident/incident. Examples: 1) Employee had not been instructed in overloading hazards. 2) Employee had not been trained in driving under winter conditions; company has no driver training program.

Codes (check all that apply)

Personal Factor Codes

- ☐ Alcohol or drug influence (possible)
- ☐ Fatigue
- ☐ Inadequate skill, capability, knowledge, or training
- ☐ Inattention
- ☐ Rushing to complete work
- ☐ Unclassified (not determined)
- ☐ Other (specify): _____

Job Factor Codes

- ☐ Inadequate engineering
- ☐ Inadequate leadership/supervision
- ☐ Inadequate maintenance, wear, abuse, or misuse
- ☐ Inadequate planning or accelerated schedule
- ☐ Inadequate tools/equipment
- ☐ Inadequate work standards/procedures
- ☐ Unclassified (not determined)
- ☐ Other (specify): _____

Remedial Actions

Describe the actions taken or planned to prevent recurrence of accident/incident - provide the implementation date and person responsible for any planned corrective action.. Examples: 1) Wheels of utility cart were replaced with larger size wheels; all carts were inspected for safe operation; employees were instructed in overloading hazards. 2) All project personnel were instructed at the safety training meeting on driving under hazardous conditions; driver training program will be implemented.

Codes (check all that apply)

- ☐ Equipment repair or replacement
- ☐ Improve design or construction
- ☐ Improve housekeeping
- ☐ Improve PPE
- ☐ Install safety guard or device
- ☐ Reinstruction or reprimand of personnel involved
- ☐ Temporary/permanent reassignment of personnel
- ☐ Work method change
- ☐ Use safer materials or equipment
- ☐ Develop and publish lessons learned
- ☐ Unclassified (not determined)
- ☐ Other (specify): _____

Appendix F:

Miscellaneous Health and Safety Information

Appendix J: Technical Specifications

Technical Specifications
NYSDEC Site No. 1-52-182
Village of Patchogue
Suffolk County, New York

Prepared for

National Grid, Hicksville, New York

December 2012

Technical Specifications
NYSDEC Site No. 1-52-182
Village of Patchogue
Suffolk County, New York

Prepared for
National Grid
175 East Old Country Road
Hicksville, New York 11801

December 2012

Project Number: 142128.550

Brown and Caldwell Associates
2 Park Way, Suite 2A
Upper Saddle River, New Jersey 07458

Table of Contents

PART 1 – CONSTRUCTION SPECIFICATIONS

Division 01 – General Requirements

01 09 00 Definitions, Codes and Abbreviations
01 10 00 Summary of Work
01 10 56 Protection of Work and Property
01 20 00 Price and Payment Procedures
01 30 00 Administrative Requirements
01 30 50 Work Restrictions
01 30 65 Health and Safety Requirements
01 33 00 Submittal Requirements
01 40 00 Quality Requirements
01 50 00 Temporary Facilities and Controls
01 52 00 Environmental Site Monitoring
01 52 10 Dust, Odor, and Noise Control
01 52 20 Equipment and Material Decontamination
01 54 00 Site Security
01 70 00 Execution and Closeout Requirements
01 78 00 Demobilization

Division 02 - Existing Conditions

02 41 19 Selective Demolition
02 61 00 Monitoring Well Decommissioning

Division 31 – Earthwork

31 10 00 Site Clearing
31 20 00 Temporary Construction Access
31 23 16 Excavation
31 23 19 Dewatering and On-Site Treatment
31 23 23 Backfill
31 25 13 Erosion and Sediment Controls
31 41 16 Excavation Support and Protection

31 50 00 Site Restoration
31 70 00 Waste Management, Transportation, and Disposal
31 80 00 In-Situ Solidification/Stabilization
Division 32 – Exterior Improvements
32 12 16 Asphalt Pavement
32 31 13 Chain Link Fences and Gates
32 92 19 Seeding and Vegetation
Division 33 – Utilities
33 05 17 Perimeter Utility Cut and Cap
33 05 18 Utility Protection and Rerouting

SECTION 01 09 00

DEFINITIONS, CODES, AND ABBREVIATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes
   1. Reference standards
   2. Abbreviations
   3. Definitions

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.

1.2 REFERENCE STANDARDS AND ORGANIZATION ABBREVIATIONS

A. The following standards and organizations may be referred to in these specifications by the identified abbreviations. The latest version of all noted standards shall apply to this work, unless otherwise specified. Reference standards include, but are not necessarily limited to, the following:
   1. American Association of State Highway and Transportation Officials (AASHTO)
   2. American Industrial Hygiene Association (AIHA)
   3. American National Standards Institute, Inc. (ANSI)
   4. American Society for Testing and Materials (ASTM)
   5. American Society of Civil Engineers (ASCE)
   6. Code of Federal Regulations (CFR)
   7. New York Standards and Specifications for Erosion and Sediment Control (NYSSESC)
   8. New York State Department of Environmental Conservation (NYSDEC)
   9. New York State Department of Health (NYSDOH)
   10. New York State Department of Transportation (NYSDOT)
   11. Occupational Safety and Health Act (Current Standards) (OSHA)
   12. United States Environmental Protection Agency (USEPA)

1.3 DEFINITIONS

A. Abbreviations may be similar but have different meanings. If clarification is required, National Grid shall be consulted.

B. Within the context of this Contract, the terms below will have the meanings associated therewith:
   1. Addenda: Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Documents or the Contract Documents.

2. Agreement: The written agreement between the Owner and Contractor covering the Work to be performed; other Contract Documents are attached to the Contract and made a part thereof as provided therein.
3. Bid: The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices and the Work to be performed.
4. Bidder: One who submits a Bid directly to the Owner, as distinct from a sub-bidder, who submits a bid to Bidder.
5. Bidding Documents: Includes the Invitation to Bid, Instructions to Bidders, the Bid Form, and the "Contract Documents" (including all Addenda issued prior to receipt of Bids).
6. Bonds: Bid, performance and payment bonds and other instruments of security.
7. Change Order: A document which is signed by Contractor and the Owner authorizing an addition, deletion, or revision in the Work, or an adjustment in the contract price or the contract time, issued on or after the Effective Date of the Contract.
8. Competent Person: A person who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, incompliant, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. The Construction Superintendent can serve as a competent person, in some instances, if approved by National Grid and/or approved representative.
9. Construction Phase: The time period, generally beginning with mobilization, during which the remaining portion of the Contractor's Scope of Work is to be performed (i.e., the portion not completed during the Preconstruction Phase).
10. Container: A portable unit in which a material is stored, transported, treated, disposed of, or otherwise handled. Examples include but are not limited to drums, dumpsters, roll-off boxes, bulk cargo containers commonly known as "portable tanks" or "totes," cargo tank trucks, and tank railcars.
11. Contract Documents: The documents so identified in the executed Subcontract. Documents consisting of the Design Drawings, Technical Specifications, and Remedial Design Report in which the implementation of the remedial work is based upon.
12. Contract: All project work covered by the Contract documents including Terms and Conditions, Remedial Design Report, Technical Specifications, and Design Drawings.
13. Contractor: The person, firm or corporation with whom National Grid has entered into the Contract. The party contracted directly with National Grid to furnish and perform the work in accordance with the Contract Documents.
14. Construction Superintendent: A representative assigned the duties and responsibilities of managing the construction activities for the Contractor as specified herein.
15. Design Drawings: Drawings included with the Contract Documents that the Contractor shall use as a guide during the remedial construction work.
16. Design Engineer: Brown and Caldwell Associates (BC).
17. Effective Date of the Contract: The date indicated in the Contract on which it becomes effective, but if no such date is indicated it means the date on which the Contract is signed and delivered by the last of the two parties to sign and deliver.
18. Laws and Regulations; Laws or Regulations: Laws, rules, regulations, ordinances, codes, and/or orders of any governmental entity having jurisdiction over the Work, which apply to the Work.

19. Lump Sum Price Work: Work to be paid for on the basis of Lump Sum prices as shown on Contractor's Schedule of Values.
20. National Grid: Project Owner who has entered into an Administrative Order on Consent with the NYSDEC to perform the environmental investigation and remediation at the site.
21. National Grid Approved Representative: The person, firm or corporation contracted directly with National Grid to be their Representative and perform quality assurance during the work in accordance with the Contract Documents.
22. Notice of Award: The written notice by the Owner to the apparent successful Bidder stating that upon compliance by the apparent successful Bidder with the conditions precedent enumerated therein, within the time specified, the Owner will sign and deliver the Contract.
23. Notice to Proceed: A written notice given by the Owner and Contractor to perform Contractor's obligations under the Contract.
24. Owner: National Grid the Project Owner who has entered into an Administrative Order on Consent with the NYSDEC to perform the environmental investigation and remediation at the Site.
25. Project: The total construction of which the Work to be provided under this Contract may be the whole, or a part as indicated elsewhere in the Contract Documents.
26. Record Drawings: The drawings, diagrams, and details which are prepared by Contractor or his subcontractors to record actual construction, are updated concurrent with construction progress, and are converted to a final set of documents to be submitted to the Owner with a claim for final Application for Payment. Record Drawings shall include necessary survey information, field changes of dimension and detail, details not on original Contract Drawings, and any other information as required by the Contract Documents.
27. Schedule of Values: Contractor's itemized listing of activities of the Work, setting forth in a form acceptable to the National Grid, Contractor's allocation of the contract price by activity. The same activities shall be incorporated into Contractor's progress schedule.
28. Shop Drawings: All drawings, diagrams, illustrations, schedules, and other data which are specifically prepared by or for Contractor to illustrate some portion of the Work; and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a Supplier and submitted by Contractor to illustrate materials or equipment for some portion of the Work.
29. Site: The Patchogue Former Manufactured Gas Plant Site is located at 234 West Main Street in the Village of Patchogue, Town of Brookhaven, New York.
30. Site Safety Officer (SSO): A representative assigned the duties and responsibilities of providing Health and Safety monitoring of construction activities as specified herein, including Section 01 30 65.
31. Supplemental Conditions to the National Grid Remedial Construction Purchase Orders (Supplemental Conditions): National Grid’s proprietary specifications and conditions in regards to remedial construction purchase orders.
32. Technical Specifications: Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.
33. State: State of New York

34. Subcontractor: Any individual, firm or corporation contracted directly with the Contractor or any other Subcontractor for the performance of work at the Site (e.g., Land Surveyor, Well Driller, ISS Contractor, etc.).
35. Successful Bidder: In the event the Owner makes an award, means the Bidder to whom the Owner awards a Contract.
36. Supplier: A manufacturer, fabricator, distributor, materialman, or vendor.
37. Underground Facilities: All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasement containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control system or water.
38. Unit Price Work: Work to be paid for on the basis of unit prices as shown on Contractor's Schedule of Values.
39. Unit Price: The price of a unit of Work as shown in Contractor's Schedule of Values.
40. Work: The entire completed construction or the various separately identifiable parts therefore required to be furnished under the Contract Documents. Work is the result of performing services, furnishing labor, and furnishing and incorporating materials and equipment into the Construction, all as required by the Contract Documents.
41. Written Amendment: A written document of the Contract Documents, signed by the National Grid and Contractor on or after the Effective Date of the Contract and normally dealing with the non-engineering or non-technical rather than strictly work-related aspects of the Contract Documents.

1.4 ABBREVIATIONS

A. Abbreviations may be similar but have different meanings. If clarification is required, National Grid shall be consulted.

Ac.	Acre
ADT	Aquifer Drilling and Testing, Inc.
BC	Brown and Caldwell Associates
BZ	Breathing Zone
bgs	Below ground surface
BMP	Best Management Practices
CAMP	Community Air Monitoring Plan
CQAPP	Construction Quality Assurance Project Plan
CMP	Construction Management Plan
COC	Chain of Custody
CQC	Construction Quality Control
CQCPP	Construction Quality Control Project Plan
cu.	Cubic
C.F.	cubic feet
C.Y.	cubic yards
^{o}C	degrees Centigrade
^{o}F	degrees Fahrenheit
DER	Division of Environmental Remediation

DI	Deionized water
DNAPL	Dense non-aqueous phase liquid
C	Drawing
el. or elev.	Elevation
ft.	feet
FER	Final Engineering Report
FFS	Focused Feasibility Report
gal.	Gallons
gpm	gallons per minute
HASP	Health and Safety Plan
ICON	ICON Shoring System
ISS	In-Situ Solidification
LIPA	Long Island Power Authority
L.F.	linear feet
max.	maximum
min.	minutes or minimum
msl	Mean sea level
MGP	Manufactured Gas Plant
MPTP	Maintenance and Protection of Traffic Plan
MTBE	Methyl tertiary butyl ether
NAD	North American Datum
NAPL	Non-aqueous phase liquids
NAVD	North American Vertical Datum
NYCRR	New York State Codes, Rules and Regulations
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
NYSDEC	New York State Department of Environmental Conservation
NYSSESC	New York Standards and Specifications for Erosion and Sediment Controls
N.T.S.	not to scale
O.D.	Outside diameter
OM&M	Operation, Monitoring and Maintenance
OWS	Oil-Water Separator
PDI	Pre-design Investigation
PID	Photoionization detector
PRAP	Proposed Remedial Action Plan
PSA	Preliminary Site Assessment
PVC	Polyvinyl chloride
ppm	parts per million
psi	pounds per square inch
%	percent
QA	Quality Assurance
QC	Quality Control
RAOs	Remedial Action Objectives
RDR	Remedial Design Report
RDWP	Remedial Design Workplan
RFP	Request for Proposal
RI	Remedial Investigation
RIR	Remedial Investigation Report

ROD	Record of Decision
SCDHS	Suffolk County Department of Health Services
SCOs	Soil Cleanup Objectives
SESC	Soil erosion and sediment control
SPDES	State Pollutant Discharge Elimination System
SPT	Standard Penetration Test
S.F.	square feet
S.Y.	square yards
SSO	Site Safety Officer
TCLP	Toxicity Characteristic Leaching Procedure
TS	Treatability Study
UCS	Unconfined Compressive Strength
UCWP	Utility Corridor Work Plan
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VHB	Vanasse, Hangen, Brustlin
VOCs	Volatile organic chemicals
WMP	Waste Management Plan
w.w	Wet weight
Owner	National Grid
Design Engineer	Brown and Caldwell Associates

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 10 00

SUMMARY OF WORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Site description
2. Contractor's Scope of Work
3. Contract/bid items
4. Construction Management Plan
5. Submittals
6. Contractor's use of site
7. Work sequence
8. Waste management, transportation and disposal

B. Related Sections and Documents:
1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
2. Section 01 33 00

C. Contractor Procurement

These technical specifications present the 50-75% design elements associated with the construction and implementation of the selected remedy to address known soil and groundwater impacts at the Patchogue Former Manufactured Gas Plant (MGP) Site (i.e., herein referred to as the Site). The remedy to be implemented at the Site is described in a document entitled "Record of Decision (ROD), Patchogue Former Manufactured Gas Plant Site, Patchogue, New York" prepared by the New York State Department of Environmental Conservation (NYSDEC) and dated March 31, 2011.

These specifications were developed to procure the Remediation Contractor (Contractor) who will participate in advancing the design into the required subsequent design submittals. The development of the remedial design will culminate in a 100% Remedial Design Report (RDR) and Design Drawings. The Contractor will assist in the development of the 100% design and will also implement the remedial construction in accordance with the NYSDEC-approved 100% RDR, associated Design Drawings and these Technical Specifications.

1.2 SITE DESCRIPTION

The Site is located at 234 West Main Street in the Village of Patchogue, Town of Brookhaven, Suffolk County, New York. The Site is located in a mixed commercial and residential area, and is currently undeveloped and vacant. The Site encompasses approximately 3.6 acres and is informally divided into three areas: the Northern Area, the Central/Core Area, and the Southern Area. The Northern Area is a rectangular area comprising the northern portion of the Site and is enclosed with a chain-link fence. This area is mostly clear of vegetation and the ground surface is comprised of two adjacent concrete slabs with a combined size of approximately 240 feet by 60 feet. The

Central/Core area consists of the central portion of the Site where the majority of the former MGP structures were located and where the UCWP was implemented. The Central/Core area is also rectangular in shape and is enclosed by a chain-link fence. This area is vegetated primarily by grass, weeds and low brush and stone installed during the implementation of the UCWP. A steep slope runs along the western boundary of the Site. The Southern Area comprises the tapered southern end of the property. This area has considerable concrete debris and dense vegetation. The overall layout of the Site is shown on Drawing C-101 (Appendix A).

Remedial work will be performed within the Central/Core area of the Site and immediately to the east on the adjacent commercial property.

1.3 SUMMARY OF REMEDY

Based on the results of the evaluation detailed in the FFS as well the public's input into the Proposed Remedial Action Plan (PRAP), as documented in the ROD, the NYSDEC selected a remedy for the Patchogue Former MGP Site. The components of the remedy, as presented in the ROD, are described below:

- Remedial Design Program: A remedial design program will be implemented to provide the details necessary for the design, construction, operation, maintenance, and monitoring of the remedial program. Green remediation principals and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31, Green Remediation. The major green remediation components are as follows:

    1. Considering the environmental impacts of treatment technologies and remedy stewardship over the long-term;

    2. Reducing direct and indirect greenhouse gas and other emissions;

    3. Increasing energy efficiency and minimizing use of non-renewable energy;

    4. Conserving and efficiently managing resources and materials;

    5. Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;

    6. Maximizing habitat value and creating habitat, when possible;

    7. Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and

    8. Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

- On-site Excavation: On-site excavation of the following:

    1. any existing former MGP structures, debris, and major obstructions, including highly impacted soils in the immediate vicinity of these structures, to allow for excavation and/or treatment of underlying soils and installation of a soil cover; and

2. on-site fill materials to a depth of at least two feet below ground surface (bgs) over the entire Central/Core Area (beyond the limits of the ISS area) to allow for installation of a two-foot thick soil cover. The on-site excavations will be backfilled with stockpiled soils and/or imported soil, the top two-feet of which will meet the 6NYCRR 375-6.7(d) restricted-residential criteria for backfill.

- Off-Site Excavation: Off-site excavation (immediately to the east of the main MGP site), to a depth of approximately nine feet bgs to remove visible MGP-related source material and petroleum impacted soils. A demarcation layer will be placed at the bottom of the off-site excavation and the area will be backfilled entirely with material that meets 6NYCRR 375-6.7(d) residential criteria for backfill. The excavation area will be dewatered as necessary to install the shoring system.

- In-Situ Solidification (ISS) of Soil: In-situ solidification (ISS) of impacted soil will include all areas of MGP-related source material and associated soil, with the deepest targeted treatment depth being 23 feet below grade (bgs.) The soil will be mixed in place with cement and/or other hardening materials to form an impermeable, solid mass to prevent migration of MGP-related contaminants. The area to be solidified will extend laterally beyond the limits of contamination to encapsulate the impacts. The method of ISS will be determined during the remedial design. Solidified soils will be covered by a sufficient layer of soil to protect them from freeze-thaw cycles. The top two feet of this cover will be soil that meets the restricted-residential requirements for cover material set forth in 6 NYCRR Part 375-6.7(d) which will be placed over a demarcation layer. The ISS treatment process increases the volume of the soil so an additional volume of material sufficient to account for this expansion will be required to be excavated and removed. The materials to be excavated to account for the frost protection layer and volume expansion will target source areas that are accessible and not otherwise excavated. Impacted soil and any excess stabilized soil will be transported to an approved off-site disposal facility. Excavated materials that are not considered source material (e.g. visible MGP tar-impacts) may be stockpiled and evaluated for reuse as backfill on-site. All excavated soils, not suitable for reuse, will be transported and disposed off-site at an approved landfill or treatment facility.

- Odor/Dust Control: On-site material handling (dewatering and/or blending operations) will be performed under a temporary fabric structure, as necessary, to control vapor, odor and dust emissions. Odor suppression materials such as foam will be available on-site at all times. Excavated soils will either be directly loaded into transport trucks, if waste characterization has been performed, or staged on-site for waste characterization. A Community Air Monitoring Plan (CAMP) will be implemented which will include real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area during all ground-intrusive activities at the Site.

- Soil Cover: Installation of a site cover to allow for restricted-residential use of the Site. The Site will be restored to its existing grade. The cover will consist either of structures, such as buildings, pavement, and sidewalks comprising the site development, or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). The soil cover will consist of a minimum of two feet of soil meeting the requirements for cover material set forth in 6 NYCRR Part 375-6.7(d). The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to support vegetation.

- Institutional Controls: Imposition of an institutional control in the form of an environmental easement for the controlled property that:

    1. requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);

    2. allows the use and development of the controlled property for restricted residential, commercial and industrial uses or as defined by Part 375-1.8(g), though land use is subject to local zoning laws;

    3. restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDEC, the New York State Department of Health (NYSDOH) or the Suffolk County Department of Health Services (SCDHS);

    4. prohibits agriculture or vegetable gardens on the controlled property; and

    5. requires compliance with the NYSDEC approved Site Management Plan.

- Site Management Plan: A Site Management Plan is required which includes the following:

    1. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the Site and details the steps and media-specific requirements necessary to allow the following institutional and/or engineering controls to remain in place and effective:

        a. Institutional Controls: The Environmental Easement discussed in Paragraph 7 above.

        b. Engineering Controls: The ISS area discussed in Paragraph 4 and the site cover discussed in Paragraph 6 above.

        A copy of the Site Management Plan will be provided to the appropriate property owners. This plan will include, but may not be limited to:

        a. Engineering Controls: The ISS area discussed in Paragraph 4 and the site cover discussed in Paragraph 6 above.
        b. descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;
        c. a provision to evaluate the potential for soil vapor intrusion should the on-site building become occupied or should any buildings be developed on the site and to implement actions (e.g., mitigation or monitoring) recommended to address exposures related to soil vapor intrusion;
        d. provisions for the management and inspection of the identified engineering controls;
        e. maintaining site access controls and NYSDEC notification; and
        f. the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

2. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan will include, but may not be limited to:
   a. monitoring of groundwater to assess the performance and effectiveness of the remedy; and
   b. a schedule of monitoring and frequency of submittals to the NYSDEC.

1.4 CONTRACTOR'S SCOPE OF WORK

Specifically, the components of the Selected Remedy included in the Contractor's Scope of Work are:

- On-site Excavation: On-site excavation of the following:

  1. any existing former MGP structures, debris, and major obstructions, including highly impacted soils in the immediate vicinity of these structures, to allow for excavation and/or treatment of underlying soils and installation of a soil cover; and

  2. on-site fill materials to a depth of at least two feet below ground surface (bgs) over the entire Central/Core Area (beyond the limits of the ISS area) to allow for installation of a two-foot thick soil cover. The on-site excavations will be backfilled with stockpiled soils and/or imported soil, the top two-feet of which will meet the 6NYCRR 375-6.7(d) restricted-residential criteria for backfill.

- Off-Site Excavation: Off-site excavation (immediately to the east of the main MGP site), to a depth of approximately nine feet bgs to remove visible MGP-related source material and petroleum impacted soils. A demarcation layer will be placed at the bottom of the off-site excavation and the area will be backfilled entirely with material that meets 6NYCRR 375-6.7(d) residential criteria for backfill. The excavation area will be dewatered as necessary to install the shoring system.

- In-Situ Solidification (ISS) of Soil: In-situ solidification (ISS) of impacted soil will include all areas of MGP-related source material and associated soil, with the deepest targeted treatment depth being 23 feet below grade (bgs.) The soil will be mixed in place with cement and/or other hardening materials to form an impermeable, solid mass to prevent migration of MGP-related contaminants. The area to be solidified will extend laterally beyond the limits of contamination to encapsulate the impacts. The method of ISS will be determined during the remedial design. Solidified soils will be covered by a sufficient layer of soil to protect them from freeze-thaw cycles. The top two feet of this cover will be soil that meets the restricted-residential requirements for cover material set forth in 6 NYCRR Part 375-6.7(d) which will be placed over a demarcation layer. The ISS treatment process increases the volume of the soil so an additional volume of material sufficient to account for this expansion will be required to be excavated and removed. The materials to be excavated to account for the frost protection layer and volume expansion will target source areas that are accessible and not otherwise excavated. Impacted soil and any excess stabilized soil will be transported to an approved off-site disposal facility. Excavated materials that are not considered source material (e.g. visible MGP tar-impacts) may be stockpiled and evaluated for reuse as backfill on-site. All excavated soils, not

suitable for reuse, will be transported and disposed off-site at an approved landfill or treatment facility.

- Odor/Dust Control: On-site material handling (dewatering and/or blending operations) will be performed under a temporary fabric structure, as necessary, to control vapor, odor and dust emissions. Odor suppression materials such as foam will be available on-site at all times. Excavated soils will either be directly loaded into transport trucks, if waste characterization has been performed, or staged on-site for waste characterization. A Community Air Monitoring Plan (CAMP) will be implemented which will include real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area during all ground-intrusive activities at the Site.

- Soil Cover: Installation of a site cover to allow for restricted-residential use of the Site. The Site will be restored to its existing grade. The cover will consist either of structures, such as buildings, pavement, and sidewalks comprising the site development, or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). The soil cover will consist of a minimum of two feet of soil meeting the requirements for cover material set forth in 6 NYCRR Part 375-6.7(d). The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to support vegetation.

Site preparation activities shall include, be not be limited to, surveying, mobilization of personnel and equipment; preparation of staging areas for stockpiling materials, installation of soil erosion and sediment controls, implementation of health and safety measures and dust monitoring program, setup of exclusion areas and decontamination areas, site clearing, fence installation and/ or removal, utility locating and protection, including a perimeter utility cut and cap, and selective demolition.

Restoration activities shall include, but not limited to backfilling, surface restoration (including surface cover/cap, asphalt pavement, gravel, and vegetation), fence installation and/or replacement, removal of soil erosion and sediment controls, removal of temporary facilities and controls, restoration of site utilities, and demobilization.

1.5 CONTRACT/BID ITEMS

A. Work of the Project includes:
   1. Preparation of 100% RDR;
      a. Support with the development of the final remedial design.
      b. Support with the development of the 100% RDR.
   2. Mobilization/Demobilization;
      a. Preparation of a Site-specific HASP to apply to all personnel on site during construction, including but not limited to. Contractor's employees and Subcontractor's employees. At a minimum the HASP must meet the requirements of 29 CFR 1910 and 29 CFR 1926, as applicable, and BC's HASP. Perform construction activities in accordance with the HASP.
      b. Preparation of Work Schedule including detailed description of the proposed sequence of construction.
      c. Obtain necessary construction permits and provide necessary notifications.
      d. Mobilization of necessary personnel, equipment, and materials to the Site.
      e. Obtain utility clearance.
      f. Demobilization of personnel, equipment, and materials.
      g. Final site cleaning.
   3. Temporary Facilities and Controls:
      a. Provide and maintain temporary utilities, including electricity, lighting, and water, as necessary, to complete the work in accordance with the Contract Documents.
      b. Provide and maintain temporary facilities, including sanitary facilities, etc.
      c. Provide and maintain site controls including temporary construction fencing, construction access routes, waste staging pads, and decontamination pads.
      d. Perform work zone air monitoring and implement control measures.
      e. Provide and maintain soil erosion and sediment control measures in accordance with NY Standard and Specifications for Erosion and Sediment Controls (NYSSESC), the Specifications, and Design Drawings (specifically the Erosion and Sediment Control Plan and Details).
      f. Implement Site Specific Health and Safety Plan.
      g. Protect utilities during the course of construction activities.
   4. Surveying and Record Documents:
      a. Employ Land Surveyor licensed in the State of New York to conduct surveying work, including delineation of Limits of Work, property lines, limits of soil excavation, ISS treatment area, surface covers, fencing, utilities, etc.
      b. Provide Record Survey.
   5. Site Clearing and Preparation
      a. Provide materials, labor, and equipment necessary to perform site clearing, vegetation removal/grubbing and disposal, fence removal and staging (for re-use) or disposal, and debris removal and disposal, in accordance with the Design Drawings and Specifications.
   6. Excavation Support and Protection:
      a. Provide materials, labor, and equipment necessary to support excavation and backfilling activities in off-site work area and adjacent to the existing structure and utilities in accordance with the Design Drawings and Specifications.
   7. Soil Excavation:
      a. Provide materials, labor, and equipment necessary to excavate soils and waste materials in accordance with the Design Drawings and Specifications.

8. In-Situ Solidification:
    a. Provide materials, labor, and equipment necessary to implement a pilot test and implement full-scale ISS treatment in accordance with the Design Drawings and the Specifications.
9. Waste Management, Transportation and Disposal:
    a. Provide materials, labor, and equipment necessary to manage on-site, handle, load, condition/dewater, transport, and dispose of generated waste materials (including excavated soil, ISS swell material, and excavated solidified/stabilized material), in accordance with applicable laws, regulations, codes, the Design Drawings and the Specifications.
10. Backfill:
    a. Provide materials, labor, and equipment necessary to backfill excavation areas in accordance with the Design Drawings and Specifications.
11. Construction of Environmental Cap:
    a. Provide materials, labor, and equipment necessary to install environmental cap (soil cover or coarse stone cover) in accordance with the Design Drawings and Specifications.
12. Asphalt Pavement:
    a. Provide materials, labor, and equipment necessary to install asphalt pavement cover over the off-site excavation area in accordance with the Design Drawings and Specifications.
13. Miscellaneous Restoration:
    a. Provide materials, labor, and equipment necessary to install fencing, if necessary, in accordance with the Design Drawings and Specifications.
    b. Provide materials, labor, and equipment necessary to restore Site utilities in accordance with the Design Drawings and Specifications.
14. Demobilization:
    a. Perform final cleanup of Site.
    b. Demobilize personnel, equipment, and materials.
    c. Remove temporary facilities and controls.
    d. Submit project close-out documentation.
15. Miscellaneous:
    a. Provide any other miscellaneous items required to complete the Work, in accordance with Design Drawings and Specifications.

1.6 SUBMITTALS

A. Contractor shall prepare and submit project submittals for review and approval in accordance with Section 01 33 00 (Submittal Requirements).

B. During the development of the remedial design, the Contractor shall provide submittals to Brown and Caldwell, National Grid and/or the National Grid authorized representative, some of which will be incorporated into the design and subsequent design submittals to the NYSDEC (i.e. 95% and 100% Remedial Design Reports).

C. Contractor shall submit a Construction Management Plan (CMP) for review and acceptance by National Grid, the National Grid approved representative and the Design Engineer. The CMP shall contain, at a minimum:
    1. Proposed detailed remedial construction schedule.
    2. Contingency Plan (Section 01 10 00).
    3. Survey Control Plan (Section 01 30 00).

4. Decontamination Plan (Section 01 52 20).
5. Traffic Control Plan (Section 01 50 00).
6. Dust and Odor Control Plan (Section 01 52 00).
7. Utility Protection and Rerouting (Section 33 05 18).
8. Temporary Access Plan (Section 31 20 00).
9. Dewatering Plan (Section 31 23 19).
10. Excavation Support and Protection Plan (Section 31 41 16).
11. Excavation and Waste Management Plan (Section 31 23 16).

1.7 CONTRACTOR'S USE OF SITE

A. Access to Site: Limited to Limit of Work shown on the Design Drawings or as otherwise approved by National Grid or a National Grid Authorized representative. Limit of Work shall be confined to the smallest reasonable and practical area to perform work in a safe and efficient manner. Equipment staging areas, material storage areas, and decontamination stations shall be within the Limit of Work.

B. Under no circumstances shall Contractor perform any Work or conduct any activities at the Site outside of Limit of Work without the written approval by National Grid or a National Grid Authorized representative.

C. Any disturbed areas shall be restored to original conditions at no additional cost to National Grid.

D. Contractor shall:
   1. Assume full responsibility of Site security.
   2. Confine operations to within the Limit of Work and shall not encumber the regular operation and maintenance routines of adjacent properties.
   3. Conform to all applicable laws, regulations, permits and Contract Documents.
   4. Assume full responsibility for the health and safety of Contractor's employees while at the Site and for implementation of the Contractor's Health and Safety Plan for the Work.

1.8 WORK SEQUENCE

A. Contractor shall perform work in a manner that will allow the adjacent Property Owner's operations to maintain normal activities on their sites. Contractor must ensure that neighboring operations or activities are not disturbed, interrupted, or prohibited as a result of the work.

B. Perform all work during hours specified by local, county, and/or state agencies. Notify the National Grid at least one week in advance, if a deviation from the normal working hours (Monday- Friday 7:00 a.m. – 5:00 p.m.) is required. National Grid or the National Grid authorized representative shall not be responsible for extra costs associated with the Contractor's expenses/fees for work outside the normal work hours in order to meet scheduled deadlines/constraints.

C. Plan and schedule work activities to be limited to weekdays, unless otherwise requested a minimum of two days in advance and approved in writing by National Grid or the National Grid authorized representative.

D. Work sequencing shall be conducted in a manner that prevents contamination or recontamination of areas not contaminated or already decontaminated.

E. Work sequencing shall be conducted in a manner to coordinate staging, stockpiling and loading of waste to be transported and disposed off- site.

F. The proposed work sequence shall be reflected in the Contractor's schedule. Contractor shall notify the National Grid Authorized representative and submit an updated project schedule with any modifications to the sequence of work.

1.9 CONTINGENCY

A. The Contractor shall prepare, submit and implement a Contingency Plan that includes, at a minimum:
   1. A Pollution Prevention Plan for all materials brought to the work site that shall include methods to address spills, should they occur.
   2. Emergency vehicular access/egress.
   3. Evacuation procedures for personnel from the work site.

B. A list of all contact personnel with phone numbers, including: the Contractor; the Village of Patchogue fire official(s); ambulance service; local, county, and State police; and local hospitals, including routes to local hospitals, including routes to local hospitals and procedures for notifying each.

C. Identification of responsible personnel who will be in a position at all times to receive incoming phone calls and to dispatch Contractor personnel and equipment in the event of an emergency situation.

1.10 WASTE MANAGEMENT, TRANSPORTATION AND DISPOSAL

A. Wastes generated from the excavation, dewatering and other construction activities shall be transported by the Contractor and disposed at a National Grid approved facility in accordance with Waste Management Plan and the Technical Specifications.

B. Waste generated shall be disposed at an approved disposal facility listed in the *National Grid USA Environmentally Approved Hazardous Waste Disposal and Recycling Facilities*, included with the Contract Documents.

1.11 PROPERTY OWNER OCCUPANCY

A. The National Grid Property Owner will not occupy the Site during the remedial construction activities.

B. It shall be assumed that adjacent property owners/tenants will occupy their respective properties/facilities and that construction activities shall be performed and sequenced in a manner that does not interfere with operations on adjacent properties.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 10 56

PROTECTION OF WORK AND PROPERTY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Precautions and programs to protect the work, existing surface structures and all public and private property from damage.
   2. Protection of active utilities and associated support structures designated to remain.

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections apply to this Section.
   2. Supplemental Conditions to National Grid Remedial Construction Purchase Orders
   3. Section 01 10 00 – Summary of Work
   4. Section 01 33 00 – Submittal Requirements
   5. Section 01 50 00 – Temporary Facilities and Controls

1.2 SUBMITTALS

A. List of damages to property that existed prior to construction or construction-related activities.

1.3 PROJECT CONDITIONS AND COORDINATION

A. Underground utilities are defined to be, but are not limited to: sanitary sewer, water, storm water, gas, oil water separator, cable, other piping, electrical conduits, etc.

B. Underground structures known to National Grid and the National Grid authorized representative are shown on the Design Drawings. This information is shown to assist the Contractor in accordance with the best information available, but is not guaranteed to be correct or complete. The Contractor shall field verify and field mark-out all underground utilities and structures indicated on Design Drawings. The Contractor shall request an official mark out of utilities at and in the immediate vicinity of the Site and limits of work to verify the location of underground utilities with the appropriate agencies.

C. Coordinate with the utility company who owns the utility during the performance of the work to determine which electrical and gas lines or other utilities, presented on the Design Drawings, reference drawings, utility mark-up and encountered in the field, are active and which may be abandoned.

D. Support and protect active utilities to prevent damage and to prevent service interruption. The Contractor shall meet the substantive requirements of the pertinent utility companies with regard to support and protection of any existing utilities impacted by the proposed remedial construction activities.

E. The Contractor shall be liable for all damage and expense for direct or indirect damage caused to an active utility and is responsible to have it repaired promptly. The Contractor shall repair

any damage to protected structures and utilities during construction operations in accordance with the pertinent New York State, Village of Patchogue/ Town of Brookhaven and/or Department of Public Works and utility authorities and as directed by the National Grid approved representative.

F. Surface structures are defined as all existing structures and other facilities at or above the ground surface. Surface structures include, but are not limited to, monitoring wells, piezometers, utility poles (including anchors and support cables), fire hydrants, electrical panels, curbs, piles, fencing, foundations, and all other facilities that are visible above the ground surface.

G. The locations of the proposed remedial activities are fixed and any proposed changes in the location of Work shall be approved by the Design Engineer and/or the National Grid authorized representative to avoid unanticipated underground structures or impediments.

H. If permanent relocation of an underground structure or other subsurface facility is required and is not otherwise provided for in the Contract Documents, the National Grid authorized representative will direct the Contractor in writing to perform the necessary work.

I. The Contractor shall not interrupt utilities unless permitted in writing by National Grid and utility owner and then only after arranging for temporary utility services, if required.

J. Coordinate with utility company and the appropriate local and county authorities when working within utility easements.

K. Take photographs or video of surrounding structures, including buildings, fences, monitoring wells, and utility lines, prior to starting the work to provide a basis for existing conditions.

L. Prior to the implementation of the proposed remedial construction activities, a property conditions assessment (PCA) of nearby structures and buildings will be performed by the Contractor. The PCAs shall serve as a baseline of existing conditions.

M. Replace and restore all other existing surface facilities, including but not limited to fencing, guard rails, posts, guard cables, signs, poles, markers, and curbs, which are temporarily removed to facilitate the performance of the work, to their original condition at the Contractor's expense.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 PROTECTION OF WORK

A. The Contractor shall adhere to section SC-2.0, Care and Protection of Work, in the Supplemental Conditions for protecting all material intended to be used in the Work. In order to prevent damage, injury or loss, the Contractor's actions shall include, but not be limited to, the following:

1. Store apparatus, materials, supplies, and equipment in an orderly, safe manner that will not unduly interfere with the progress of the work or the work of any other subcontractor.
2. Provide suitable storage facilities in accordance with manufacturer's recommendations for all materials which are subject to damage by exposure to weather, theft, breakage or otherwise.
3. Frequent clean up of all refuse, rubbish, scrap materials, and debris caused by site operations, so that the area of the work shall present a safe, orderly and workmanlike appearance at all times.
4. Provide barricades and fences around openings, excavations, and other hazardous areas in accordance with applicable requirements and OSHA regulations.
5. Failure to comply with these provisions could result in stoppage of work until they are met. Any costs incurred due to this work stoppage shall be borne by the Contractor.

B. Immediately repair damages to curbs, monuments, overhead utilities, subsurface utilities, or other property caused by the Contractor, and to the satisfaction of the National Grid authorized representative and/or the Design Engineer, and/or the pertinent utility company, following completion of the work,. The costs for these repairs will be borne solely by the Contractor, as determined by National Grid. The Contractor may take photographs or videos to document damage, which existed prior to construction. Such photographs and/or videos shall be submitted to the National Grid authorized representative prior to construction.

C. Submit to the National Grid authorized representative a list of damages to property that existed prior to construction or construction-related activity. Submit the list in the sequence with the construction progress and sufficiently in advance for the National Grid authorized representative to verify the damages. The lists shall include the following information:
   1. Location of damage;
   2. Nature of damage; and
   3. Extent of damage.

D. Immediately notify the National Grid authorized representative of any and all claims and complaints arising as a result of the work. Provide assistance, as required, to resolve all claims and complaints.

1.2 VIBRATION MONITORING FOR SENSITIVE STRUCTURES/RECEPTORS

A. Perform the remedial construction in a manner that will limit the potential for adverse impacts due to vibrations.

B. The Contractor will perform vibration and settlement monitoring during the Work.

1.3 BARRICADES AND WARNING SIGNALS

A. Furnish and erect barricades, fences, lights, warning signs, and danger signals as required and take other precautionary measures for the protection of persons or property and of the work, where work is performed on or adjacent to any roadway, right-of-way, or public place.

1.4 PROTECTION OF EXISTING UTILITIES AND STRUCTURES

A. Existing Utility Poles: Protect and support existing on-site utility poles that are actively in service and are within the planned remedial work areas. Protect and support the existing on-site utility poles that are to remain in place in accordance with the requirements of the pertinent utility company.

B. Protection of Underground and Surface Structures: Sustain in place and protect from direct or indirect damage, the designated utilities (active or inactive) to remain.

C. Flag, barricade or otherwise suitably protect existing buildings, above and below ground facilities, and public roadways during construction operations.

END OF SECTION

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General Conditions

B. Schedule of values.

C. Applications for payment.

D. Progress payments.

E. Payment for material delivered.

F. Change procedures.

G. Defect assessment.

H. Unit prices.

I. Alternates.

1.2 GENERAL CONDITIONS

A. For lump-sum items, payment will be made set forth in the Contract on the basis of actual Work completed.

B. For unit-price items, payment will be based on the actual amount of Work accepted and for the actual quantity of materials in place, as shown by final measurement.

C. All units of measurement shall be standard United Stated convention as applied to the specific items of Work by tradition and as interpreted by Design Engineer.

D. At the end of each day's work, Contractor's Representative shall meet with the National Grid authorized representative and determine the quantities of unit price Work accomplished and/or completed during the workday.

E. Contractor's Site Manager shall prepare a "Daily Work Summary" report which shall be signed by the Contractor's Site Manager.

F. Each month, Contractor shall prepare a "Monthly Progress Summation" form from the month's accumulation of "Daily Work Summary" reports, which shall be signed by the Contractor Project Manger.

G. These completed forms will provide the basis for National Grid and/or the National Grid authorized representative review and verification of monthly applications for payment submitted by Contractor.

1.3 SCHEDULE OF VALUES

A. Submit Schedule of Values in duplicate within 5 days after Notice of Award.

1.4 APPLICATIONS FOR PAYMENT

A. Submit a template of the payment application to National Grid and/or the National Grid authorized representative for approval.

B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

C. Submit updated construction schedule with each Application for Payment.

D. Payment Period: Submit at intervals stipulated in the executed Contract.

E. Submit with transmittal letter as specified for Submittals in Section 01 33 00 - Submittal Requirements.

F. Substantiating Data: When Construction Manager requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
   1. Partial release of liens from major subcontractors and vendors.
   2. Record documents as specified in Section 01 70 00, for review by National Grid and/or the National Grid authorized representative which will be returned to Contractor.
   3. Construction progress schedules, revised and current as specified in Section 01 33 00.

1.5 PROGRESS PAYMENTS

A. Progress payments shall be made monthly as the Work progresses in accordance with the Contract. All progress invoices and payments shall be subject to correction in the final quantity invoice and payment.

B. No monthly payment shall be required to made when, in judgment of National Grid and/or the National Grid authorized representative, the Work is not proceeding in accordance with the provisions of the Contract Documents, or when, in his/her judgment, the total value of the Work performed since the last payment amounts to less than $1,000.00 other than for the final payment.

C. A retainage of 10% (ten percent) will be made on all progress payment. Retainage shall be paid after National Grid and/or the National Grid authorized representative determines that a Work has been satisfactory performed and completed in accordance with the Contract Documents.

D. Neither the final payment nor any part of any retained percentage shall become due until Contractor shall deliver to the National Grid and/or the National Grid authorized representative a complete waiver and release of any and all liens, and claims and rights of lien under the laws and regulations of the State wherein the Work is performed relating to Mechanic's Liens or materialmen's liens on account of labor or materials or both, arising out of the Work performed hereunder, and an affidavit stating that the waiver and release include all the work, labor, materials, equipment, services and all other indebtedness in connection with the Work for which a lien might be filed. Contractor's affidavit shall recite that there are no unsatisfied or outstanding claims or demand by virtue of said Work which can be asserted against National Grid and/or the National Grid authorized representative or the real estate or improvements upon which the Work is performed, by way of Mechanic's Lien or materialmen's lien or similar lien or action, however

called. All affidavits, waivers and releases shall be satisfactory in form and content to the Construction Manager.

E. The final payment, including any retained percentage, due to the Contractor for Work performed shall be paid within thirty (30) days after (1) the furnishing by Contractor to Construction Manager of the necessary documents required by Paragraph D above, (2) proof satisfactory to Construction Manager that there are no unsatisfied claims for injuries to persons or property, and no other indebtedness in connection with the Work, (3) the Work is complete, and (4) written acceptance of the Work by Construction Manager.

1.6 CHANGE PROCEDURES

A. Payment shall not be made for materials and equipment not incorporated into the Work.

B. No progress payment shall be made upon fuels, supplies, falsework, or other materials that are not a permanent part of the Contract.

1.7 CHANGE PROCEDURES

A. Submittals: Submit name of individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. The Construction Manager will advise of minor changes in the Work not involving adjustment to Contract Price or Contract Time by issuing supplemental instructions.

C. The Construction Manager may issue a Proposal Request including a detailed description of proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change and the period of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within 5 days.

D. Contractor may propose changes by submitting a request for change to the National Grid and/or the National Grid authorized representative, describing proposed change and its fill effect on the Work. Include a statement describing reason for the change, and effect on Contract Price and Contract Time with full documentation and a statement describing effect on Work by separate or other Contractors.

E. Stipulated Price Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for Change Order as approved by the Construction Manager.

F. Unit price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit prices basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under Construction Change Directive. Changes in Contract Price or Contract Time will be computed as specified based on method determined by the Construction Manager in the Construction Change Directive.

G. Construction Change Directive: the National Grid authorized representative may issue directive, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Price and Contract Time. Promptly execute change.

H. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. The Construction Manager will determine change allowable in Contract Price and Contract Time as provided in Contract Documents.

I. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs in the Work.

J. Document each quotation for change in cost or time with sufficient data to allow evaluation of quotation.

K. Execution of Change Orders: National Grid and/or the National Grid authorized representative will issue Change Orders for signatures of parties as provided in Conditions of the Contract.

L. Correlation of Contractor Submittals.
   1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Price.
   2. Promptly revise progress schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
   3. Promptly enter changes in Project Record Documents.

1.8 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of the Design Engineer, it is not practical to remove and replace the Work, National Grid and/or the National Grid authorized representative will direct appropriate remedy or adjust payment.

C. At the discretion of the Construction Manager, defective Work will be partially repaired to instructions of the Engineer, and unit price will be adjusted to new price at discretion of Construction Manager.

D. Individual specification sections may modify these options or may identify specific formula or percentage price reduction.

E. Authority of Construction Manager to assess defects and identify payment adjustments, is final.

F. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products stored improperly.
   4. Products not completely unloaded from transporting vehicle.
   5. Products placed beyond lines and levels of required Work.
   6. Products remaining on hand after completion of the Work.
   7. Loading, hauling, and disposing of rejected products.

1.9 UNIT PRICES

A. Authority: Measurement methods are delineated in individual specification sections.

B. Measurement methods delineated in individual specification sections complement criteria of this section. In event of conflict, requirements of individual specification section govern.

C. Take measurements and compute quantities. The National Grid authorized representative will verify measurements and quantities.

D. Unit Quantities: Quantities and measurements indicated in Bid Form are for contract purposes only. Actual quantities provided shall determine payment.
   1. When actual Work requires more or fewer quantities than those quantities indicated, provide required quantities at unit prices contracted.
   2. When actual Work requires 25 percent or greater change in quantity than those quantities indicated, National Grid or Contractor may claim for Contract Price adjustment.

E. Payment Includes: Full compensation for required labor, products, tools, equipment, transportation, services and incidentals; erection, application or installation of item of the Work; overhead and profit.

F. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by Construction Manager multiplied by unit price for Work incorporated in or made necessary by the Work.

G. Measurement Of Quantities:
   1. Weigh Scales: Inspected, tested and certified by applicable New York Weights and Measures department within past one year.
   2. Platform Scales: Of sufficient size and capacity to accommodate conveying vehicle.
   3. Metering Devices: Inspected, tested and certified by applicable New York department within past year.
   4. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
   5. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
   6. Measurement by Area: Measured by square dimension using mean length and width or radius.
   7. Linear Measurement: Measured by linear dimension, at item centerline or mean chord.
   8. Stipulated Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of the Work.

1.10 ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at the National Grid authorized representative's option. Accepted Alternates will be identified in the executed Contract.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Project coordination and conditions.
   2. Field engineering.
   3. Preconstruction meeting.
   4. Site mobilization meeting.
   5. Progress meetings.

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
   2. Section 01 10 00 – Summary of Work.
   3. Section 01 30 50 – Work Restrictions.
   4. Section 01 50 00 – Temporary Facilities and Controls.

1.2 SUBMITTALS

A. The Contractor shall submit a Survey Control Plan. The Survey Control Plan shall include the Contractor's proposed method of recording survey data within each excavation cell and a drawing showing the elevation tracking locations on a 15-foot grid to be used for each excavation cell during the remedial activities.

B. Five (5) signed and sealed as-built surveys detailing Existing Site Conditions, Excavation Plan including final excavation depths and excavation sloping, if applicable, and Final Site Conditions.

C. Meeting Minutes (preconstruction, site mobilization, progress)

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 COORDINATION AND PROJECT CONDITIONS

A. Contractor shall cooperate with National Grid and/or the National Grid authorized representative in all activities, as necessary, to ascertain compliance with the Contract Documents, including but not limited to providing data, providing working record drawings, collecting samples, site security, site access, transportation and off-site disposal of remediation derived waste, and any reasonable requests for information or use of personnel and equipment.

B. Regardless of how extensive or intensive the monitoring of Work quality, National Grid will not be responsible for construction means, methods, techniques, sequences or procedures, safety precautions and programs in connection with the Work, and Contractor's failure to carry out the Work in accordance with the Contract Documents. National Grid's duties, services, and work will in no way supersede or dilute Contractor's obligation to perform Work in conformance with all Contract requirements. An authorized representative is empowered by National Grid to act on behalf of National Grid with respect to the proper execution of the Work and to issue a Stop Work order or to give instructions when necessary to require such corrective measures as may be necessary, in the professional opinion of the National Grid authorized representative, for the proper execution of the Contract or to protect National Grid's interest.

C. National Grid, the National Grid authorized representative, NYSDEC representatives, Design Engineer, other employees and any other parties who may enter into contracts with National Grid for doing Work within the area covered by the Contract or representatives of local, State and Federal regulatory agencies shall, for all purposes which may be required by their contracts or authority, have access to the Work and the premises used by Contractor, and Contractor shall provide safe and proper facilities therefore.

D. The National Grid authorized representative, Design Engineer, or others may conduct independent observations or sampling and analyses for the purpose of assessing the Work by Contractor. Contractor shall fully cooperate with the National Grid authorized representative and/or Design Engineer in the collection of any such samples, and shall provide assistance (labor or equipment) as appropriate.

E. Coordinate scheduling, submittals, and Work of various sections of project design documents to ensure efficient and orderly sequence of installation of interdependent construction elements.

F. The Contractor shall provide a full-time capable and experienced Construction Superintendent, Resident QA/QC Engineer, Competent Person(s) and Site Safety Officer (SSO) for the duration of the remedial construction activities at the Site. These individuals shall be totally responsible for the execution of the work as representatives of the Contractor and shall coordinate all activities with National Grid and the National Grid authorized representative. If qualified, the Construction Superintendent can act as a Competent Person.

G. The Contractor shall coordinate, supervise, direct and cooperate fully with subcontractors, manufacturers, fabricators, suppliers, distributors, installers and testing agencies whose services, materials or equipment are required to ensure the completion of the work and comply with the project schedule. The Contractor shall have no claim against National Grid or the National Grid authorized representative for delay caused by conflicts with their subcontractors and utility service companies.

H. The Contractor is required to provide all necessary coordination with the pertinent utility companies and governmental entities regarding the implementation of the proposed remedial construction activities.

I. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.

J. Coordinate with National Grid access to the Site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of property National Grid's activities.

K. The Contractor shall minimize direct communications with regulatory agency personnel outside of regular progress meetings and members of the public and other interested parties (excluding regulatory agency personnel). Direct communication with these entities is the sole responsibility of National Grid.

L. The Contractor shall participate in all project coordination or progress meetings to comply with the project schedule.

3.2 FIELD ENGINEERING

A. Employ Land Surveyor registered in State of New York and approved by National Grid.

B. Locate and protect survey control and reference points. Promptly notify National Grid of discrepancies discovered.

C. Control datum for survey is that shown on Design Drawings.

D. Verify set-backs and easements; confirm drawing dimensions and elevations.

E. Provide the following the services:
   1. Establish and demarcate the Limit of Work, property lines, limits of each excavation area, setbacks, existing wells, existing utilities and associated structures, subsurface structures, and as directed by the National Grid authorized representative.
   2. Obtain the necessary information and prepare the following survey drawings: Existing Site Conditions; Excavation Plan including final excavation depths and excavation sloping, if applicable; and Final Site Conditions.
   3. Provide field engineering services during construction including mapping of bedrock fractures, as directed by the National Grid authorized representative.

F. Vertical survey tolerance to be maintained during construction is 0.15 foot for general site grading and 0.05 foot for structural features (e.g. pipes, manholes, etc.) unless otherwise specified in the Design Drawings or approved by the Design Engineer.

G. Within each excavation area, the Contractor shall prepare a tabular summary of pre- and post-excavation elevations for each of the removal elevation tracking locations, and submit the completed table (as appropriate) to the National Grid authorized representative for review prior to the placement of any backfill material. The Contractor shall proceed with backfill placement until directed to do so by the National Grid authorized representative.

H. The Contractor shall establish a 5-foot grid to be used within the off-site excavation area to record both pre-existing and post-construction surface elevations. Pre-existing and post-construction survey locations shall be co-located. The Contractor shall submit a drawing illustrating the proposed location of the 5-foot grid as part of the Survey Control Plan.

I. The Contractor shall establish a 20-foot grid to be used within the on-site ISS and environmental cap location to record both pre-existing and post-construction surface elevations. Pre-existing and post-construction survey locations shall be co-located. The Contractor shall submit a drawing illustrating the proposed location of the 20-foot grid as part of the Survey Control Plan.

J. Maintain complete and accurate log of control and survey work as Work progresses.

K. Surveyor shall submit 5 copies of surveys, signed and sealed by Land Surveyor, of each required survey drawing.

3.3 PRECONSTRUCTION MEETING

A. The National Grid authorized representative will schedule meeting after Notice of Award.

B. Attendance Required: National Grid, the National Grid authorized representative, Contractor Project Manager and Superintendent, Contractor Site Safety Officer, and Design Engineer.

C. Agenda:
   1. Execution of National Grid-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
   5. Designation of personnel representing parties in Contract and Engineer.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   7. Scheduling.

D. The National Grid authorized representative will record minutes and distribute copies within five days after meeting to participants, with electronic and hard copies to: National Grid, the National Grid authorized representative, Design Engineer, Contractor and those affected by decisions made.

3.4 SITE MOBILIZATION MEETING

A. Engineer will schedule meeting at Project site prior to Contractor occupancy.

B. Attendance Required: National Grid, the National Grid authorized representative, Contractor Project Manager and Superintendent, Contractor Site Safety Officer, Design Engineer, NYSDEC Representative, and major Subcontractors.

C. Agenda:
1. Use of premises by National Grid and Contractor.
2. National Grid's requirements.
3. Survey and excavation layout.
4. Security and housekeeping procedures.
5. Schedules.
6. Application for payment procedures.
7. Procedures for testing.
8. Procedures for maintaining record documents.
9. Requirements for start-up of equipment.
10. Inspection and acceptance of equipment put into service during construction period.

D. The National Grid authorized representative will record minutes and distribute copies within five days after meeting to participants, with electronic and hard copies to: National Grid, the National Grid authorized representative, Design Engineer, Contractor and those affected by decisions made.

3.5 PROGRESS MEETINGS

A. The National Grid authorized representative will schedule and administer meetings throughout progress of the Work, to be attended by the Contractor Project Manager and Site Superintendent, at maximum weekly intervals.

B. Contractor will make arrangements for meetings, prepare agenda with copies for participants and preside at meetings.

C. Attendance Required: National Grid, the National Grid authorized representative, Contractor Project Manager and Superintendent, Contractor Site Safety Officer, Design Engineer, NYSDEC Representative, and major subcontractors and suppliers, as appropriate to agenda topics for each meeting.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems impeding planned progress.
5. Review of submittals schedule and status of submittals.
6. Maintenance of progress schedule.
7. Corrective measures to regain projected schedules.
8. Planned progress during succeeding work period.
9. Coordination of projected progress.
10. Maintenance of quality and work standards.

11. Effect of proposed changes on progress schedule and coordination.
12. Other business relating to Work.

E. The Contractor will be responsible for recording the minutes of meetings and will include any significant proceedings and decisions. The Contractor will provide the minutes of the meetings to National Grid, the National Grid authorized representative, Contractor, and Design Engineer for review and approval. Once approved, copies of the minutes shall be distributed to each participant in the meeting and to parties affected by decisions made at the meeting. Deviations or clarifications to the meeting minutes shall be made in writing and are subject to acceptance and approval by National Grid and/or the National Grid authorized representative.

END OF SECTION

SECTION 01 30 50

WORK RESTRICTIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Use of Site.
   2. Restrictions on performing work

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
   2. Section 01 10 00 – Summary of Work

1.2 USE OF SITE

A. Perform all work during hours specified by local, county, and/or state agencies. Notify the National Grid at least one week in advance, if a deviation from the normal working hours (Monday- Friday 7:00 a.m. – 5:00 p.m.) is required. National Grid and/or the National Grid authorized representative shall not be responsible for extra costs associated with the Contractor's expenses/fees for work outside the normal work hours in order to meet scheduled deadlines/constraints.

B. Limit the use of Site to work in areas indicated. Do not disturb portions of Site beyond areas in which the Work is indicated.
   1. Limits: Confine constructions operations to areas indicated on the Design Drawings.
   2. Work Area Access: The Contractor will interact with National Grid and/or the National Grid authorized representative, for arranging access to the work areas and to designate areas for decontamination, parking, materials and equipment storage, contaminated waste storage and other operations as needed in support of the remedial work.
   3. Roadways, Driveways and Entrances: Keep roadways, driveways and entrances serving premises clear and available to employees, authorized visitors and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
   4. Off Site Excavation Area: Keep disturbance of the off-site work area and nearby building to a minimum during Work activities. Abide and enforce necessary traffic control measures to ensure the safety of all parties during Work hours.
   5. Schedule deliveries to minimize use of driveways and entrances.
   6. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
   7. Access for both vehicles and personnel, to the Site and off Site Work area shall be as depicted on the Design Drawings.

1.3 RESTRICTIONS IN WORKING IN PROXIMITY TO OVERHEAD UTILITIES

A. Overhead electrical lines are present at the Site. Overhead electrical lines currently located on the eastern side of the property will be relocated to the Utility Corridor by LIPA to the western side of the property. The Contractor shall use extreme care during the implementation of the remedial construction activities so as not to damage or interfere with these utilities. Contractor shall coordinate with the property owners and utility purveyors of these lines to establish minimum setbacks from these overhead lines for all equipment and personnel.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 30 65

HEALTH AND SAFETY REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. General requirements.
   2. Contractor Health and Safety Plan.
   3. Submittals.
   4. References and Standards.

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
   2. Section 01 10 10 – Summary of Work.
   3. Section 01 33 00 – Submittal Requirements.

1.2 GENERAL REQUIREMENTS

A. The Contractor shall be responsible for providing all personnel, facilities, equipment and materials to protect on-site workers from physical injury and adverse health effects due to exposure to potential Site hazards. All on-site personnel shall comply with the requirements of a Site-Specific Health and Safety Plan (SSHASP) prepared by the Contractor.

B. The Contractor shall provide a dedicated, qualified, and experienced Site Health & Safety Officer to the Project (SHASO) to monitor all necessary requirements as outlined in the SSHASP. The SHASO will have no other responsibilities except for those related to health and safety issues including, but not limited to:
   1. Conducting daily H&S meetings and job safety analyses.
   2. Performing and documenting work-zone air monitoring and enforcement of work-zone action levels.
   3. Inspection of decontamination areas and implementation of proper decontamination procedures.
   4. Inspection of construction fencing and barriers.
   5. Restriction of access to work zone by unauthorized personnel.

C. Work-zone air monitoring shall be performed by the Contractor in accordance with the SSHASP. The work-zone action levels are specified for the Project are presented in the SSHASP.

1.3 CONTRACTOR HEALTH AND SAFETY PLAN

A. Contractor shall provide a SSHASP which establishes policies and procedures to protect workers and the public from the potential hazards posed by the work. Contractor shall be responsible for preparing and implementing the SSHASP. This SSHASP shall apply to all

personnel on site during construction, including but not limited to, Contractor's employees and Subcontractor's employees. The Contractor's SSHASP shall conform to the requirements of Item SC-34.0 of the *Supplemental Conditions to National Grid Remedial Construction Purchase Orders (NG SC 5/18/2005)*.

B. At a minimum the plan shall:
   1. Include any additional requirements that the Contractor deems to be appropriate or applicable to the Work, the Site, or the Contractor's methods and/or equipment.
   2. Name key personnel and alternates responsible for site safety.
   3. Describe risks associated with each operation conducted.
   4. Confirm that personnel are adequately trained to perform their job responsibilities and to handle the specific hazardous situations they may encounter.
   5. Describe the protective clothing and equipment to be worn by personnel during various site operations.
   6. Describe any site-specific medical surveillance requirements.
   7. Describe the program for periodic air monitoring, personnel monitoring, and environmental sampling.
   8. Describe the actions to be taken to mitigate existing hazards to make the work environment less hazardous.
   9. Define site control measures and include a site map.
   10. Establish decontamination procedures for personnel and equipment.
   11. Describe audit/inspection program to ensure compliance with the SSHASP.
   12. Designation of Work-Specific Areas, including exclusion zone, contamination reduction zone, and health/safety/emergency facilities.

1.4 SUBMITTALS

A. Submit SSHASP in accordance with Section 01 33 00.

B. Within 14 days of Notice of Award but no less than 14 days prior to commencement of field activities. Contractor shall submit the following to National Grid:
   1. Written SSHASP containing all requirements under 29 CFR 1910.120. The plan shall be written to avoid misinterpretation, ambiguity, and mistakes that verbal orders cause.
   2. Documentation of medical monitoring.
   3. Documentation of 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training and applicable 8-hr annual HAZWOPER refresher training and other applicable training (e.g., confined space entry).
   4. Documentation of personnel respirator qualification and fit testing.

C. During Construction Activities:
   1. All required forms and OSHA records will be kept on Site.
   2. The Contractor shall provide documentation certifying that all on-site personnel have read and understood the provisions of the plan, as per Item SC-34.0 of the *Supplemental Conditions to National Grid Remedial Construction Purchase Orders (NG SC 5/18/2005)*.

D. Work Zone and Air and Dust Monitoring:
   1. Provisions must be made for work area monitoring during construction activities, as per section SC-34.0 of the *Supplemental Conditions to National Grid Remedial Construction Purchase Orders (NG SC 5/18/2005)*. The

monitoring devices to be used at a minimum, are a combustible gas/oxygen meter, a photoionization detector (PID), MIE MiniRAM portable dust monitor, and an LEL/Oxygen/Carbon Monoxide/Hydrogen Sulfide monitor.

2. Work zone monitoring results shall be continuously reviewed and documented by Contractor. Contractor shall notify Natinoal Grid approved representative immediately of concentrations above the specified action levels for organic compounds and dust. These elevated conditions will be recorded in the Contractor's Daily Field Reports.
3. Contractor shall submit documented monitoring results daily and the electronic data files weekly.
4. Complete monitoring results shall be submitted within seven (7) days of completion of Work.

E. Community Air Monitoring Results:
1. A community Air Monitoring Plan will be implemented at the Site.
2. Community air monitoring results shall be continuously reviewed by an Air Monitoring Manager. Air Monitoring Manager shall notify the National Grid authorized representative and the Contractor immediately of concentrations above established action levels for volatile organic compounds (VOCs), dust and odors. These elevated conditions will be recorded and be available for review.
3. Contractor shall implemented corrective measures and document these actions in daily field reports.

1.5 REFERENCES AND STANDARDS

A. Federal OSHA Standards
1. Air Contaminants - Permissible Exposure Limits; OSHA 3112; 1989.
2. General Industry Standards and Interpretations; Volumes 1 - 3- OSHA 2077; U.S. Department of Labor, Occupational Safety and Health Administration; Specifically Sections: 29 CFR 1910.1000-1050 (air contaminants), 1910.120 (Hazardous Waste Operations and Emergency Response), 1910.1200 (Hazard Communication), 1910.301 Subpart S (Electrical), 1910.146 (Permit Required Confined Space) 1910.147 (Control of Hazardous Energy (Lockout/Tagout)), 1904 (Recordkeeping and Reporting Occupational Injuries and Illnesses), 1990 (Identification, Classification and Regulation of Potential Occupational Carcinogens), and 1926 (Safety and Health Regulations for Construction).
3. Hazardous Waste Inspections Reference Manual; U.S. Department of Labor; Occupational Safety and Health Administration; 1986.
4. OSHA Field Operations Manual; 2nd Edition; U.S. Department of Labor; Occupational Safety and Health Administration; 1987.

B. Other References and Standards
1. A Guide to the Safe Handling of Hazardous Materials Accidents; STP 825; American Society for Testing and Materials; 1983.
2. Air Sampling Instruments; 6th Edition; American Conference of Governmental Industrial Hygienists (ACGIH); 1983.
3. Air Surveillance for Hazardous Materials; USEPA Office of Emergency and Remedial Response, Hazardous Response Support Division; 1985.
4. Casarett and Doull's Toxicology -- The Basic Science of Poisons; 3rd Edition; Klaassen, CD, Amdur, MO, Doull, J; MacMillan; 1986.

5. Dangerous Properties of Industrial Materials; Sax, NI; Van Nostrand Reinhold Cn.; New York; 1988.
6. Detector Tube Handbook, 7th Edition; Dragerwerk AG Lubeck (National Draeger); 1989.
7. Fire Service Emergency Management Handbook; Federal Emergency Management Agency; 1985.
8. Fire Protection Guide on Hazardous Materials; 8th Edition; National Fire Protection Association; 1986,
9. Fundamentals of Industrial Hygiene, 3rd Edition; Plog, BA; National Safety Council; 1988.
10. Guide to Industrial Respiratory Protection; NIOSH Publication 87-116; US Department of Health and Human Services, Public Health Service, Centers for Disease Control, NIOSH; 1987.
11. Guide to Portable Instruments for Assessing Airborne Pollutants Arising from Hazardous Wastes; (draft international document); International Organization of Legal Metrology; 1988.
12. Guidelines for the Selection of Personal Protective Equipment; 3rd Edition; Schwope, A.D.; American Conference of Governmental Industrial Hygienists; Cincinnati; 1987.
13. Handbook of Reactive Chemical Hazards; 3rd Edition; Bretherick, L.; Butterworths, London; 1985.
14. Hazardous Materials: Practical Tactical Considerations for Emergency Response Personnel (seminar proceedings); Institute for Life Safety Technology and Emergency Management Education; International Society of Fire Service Instructors.
15. Hazardous Waste Handbook for Health and Safety; Martin, W.F.; Lippit, J.M.; Prothero, T.C.; Butterworth Publishers; 1987.
16. Hazardous Materials Emergencies Response and Control; Cashmon, J.R.; Technomic Publishing Company; 1983.
17. Hazardous Materials; Isman, W.E., Carlson, G.P.; MacMillan; 1980.
18. Hazardous Materials for First Responders; First Edition; International Fire Service Training Association, Oklahoma State University; 1988.
19. Health and Safety Audit Guidelines - SARA Title I Section 126; USEPA Office of Emergency and Remedial Response, EPA 540/G-89/010; December 1989.
20. ILO Encyclopedia of Occupational Health and Safety; Volumes 1 and 2; International Labor Organization; 1983.
21. Industrial Hygiene -- A Guide to Technical Information Sources; Tucker, M.E.; American Industrial Hygiene Association; 1984.
22. NIOSH Manual of Analytical Methods; 3rd Edition; DHHS (NIOSH) Publication No. 84-100, Eller, P. M., Ph.D., CIH Editor; February 1984.
23. NIOSH/OSHA Pocket Guide to Chemical Hazards; U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, NIOSH; 1994.
24. Occupational Health Guidelines for Chemical Hazards; NIOSH/OSHA Department of Health and Human Services (NIOSH) Publication No. 81-113; January 1981.
25. Occupational Safety and Health Guidance Manual for Hazardous Waste, Site Activities; NIOSH/OSHA/USCG/EPA; U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, NIOSH; 1985.

26. Patty's Industrial Hygiene and Toxicology; Volumes I through 3B. Clayton, F. E. et al; John Wiley and Sons, Inc.; 1978.
27. Performance of Protective Clothing; Barker, R.L., Colletta, G.C.; American Society for Testing and Materials; 1986.
28. Personal Protective Equipment for Hazardous Materials Incidents: A Selection Guide; NIOSH Publication 84-114; U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, NIOSH; 1984.
29. Practical Guide to Respirator Use in Industry; Rajhans, GS, Blackwell, DSL; Butterworth; 1985.
30. Protecting Personnel at Hazardous Waste Sites; Levine, S.P., Martin, W.F.; Butterworths.
31. Safety and Health in Building and Civil Engineering Work; International Labor Office, Geneva; 3rd Printing, 1985.
32. The Health Physics and Radiological Health Handbook; Nucleon Lectern Associates, Inc. Schleien, B. et al. editors; 1984.
33. The Industrial Environment -- Its Evaluation and Control; US Public Health Service, Centers for Disease Control, NIOSH; 1973.
34. The Merck Index, an Encyclopedia of Chemicals and Drugs; 11th Ed. Merck Company; 1989.
35. Threshold Limit Values and Biological Exposure Indices for 1992-1993; American Conference of Governmental Industrial Hygienists (ACGIH).

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL

A. The Contractor shall be responsible for providing all personnel, facilities, equipment and materials to protect all on-site workers from physical injury and adverse health effects due to exposure to site hazards.

B. All on-site personnel shall comply with the requirements of a Site Specific Health and Safety Plan (HASP) prepared by the Contractor and approved by National Grid or its designated representative.

END OF SECTION

SECTION 01 33 00

SUBMITTAL REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Submittal procedures.
2. Work Plans.
3. Construction progress schedule.
4. Proposed products list.
5. Product data.
6. Shop drawings.
7. Design data.
8. Certificates.
9. Manufacturer's instructions.
10. Manufacturer's field reports.
11. Construction photographs.

B. Related Sections and Documents
1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
2. Section 01 10 00 - Summary of Work.
3. Section 01 40 00 Quality Requirements.
4. Section 01 70 00 - Execution Requirements.

1.2 SUBMITTAL PROCEDURES

A. All submittals requiring National Grid review and approval shall include calculations, construction drawings, shop drawings, plans, reports, records, photographs, diagrams and details where applicable to facilitate the review by National Grid. All submittals shall be submitted to the National Grid Authorized Representative for distribution to National Grid.

B. The Contractor shall conform to the following requirements regarding submittals:
1. Number of Copies: Submit six (6) copies of each submittal, unless otherwise indicated. National Grid will not return copies. Also, one electronic copy of each submittal shall be provided by the Contractor.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and Certifications shall be signed by an officer, or other individual, authorized to sign documents on behalf of that entity. Submittals requiring preparation by an engineer shall be signed and sealed by a Professional Engineer licensed to practice engineering in the State of New York.
3. Test and Inspection Reports: Comply with requirements in Section 01 40 00, Quality Requirements.

C. Transmit each submittal with National Grid accepted form.

D. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.

E. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.

F. Schedule submittals to expedite Project. Coordinate submission of related items with the National Grid Authorized Representative and Design Engineer.

G. For each submittal for review, allow 20 days excluding delivery time to and from Contractor.

H. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.

I. Allow space on submittals for Contractor and National Grid Authorized Representative and/or Design Engineer review stamps.

J. When revised for resubmission, identify changes made since previous submission.

K. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

L. Submittals not requested will not be recognized or processed.

1.3 WORK PLANS

A. During the development of the remedial design, the Contractor shall provide submittals to National Grid and/or the Design Engineer, some of which will be incorporated into the design and subsequent design submittals to the NYSDEC (i.e., 95% and 100% RDR). The Plans to be submitted include:
   1. Contingency Plan (Section 01 10 00).
   2. Survey Control Plan (Section 01 30 00).
   3. Amendments to Site-Specific Health and Safety Plan (Section 01 30 65).
   4. Construction Management Plan (Section 01 33 00).
   5. Site-Specific Construction Quality Control Project Plan (CQCPP) (Section 01 40 00).
   6. Amendments to Dust, Odor, and Noise Control Plan (Section 01 52 00).
   7. Amendments to Material and Equipment Decontamination Plan (Section 01 52 20).
   8. Site Security Plan (Section 01 54 00).
   9. Temporary Construction Access Plan (Section 31 20 00).
   10. Amendments to Dewatering Plan (Section 31 23 19).
   11. Amendments to Vibration and Noise Mitigation Plan (Section 31 41 16).
   12. Amendments to Excavation Plan (Section 31 23 16)
   13. Amendments to Erosion and Sediment Control (E&SC) Plan (Section 31 25 13).
   14. ISS Pilot Scale-Study Work Plan (Section 31 80 00)
   15. ISS Work Plan (Section 31 80 00)
   16. Amendments to Utility Protection and Rerouting Plan (Section 33 05 18).
   17. A detailed CPM construction schedule
   18. Site preparation activities including the implementation of soil erosion and sediment control measures
   19. Methods for protection of work and property

20. Methods for support and protection of impacted utilities
21. Sequencing of the implementation of the remedial construction activities
22. Proposed equipment, supplies, materials, labor and methodology for implementing the proposed remedial construction activities
23. Proposed staging areas for equipment and materials
24. Proposed equipment and personnel decontamination areas
25. List of subcontractor(s) to be used by the Contractor
26. Design submittal for the temporary fabric enclosure(s) to be utilized for the remedial excavation activities, including number of enclosures and sizing
27. Manufacturer's specifications and details on the VMS system(s)
28. Final design submittal for the support of the remedial excavation areas
29. Procedures for erection and relocation of the temporary fabric enclosures
30. Mitigation procedures to be implemented for limiting of vibration, noise, and fugitive odors during remedial construction
31. Certification sheets for all off-site backfill materials
32. Proposed trucking subcontractors to be utilized including the number of trucks per day
33. Procedures for demolition and removal of subsurface foundations (i.e., former gas holder, industrial piping, foundations, and tunnel entrance)
34. Procedures to ensure work does not undermine the foundations of adjacent streets and property
35. Procedures for implementing construction activities in proximity to overhead and underground utilities
36. Proposed disposal facilities to be utilized during the remedial work
37. MSDS sheets for all materials brought on site
38. Side-slope stabilization methods (i.e., benching, shoring, etc.) to be utilized for the remedial excavation areas
39. Methods for subsurface utility exposure (i.e., removing overburden soil), protection, and utility support within the site
40. Sources for backfill material including required certifications and analytical data
41. Mitigation procedures to be implemented for limiting of vibration, noise, and fugitive odors during remedial construction

B. After approval by National Grid and/or the National Grid authorized representative and Design Engineer, the Plans will be compiled to create a Construction Management Plan.

1.4 CONSTRUCTION PROGRESS SCHEDULE

A. Submit initial schedules within 15 days after date of National Grid-Contractor Agreement. After review, resubmit required revised data within ten (10) days.

B. Submit revised Progress Schedules with each Application for Payment.

C. Revisions To Progress Schedule:
   1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
   2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
   3. Prepare narrative report to define problem areas, anticipated delays, and impact on Progress Schedule. Report corrective action taken, or proposed, and its effect.

D. Distribute copies of reviewed schedules at each Weekly Progress Meeting and to Project site file, subcontractors, suppliers, and other concerned parties.

E. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

F. Submit computer generated chart with separate line for each section of Work, identifying first work day of each week.

G. Show complete sequence of report preparation and construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.

H. Indicate estimated percentage of completion for each item of Work at each submission and at each Weekly Progress Meeting.

I. Indicate delivery dates for products.

1.5 PROPOSED PRODUCTS LIST

A. Submit list of major products proposed for use, with name of manufacturer of each product not less than 15 days prior to mobilization.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.6 PRODUCT DATA

A. Product Data: Submit to National Grid, the National Grid authorized representative and Design Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

1.7 SHOP DRAWINGS

A. Shop Drawings: Submit to National Grid, the National Grid authorized representative and Design Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. When required by individual specification sections, provide shop drawings, signed and sealed by professional engineer licensed in the State of New York, and responsible for designing components shown on shop drawings.
   1. Include signed and sealed calculations to support design.
   2. Make revisions and provide additional information when required by authorities having jurisdiction.

1.8 DESIGN DATA

A. Submit to National Grid, the National Grid authorized representative and Design Engineer for approval.

B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.9 CERTIFICATES

A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or subcontractor to National Grid, the National Grid authorized representative, and Design Engineer.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to National Grid, the National Grid authorized representative, and Design Engineer.

1.10 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, to National Grid, the National Grid authorized representative, and Design Engineer.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.11 MANUFACTURER'S FIELD REPORTS

A. Submit to National Grid, the National Grid authorized representative, and Design Engineer.

B. Submit report within five (5) days of observation for information for limited purpose of assessing conformance with information given and design specified in Contract Documents.

1.12 CONSTRUCTION PHOTOGRAPHS

A. Provide photographs of Site and construction throughout progress of Work to National Grid, the National Grid authorized representative, and Design Engineer.

B. Each month submit photographs with Application for Payment.

C. Digital photographs: Provide high resolution photographs on a CD.

D. Take site photographs from differing directions indicating relative progress of the Work.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Construction Quality Control Project Plan (CQCPP).
2. General requirements.
3. Quality control and control of installation.
4. Examination.
5. Inspection.
6. Testing.
7. Errors and omissions.
8. Records.

B. Related Sections and Documents
1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
2. Section 01 10 00 - Summary of Work.
3. Section 01 70 00 - Execution Requirements.
4. Section 01 33 00 – Submittal Requirements

1.2 SUBMITTALS

A. The Contractor shall prepare and submit to the Design Engineer for review and approval, a Site-Specific Construction Quality Control Project Plan (CQCPP). A Site-Specific Construction Quality Assurance Project Plan (CQAPP) has been provided in the Remedial Design Report, Appendix M. The CQCPP will be based on the CQAPP and shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. Construction will be permitted to begin only after acceptance of the CQCPP by National Grid's Authorized Representative and Design Engineer.

1.3 CQAPP REQUIREMENTS

A. A CQAPP has been prepared and is contained in the Remedial Design Report, Appendix M. The Contractor will review this CQAPP and develop a CQCPP for review and acceptance by National Grid's Authorized Representative and Design Engineer. The CQCPP must meet, at least, the minimum requirements of, and may be more stringent than the CQAPP.

B. The CQCPP shall include procedures for controlling activities related to inspection, testing and documentation, including those of Contractor's suppliers and laboratories, as necessary.

C. The CQCPP shall also include the following:
   1. Control, verification and acceptance testing procedures for each specific test, to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test.
   2. Procedures for tracking inspections, verification, and acceptance tests including documentation.
   3. Procedures for tracking construction deficiencies for identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.

1.4 GENERAL REQUIREMENTS

A. The Contractor shall be responsible for quality control and shall establish and maintain an effective quality control system in compliance with the contract. The quality control system shall consist of plans, procedures and the organization necessary to produce an end product that complies with the Contract Documents. The system shall cover all construction operations, both on-site and off-site, and shall be keyed to the proposed construction sequence.

B. Activities affecting quality shall be accomplished under controlled conditions. Controlled conditions include the use of appropriate equipment; suitable environmental conditions for accomplishing the activity such as adequate cleanliness; and assurance that all prerequisites for the given activity have been satisfied.

C. Prior to the initiation of the remedial work, the Contractor shall review Design Drawings, Technical Specifications, Remedial Design Report, applicable codes, standards and other contract documents to assure proper knowledge of the contract requirements. Any inconsistencies in the above shall be immediately brought to the attention of National Grid's Authorized Representative and Design Engineer.

D. Quality control testing shall include all the tests required by the Technical Specifications along with field inspection of the work.

E. The Contractor shall deliver materials to the Site in the approved manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand name and manufacturer's name. Delivered materials shall be identical to approved samples. Certifications from the manufacturer for materials shall be included with the shipment.

F. The Contractor shall store materials in accordance with manufacturer's recommendations, under cover (if appropriate) in a clean, dry, aboveground location. The Contractor shall remove materials which are damaged or otherwise not suitable for installation from the Site and replace with acceptable materials.

G. National Grid's Authorized Representative shall be responsible for management of QC/QA activities in the field in accordance with the CQAPP. The Contractor shall be responsible for management of QC/QA activities in the field in accordance with the CQCPP. Personnel performing QC/QA functions, employed by either the Contractor or its subcontractors shall report to their respective Project Manager or Site Superintendent.

H. The Contractor's Site Superintendent shall possess adequate experience, skill, and training to be knowledgeable about the QC/QA work specified in the CQCPP and be capable of implementing the CQCPP.

1.5 QUALITY CONTROL AND CONTROL OF INSTALLATION

A. All items of equipment and materials of like type furnished under one Purchase Order shall be the product of one manufacturer, unless otherwise specified, as per Item SC-12.0 of the *Supplemental Conditions to National Grid Remedial Construction Purchase Orders (NG SC 5/18/2005)*.

B. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

C. Comply with manufacturers' instructions, including each step in sequence.

D. When manufacturers' instructions conflict with Contract Documents, request clarification from the Design Engineer before proceeding. Notify National Grid's Authorized Representative regarding the conflict as well as modifications and/or changes made per discussions with the Design Engineer.

E. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

F. Perform Work by persons qualified to produce required and specified quality.

G. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Examine and verify specific conditions described in individual specification sections.

C. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 INSPECTION

A. The Contractor shall implement the CQCPP for inspection of construction methods and materials. These inspections shall be performed to verify compliance with the Contract Documents.

B. The Contractor shall establish a program for inspection of activities affecting quality and shall include all construction activities. The quality of the products of the Contractor's and suppliers must also meet requirements of the Contract Documents. Inspections shall be performed to verify compliance to documented instructions, drawings, procedures and specifications.

3.3 TESTING

A. Employ and pay for services of independent testing agencies or laboratories acceptable to National Grid to perform testing as required in the Specifications.

B. All testing procedures shall incorporate or reference the requirements contained in the Specifications, Design Drawings and Contract Documents. Test procedures shall also be in conformance with reference standards.

C. The CQCPP shall state the types of testing equipment to be utilized.

D. All testing equipment shall be calibrated and maintained as required by the manufacturer and/or applicable standards.

E. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

F. Re-testing or re-inspection required because of non-conformance to specifications shall be performed by same independent firm on instructions by National Grid's Authorized Representative.

3.4 ERRORS AND OMISSIONS

A. The work shall be done and completed in a thorough, workmanlike manner, notwithstanding any omission in the Contract Documents.

B. It shall be the responsibility of the Contractor to call to the attention of National Grid's Authorized Representative and Design Engineer any apparent errors or omissions and request instructions in writing before proceeding with the work.

C. National Grid and Design Engineer may, by appropriate written instructions, correct errors and omissions, and supply instructions, which shall be as binding upon the Contractor as though contained in the original Contract Documents. All written instructions from National Grid and Design Engineer will be provided to the Contractor by National Grid's Authorized Representative.

3.5 RECORDS

A. Sufficient records shall be prepared as the work is performed to furnish documentary evidence that QC/QA testing was performed in accordance with the approved CQCPP. These records shall be submitted to National Grid's Authorized Representative and Design Engineer for review as they become available.

B. The records shall include, but not be limited to, the results of reviews, inspections, tests, and audits. The records shall also include, but not be limited to, the procedures, equipment used, date, name of the inspector, results, inspections, and corrective measures. These records shall be maintained in an identifiable, meaningful, and organized manner.

C. The Contractor shall maintain current records of QC/QA operations, activities and tests performed by suppliers and subcontractors.

D. Project records shall be stored on-site and shall be readily retrievable.

3.6 AUTHORITY OF NATIONAL GRID'S AUTHORIZED REPRESENTATIVE AND DESIGN ENGINEER

A. National Grid and/or National Grid's Authorized Representative and Design Engineer may observe all work done and inspect materials and equipment furnished and perform additional testing as required. Such observation may extend to all or any part of the work and to the preparation, fabrication or manufacture of the materials and equipment to be used.

B. The Contractor will keep National Grid's Authorized Representative informed as to the progress of the work and the manner in which it is being done.

C. National Grid's Authorized Representative will call the Contractor's attention to any non-conformance with the Contract Documents.

D. National Grid's Authorized Representative may reject defective materials, equipment, or work that does not meet the requirements of the Contract Documents.

E. The Contractor shall facilitate and allow National Grid's Authorized Representative and Design Engineer to perform any QC/QA testing.

F. The Contractor shall notify and give National Grid's Authorized Representative and Design Engineer sufficient time to inspect any work that will be made inaccessible by future construction. If notification and inspection is not conducted, the Contractor shall remove, at their own cost, elements that will allow for proper inspection.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Submittals
   2. Temporary utilities
   3. Construction Facilities
   4. Temporary Controls
   5. Removal of Utilities, Facilities, and Controls

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
   2. Section 01 10 56 – Protection of Work and Property
   3. Section 01 33 00 – Submittal Requirements
   4. Section 01 52 10 – Dust, Odor, and Noise Control
   5. Section 01 52 20 – Equipment and Vehicle Decontamination
   6. Section 31 20 00 – Temporary Construction Access
   7. Section 31 23 16 – Excavation

1.2 SUBMITTALS

A. Traffic Control Plan: Contractor shall prepare and submit amendments to the Traffic Control Plan for inclusion in the Final Remedial Design Report. Contractor shall submit and obtain approval for the Final Traffic Control Plan Traffic (as taken from the Final Remedial Design Report) from local municipality and county.

B. Project Signage Sketch: Contractor shall prepare, submit and obtain approval for the proposed sign configuration, contents, appearance, and materials of construction and a figure showing the proposed sign location.

C. Occupancy Permits: Contractor shall obtain permits and/or approvals for use and occupancy for the temporary offices and other buildings, shed, etc., as necessary. Contractor shall provide to National Grid at least 5 days in advance of occupying structures.

D. Product and Equipment Data: Contractor shall provide product and equipment data for items in this sections. Contractor shall provide to National Grid at least 5 days prior to use.

1.3 TEMPORARY UTILITIES

A. Temporary utilities shall be provided for implementation of the Remedial Design. Temporary utilities may include but are not limited to:
   1. Electricity and lighting
   2. Heating and cooling

3. Ventilation and humidity control
4. Telephone and facsimile service
5. Water supply
6. Decontamination water generation handling
7. Sanitary facilities

B. Electricity and Lighting

1. All temporary electric service required throughout Site shall be provided by the Contractor. The Contractor shall coordinate electric service installation with the National Grid or National Grid approved representative.
2. The Contractor is responsible for extending electrical service to the site facilities. The Contractor shall ascertain site power requirements and inform National Grid and/or National Grid approved representative of such requirements in advance.
3. Electricity service required at the site shall be sourced through local utilities with a preference for renewably generated electricity. The Contractor shall ascertain pricing for renewably generated electricity and provide a cost estimate to National Grid and/or National Grid approved representative for this service.
4. Service shall be brought to immediate work areas of the Site, as required, by construction-type power cords. Distribution boxes and circuit wiring shall be provided, if required, to meet the required power needs. All electrical service shall meet the substantive requirements of applicable building codes.
5. Electric Distribution: The Contractor shall provide receptacle outlets adequate for connection of power tools and equipment.

a. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
b. Provide warning signs at power outlets other than 110 to 120 V.
c. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades or other traffic areas.
d. Provide metal conduit enclosures or boxes for wiring devices.
e. Provide 4-gang outlets, spaced so 100-foot extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.

6. Lighting: The Contractor shall provide temporary lighting with local switching that provides adequate illumination for construction operations.

a. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
b. Provide one 100-W equivalent fluorescent light bulb per 500 sq. ft., uniformly distributed, for general lighting, or equivalent illumination.
c. Install exterior-yard site lighting that will provide adequate illumination for construction operations, traffic conditions, and signage visibility when the Work is being performed. Where possible, angle exterior-yard lighting below the horizontal so vertical and off-sight illumination and light-pollution of the area is avoided.

7. Provide and maintain lighting for construction operations
8. Provide and maintain lighting of the entire site after dark as necessary for security purposes.
9. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps for specified lighting levels.
10. Maintain lighting and provide routine repairs.

C. Temporary Heating and Cooling
1. The Contractor shall provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that is EnergyStar certified and will not have a harmful effect on completed installations or elements being installed.

D. Temporary Ventilation and Humidity Control
1. The Contractor shall provide temporary ventilation and required by construction activities for curing or drying of completed installations, protecting installed construction from adverse effects of high humidity and to prevent accumulation of dust, fumes, vapors and gases. Select equipment that is EnergyStar certified and will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

E. Telephone and Facsimile Service
1. The Contractor shall provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities.
2. Provide additional telephone lines for the following:
    a. In field office with more than two occupants, install a telephone for each additional occupant or pair of occupants.
    b. Provide a dedicated telephone line for each facsimile machine and computer with modem in each field office.
    c. Provide a separate telephone line for the National Grid approved representative.
    d. At each telephone, post a list of important telephone numbers.
        1) Police and fire departments.
        2) Ambulance service.
        3) Group Project Coordinator's office.
        4) The National Grid approved representative's home office.
        5) Utility contacts.
        6) Principal Contractors' field and home offices.
        7) Subcontractor's field and home offices.
3. Provide an answering machine on Contractor's superintendent telephone.
4. Furnish Contractor superintendent with portable two-way radios or a cellular telephone for use when away from field office.

F. Temporary Water Service
1. The Contractor shall determine the site water requirements and provide adequate water from accepted sources. The Contractor shall adhere to Item SC-4.0 of the *Supplemental Conditions to National Grid Remedial Construction Purchase Orders (NG SC 5/18/2005)*.
2. Non-potable site water may be stored in holding tanks and distribution piping or by tank trucks or any combination thereof.
3. A high-pressure steam-cleaning system shall be provided for equipment and vehicles use, after the mud and/or dirt has been cleaned from the equipment.
4. The Contractor shall also ensure that the available water source on-site is adequate to implement odor suppression and dust control measures as required

by the National Grid approved representative during the implementation of the planned remedial construction activities.

5. The Contractor shall collect and use non-potable rainwater as a potential water supply during dust control, as practical.

G. Decontamination Water Handling

1. The Contractor shall be responsible for collecting the wastewater resulting from the cleaning of the equipment and pump to containers (i.e., Frac/Baker Tanks, drums, etc.) for disposal. The collected wastewater shall be managed in accordance with the requirements of the Technical Specifications.

H. Temporary Sanitary Facilities

1. The Contractor shall provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities. The Contractor shall adhere to the requirements and specifications in section SC-5.0, Temporary Sanitary Facilities, of the Supplementary Conditions.
    a. Disposable Supplies: Provide toilet tissue, soap, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
    b. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.
    c. Wash Facilities: Install wash facilities supplied with water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled. Provide eyewash stations and similar facilities for convenience, safety, and sanitation of personnel.
    d. Drinking-Water Facilities: Provide bottled-water, drinking-water units. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F.
    e. Locate toilets and drinking-water fixtures so personnel need not walk more than 200 feet to facilities from work area.

1.4 CONSTRUCTION FACILITIES

A. Construction Facilities shall be provided for implementation of the Remedial Design. Construction Facilities may include but are not limited to:

1. Field offices and sheds
2. Vehicular access
3. Parking
4. Progress cleaning and waste removal
5. Project sign
6. Traffic regulation
7. Equipment storage
8. Decontamination facilities
9. Health and safety equipment storage
10. Stockpiling and material storage areas
11. Fences and barriers
12. All other temporary facilities required to perform the work

B. Field Offices and Sheds

1. Prior to installation of offices and sheds, the Contractor shall consult with the National Grid approved representative in regard to requirements, locations, access, and related facilities. The Contractor shall be responsible to obtain necessary permits and/or approvals for use and occupancy of these facilities. All trailers other than storage sheds shall be provided with the following minimum requirements:
    a. Grounded Lighting - Lighting shall be electric, non-glare type producing a minimum illumination level of 50 foot-candles measured at desk height.
    b. Heating and Cooling - Heating and cooling shall be capable of maintaining ambient temperatures within the trailer of approximately 70°F. Heating and cooling apparatus shall be EnergyStar certified.
    c. Potable bottled water.
    d. Fire Protection - Fire extinguishers shall be non-toxic dry chemical type, UL approved for Class A, 8 and C fires (minimum rating of 2A, 108, 10C).
    e. Telephone Service - Provide minimum of two telephone lines for use by the National Grid approved representative.
    f. Offices - Coordinate with the National Grid approved representative as to the extent of offices, furniture (desks, chairs), conference table and chairs. At a minimum, each of the office trailers to be used by the National Grid approved representative and Design Team shall include the following:
        1) Built-in desks;
        2) Built-in overhead shelves;
        3) Built-in plan table;
        4) High speed DSL internet access with two jacks;
        5) Adjustable office chairs with swivels;
        6) Fireproof file cabinets;
        7) Folding chairs;
        8) Folding conference tables;
        9) Coffee machine;
        10) Microwave oven (EnergyStar certified);
        11) Medium size compact refrigerator (EnergyStar certified);
        12) Plain paper fax machines; and
        13) One floor standing copier/scanner capable of 11” x 17” copying and scanning (EnergyStar certified, and/or with enabled energy saving “sleep” mode).
2. Facilities shall be structurally sound and weather-tight, with floors raised above ground and open to allow free circulation of air.
3. All trailers and equipment supplied by the Contractor shall be removed from the site at the close of construction.
4. Locate offices and sheds minimum distance of 50 feet from excavations.
5. Preparation: Fill and grade sites for temporary structures sloped for drainage away from buildings.
6. Installation:
    a. Install office spaces ready for occupancy upon Site mobilization.
    b. Employee Residential Occupancy: Not allowed on Site.
7. Maintenance and Cleaning:
    a. Periodic cleaning and maintenance for office and storage areas.

b. Maintain approach walks free of mud, water, and snow.

8. At completion of Work remove buildings, foundations, utility services, and debris.

B. Temporary Construction Access

1. Construction and maintain temporary access roads from public thoroughfares to serve construction area, of width and load bearing capacity to accommodate unimpeded traffic for construction purposes as required by the Erosion and Sediment Control Plan and Section 32 20 00.

C. Parking

1. Provide temporary gravel surface parking areas to accommodate construction personnel.
2. Locate as approved by the National Grid approved representative.
3. When site space is not adequate, provide additional off-site parking.
4. Use of existing on-site streets and driveways used for construction traffic is permitted. Tracked vehicles not allowed on paved areas.
5. Do not allow heavy vehicles or construction equipment in parking areas.
6. Maintenance:
   a. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
   b. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.
7. Removal and Repair:
   c. Remove temporary materials and construction at Substantial Completion.
   d. Repair existing facilities damaged by use to original condition.

D. Progress Cleaning and Waste Removal

1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.
2. Collect and remove waste materials, debris, and rubbish from site weekly and dispose off-site.

E. Project Sign

1. General
   a. Furnish, install, and maintain a project sign.
   b. Submit a sketch of the project sign (including dimensions and materials) and a figure showing the proposed location and orientation for the project sign at the site.
   c. The sign face background shall be white.
   d. All lettering shall be black in color and a minimum 2 inches in height.
   e. The back of the sign and all supports shall be painted white.
   f. The sign shall be adequately supported and braced and properly positioned and aligned.
   g. The project sign shall be posted in at the Site entrance or as designated by the National Grid approved representative.
   h. The sign is to remain onsite until the Project completion and notification from the National Grid approved representative. At that time, the sign is to be dismantles and shall become the Contractor's property.

2. Materials
   a. All lumber shall be structural quality and exterior grade (pressure treated).
   b. All bolts, nuts, and washers shall be plated or galvanized steel.
   c. The project sign shall be rectangular in shape with minimum dimensions of 6 feet (W) by 3 feet (H).
   d. Paint shall be weather resistant, suitable for exterior sign applications, and compatible with exterior grade plywood and primer
3. Sign Content
   a. "Project Title: "National Grid Property"
   b. "Project Description: Implementation of the Selected Remedy including Cap Maintenance, Groundwater Monitoring, In-Situ Solidification/Stabilization, Soil Excavation, Institutional Controls for Soil and Groundwater, and Removal and Disposal of Contaminated Sediments"
   c. Name and telephone number of Contractor, National Grid and National Grid approved representative as indicated on Contract Documents:
   d. Statement that the project is being performed under EPA oversight
   e. "USEPA Project Manager: Thomas Taccone (212) 637-4281"

F. Traffic Regulation
1. Signs, Signals, And Devices:
   a. Post Mounted and Wall Mounted Traffic Control and Informational Signs: As approved by authority having jurisdiction.
   b. Traffic Cones and Drums, Flares and Lights: As approved by authority having jurisdiction.
2. Flag person Equipment: As required by authority having jurisdiction.
   a. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.
   b. Flares and Lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.
3. Haul Routes:
   a. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.
   b. Prepare a Traffic Control Plan for review and approval, as required by local jurisdictions and Specifications.
   c. Confine construction traffic to designated haul routes.
   d. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.
4. Traffic Signs and Signals:
   a. Provide signs at approaches to site and on site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
   b. Provide, operate, and maintain traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.
   c. Relocate as Work progresses, to maintain effective traffic control.

5. Removal:
   a. Remove equipment and devices when no longer required.
   b. Repair damage caused by installation.
   c. Remove post settings.

G. Decontamination Facilities
1. Install and maintain decontamination facilities for equipment and vehicles as specified in Section 01 52 20.

H. Health and Safety Equipment Storage
1. A partitioned health and safety equipment storage area shall be provided and shall have access through a lockable door. Sufficient shelving shall be installed for storage and inventory control of small items.

I. Stockpile and Materials Storage Areas
1. Stockpiles shall be protected and managed in accordance with the Drawings and Technical Specifications.

J. Waste Collection Areas
1. Utilize waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label any hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 1 Section 01 70 00 for progress cleaning requirements.

K. Fences
1. The Contractor shall furnish (if necessary), install and maintain temporary fences and around the Site during the duration of the project.

1.5 TEMPORARY CONTROLS

B. Temporary Controls shall be provided for implementation of the Remedial Design. Temporary Controls may include but are not limited to:
1. Barriers
2. Enclosures and fencing
3. Security
4. Water control
5. Dust control
6. Erosion and sediment control
7. Pollution control
8. Rodent control

C. Barriers
1. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
2. Provide barricades and covered walkways required by authorities having jurisdiction for public rights-of-way.
3. Provide protection for plants designated to remain. Replace damaged plants.
4. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

D. Temporary Fencing and Enclosures
   1. Temporary Fencing:
      a. Fencing shall be constructed of commercial grade chain link fence.
      b. Provide, install, and maintain a 6-foot high fence around the Limit of the Work, waste staging pads, excavations, and ISS treatment area.
      c. The Limit of Work fence shall have vehicular and pedestrian gates with locks.
   2. Exterior Enclosures:
      a. Provide, install, and maintain temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons.
      b. Provide access doors with self-closing hardware and locks.

E. Security
   1. Security Program:
      a. Protect Work and existing premises from theft, vandalism, and unauthorized entry.
      b. Prepare and implement a site-specific security plan
      c. Maintain program throughout construction period until directed by the National Grid approved representative.
   2. Entry Control:
      a. Restrict entrance of persons and vehicles into Project site.
      b. Allow entrance only to authorized persons with proper identification.
      c. Maintain log of workers and visitors, make available to the Group on request.
   3. Restrictions:
      a. Do not allow cameras on site or photographs taken except by written approval of National Grid.
      b. Do no work on days indicated in the National Grid-Contractor Agreement or after hours as indicated.

F. Water Control
   1. Grade site to drain. Provide, operate, and maintain pumping equipment where necessary.
   2. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion and as described in the Erosion and Sediment Control Plan.
   3. Perform temporary dewatering as necessary and described in design documents.

G. Dust Control
   1. Perform dust monitoring and implement dust control measures as specified in Section 01 52 10.

H. Erosion and Sediment Control
   1. Install and maintain erosion and sediment control measures as specified in Section 31 25 13, the Design Drawings and the NYSSESC.

I. Pollution Control
   1. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations, as described in section SC-3.0, Pollution Control, of the Supplementary Conditions.
   2. Comply with pollution and environmental control requirements of authorities having jurisdiction.

J. Rodent Control
   1. Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

1.6 Removal of Temporary Utilities, Facilities and Controls

A. Remove temporary utilities, equipment, facilities, and materials prior to Final Application for Payment inspection.

B. Clean and repair damage caused by installation or use of temporary work.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 52 00

ENVIRONMENTAL SITE MONITORING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Submittals
2. Dust Monitoring
3. Dust Control
4. Organic Vapor/Odor Monitoring
5. Odor Control
6. Noise Monitoring
7. Noise Control

B. Related Sections and Documents:
1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
2. Remedial Design Report, Appendix H- Community Air Monitoring Plan (CAMP)
3. Section 01 10 00 – Summary of Work
4. Section 01 30 65 – Health and Safety Requirements
5. Section 01 52 10 – Dust, Odor, Noise Control

1.2 SUBMITTALS

A. Daily monitoring reports presenting dust, odor and noise data as specified in this Section.

PART 2 PRODUCTS

None

PART 3 EXECUTION

3.1 DUST MONITORING

A. Contractor shall perform continuous dust monitoring in the Work Zone during the implementation of the remedial construction activities in accordance with the Contractor's Site Specific HASP.

B. Air monitoring at the perimeter of the Work will be implemented by the Air Monitoring Manager in accordance with the CAMP.

C. Collect background dust data prior to beginning Work. The background reading shall be taken in an area removed and upwind of the Site.

D. National Grid reserves the right to request instantaneous perimeter monitoring depending on continuous air monitoring results and/or receipt of complaints.

E. Submit a daily report presenting the results of the work zone dust monitoring to National Grid and/or National Grid's Authorized Representative.

F. Dust monitoring is not intended to be a substitute for any worker exposure monitoring which Contractor may deem necessary for the protection of the work force.

3.2 DUST CONTROL

A. As required per the Contractor's Site Specific HASP and the CAMP, the Contractor shall implement dust control measures in accordance with Section 01 52 10.

3.3 ORGANIC VAPOR/ODOR MONITORING

A. Contractor shall perform continuous organic vapor monitoring in the Work Zone. Collect background organic vapor level data prior to beginning Work. The background reading will be taken in an area removed and upwind of the Site.

B. The National Grid approved representative reserves the right to request instantaneous perimeter monitoring depending on continuous air monitoring results and/or receipt of complaints.

C. Submit a daily report to the National Grid approved representative presenting the results of the organic vapor monitoring.

D. This monitoring is not intended to be a substitute for any worker exposure monitoring which Contractor may deem necessary for the protection of the work force.

3.4 ODOR CONTROL

A. As required per the Contractor's Site Specific HASP and the CAMP, the Contractor shall implement odor control measures to suppress organic vapor concentrations or objectionable odors in the work area in accordance with Section 01 52 10.

3.5 NOISE MONITORING

A. Contractor shall perform noise monitoring continuously within the immediate vicinity of the work zone and a minimum of twice a day at the nearest property boundary in the direction of the nearest receptor.

B. Contractor shall monitor and record background noise prior to start of Work.

C. Noise monitoring shall be performed during heavy work activities and at the direction of the National Grid approved representative. The National Grid approved representative reserves the right to monitor simultaneously and as necessary. Noise levels shall not exceed the levels specified without implementation of a hearing protection program.

D. Submit a daily report to the National Grid approved representative presenting the results of the day's noise monitoring.

3.6 NOISE CONTROL

A. As required per the Contractor's Site-Specific HASP and the Project CQAPP, the Contractor shall implement noise control measures in accordance with Section 01 52 10.

END OF SECTION

SECTION 01 52 10

DUST, ODOR, NOISE CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. References
   2. Submittals
   3. Products
   4. Dust Control
   5. Organic Vapor and Odor Control
   6. Noise Control

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
   2. Remedial Design Report, Appendix H- Community Air Monitoring Plan (CAMP)
   3. Section 01 10 00 – Summary of Work
   4. Section 01 33 00 – Submittal Requirements
   5. Section 01 30 65 – Health and Safety Requirements
   6. Section 31 25 13 – Erosion and Sediment Control

1.2 REFERENCES

A. *National Grid USA and Affiliated Companies Terms and Conditions For Construction Purchase Orders (NG Document No. 00700)*.

B. *Supplemental Conditions to National Grid Remedial Construction Purchase Orders (NG SC 5/18/2005)*.

C. Occupational Safety and Health Administration (OSHA) Regulations – Part 1910.95 and Part 1910.1000, Table Z-1.

D. New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP).

1.3 SUBMITTALS

A. Submit a detailed Dust and Odor Control Plan describing appropriate measures that will be used during the anticipated remedial activities. The Dust and Odor Control shall specifically include:
   1. A description of each remedial activity and the proposed dust and odor control methods.
   2. A description of meteorological data (temperature, humidity, and prevailing winds) monitoring methods and potential effects on prescribed dust and odor control measures.

3. A list of potential receptors that may be impacted by odor and dust from the site during remedial activities and a description of contingency activities in the event the receptors are impacted.
4. A list of measures that will be conducted if an odor release occurs, including specific task and personnel responsible to implement tasks.
5. The implementation of a communication response system for recording an early response to address complaints from the public and a list of personnel responsible to inform the public about the release and subsequent mitigation activities.

B. Product and Equipment Data: Submit product information a minimum of 5 working days before use of the material, to National Grid approved representative for approval.

C. Dust and Odor Control: Submit daily reports summarizing results of the dust and odor monitoring in accordance with the CAMP.

D. Noise Monitoring: Submit daily reports summarizing results of the noise monitoring.

PART 2 PRODUCTS

2.1 ORGANIC VAPOR/ODOR CONTROL

A. Organic vapor and odor control products shall be manufactured by BioSolve® or approved equal.

PART 3 EXECUTION

3.1 DUST CONTROL

A. Contractor shall conduct all operations in accordance with Item SC-23.0 of the *Supplemental Conditions to National Grid Remedial Construction Purchase Orders* (NG SC 5/18/2005).

B. Contractor shall conduct all operations and maintain the work area so as to minimize and suppress dust associated with the Work.

C. Dust control measures shall be employed to mitigate the release of airborne particulate matter beyond the property line of the facility in accordance with CAMP.

D. In the event that it becomes necessary in the opinion of National Grid and/or National Grid's authorized representative to provide additional measures to control the release of dust, Contractor shall implement such measures immediately, at no additional cost.

E. National Grid and/or National Grid's authorized representative reserves the right to suspend work at any time, if necessary, due to dust generation which causes a safety or an air quality problem or which may cause contamination of adjacent areas. Contractor shall not be entitled to any additional compensation for suspension of work under such conditions.

F. Visible dust shall not be permitted to leave the site.

G. The primary method of dust control will be the application of water spray using water trucks and/or flat hose(s) connected to a water supply.

H. When dust is noted leaving the Work Zone, at the perimeter or when directed by National Grid's authorized representative, halt work and apply dust suppression techniques (e.g. potable water spray).

I. After implementation of dust suppression techniques, walk perimeter of Work Zone and verify absence of dust, resume work activities and continue monitoring.

J. Trucks exiting the Site shall be inspected to ensure tires and undercarriages are clean and that tarps are secured. Excessive mud and loose soil observed on the trucks shall be manually removed with brooms and brushes, as necessary.

K. Inspect truck routes on- and off-site during high truck traffic periods for accumulation of excessive soil or dust. Excessive mud and loose soil observed on the truck routes shall be removed with brooms and brushes or a street cleaner, as necessary. Heavily traveled truck routes will be wet down by the water truck to minimize dust emissions. During freezing temperatures, calcium chloride will be spread in lieu of water to minimize the potential for ice at the Site.

L. Additional dust control measures shall include covering soil stockpiles minimize erosion and dust generation.

3.2 ORGANIC VAPOR/ODOR CONTROL

A. Contractor shall conduct all operations in accordance with Item SC-23.0 of the *Supplemental Conditions to National Grid Remedial Construction Purchase Orders* (NG SC 5/18/2005).

B. Contractor shall conduct all operations and maintain the work area so as to minimize and suppress organic vapor emissions and objectionable odors associated with the Work.

C. Organic vapor and odor control measures shall be employed to mitigate the release of volatile organic compounds beyond the property line of the facility in accordance with the CAMP.

D. Contractor shall implement organic vapor and odor control procedures (e.g., apply odor mitigating foam) to suppress organic vapor concentrations or objectionable odors in the work area at the National Grid's or National Grid's authorized representative's request.

E. In the event that it becomes necessary, in the opinion of National Grid's authorized representative, to provide additional measures to suppress organic vapor concentrations or objectionable odors, such measures shall be implemented immediately, at no additional cost to National Grid.

F. National Grid and/or National Grid's authorized representative reserve the right to suspend work at any time, if necessary, due to organic vapors or objectionable odors which cause a safety or air quality problem. Contractor shall not be entitled to any additional compensation for suspension of work under such conditions.

G. When odors are noted at the perimeter or when directed by National Grid's authorized representative, halt work and apply foam to exposed surfaces in accordance with manufacturer's recommendations.

H. After the application of the foam, walk perimeter of Work Zone and verify absence of odors, resume work activities and continue monitoring.

3.3 NOISE CONTROL

A. Contractor shall conduct all operations in accordance with Item SC-23.0 of the *Supplemental Conditions to National Grid Remedial Construction Purchase Orders (NG SC 5/18/2005)*.

B. National Grid and/or National Grid's authorized representative reserve the right to suspend work at any time, if necessary, due to noise generation causing a safety or excessive vibration hazard. In the event the OSHA limit of 85 dBA is exceeded for eight (8) hours per day or a peak level of 140 dBA is exceeded at the boundary of the Site, a hearing protection program shall be implemented.

END OF SECTION

SECTION 01 52 20

EQUIPMENT AND MATERIAL DECONTAMINATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. References
   2. Submittals
   3. Products
   4. Decontamination
   5. Decontamination pad
   6. Decontamination Wash Water Management
   7. Inspections

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
   2. Section 01 10 00 – Summary of Work.
   3. Section 01 30 65 – Health and Safety Requirements.
   4. Section 01 50 00 – Temporary Facilities and Controls.
   5. Section 01 52 10 – Dust, Odor, and Noise Control.
   6. Section 31 23 16 – Excavation.
   7. Section 31 23 19 – Dewatering and On-Site Treatment
   8. Section 31 70 00 – Waste Management, Transportation and Disposal.
   9. Section 33 05 17 – Perimeter Utility Cut and Cap

1.2 REFERENCES

A. 40 CFR 268.45 Hazardous Debris Regulations and 57 FR 371.94.

1.3 SUBMITTALS

A. Decontamination Plan: Contractor shall submit a Decontamination Plan for inclusion in the Final Remedial Design Report in accordance with Section 01 10 00. The Decontamination Plan shall detail all equipment and procedures proposed for the decontamination of vehicles, personnel, process equipment and debris leaving the site.

B. Certification of Potable Water Source: Contractor shall certify to National Grid that all water brought on-site for potable use is supplied by a potable water source. Certification shall be in the form of a letter from a municipal agency confirming that the source of water brought on-site is suitable for human consumption, or in the form of current laboratory analyses documenting that the water contains no contaminants above USEPA drinking water standards and/or New York State Department of Health standards.

C. Contractor shall certify to National Grid that all water used on-site for personnel and equipment decontamination will be contained, treated as required, disposed off-site in accordance with local, state, and federal regulations.

PART 2 PRODUCTS

2.1 WATER

A. Contractor shall provide potable drinking water from an off-site source in sufficient quantity and of sufficient quality required for implementation of the contract documents and completion of the project. Contractor shall adhere to Item SC-4.0 of the *Supplemental Conditions to National Grid Remedial Construction Purchase Orders (NG SC 5/18/2005)*.

B. Contractor may obtain water to perform dust suppression and decontamination operations from a water hydrant on or within the proximity of the Site. Contractor shall obtain all necessary permits from local authorities and the water use metered. A City-approved backflow prevention device shall be installed on the hydrant.

C. Contractor shall be responsible for removal of all temporary water supply lines and equipment at the completion of the project.

2.2 HOLDING TANKS

A. Contractor shall provide any holding tanks required for use on-site to store clean decontamination water.

B. Contractor shall provide any holding tanks required to manage generated wastewater prior to processing at an on-site treatment system in accordance with Section 31 23 19.

C. Holding tank(s) should be sized accordingly to prevent down time from insufficient storage capacity.

2.3 TRANSFER PUMP

A. Contractor shall provide transfer pumps, as necessary, to transfer wash water to and from the decontamination pad.

2.4 PRESSURE WASHER

A. Contractor shall provide a portable low-volume, high-pressure washer for use on-site. Pressure washer(s) shall be the property and responsibility of Contractor.

2.5 HOSE AND FITTINGS

A. Contractor shall provide all necessary hoses and fittings necessary to connect the pressure washer(s) to the water supply and to connect the transfer pumps to the holding tanks.

2.6 DECONTAMINATION FLUID ADDITIVES

A. Contractor may use additives such as surfactants or water-borne abrasives to facilitate removal of hardened material from equipment or demolition debris. All additives are subject to the approval of National Grid and shall be compatible with the processes utilized in the on-site treatment system.

B. Contractor shall be responsible for the proper collection and treatment of decontamination fluids containing additives used during the project.

2.7 MISCELLANEOUS EQUIPMENT

A. Contractor may use steam-generating pressure washers for equipment with the approval of National Grid.

B. Contractor shall be responsible for providing all scrub brushes or other equipment necessary to remove caked or hardened material from the equipment and construction vehicles.

C. Contractor shall also be responsible for providing all miscellaneous equipment such as buckets, shovels, etc. necessary to handle, transfer, and/or remove construction water and associated sediment from the decontamination pad and any necessary storage containers during construction activities.

PART 3 EXECUTION

3.1 DECONTAMINATION

A. All personnel entering the Exclusion Zone, as defined in Section 01 30 65 - Health and Safety Requirements, shall be decontaminated when exiting the Exclusion Zone.

B. All vehicles and equipment entering the Exclusion Zone, as defined in Section 01 30 65 - Health and Safety Requirements shall be decontaminated when exiting the Exclusion Zone.

C. All bulky debris such as concrete rubble, empty drums, synthetic liners and miscellaneous utilities such as piping shall require decontamination prior to off-site transportation and disposal. All bulky debris shall be clean and washed to the extent that visible contamination is removed from bulky debris.

D. Decontamination areas shall be returned to pre-existing conditions upon completion of the work.

3.2 DECONTAMINATION PAD

A. The Contractor shall be responsible for proper operation of the decontamination pad and equipment in accordance with the *Supplemental Conditions to National Grid Remedial Construction Purchase Orders* (NG SC 5/18/2005).

B. Contractor shall use the decontamination pad for the decontamination of all equipment and vehicles which have entered the Exclusion and/or Contamination Reduction Zones. Contractor shall ensure that any equipment, vehicles or personnel that have been in contact with the Exclusion and/or Contamination Reduction Zones are decontaminated properly before leaving these zones.

C. Contractor shall install and maintain a decontamination station consisting of a pad with sump and equipment to drain the pad. Decontamination pad shall be constructed in accordance with the Design Drawings. Contractor may propose a pre-fabricated decontamination station and/or pad for review and approval by the Design Engineer.

D. The decontamination pad(s) shall consist of an area of suitable size for the decontamination of the largest vehicle and equipment as they exit the site onto adjoining property either public or private.

E. The decontamination pad(s) shall be graded for easy entrance and exit to vehicles and equipment.

F. The Contractor shall be responsible for proper operation of the decontamination pad and equipment.

G. Contractor shall use the decontamination pad for the decontamination of all equipment and vehicles which have entered the Exclusion and/or Contamination Reduction Zones. Contractor shall ensure that any equipment, vehicles or personnel that have been in contact with the Exclusion and/or Contamination Reduction Zones are decontaminated properly before leaving these zones.

H. To minimize the volume of decontamination wastewater, Contractor may use a temporary covering to shed rainfall away from the pad. In any event, Contractor shall be responsible for management of wastewater collected by the decontamination facility.

3.3 DECONTAMINATION WASH WATER MANAGEMENT

A. All wash water generated from the equipment decontamination and personnel decontamination procedures shall be collected, contained, and handled by the Contractor in accordance with all applicable Federal and State hazardous waste regulations and policies.

B. Personnel decontamination procedures shall be performed in accordance with the Contractor's Site-Specific HASP.

C. All vehicles requiring decontamination shall be washed to the extent that visible contamination is removed from the vehicle body, undercarriage, and tires.

D. The decontamination process shall be performed in such a manner that all water used and visible contamination removed during decontamination falls onto the decontamination pad and is captured by the sump provided in the decontamination facility. Barriers shall be erected in such a manner as to capture and redirect overspray onto the decontamination pad.

E. The decontamination pad shall be washed down at the completion of each day of work. Soil and/or sediment captured by the sump shall be removed on a daily basis, as operationally required, or as required by National Grid's authorized representative.

F. Decontamination fluids generated from decontamination activities shall be processed at an on-site treatment system in accordance with Section 31 23 19. Treatment residuals generated from water treatment activities shall be disposed of in accordance with Section 31 70 00.

G. Decontamination fluids generated after decommissioning of the treatment plant, if any, and soil/sediment generated from decontamination activities shall be disposed of in accordance with Section 31 70 00.

H. Water used for decontamination that is acquired by the Contractor from an off-site source shall be at no additional cost to the National Grid.

3.4 INSPECTIONS

A. National Grid's authorized representative shall oversee all decontamination activities and shall make the final determination as to whether or not a piece of equipment, tool, or bulk recyclable remnant structure or pipe being removed from the Site has been properly decontaminated.

B. Inspection forms may be completed by National Grid, National Grid's authorized representative and/or the Design Engineer during the decontamination activities.

C. The Contractor shall inspect each decontamination pad on a daily basis and after a major storm event.

END OF SECTION

SECTION 01 54 00

SITE SECURITY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Submittals: Site Security Plan
   2. Site Security Requirements.

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, include Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
   2. Section 01 30 00 – Administrative Requirements.
   3. Section 01 33 00 - Submittal Requirements.

1.2 SUBMITTALS

A. Develop Site Security Plan for incorporation into the design and subsequent design submittals to the NYSDEC (i.e., 95% and 100% RDR) in accordance with Section 01 33 00. Site Security Plan shall address the following items at a minimum:
   1. Personnel responsible for implementing and maintaining security measures in the work area including names and assigned functions.
   2. Description of proposed daily security operations.
   3. Description of proposed methods and frequency of security checks at the Site.
   4. Description of proposed methods for responding to the following breaches in security:
      a. Entry of unauthorized personnel into the work area.
      b. Site boundary security provisions are breached.

1.3 SITE SECURITY REQUIREMENTS

A. The Contractor shall be responsible for maintaining site security at all times throughout the duration of the contract.

B. The Contractor shall employ uniformed, security personnel at the site during non-working hours including weekends and holidays. The Contractor may designate an employee to perform security operations during working hours. Security personnel shall be provided by an independent third-party company. These personnel do not need medical monitoring or OSHA training provided they not enter any Contamination Reduction or Exclusion Zone.

C. The Contractor shall:
   1. Protect work from theft, vandalism, and unauthorized entry.
   2. Maintain program throughout construction period. Restrict entrance of persons and vehicles into Site.
   3. Allow entrance only to authorized persons with proper identification.

4. Maintain log of workers and visitors and submit to National Grid's authorized representative weekly. Include the date, name, address, affiliation, purpose of visit, and time in and time out, for each worker/visitor.

D. No claim shall be made against National Grid or National Grid's authorized representative for damage resulting from trespass or loss of Contractor's equipment.

E. The Contractor shall make good all damage to property of the National Grid and adjacent property owner's arising from failure to provide adequate security.

F. If existing fencing or barriers are breached or removed for purposes of construction, the Contractor shall notify National Grid's authorized representative immediately and provide and maintain temporary security fencing in a manner satisfactory to National Grid.

G. Contractor shall post signs at entrance gates and along perimeter fencing at a minimum frequency of one every 100 feet. Signs shall read "UNAUTHORIZED ENTRANCE TO THE WORK AREA IS PROHIBITED", with black lettering on a white surface. Signs shall be rectangular in shape with minimum dimensions of 24 inches wide by 18 inches high. Signs shall be securely attached to the fencing, maintained throughout the work, and removed at the completion of the Project.

H. The Contractor shall also post signs at entrance gates directing site visitors to sign-in at the field office. Signs shall read "ALL SITE VISITORS ARE REQUIRED TO SIGN-IN AT THE FIELD OFFICE", with black lettering on a white surface. Signs shall be rectangular in shape with minimum dimensions of 24 inches wide by 18 inches high. Signs shall be securely attached to the fencing, maintained throughout the work, and removed at the completion of the Project.

I. The Contractor shall be responsible for all costs associated with providing the access restriction features, maintaining all features during construction and removal and disposal of temporary features at the conclusion of the Project.

J. Entrance Control:
   1. The Contractor shall require each person to have available proper photo identification.
   2. The Contractor shall maintain a list of persons authorized for Site entry and submit a copy of the list to the National Grid approved representative.
   3. The Contractor shall require all personnel and visitors having access to the Site to sign in and sign out, and shall keep a record of all site access.
   4. Site visitors shall not be permitted to enter active work areas unless authorized by National Grid approved representative or National Grid.
   5. Vehicular access shall be restricted to authorized vehicles only. The National Grid approved representative reserves the right to search all Contractor vehicles.
   6. Personal vehicles shall not be authorized to enter the Contamination Reduction or Exclusion Zone.

K. Security Station:
   1. The Contractor shall provide an area designated for security operations. This area that may be part of Contractor's offices, or a separate enclosure and shall contain one independent telephone line and telephone.

2. The Contractor will maintain a minimum of two portable two-way radios for the Contractor, two portable two-way radios for the National Grid approved representative and one base radio station. All sets shall be capable of transmitting to and receiving from any other set, at any point within the Limits of Work. All portable units shall be rechargeable and shall be capable of operating continuously without recharge for eight hours.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Protecting installed construction.
   2. Project record documents.
   3. Product warranties.

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
   2. Section 01 33 00 – Submittal Requirements.
   3. Section 01 40 00 – Quality Requirements.

1.2 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

1.3 PROJECT RECORD DOCUMENTS

A. Maintain on-Site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed Shop Drawings, Product Data, and Samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by National Grid.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   2. Field changes of dimension and detail.
   3. Details not on original Contract drawings.

G. Submit documents to National Grid with claim for final Application for Payment.

1.4 PRODUCT WARRANTIES

A. Obtain warranties executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten (10) days after completion of applicable item of work.

B. Execute and assemble transferable warranty documents from subcontractors, suppliers, and manufacturers.

C. Verify documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Include Table of Contents and assemble in three-ring D-style binder with durable plastic cover.

F. Submit prior to final Application for Payment.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 78 00

DEMOBILIZATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Submittals
   2. Requirements for final cleaning.
   3. Administrative provisions.
   4. Final Inspection
   5. Guarantee.

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
   2. Section 01 10 00 – Summary of Work.
   3. Section 01 30 65 – Health and Safety Requirements.
   4. Section 01 33 00 – Submittal Requirements.
   5. Section 01 50 00 – Temporary Facilities and Controls.
   6. Section 01 52 20 – Equipment and Material Decontamination Requirements
   7. Section 01 70 00 – Execution Requirements.
   8. Section 31 25 13 – Erosion and Sediment Control.

1.2 SUBMITTALS

A. Contractor shall submit a Work Punch List prior to Substantial Completion of Work.

B. Certification for Final Acceptance.

C. Permit closeouts.

D. Waste Disposal Manifests and Certificates of Disposal.

E. Project Record Documents (including as-built surveys).

F. Final Payment Invoice.

G. Certificate of final cleaning.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 REQUIREMENTS FOR FINAL CLEANING

A. The final cleaning to be performed by the Contractor shall include the following:
   1. Transport of all containerized soil waste removed under this contract to the approved disposal facility;
   2. Cleaning and removal of all of the Contractor's construction equipment and materials;
   3. Collection and management of all the Contractor generated material including decontamination water and equipment on the Site for which cleaning is inappropriate;
   4. Repair of any erosion or runoff related damage;
   5. Grading and restoration, as required, of all areas used by the Contractor;
   6. Removal of all materials such as excess construction material, wood, debris and any other foreign material; and
   7. Removal of all construction equipment

B. Equipment Cleaning: Equipment cleaning shall consist of degreasing (if required) followed by high-pressure water and/or steam cleaning supplemented by detergents or solvents as appropriate in accordance with Section 01 52 20.

C. Tools Cleaning: Tools and items for which cleaning is difficult or impossible to verify shall remain on Site, until for subsequent sampling and analytical testing, packing and disposal by the Contractor at an approved disposal facility. Examples of such items are wire, rope, lumber, personal protective equipment and apparel.

D. Temporary Facilities: Cleaning of the temporary facilities located within the Support Zone shall be limited to cleaning in accordance with Section 01 52 20 and Section 01 50 00.

3.2 ADMINISTRATIVE PROVISIONS

A. Prior to substantial completion, National Grid, National Grid's authorized representative, and/or the Design Engineer shall present to the Contractor a punch list of work items to be completed in accordance with the Contract Documents.

B. When the Contractor considers the work on the punch list to be substantially complete, he shall submit written notice with a list of items to be completed or corrected, and the estimated dates of the completion or correction. Should inspection by National Grid, National Grid's authorized representative, and/or the Design Engineer find the work is not substantially complete, the Contractor will be notified in writing, listing observed deficiencies. The Contractor shall remedy the deficiencies and send a new written notice of substantial completion. This procedure shall continue until such time when National Grid, National Grid's authorized representative, and/or the Design Engineer are satisfied with such repairs and corrections.

C. When National Grid, National Grid's authorized representative, and/or the Design Engineer finds the work to be substantially complete, a Certificate of Substantial Completion will be prepared with a list of deficiencies that require timely correction and/or non-construction deficiencies in accordance with the latest revision of the General Terms and Contract Conditions.

D. Final Acceptance: When the Contractor considers the work to be complete, he shall submit to National Grid, National Grid's authorized representative, and/or the Design Engineer a written certification that:
   1. Contract Documents have been reviewed.
   2. Work has been inspected for compliance with Contract Documents.
   3. Work has been completed in accordance with Contract Documents, and deficiencies listed with Certificate of Substantial Completion have been corrected.
   4. All construction equipment, excess construction material, debris and other foreign material has been removed.
   5. Work is complete and ready for final inspection.

E. The Contractor shall also submit the following materials:
   1. Permit closeouts.
   2. Waste disposal manifests and other transportation and disposal (T&D) documentation.
   3. Project Record Documents including, but not limited to, as-built surveys.

F. Should National Grid, National Grid's authorized representative, and/or the Design Engineer's inspection find work incomplete, the Contractor will be notified, immediately, in writing listing observed deficiencies. The Contractor shall remedy the deficiencies and send a second certification of final completion. This procedure shall continue until such time when National Grid, National Grid's authorized representative, and/or the Design Engineer are satisfied with such repairs and corrections.

G. When all work is complete, National Grid, National Grid's authorized representative, and/or the Design Engineer will review the closeout submittals, and a Final Acceptance Certificate will be issued to the Contractor.

H. When the Contractor receives the Final Acceptance Certificate, he shall submit his final invoice for final payment.

3.3 FINAL INSPECTION

A. Prior to removal from Site, all cleaned equipment and material shall be inspected and accepted by the Site Safety Officer, National Grid, National Grid's authorized representative, and/or the Design Engineer.

B. Certification of cleaning shall be attested to by the Site Safety Officer. A copy of each cleaning certificate shall be provided to National Grid. The original certificate will be maintained at the Site Safety Officer's office.

C. The work shall be successfully completed and approved by National Grid, National Grid's authorized representative, and/or the Design Engineer prior to demobilization of equipment.

3.4 GUARANTEE

A. The Contractor shall guarantee, for one year from the date of final payment, the backfill installation as specified in Section 31 23 23.

B. The Contractor, at no additional cost to National Grid, National Grid's authorized representative, and/or the Design Engineer, shall correct defective work that results in a backfill settlement of two inches or more. Failure of the Contractor to correct such defects within a reasonable time after being notified to do so shall permit National Grid to cause such defects to be corrected and charge the Contractor the cost of corrections.

END OF SECTION

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Submittals
2. Quality Assurance
3. Project Conditions
4. Preparation
5. Inspection of Structures to be Demolished
6. Demolition Requirements
7. Demolition

B. Related Sections and Documents:
1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
2. Section 01 10 00 – Summary of Work.
3. Section 01 30 65 – Health and Safety Requirements.
4. Section 01 33 00 – Submittal Requirements
5. Section 01 52 00 – Dust, Odor and Noise Control.
6. Section 01 52 20 – Equipment and Material Decontamination.
7. Section 31 23 19 – Dewatering and On-Site Treatment
8. Section 31 23 16 – Excavation and Waste Management.
9. Section 31 23 23 – Backfill.
10. Section 33 05 17 – Perimeter Utility Cut and Cap.
11. Section 33 05 18 – Utility Protection and Rerouting.

1.2 SUBMITTALS

A. Submit a schedule of selective demolition activities, sequencing plan and schedule for those selective demolition activities that can be foreseen for incorporation into the design and subsequent design submittals to the NYSDEC (i.e., 95% and 100% RDR) in accordance with Section 01 33 00. The plan shall include the following:
1. Detailed sequence of selective demolition and removal work, with start and end dates for each activity.
2. Interruption of utility services.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Plans for protecting existing utilities.
5. Locations of temporary partitions and means of egress.

B. Submit proof of the Utility Clearance. This may include but is not limited to the Ticket information and responses received from the various utility companies that perform the clearances.

C. Submit copy of demolition permits required by local and state regulatory agencies.

D. Project Record Documents: Accurately record actual locations of utilities, subsurface obstructions, and structures.

1.3 QUALITY ASSURANCE

A. Obtain required permits from local, state, and federal agencies, if required.

B. Perform Work in accordance with the Village of Patchogue codes and regulations.

1.4 PROJECT CONDITIONS

A. The structures to be demolished are indicated on the Design Drawings and will be confirmed on Site by National Grid and/or National Grid's authorized representative prior to the start of Work.

B. The at-grade and subsurface structures to be demolished may include asphalt pavement, concrete pads, gas holders and building foundations.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 PREPARATION

A. Call Local Utility Line Information service not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.
   2. Retain Local Utility Line Ticket information and responses received from the various utility companies that perform the clearances.

B. Erect, and maintain temporary barriers and security devices for Site workers' protection.

C. Protect existing structures indicated to remain.

D. Prevent movement or settlement of adjacent structures. Implement excavation support and protection procedures in accordance with Section 31 41 16 (Excavation Support and Protection), as required.

3.2 INSPECTION OF STRUCTURES TO BE DEMOLISHED

A. The interior of the structures shall be exposed to facilitate an inspection of the interior surfaces for integrity. Contractor shall notify the National Grid approved representative when a subsurface structure is ready for inspection.

B. The soils around the exterior of the structures shall be removed so that the soils adjacent to the structure can be visually inspected for indications of MGP impacts.
   1. If impacts are not evident, as determined by the National Grid approved representative, then, the Contractor shall excavate in accordance with the Design Drawings.
   2. If impacts are evident, as determined by the National Grid approved representative, then, the Contractor shall remove the structure and the soil with evidence of MGP impacts will be removed and disposed off-site.

3.3 DEMOLITION REQUIREMENTS

A. Use of explosives is not permitted.

B. Conduct demolition to minimize interference with adjacent structures, off-site properties or other on-site construction activities.

C. Cease operations immediately when adjacent structures appear to be in danger. Notify National Grid's authorized representative and the Village of Patchogue authorities. Do not resume operations until directed by National Grid's authorized representative.

D. Conduct operations with minimum interference to public or private accesses to occupied adjacent structures. Maintain protected egress and access from adjacent structures at all times.

E. Obtain written permission from National Grid when demolition equipment will traverse, infringe upon or limit access to off-site properties or occupied adjacent structures.

F. Perform air, dust and noise monitoring and control in accordance with Section 01 52 00.

3.4 DEMOLITION

A. Demolish and remove asphalt pavement, concrete pads, gas holders, building foundations and other structures encountered during excavation Work within the limits of the excavation areas as shown on the Design Drawings.

B. The structures will be demolished utilizing a hoe ram, hydraulic hammer or equivalent attachment mounted on an excavator, backhoe or other conventional excavation equipment.

C. After demolition, the debris shall be prepared and decontaminated, as necessary, to meet the acceptance criteria of the disposal or recycling facility. Preparation shall consist of demolishing the structures into manageable sized pieces and that meet the disposal facilities' acceptance criteria.

D. If required by the disposal facility, decontamination of concrete debris shall consist of pressure washing using a high pressure, low volume power washer. Physical/mechanical agitation (scraping with hand tools) of soil adhered to debris may be utilized to minimize wastewater generation.

E. Generated decontamination fluids shall be collected and treated at an on-site treatment system in accordance with Section 31 23 19.

F. Remove and cap designated utilities in accordance with Section 33 05 17.

G. Protect and support utilities to remain in accordance with Section 33 05 18.

H. Backfill excavation in accordance with Section 31 23 23.

I. Continuously clean-up and remove demolished materials from the Site.

END OF SECTION

SECTION 02 61 00

MONITORING WELL DECOMMISSIONING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. References
2. Submittals
3. Quality Assurance
4. Qualifications
5. Materials
6. Preparation
7. Monitoring well decommissioning
8. Equipment decontamination
9. Waste management
10. Field Quality Control

B. Related Sections and Documents:
1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
2. Section 01 30 65 – Health and Safety Requirements.
3. Section 01 33 00 – Submittal Requirements
4. Section 01 40 00 – Quality Requirements
5. Section 01 52 20 – Equipment and Material Decontamination.
6. Section 31 23 16 – Excavation.
7. Section 31 70 00 – Waste Management, Transportation and Disposal

1.2 SUBMITTALS

A. Drilling Contractor information including:
1. Name and address of the drilling company
2. Name of proposed project Driller,
3. Copy of Driller's certification and company's New York registration.
4. Certificate of insurance naming Client as additionally insured.

B. The driller's well decommissioning/sealing records for each well, including the type and amount of material removed from each well prior to decommissioning and the amount and type of material used to decommission each well.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with applicable local, state and federal regulations and standards.

1.4 QUALIFICATIONS

A. Drilling company and proposed driller: Specializing in performing the work of this section with minimum of five years of documented experience.

1.5 REFERENCES

A. All applicable federal, state and local regulations.

B. Occupational Safety and Health Administration (OSHA) Regulations.

C. CP-43: Groundwater Monitoring Well Decommissioning Policy" (New York State Department of Environmental Conservations [NYSDEC], November 2009)

PART 2 PRODUCTS

2.1 MATERIALS

A Grout mixture: A cement-betonies slurry in the ratio of 7.8 gallons of water to 3.9 pounds of dry powdered bentonite to 94 pounds of dry Portland cement (Type I).

PART 3 EXECUTION

3.1 PREPARATION

A. Verify that site conditions will support equipment for performing decommissioning operations.

B. Protect structures near each well to be decommissioned from damage. Damage to existing structures shall be repaired and/or damaged structures shall be replaced at no cost to National Grid.

C. Call New York Dig Safely and local utilities not less than 3 working days before initiating work and request underground utilities to be located and marked within and surrounding construction areas.

D. Protect utilities from damage.

3.2 WELL DECOMMISSIONING

A. Wells will be decommissioned in accordance with "CP-43: Groundwater Monitoring Well Decommissioning Policy" (NYSDEC, November 2009) by grouting in-place.

B. Measure well depth and compare to well construction diagram to determine if there is sediment, debris or other materials (e.g., tubing, bailers, etc.) in the screen or riser casing of the well. If there is material in the screen or riser casing, an attempt shall be made to remove this material prior to decommissioning.

C. A tremie pipe will be lowered to the bottom of the well and cement-bentonite grout pumped through the tremie pipe so that the well is grouted from the bottom to the top.

Water displaced from the well during decommissioning will be contained for proper disposal. The grout level will be monitored, and if it settles substantially, additional grout will be added to raise the grout level.

D. Following completion of the grouting, the above-grade protective casing or flush-mounted protective cover will be removed, along with any portion of the polyvinyl chloride (PVC) casing that is above grade. The area where the protective cover/casing was removed will be backfilled with clean soil to grade.

3.3 EQUIPMENT DECONTAMINATION

A. Equipment decontamination shall be conducted in accordance with the Section 01 52 20.

B. All equipment used for well decommissioning shall be steam cleaned prior to mobilizing to the site.

C. Well decommissioning equipment that comes in contact with subsurface materials shall be decontaminated by steam cleaning prior to use at each location.

D. All equipment used for well decommissioning shall be decontaminated prior to demobilizing from the site.

3.4 WASTE MANAGEMENT

A. Solids derived from well decommissioning activities shall be contained and disposed of in accordance with Section 31 70 00.

B. Water or liquids derived from well decommissioning activates shall be contained and disposed in accordance with Section 31 70 00.

3.5 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements

B. Request inspection by the National Grid authorized representative after determining well to be decommissioned is free of debris/materials and/or after debris/materials, if present, have been removed.

C. At the completion of grouting to seal well, request visual inspection by the National Grid authorized representative.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 **GENERAL**

1.1 SUMMARY

A. Section Includes:
   1. Protection
   2. Preparation
   3. Site clearing.
   4. Waste management.

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
   2. Section 01 10 00 – Summary of Work.
   3. Section 01 10 56 – Protection of Work and Property.
   4. Section 01 30 00 – Administrative Requirements.
   5. Section 01 50 00 – Temporary Facilities and Controls.
   6. Section 02 41 16 – Selective Demolition.
   7. Section 02 61 00 – Monitoring Well Decommissioning.
   8. Section 31 20 00 – Temporary Construction Access.
   9. Section 31 25 13 – Erosion and Sediment Control.
   10. Section 33 05 18 – Utility Protection and Rerouting.

1.2 QUALITY ASSURANCE

A. Perform Work in accordance with Village of Patchogue and Town of Brookhaven codes and regulations.

PART 2 **PRODUCTS**

Not Used

PART 3 **EXECUTION**

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verify existing conditions before starting Work.

B. Verify existing plant life designated to remain is tagged or identified.

3.2 PROTECTION

A. Verify utilities requiring protection and rerouting in accordance with Section 33 05 18 – Utility Protection and Rerouting.

B. Locate, identify, and protect utilities indicated to remain, from damage.

C. Protect trees, plant growth, and features designated to remain, as final landscaping.

D. Protect bench marks, survey control points, and existing structures from damage or displacement.

3.3 PREPARATION

A. Call Local Utility Line Information service not less than three (3) working days before performing Work. Request underground utilities to be located and marked within and surrounding work areas.

B. Construct stabilized construction entrance and temporary access roads in accordance with Section 31 20 00 – Temporary Construction Access.

C. Implement erosion and sediment control measures in accordance with Section 31 25 13 – Erosion and Sediment Control.

D. Set up temporary facilities and controls in accordance with Section 01 50 00 –Temporary Facilities and Controls.

E. Decommission designated groundwater monitoring wells in accordance with Section 02 61 00 – Monitoring Well Decommissioning and protect existing monitoring wells to remain.

3.4 CLEARING

A. Contractor shall clear all debris, rubble, and vegetation from the work areas and in any other areas which will be used by the Contractor for construction support as approved by National Grid and/or the National Grid approved representative.

B. Contractor shall coordinate with all applicable utility companies regarding managing utilities impacted by the proposed remedial activities.

C. Contractor shall meet all the requirements imposed by the utility companies including but not limited to: supporting and/or protecting existing utilities, coordinating with utility companies regarding disconnecting or relocating existing utilities, backfilling and compacting excavation areas as required, and conducting necessary vibration and settlement monitoring.

D. Remove trees and stumps and shrubs within work areas. Debris, stumps, roots and other vegetation that are generated during clearing operations will be stockpiled, characterized and disposed off-site at an approved disposal facility.

E. Perform selective demolition, in accordance with Section 02 41 19 – Selective Demolition.

3.5 WASTE MANAGEMENT

A. The Contractor shall be responsible for handling, stockpiling, characterization, transportation and off-site disposal of all generated wastes at properly licensed and permitted disposal facilities approved by National Grid.

B. Continuously clean-up and remove waste materials from site. Do not allow waste materials to accumulate on site.

C. Do not burn or bury materials on site. Leave site in clean condition.

D. Segregate contaminated materials from non-contaminated materials.

END OF SECTION

SECTION 31 20 00

TEMPORARY CONSTRUCTION ACCESS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Stabilized construction entrance and exit
   2. Construction access roads

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
   2. Section 01 10 00 – Summary of Work
   3. Section 01 30 65 – Health and Safety Requirements
   4. Section 01 33 00 – Submittal Requirements
   5. Section 01 50 00 – Temporary Facilities and Controls
   6. Section 31 23 16 – Excavation
   7. Section 31 70 00 – Waste Management, Transportation, and Disposal

1.2 REFERENCES

A. New York State Department of Transportation's (NYSDOT), Standard Specifications and Construction Materials (May 1, 2008)

B. New York Standards and Specifications for Erosion and Sediment Control (NY SSESC)

1.3 SUBMITTALS

A. Contractor shall submit a plan showing proposed locations and alignments for stabilized construction entrances and exits and construction access roads, for approval by the National Grid approved representative.

B. Crushed Stone:
   1. Samples: Submit, in air-tight containers, 1 lb sample of each material to the National Grid approved representative and 5 lbs to testing laboratory.
   2. Material Source: Submit name of imported material source and certification stating that the materials are natural, virgin materials from a commercial or non-commercial source with a statement that to the best of the affiant's knowledge, the material is not contaminated pursuant to any applicable remediation standards and is free of extraneous or deleterious material and/or solid waste, and a description of the steps taken to confirm such.
   3. Bills of lading to document the source(s) of the material, including the name of the affiant and relationship to the source, and the location where the materials were obtained, including the street, town, state, and a brief source history.

4. A grain-size analysis in accordance with ASTM standards. Test reports shall be submitted directly from the testing facility to the National Grid approved representative.
5. Submit copies of geotechnical laboratory tests to National Grid approved representative two (2) weeks prior to the material being needed on the Site.

C. Subbase Material:
1. Samples: Submit, in air-tight containers, 1 lb sample of each material to the National Grid approved representative and 5 lbs to testing laboratory.
2. Material Source: Submit name of imported material source and certification stating that the materials are natural, virgin materials from a commercial or non-commercial source with a statement that to the best of the affiant's knowledge, the material is not contaminated pursuant to any applicable remediation standards and is free of extraneous or deleterious material and/or solid waste, and a description of the steps taken to confirm such.
3. Bills of lading to document the source(s) of the material, including the name of the affiant and relationship to the source, and the location where the materials were obtained, including the street, town, state, and a brief source history.
4. A grain-size analysis in accordance with ASTM standards. Test reports shall be submitted directly from the testing facility to the National Grid approved representative.
5. Submit copies of geotechnical laboratory tests to National Grid approved representative two (2) weeks prior to the material being needed on the Site.

D. Geotextile:
1. Manufacturer's information and product data

PART 2 PRODUCTS

2.1 CRUSHED STONE

A. Crushed stone shall be used for the installation of the stabilized construction entrances and exits. Crushed stone material shall meet the requirements of "Size Designation #3" of the NYSDOT Specification §703-4 or alternate approved by the National Grid approved representative.

2.2 SUBBASE MATERIAL

A. Subbase material shall be used for installation of construction access roads. Subbase material shall meet the requirements of "Size Designation #4" of the NYSDOT Specification §304-2 or alternate approved by the National Grid approved representative.

2.3 GEOTEXTILE

A. Geotextile shall be used for the installation of stabilized construction entrances/exits and construction access roads. Geotextile shall meet the requirements of NYSDOT Specification §207-2 (Materials, Geotextile Stabilization, Strength Class 1) or alternate approved by the National Grid approved representative.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. The Contractor shall furnish all labor, materials, equipment, and incidentals required to construct stabilized vehicle access surfaces, as shown on the Design Drawings, as directed by the National Grid approved representative, and as necessary to complete the Work.

B. The locations of the stabilized construction entrances/exits and temporary access roads shall be cleared, graded to the appropriate slopes, and compacted.

3.2 STABILIZED CONSTRUCTION ENTRANCES AND EXITS

A. Stabilized construction access pads shall be installed at the Site entrances and exits, as indicated on the Design Drawings or alternate locations approved by the National Grid approved representative.

B. Construction entrances shall be constructed in accordance with the NYSSESC and shall consist of a geotextile placed on the subgrade followed by a minimum of 6 inches of crushed stone. Equipment shall not be driven directly on the geotextile. The crushed stone shall be compacted a minimum of three (3) passes with construction equipment.

C. The stabilized construction entrances and exits shall be a minimum of 12 feet wide, but not less than the full width of the ingress or egress, and a minimum of 50 feet long. The actual length and width shall conform to the NYSSESC and the Design Drawings.

3.3 CONSTRUCTION ACCESS ROADS

A. Construction access roads shall be installed, as necessary, to access the off-site excavation area, to create on-site vehicle and truck travel routes, and other work areas such vehicle parking and equipment staging areas, as directed by the National Grid approved representative.

B. Construction access roads shall be constructed in accordance with the NYSSESC.

C. The subgrade of the access roads shall be cleared, graded and compacted prior to installation of access road.

D. The maximum allowable slope for the construction access roads is 15%.

E. Construction access roads shall consist of a geotextile and a minimum six (6) inches of compacted subbase material. Equipment shall not be driven directly on the geotextile. The subbase material shall be compacted a minimum of three (3) passes with vibratory drum compactor or alternate approved compaction equipment as approved by National Grid approved representative.

3.4 PROTECTION OF WORK

A. Contractor shall maintain access roads until completion of work activities.

3.5 REMOVAL OF WORK

A. Contractor shall remove all temporary construction access roads and stabilized entrance/exits access at the completion of work activities.

END OF SECTION

SECTION 31 23 16

EXCAVATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Excavation of soils
   2. Excavation of solidified/stabilized material generated from the In-Situ Solidification/Stabilization (ISS) treatment
   3. Post-excavation sampling and backfill coordination

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
   2. Section 01 10 00 – Summary of Work
   3. Section 01 30 00 – Administrative Requirements
   4. Section 01 33 00 – Submittal Requirements
   5. Section 01 40 00 – Quality Requirements
   6. Section 01 50 00 – Temporary Facilities and Controls
   7. Section 31 23 23 – Backfill
   8. Section 31 25 13 – Erosion and Sediment Controls
   9. Section 31 41 16 – Excavation Support and Protection
   10. Section 31 70 00 – Waste Management, Transportation and Disposal
   11. Section 31 80 00 – In-Situ Solidification/Stabilization

1.2 SUBMITTALS

A. Contractor shall prepare and submit an Excavation Plan for review and approval within 10 days of the Notice to Proceed. The Plan shall describe the proposed excavation method for each designated excavation area, identify the ESC measures, and the schedule and sequencing of excavation activities.

1.3 REFERENCES

A. Occupational Safety and Health Administration (OSHA) Regulations

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the quality control requirements specified in Section 01 40 00.

B. Perform Work in accordance with local and state's regulations and standards.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 PREPARATION

A. Protect active utilities indicated to remain from damage. Utilities affected by the construction activities shall be protected during the course of work or temporarily isolated and re-established at the completion of Work. Work in the vicinity of utilities shall be coordinated the utility purveyor. Work near utilities shall be performed in accordance with the utility purveyor requirements. The utility trench through the off-site excavation area, as seen in Drawing C-401, shall be maintained throughout the excavation.

B. Call Local Utility Line Information service and Village of Patchogue and/or Town of Brookhaven not less than three (3) working days before performing Work.
   1. Request underground utilities to be located and marked within and adjacent properties.
   2. Do not proceed with intrusive activities until the markout is complete and confirmed.

C. Excavations shall be supported in accordance with Section 31 41 16.

D. Protect bench marks, survey control points, existing structures, fences from equipment and vehicular traffic. Benchmarks and survey marks that are missing or damaged shall be replaced by the Contractor's Surveyor.

E. Confirm that site clearing and preparation activities have been completed in accordance with Section 31 10 00.

F. Inspect and repair, if necessary, erosion and sediment controls prior to the start of excavation activities in accordance with Section 31 25 13.

G. Confirm that the excavation limits for each excavation area have been surveyed and demarcated in accordance with Section 01 30 00.

H. Furnish and install temporary chain-link fencing around the off-site excavation area and waste staging pads in accordance with Section 01 50 00.

3.2 SOIL EXCAVATION

A. All excavation work shall be performed in compliance with all appropriate Federal, State, and OSHA regulations.

B. Excavations adjacent to existing structures designated to remain (e.g., building, utility structures as indicated on the Drawings) shall be supported in accordance with Section 31 41 16.

C. Soil excavation shall be performed within the limits indicated on the Design Drawings.

D. All excavation outside the limits shown on the Drawings, which is not approved by the National Grid approved representative, together with the removal and disposal of the excavated material, shall be at the Contractor's expense. The unauthorized excavation shall be filled and compacted with the specified backfill materials by the Contractor at no additional cost to the National Grid.

E. The limits shall be staked out and approved by the National Grid approved representative prior to commencing additional excavation activities. The Contractor shall commence additional excavation activities only after receiving written authorization from the National Grid or National Grid approved representative for a particular excavation area.

F. Soil shall be excavated to the depths indicated on the Design Drawings. The depth of excavation areas range from 4 to 9 feet below ground surface.

G. Excavated soils may be stockpiled and staged on Site in designated waste staging areas or direct-loaded into trucks for off-site disposal. If direct-loading is selected, the Contractor shall identify this in the Excavation and Waste Management Plan, along with the basis for using this method, and all required waste characterization and waste acceptance from the disposal facility shall be completed prior to initiating excavation.

H. Soil excavation beyond the limits of excavation shown on the Drawings will be required if post-excavation sampling results indicate exceedances of the cleanup criteria. The limits of the additional excavation will be provided to the Contractor by the National Grid approved representative.

I. Notify National Grid approved representative of unexpected subsurface conditions.

J. The excavation activities shall be sequenced such that sufficient area is available at all times to stage materials and excavated soils, loading, and backfilling.

K. Subsurface structures encountered during excavation shall be removed and disposed.

3.3 EXCAVATION OF SOLIDIFIED/STABILIZED MATERIAL IN ISS TREATMENT AREA

A. As specified in Section 31 80 00, the solidified/stabilized material within the limits of the treatment area shall be excavated, if not removed concurrently with active ISS operations, to approximately four (4) feet below pre-existing grades to accommodate the Surface Cover/Cap and to ensure that the limit of the ISS treatment is below the frost line.

B. Excavated material shall be placed in a waste staging area for characterization and off-site disposal in accordance with Section 31 70 00.

3.4 POST-EXCAVATION SAMPLING AND BACKFILL COORDINATION

A. At the completion of an excavation area, request visual inspection of excavation by the National Grid approved representative.

B. After visual inspection of the excavation area, the National Grid approved representative will collect post-excavation samples. The Contractor shall assist the National Grid approved representative with collecting the samples.

C. After receipt of sample results, the National Grid approved representative will notify the Contractor in writing if additional excavation is required or if the excavation is complete.

D. After receipt of favorable post-excavation sampling results, the final excavation limits shall be surveyed by the Contractor's licensed surveyor in accordance with Section 01 40 00.

E. Backfilling shall only be performed after a written authorization is provided by the National Grid approved representative to the Contractor authorizing a particular area for backfilling. Backfilling shall be performed in accordance with Section 31 23 23.

3.5 PROTECTION

A. Contractor shall protect excavation areas until backfilling and restoration is completed.

B. Prevent displacement or loose soil from falling into excavation; maintain excavation stability.

C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION

SECTION 31 23 19

DEWATERING AND ON-SITE WATER TREATMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
1. Dewatering system design and installation.
2. Temporary on-site wastewater treatment.
3. System general requirements.
4. System operation and maintenance.
5. Treatment, sampling and disposal of collected water.
6. System dismantling and removal.

B. Related Sections and Documents:
1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
2. Section 01 10 00 – Summary of Work.
3. Section 01 33 00 – Submittal Requirements.
4. Section 01 40 00 – Quality Requirements.
5. Section 31 23 16 – Excavation.
6. Section 31 23 23 – Backfill.
7. Section 31 41 16 – Excavation Support and Protection.

1.2 REFERENCES

A. Occupational Safety and Health Administration (OSHA) Regulations.

B. National Grid USA and Affiliated Companies Terms and Conditions For Construction Purchase Orders.

C. Supplemental Conditions to National Grid Remedial Construction Purchase Orders.

D. Approved NYSDEC State Pollutant Discharge Elimination System (SPDES) Equivalency Permit.

1.3 PERFORMANCE REQUIREMENTS

A. Perform Work in accordance with local and state's regulations and standards.

B. Contractor shall, at all times, provide and maintain proper and satisfactory means and devices for the removal of water within the excavation areas, and shall remove such water as it may collect, in such a manner as shall not interfere with the execution of the work. Contractor shall provide means to prevent surface water from entering excavation areas.

C. Water pumped or drained from the excavation areas shall be handled in a suitable manner approved by the Design Engineer and without injury to the adjacent property, the work under construction, or to pavement, roads, drives and water courses. Water shall be collected, conveyed, stored, treated, and discharged in accordance with this Section.

D. Contractor shall assume sole responsibility for dewatering and surface water control systems and for loss or damage resulting from partial or complete failure of protective measures and settlement or resultant damage caused by ground water control operations.

E. Design the dewatering system to:
   1. Lower water table within excavation areas to the required depth to perform the excavation.
   2. Allow for the proper installation of the ICON slide rail system for the off-site excavation area.

F. Contractor shall install and operate a water treatment system for treatment of water collected during excavation work. The Contractor shall procure the necessary permits for operation of the treatment system and discharge of the treated water.

G. Collect representative samples and perform analytical system to confirm treatment to established limits before discharging to surface water. Sample collection frequency and analytical parameters shall be in accordance with the SPDES Equivalency Permit

1.4 SUBMITTALS

A. Submit information and statement of qualifications of proposed designer and installer of the dewatering system.

   Prior to commencement of excavation, the Contractor shall submit a Dewatering Plan to National Grid and the Design Engineer for review and approval. The Dewatering Plan shall be submitted at the same time as the Excavation and Waste Management Plan (Section 31 23 16 – Excavation and Waste Management). The Plan shall include:
   1. The design, installation, operation and maintenance of a temporary dewatering and treatment system that shall lower and control ground water levels and hydrostatic pressures; control surface water and precipitation entering excavations during construction; provide treatment of pumped water; and disposal of treated effluent.
   2. Design values, analyses, and calculations to support the design.
   3. A description of the dewatering system and the treatment system, including dewatering techniques and equipment, the type of water treatment and equipment, anticipated flow rates, removal efficiencies, location of equipment and piping, and discharge system design, piping and layout.
   4. A description of operation and maintenance activities and compliance sampling and testing.
   5. A description of procedures for dismantling of a temporary dewatering and treatment system.
   6. Product data for equipment and materials proposed for the dewatering system including but not limited to pumps, motors, valves, screens, filters, and standby generators.

B. Daily Dewatering Field Reports: Daily monitoring and maintenance reports including volume handled per day.

C. Analytical reports with the results from start-up testing and routing compliance sampling.

D. Qualifications of the dewatering system installer.

E. Qualifications of the dewatering and treatment system operator.

1.5 QUALIFICATIONS

A. Prepare Dewatering Plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of New York. The Professional Engineer shall have demonstrated experience in excavation support and stability and excavation dewatering design.

B. Operator: Operator trained and licensed to operate the type and size of treatment system to be used at the Site.

C. Installer: Company specializing in performing work of this section with a minimum experience of three (3) similar projects with design, installation and operation of dewatering system.

1.6 QUALITY ASSURANCE

A. Comply with the NYSDEC approved SPDES Equivalency Permit.

B. National Grid's on-site CQA personnel will implement the Construction Quality Assurance Project Plan (CQAPP) to provide quality assurance and asses the conformity of the work to the DEC-approved Remedial Design Report, Design Drawings, and Technical Specifications.

PART 2 PRODUCTS

2.1 DEWATERING EQUIPMENT

A. Select dewatering equipment to meet specified performance requirements.

B. Contractor shall provide sufficient spare parts and equipment to replace parts or equipment requiring repairs and allow for continued dewatering.

2.2 ON-SITE TREATMENT SYSTEM

A. Contractor shall provide on-site storage and treatment system to treat water generated during remedial activities to the discharge limits established in the SPDES Equivalency Permit.

B. Treatment system components shall be consistent with the SPDES Equivalency Permit, Technical Specifications, and detailed On-Site Treatment System design prepared by the Design Engineer.

PART 3 EXECUTION

3.1 PREPARATION

A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.

B. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the National Grid or National Grid approved representative and authorities having jurisdiction.

C. Employ licensed land surveyor to survey to create benchmarks for existing adjacent buildings and structures for position and elevation of principal elements before and after completion of dewatering operations.

D. Sequence work to install and test dewatering monitoring a minimum of seven (7) days before starting excavation.

3.2 GENERAL REQUIREMENTS

A. The Contractor shall provide all equipment necessary for dewatering. Contractor shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workmen for the operation of the pumping and treatment equipment.

B. Adequate standby equipment shall be kept available at all times to insure efficient dewatering and maintenance of dewatering operation during power failure.

C. Dewatering shall commence when groundwater is first encountered and shall be continuous until water can be allowed to rise in accordance with the provisions of this Section.

D. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering. In addition, the well points or wells shall be sand packed and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check by the Contractor shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.

E. Provide a means to measure total daily volume pumped from the dewatering system. This information shall be submitted to the National Grid approved representative and the Design Engineer on a daily basis as part of the Daily Field Report.

F. The release of groundwater to its static level shall be performed in such a manner as to prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.

G. Provide sufficient on-site storage and treatment capacity for water generated by dewatering operations and other remedial activities.

H. During dewatering, resurvey benchmarks weekly and maintain a log of surveyed elevations to compare to original elevations during dewatering operations. Promptly notify National Grid

approved representative if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

I. Contractor shall prevent freezing of dewatering and on-site treatment system components and collected liquids stored in on-site drums, tanks, treatment equipment, pipes and hoses.

3.3 SYSTEM OPERATION AND MAINTENANCE

A. Operate dewatering system continuously until backfill is above normal ground water table elevation.

B. Provide 24-hour supervision of dewatering system by personnel skilled in operation, maintenance, and replacement of system components.

C. Conduct daily observation of dewatering system and monitoring system. Make required repairs and perform scheduled maintenance.

D. Fill fuel tanks before tanks reach 25 percent capacity.

E. Start emergency generators at least twice each week to check operating condition.

F. The Contractor shall be responsible for providing all electrical controls and power distribution. Costs for maintenance of electrical components associated with the dewatering system shall be the responsibility of the Contractor. The Contractor shall meter and pay all costs for power associated with dewatering and installation of the system.

G. When dewatering system cannot control water within excavation, notify National Grid approved representative and stop excavation work.

H. Supplement or modify dewatering system and provide other remedial measures to control water within excavation. Demonstrate dewatering system operation complies with performance requirements before resuming excavation operations.

I. Modify dewatering and surface water control systems when operation causes or threatens to cause damage to existing structures, adjacent property, or adjacent water wells.

J. Correct unanticipated pressure conditions affecting dewatering system performance.

K. Do not discontinue dewatering operations without National Grid approved representative’s approval.

3.4 ON-SITE TREATMENT SYSTEM TESTING

A. After system set-up and installation, commence dewatering operations and on-site treatment and contain treated water in an effluent holding tank.

B. Collect representative samples and perform analytical testing to confirm treatment to established limits.

C. Sample collection, frequency, and analytical parameters shall be in accordance with the approved SPDES Equivalency Permit.

D. If analytical results demonstrate non-compliance with the approved SPDES Equivalency Permit, notify Design Engineer who will advise Contractor on system modifications.

3.5 DISPOSAL/DISCHARGE OF TREATED COLLECTED WATER

A. Following confirmation of treatment to established limits, discharge treated water at a location established in the approved SPDES Equivalency Permit.

3.6 SYSTEM DISMANTLING AND REMOVAL

A. Remove dewatering system after dewatering operations are discontinued or as approved by National Grid and/or National Grid approved representative.

3.7 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements.

B. After dewatering system is installed, perform pumping tests to determine when that system is operating correctly. Adjust system as required to ensure proper operation.

C. Monitor and record daily monitoring of the dewatering system.

3.8 PROTECTION

A. Protect structures, utilities and other facilities from damage potentially caused by dewatering operations.

END OF SECTION

SECTION 31 23 23

BACKFILL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. References
2. Submittals
3. Materials
4. Backfill materials.
5. Examination
6. Stockpiling of Fill materials
7. Backfilling.
8. Geotextile Installation
9. Demarcation Layer Installation
10. Tolerances
11. Field Quality Control
12. Protection of Finished Work

B. Related Sections and Documents:
1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
2. Section 01 10 00 –Summary of Work
3. Section 01 33 00 – Submittal Requirements.
4. Section 01 40 00 – Quality Requirements.
5. Section 31 23 16 – Excavation.
6. Section 31 50 00 – Site Restoration
7. Section 33 05 17 – Perimeter Utility Cut and Cap.

1.2 REFERENCES

A. New York State Department of Transportation (NYSDOT) Standard Specifications (May 1, 2008).

B. ASTM International:
1. ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils.
2. ASTM D1577 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.
3. ASTM D6938 – Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Requirements.

B. General:

1. Analytical Samples: Submit in laboratory prepared containers to the testing laboratory.
2. Geotechnical Samples: Submit, in air-tight containers, 1 lb sample of each material to the National Grid authorized representative and 5 lbs to testing laboratory.
3. Material Source: Submit name of imported material source and certification stating that the materials are natural, virgin materials from a commercial or non-commercial source with a statement that to the best of the affiant's knowledge, the material is not contaminated pursuant to any applicable remediation standards and is free of extraneous or deleterious material and/or solid waste; a description of the steps taken to confirm such, a brief source history; and identification of any state or local approvals as a fill source.
4. Bills of lading to document the source(s) of the material, including the name of the affiant and relationship to the source, and the location where the materials were obtained, including the street, town, state and a brief source history.
5. A particle-size analysis, plasticity index test, proctor compaction test in accordance with ASTM standards. Test reports shall be submitted directly from the testing laboratory to the National Grid authorized representative.
6. A grain-size analysis in accordance with ASTM standards. Test reports shall be submitted directly from the testing facility to the National Grid authorized representative.
7. Submit copies of analytical laboratory test results to the National Grid authorized representative two (2) weeks prior to the material being needed on the Site. The National Grid authorized representative shall then submit results to NYSDEC for written approval prior to use on Site.
8. Submit copies of geotechnical laboratory testing to the National Grid authorized representative two (2) weeks prior to the material being needed on the Site.

C. Compaction Test Results
   1. Submit copy of backfill in-situ compaction test results to the National Grid authorized representative at end of each testing day.

D. Submit information and qualifications of proposed analytical laboratory.

E. Submit information and qualifications of proposed geotechnical laboratory.

PART 2 PRODUCTS

2.1 BACKFILL MATERIALS

A. General
   1. Employ a NYSDOH-certified ELAP approved analytical testing laboratory to perform the tests on each different source and/or material proposed imported backfill material and submit the test data to the Design Engineer.
   2. Employ independent geotechnical testing laboratory approved by the National Grid authorized representative to perform the tests on each different source and/or material proposed for use in the Work and submit the test data to the Engineer. The frequency for geotechnical tests shall be one sample for each 5,000 cubic yards of material delivered to the site. The backfill shall conform to ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils and the gradations specified below.
   3. Characterization samples of the material will be a minimum of one sample analyzed from every new source (virgin mine/pit or material sources other than a virgin mine/pit) and

the sampling frequency will be determined in accordance with Table 5.4(e)10 presented below:

Contaminant:	VOCs	SVOCs, Inorganics & PCBs/Pesticides	
Soil Quantity (cubic yards)	Discrete Samples	Composite	Discrete Samples/Composite
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
> 1000	Add an additional 2 VOC discrete samples and 1 composite sample for each additional 1,000 cubic yards or consult with DER		

a. Grab samples shall be allowed for VOC analyses only.
b. Composite samples shall be prepared by collecting discrete samples from three to five random locations from the volume of soil to be tested which shall then be mixed and analyzed for SVOCs, inorganic, and PCB/pesticide constituents.

4. If results from analytical data indicate concentrations above specified criteria, the Contractor shall submit another proposed material source.
5. If results from geotechnical analysis do not meet the specifications, the Contractor shall submit another proposed material source.

B. Graded sandy soil
1. Clean naturally occurring or blended soil and aggregate mix conforming to ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils and the gradation shown below (or approved equal):

Sieve Size	**Percent Passing**
2 inch	100%
¾ inch	70% - 100%
No. 4	30% - 80%
No. 50	10% - 35%
No. 200	5% - 12%

2. Graded sandy soil will be imported from an approved off-site source.
3. Graded sandy soil will be used as backfill material above the groundwater table.

C. Coarse aggregate:
1. New York State Department of Transportation (NYSDOT) Coarse Aggregate size designation Type 1 (or approved equal) conforming to ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils and the gradation shown below (or approved equal):

Sieve Size	Percent Passing
1 inch	100%
½ inch	90% - 100%
¼ inch	0% - 15%

2. Coarse aggregate will be imported from an approved off-site source.
3. Coarse aggregate will be used as backfill material within the groundwater table.

D. Coarse stone
1. New York State Department of Transportation (NYSDOT) Coarse Aggregate size designation Type 2 (or approved equal) conforming to ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils and the gradation shown below (or approved equal):

Sieve Size	Percent Passing
1 ½ inch	100%
1 inch	90% - 100%
½ inch	0% - 15%

2. Coarse stone will be imported from an approved off-site source.
3. Coarse stone will be placed from the ground surface to six-inches below grade in lieu of a soil surface fill in the event that the groundwater elevation is within six-inches of the finished grade.

E. Excavated Soils for Re-use:
1. Excavated soils that have been designated for re-use based on visual inspection and/or analytical testing in accordance with Section 31 70 00.
2. On-site materials determined to be suitable for re-use shall only be used as backfill underneath the soil cover.

F. Geotextile:
1. 4.0 oz/sy, needle punched non-woven geotextile, 100% polypropylene staple filaments.
2. Manufacturer: Tencate; Model: Mirafi® 140N
3. Or approved equal.

G. Demarcation Layer:
1. Construction Fence: Lightweight polyethylene safety fence; orange color.

PART 3 EXECUTION

3.1 EXAMINATION

A. Request subgrade inspection by the National Grid authorized representative and Design Engineer.

B. If the physical and/or engineering properties of materials delivered to the site differ significantly from the samples tested, the Contractor shall perform additional testing to verify compliance with the specifications.

C. Any fill material placed that does not conform to these Specifications shall be removed and replaced with conforming material, at no cost to National Grid.

3.2 STOCKPILING OF FILL MATERIALS

A. Stockpile materials on site at locations approved by the National Grid authorized representative.

B. Stockpile in sufficient quantities to meet project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Stockpile topsoil 8 feet high maximum.

E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.3 BACKFILLING

A. Backfilling shall be sequenced and performed in accordance with the NYSDEC-approved Construction Management Plan included as an appendix to the Final Remedial Design Report.

B. Backfilling shall continue up to 2 feet bgs. The environmental cap shall be installed from ground surface to 2 feet bgs.

C. Initial backfilling shall be performed using the excavated soils designated for reuse, depending on the groundwater table elevation. Excavated soils designated for re-use shall be placed in 10-inch maximum lifts and compacted to 95% percent of maximum dry density per ASTM D1557.

D. If the bottom of the excavation can not be dewatered sufficiently, NYSDOT Coarse Aggregate size designation Type 1 (or approved equal) shall be placed until subgrade conditions are suitable for placement of other fill materials or 2 feet bgs.

E. Within the water table, backfill will be placed in loose layers and tamped in-place using excavation equipment.

F. Above the groundwater table, all backfill will be placed in 12-inch thick lifts and mechanically compacted.

G. Remaining backfill shall be the imported fill to design subgrade elevations. Compact uniformly to 95% percent of maximum dry density per ASTM D1557.

H. Backfill areas to design subgrade elevations with unfrozen materials.

I. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

J. Place fill material in continuous layers and compact.

K. Employ placement method that does not disturb or damage other work.

L. Maintain optimum moisture content within plus or minus 3% of the optimum moisture contact as defined by ASTM D1557 to attain required compaction density.

M. Remove surplus backfill materials from site.

3.4 GEOTEXTILE INSTALLATION

A. Install geotextile layer over prepared subgrade in areas as shown on Construction Drawings.

B. Install geotextile layer between NYSDOT Coarse Aggregate size designation Type 1 (or approved equal) and graded sandy soil to prevent migration of fines into coarse aggregate. At a minimum, the geotextile will be installed below the demarcation layer to match existing environmental cap installation within the Utility Corridor.

C. The ends of geotextiles shall be overlapped by a minimum of six inches.

D. Geotextile shall be handled in such a manner as to prevent damage and not to entrap stones, excessive dust, or moisture during placement.

E. Inspect geotextile surface after installation to ensure that the geotextile has not been damaged during installation activities. Damaged geotextile shall be removed and replaced.

3.5 DEMARCATION LAYER INSTALLATION

A. In accordance with DER-10, a demarcation layer will be installed below the environmental cap and on top of the native soils at 2 feet bgs.

B. Prior to the installation of the Site covers, the demarcation layer (construction fencing) shall be unrolled and placed on the prepared and compacted subgrade.

C. Place the fabric smoothly without extensive wrinkles and/or folds.

D. Fence ends shall be overlapped 6 inches and along the center of the overlap, tied with plastic ties every 10 feet. Fence shall also be anchored into the ground with ground staples every 15 feet at the center of fence's width.

3.6 TOLERANCES

A. Section 01 40 00 – Quality Requirements.

B. Top surface of general backfilling: Plus or minus 2 inches from required elevations.

3.7 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements.

B. Perform in-place compaction tests in accordance with the following:
   1. Density Test Methods: ASTM D6938.
   2. Testing frequency: 4 tests/acre/lift or at a minimum of one test per lift or as directed by the Design engineer.

C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

3.8 PROTECTION OF FINISHED WORK

A. Section 01 70 00 – Execution Requirements

END OF SECTION

SECTION 31 25 13

EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Silt Fencing
2. Hay Bales
3. Berms

B. Related Sections and Documents:
1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
2. Section 01 10 00 – Summary of Work.
3. Section 01 50 00 – Temporary Facilities and Controls.
4. Section 01 52 10 – Dust, Odor and Noise Control.
5. Section 01 78 00 – Demobilization.
6. Section 02 41 16 – Selective Demolition.
7. Section 31 10 00 – Site Clearing
8. Section 31 20 00 – Temporary Construction Access.
9. Section 31 23 16 – Excavation.
10. Section 31 70 00 – Waste Management, Transportation, and Disposal
11. Section 33 05 17 – Perimeter Utility Cut and Cap.

1.2 REFERENCES

A. *New York State Standards and Specifications for Erosion and Sediment Control* (NY SSESC*)* (August 2005).

B. *New York State Stormwater Management Design Manual*. Prepared by: Center for Watershed Protection. Prepared for: NYSDEC. August 2010.

C. Remedial Design Report, March 2012: Appendix E – Storm Water Pollution Prevention Plan.

D. EPA –Office of Water. Storm Water Management for Construction Activities. September, 1992.

1.3 SUBMITTALS

A. The Contractor shall submit an Erosion and Sediment Control (E&SC) Plan to National Grid for approval prior to initiating Work. The E&SC Plan shall be developed as part of the Contractor's Construction Management Plan in accordance with Section 01 10 00 – Summary of Work and shall consider the references listed in Paragraph 1.2.

B. Submit product information on erosion control products for the review and approval of the Design Engineer.

C. Weekly inspection reports of the erosion and sediment control measures.

PART 2 PRODUCTS

2.1 TEMPORARY SILT FENCING

A. Silt fence shall conform to NYSSESC.

B. Silt fence fabric shall be inert to chemicals commonly found in soil, and resistant to mildew, rot, insects, and rodent attack.

C. Silt fence fabric and fence posts shall be factory-assembled. Posts shall be attached to the silt fence at a maximum of 8-foot centers.

D. Silt fence cloth shall be Filter X, Mirafi 100X, Stabilinka T140N or approved equal.

E. Pre-fabricated silt fence shall be manufactured by Geofab, Envirofence, or approved equal.

2.2 BERMS

A. Berms may be used to collect runoff and other water that is potentially impacted by soil or other materials present at the Site. Commercially available berms may be used. Berms may be soil berms; however, the soil berms shall be lined with plastic sheeting to prevent contaminating the soil with potentially impacted runoff or Site impacted water. Any impacted soil must be collected, characterized, and properly disposed.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. The Contractor shall comply with applicable requirements in the NY SSESC latest edition.

B. The Contractor shall, in accordance with Section 01 10 00, satisfy all applicable regulatory requirements to obtain required permits or certifications prior to the start of Work.

C. The Contractor shall conduct Site activities in accordance with the regulatory requirements as specified in the Design Drawings and Specifications throughout the duration of the Work.

D. All temporary erosion and sediment control measures shall be installed and maintained in accordance with the Storm Water Pollution Prevention Plan and New York State Standards and Specifications and Sediment Control.

E. Summarize inspection results in weekly inspection reports and submit to the Design Engineer for review. Include, at a minimum, the following information:
   1. Date and time of each inspection.
   2. Name and title of person(s) performing each inspection.
   3. Weather and soil conditions (e.g. dry, wet, saturated, etc.) at the time of each inspection.
   4. Condition of the stormwater runoff at all points of discharge from the construction site, including discharges from conveyance systems (e.g. pipes, culverts, ditches, etc.) and over-land flow.
   5. Identification of any erosion and sediment control measures that require repair or maintenance.
   6. Identification of any erosion and sediment control measures that were not properly installed or are not functioning as designed.
   7. Description and sketch of areas that are disturbed at the time of inspection and any areas that have been stabilized (temporary and/or final) since the last inspection.
   8. Corrective action(s) to be taken to install, repair, replace or maintain erosion and sediment control measures.

3.2 SILT FENCE/HAY BALE INSTALLATION

A. Silt fence/hay bale dikes will be installed around the perimeter of the Site as shown on Design Drawings.

B. Additional silt fence/hay bale dikes will be installed to delineate the limit of the work areas (installed on the down slope side), around the perimeter of any stockpile areas as well as in strategic locations based on visual observation of flow patterns and topography of work areas to control sediment entrained storm water from entering and exiting work areas.

C. Silt fence material shall be embedded at least 6 inches beneath ground surface and shall extend upward at least 2 feet above the ground surface. The top edge of the fabric shall be reinforced or shall have a one-inch tuck. Silt fence posts shall be driven at minimum of 2 feet below ground surface.

D. Where two ends of a silt fence join, the ends shall be overlapped a minimum of 6 inches.

3.3 PROVISIONS FOR EROSION CONTROL DURING WORK

A. Contractor shall implement and maintain erosion and sediment control measures around all areas to be disturbed prior to disturbing ground in the area, in accordance with the approved Drawings and Specifications, and to the complete satisfaction of the National Grid approved representative. The National Grid approved representative will periodically observe erosion and sediment control structures to confirm that the Contractor is maintaining these features.

B. Contractor shall take sufficient precautions during Work to prevent the run-off of materials such as soil, wastes, fuels, and oils into the surface waters of New York. Storm water catch basins or drains shall be protected from sediment materials run-off. Contractor shall use all best management practices (BMPs) necessary to protect inlets from sediment and debris.

C. Disposal of drainage from the Site shall be at a location approved by the National Grid approved representative. Drainage shall not be disposed of until silt and other sediment material have been removed. Particular care shall be taken to prevent the discharge of unsuitable drainage to a water supply or surface water body.

D. Accumulated silt and debris shall be removed by the Contractor from behind the face of the silt fence or other BMPs as needed to maintain BMP effectiveness. Clogged or damaged BMPs shall be replaced immediately.

E. Contractor shall inspect and repair erosion and sediment controls daily but also within 12 hours after a rainfall of 0.5 inches or more. The Contractor shall notify the National Grid approved representative of such checks and repairs so that the Work can be inspected and recorded.

F. Sediment will be removed from behind the silt fence and hay bales when it accumulates to a depth greater than 0.5 feet deep behind the barrier. Accumulated sediment that originates from the excavated activities will be added to the stockpile for off-site disposal.

G. Erosion and sediment control measures will be maintained at all times by Contractor. If full implementation of the approved plan does not provide for effective erosion control, additional erosion and sediment control measures shall be implemented to control or treat the sediment source.

H. Any erosion and sediment control measures impacted by Site contaminants will be properly disposed by the Contractor.

END OF SECTION

SECTION 31 41 16

EXCAVATION SUPPORT AND PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Excavation support and protection products and methods
2. Performance requirements

B. Related Sections and Documents:
1. Design Drawings and general provisions of the Contract Documents, including the Remedial Design Report, Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
2. Section 01 10 00 – Summary of Work.
3. Section 01 33 00 – Submittal Requirements.
4. Section 01 50 00 – Temporary Facilities and Controls.
5. Section 31 23 16 – Excavation.
6. Section 31 23 19 – Dewatering and On-Site Water Treatment.
7. Section 31 23 23 – Backfill.
8. Section 31 25 13 – Erosion and Sediment Control.

1.2 PERFORMANCE REQUIREMENTS

A. Furnish, install, monitor, and maintain excavation/trench supports and protection systems, capable of supporting the excavation sidewalls, and able to resist soil and hydrostatic pressure and superimposed/construction loads.
1. Provide detail on the method of support for the excavation areas.
2. Prevent surface water from entering excavations by grading, dikes, or other means.

B. The Contractor shall install excavation support and protection systems without damaging existing work, structures and utilities adjacent to the excavation.

1.3 SUBMITTALS

A. The Contractor shall prepare and submit an Excavation Support and Protection Plan signed and sealed by a New York State Professional Engineer. The Plan shall detail the proposed excavation sequence and excavation support methods to protect excavations, active utilities and existing structures. The Plan shall be based upon excavation areas and depths shown on the design drawings.

B. If the Contractor elects to propose an alternative excavation system, the Contractor shall submit an Excavation Support and Protection Plan within 2 weeks of Notice to Proceed. The Plan shall be prepared and signed and sealed by a New York State licensed Professional Engineer. The plan shall:
1. Incorporate excavation protection specifically identified in the Design Drawings and additional excavation protection (e.g. sheeting, etc) proposed by the Contractor.

2. Provide or reference drawings that identify the shoring methods, materials, dimensions, and elevations.
3. Identify sequencing of shoring activities.
4. Identify procedures for removal of shoring.
5. Provide the engineering calculations and data to support shoring designs.

C. The Contractor shall submit a plan for vibration and noise monitoring and mitigation procedures that may be required during the remedial construction activities if directed by the Design Engineer and/or the National Grid approved representative.

D. The Contractor shall photograph existing site conditions prior to commencing work. The photographs shall be of sufficient detail in the event damage to structures occur, and shall include, at a minimum, structures, walls, and any other existing site features.

1.4 QUALIFICATIONS

A. Prepare Excavation Support and Protection Plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of New York. The Professional Engineer shall have demonstrated experience in excavation support and stability.

B. Installer: Company specializing in performing work of this section with a minimum experience of three (3) similar projects with design, installation and operation of ICON shoring systems.

1.5 PROJECT CONDITIONS

A. The Contractor shall not interrupt utilities unless permitted in writing by the National Grid approved representative and utility owner and then only after arranging for temporary utility services, if required.

B. The Contactor shall survey adjacent structures and improvements, employing a qualified Professional Surveyor licensed in the State of New York to establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

C. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify the National Grid approved representative if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent structures.

D. The Contractor shall perform the remedial construction activities so as to limit the potential for adverse impacts due to vibrations. During the installation of the shoring system for the planned remedial excavation areas, the driving of sheet piles or the ICON shoring system will have the potential to create perceptible ground vibrations. Vibration and settlement monitoring will be performed by the National Grid approved representative during the implementation of the remedial construction activities. During the remedial construction, should this vibration action level be exceeded at the locations of these adjacent structures, the Contractor shall implement vibration mitigation measures in accordance with the Excavation Support and Protection Plan.

PART 2 PRODUCTS

A. Materials:
   1. The Contractor shall provide materials that are either new or in serviceable condition. If the National Grid approved representative determines that materials are not in an acceptable condition, they shall be replaced at no additional cost to the National Grid.
   2. Excavation Support System: ICON shoring system shall be uses to support the off-site excavation area. All support elements shall be supplied by ICON.

PART 3 EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection activities.
   1. Shore, support, and protect utilities encountered.
   2. Support and protect all structures to remain.

B. Install excavation support and protection systems to minimize interference with roads, streets, walks, and other adjacent occupied and used facilities.

C. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without written authorization from the National Grid.

D. The Contractor shall have a Competent Person (as defined by OSHA regulations) inspect excavation support and protection systems daily (or following a weather event) during excavation progress and for as long as excavation remains open.

E. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.

F. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.2 VIBRATION MONITORING

A. A vibration criterion of 0.5 inches per second (in/sec) peak particle velocity (PPV) is proposed as the applicable threshold criteria for ground-borne vibration measurement during remedial construction activities. The 0.5 in/sec PPV criterion has been established by the United States Bureau of Mines as the recommended threshold above which damage to interior plaster walls may occur. This criterion has become the recognized industry standard for the control of vibration impacts to residential structures.

B. Two vibration thresholds have been established during the implementation of the remedial construction activities. The first threshold (“warning threshold”) would be triggered if vibration levels equal or exceed 0.2 PPV in proximity to the adjacent structure. Exceedance of this threshold during the remedial construction will trigger a review of site construction practices in order to identify potential causes and evaluate modifications to those practices. The second threshold level (“stop work”) would be triggered if vibration levels exceed 0.5

PPV in proximity to the adjacent structure. Exceedance of this threshold during the remedial construction will result in temporary suspension of work in the area of the affected structure. The structure would then be evaluated for potential structural impacts and mitigative measures selected based on the nature and extent of the impact.

3.3 ICON SHORING SYSTEM

A. The shoring system installation shall follow installation guidelines supplied by the manufacturer of the system, ICON.

B. Determine the proper inside trench width and depth required and consult the trench width tables (as provided by ICON) indicating proper brace configurations.

C. Excavate the length of one module (6.56 – 16.40 ft, depending on configuration) and the outside width of the system allowing extra room for some adjustment in the sheeting position. When saw cutting pavement, allow distance for outside width of system plus an additional minimum 0.5 feet.

D. A pilot cut should be made no deeper than 5 feet and should not have any breaks in the vertical trench walls. If no utility lines are uncovered crossing the trench or are indicated/identified by Drawings or mark outs, plate installation can begin as indicated by ICON's installation guidelines.

3.4 REMOVAL AND REPAIRS

A. As directed by the National Grid approved representative, remove and decontaminate excavation support and protection system when construction is complete and has progressed sufficiently to support excavation and bear soil and hydrostatic pressures as approved by the Contractor's Competent Person.

B. Remove systems in stages, or as indicated by ICON, to avoid disturbing underlying soils or demolition or damaging structures, pavements, facilities, and utilities.

C. Repair or replace, as directed by the National Grid approved representative, adjacent work damaged or displaced by removing excavation support and protection systems.

END OF SECTION

SECTION 31 50 00

SITE RESTORATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. References
2. Submittals
3. Close-Out Submittals
4. Surveying and Construction Tolerances
5. Materials
6. Preparation.
7. Stockpiling of Materials
8. Demarcation layer.
9. Asphalt pavement cover.
10. Environmental Cap Construction
11. Site restoration.
12. Protection of Installed Work

B. Related Sections and Documents:
1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
2. Section 01 10 00 – Summary of Work.
3. Section 01 30 65 – Health and Safety Requirements.
4. Section 01 30 00 – Administrative Requirements.
5. Section 01 33 00 – Submittal Requirements.
6. Section 01 40 00 – Quality Requirements.
7. Section 01 70 00 – Execution Requirements.
8. Section 31 23 23 – Backfill.
9. Section 32 12 16 – Asphalt Pavement.
10. Section 32 31 13 – Chain-Link Fencing and Gates.
11. Section 32 92 19 – Seeding and Vegetation.

1.2 REFERENCES

A. New York State Department of Transportation (NYSDOT) Standard Specifications (May 1, 2008).

B. 6 NYCRR Part 375-6.7(d) (December 14, 2006).

C. Division of Environmental Remediation, Technical Guidance for Site Investigation and Remediation (DER-10) (May 3, 2010).

1.3 SUBMITTALS

A. Section 31 23 23 - Backfill.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution Requirements.

B. Project Record Documents: As-built Survey: Record actual elevations and limits of the subgrade and completed Site covers.

1.5 SURVEYING AND CONSTRUCTION TOLERANCES

A. The Surveyor shall prepare final record-drawing documentation in accordance with Section 01 30 00 – Administrative Requirements.

B. Section 01 40 00 - Quality Requirements: Tolerances.
   1. Thickness of Site Cover: Plus or minus 1/4 inch.

PART 2 PRODUCTS

2.1 MATERIALS

A. Section 31 23 23 - Backfill.

B. Permanent Seed Mixture, Fertilizer:
   1. Seed Mixture: NYSSESC Seed Mix #6 for "Standards and Specifications for Permanent Critical Area Plantings"
   2. Soil Amendments: Shall conform to NYSSESC "Standards and Specifications for Permanent Critical Area Plantings".

PART 3 EXECUTION

3.1 PREPARATION

A. Employ independent geotechnical testing laboratory, approved by the Design Engineer, to perform the tests on each different source and/or material proposed for use in the Work. The particle-size testing shall be one sample for each 5,000 cubic yards of material delivered to the site.

B. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

C. Verify subgrade condition has been approved by the National Grid authorized representative.

D. Grade and smooth subgrade surface in preparation for the placement of the demarcation layer.

E. Final grades shall match the pre-disturbance grades.

F. Pre-existing stormwater surface flow patterns shall be maintained.

3.2 STOCKPILING OF MATERIALS

A. Stockpile materials on site at locations approved by the National Grid authorized representative.

B. Stockpile in sufficient quantities to meet project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Stockpile to a maximum height of 8 feet.

E. Direct surface water away from stockpile areas to prevent erosion or deterioration of materials.

3.3 DEMARCATION LAYER

A. In accordance with DER-10, a demarcation layer will be installed below the environmental cap and on top of the native soils at 2 feet bgs.

B. Prior to the installation of the Site covers, the demarcation layer (construction fencing) shall be unrolled and placed on the prepared and compacted subgrade.

C. Place the fabric smoothly without extensive wrinkles and/or folds.

D. Fence ends shall be overlapped 6 inches and along the center of the overlap, tied with plastic ties every 10 feet. Fence shall also be anchored into the ground with ground staples every 15 feet at the center of fence's width.

3.4 ASPHALT PAVEMENT COVER

A. Install asphalt pavement cover in the areas specified on the Design Drawings.

B. Install asphalt pavement in accordance with Section 32 12 16 – Asphalt Pavement, the Design Drawings, and the NYSDOT standards.

3.5 ENVIRONMENTAL CAP CONSTRUCTION

A. Select environmental cap, either a two-foot thick soil cover or a two-foot thick course stone cover, based on Site conditions and in particular, the height of the groundwater table at the time of installation. Confirm selected environmental cap with national Grid's authorized representative.

B. Soil Cover: Based on the anticipated groundwater table of three (3) feet bgs but not less than two (2) feet bgs, the soil cover will be constructed as follows (in descending order):
   1. vegetation
   2. Two feet of well graded sandy soil; and
   3. A demarcation layer.

C. Coarse Stone Cover: The coarse stone environmental cap will be installed when the groundwater table is less than two (2) feet bgs. The course stone cover will be constructed as follows (in descending order):

1. from the ground surface to six-inches below grade will be a coarse stone with a NYSDOT Standard Specifications for Coarse Aggregate size designation Type 2 (or approved equivalent);
2. 18 inches of NYSDOT Standard Specifications for Coarse Aggregate size designation Type 1 (or approved equal); and
3. A demarcation layer.

D. Seed the soil cover in accordance with Section 32 92 19 – Seeding and Vegetation.

E. Install crushed stone cover in the areas specified on the Design Drawings.

F. Compaction: Within the water table, backfill will be placed in loose layers and tamped in-place using excavation equipment. Above the groundwater table, all backfill will be placed in 12-inch thick lifts and mechanically compacted.

G. Manually spread stone close to structures to prevent damage.

H. Remove surplus material from Site.

3.6 SITE RESTORATION

A. Replace fence and gates in kind in accordance with Section 32 31 13 – Chain Link Fences and Gates.

B. Disturbed areas outside limit of work shall be restored to pre-existing conditions.

3.7 PROTECTION OF INSTALLED WORK

A. Section 01 70 00 - Execution Requirements: Requirements for protecting finished Work.

END OF SECTION

SECTION 31 70 00

WASTE MANAGEMENT, TRANSPORTATION, AND DISPOSAL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Submittals
2. Quality Assurance
3. Preparation
4. Management of Waste materials
5. Waste characterization
6. Waste transportation, treatment, disposal and recycling.

B. Related Sections and Documents:
1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
2. Construction Quality Assurance Project Plan (CQAPP)
3. Appendix N (RDR): Waste Management Plan
4. Section 01 10 00 – Summary of Work
5. Section 01 33 00 – Submittal Requirements
6. Section 01 50 00 – Temporary Facilities and Controls
7. Section 31 23 16 – Excavation
8. Section 31 23 23 – Backfill
9. Section 31 80 00 – In-Situ Solidification

1.2 SUBMITTALS

A. Contractor shall prepare and submit a Waste Management Plan (WMP) to National Grid and/or the Design Engineer, for incorporation into the design and subsequent design submittals to the NYSDEC (i.e., 95% and 100% RDR). The WMP shall describe the Contractor's proposed method and procedures for staging, handling, and transporting each generated waste, waste characterization sampling procedures and requirements, and identify the proposed disposal, treatment, and/or recycling facilities for each waste stream.

B. Contractor shall submit information of the proposed laboratory to be used for waste characterization analyses no later than two weeks prior to the start of sampling activities. Laboratory shall be a certified New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) laboratory.

C. Contractor shall provide electronic copies of the waste characterization analytical data to the National Grid authorized representative within 24 hours of receipt from the laboratory.

D. Waste tracking reports: As described in Paragraph 3.4D of this Section.

E. Contractor shall submit the completed waste manifests, certificates of disposal/destruction, and weight tickets.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with local and state's regulations and standards.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 PREPARATION

A. Contractor shall construct waste staging pads as detailed in Drawings. Location of waste staging pads shall be as shown on the Drawings or as pre-approved by the National Grid authorized representative. The staging pad shall be lined and bermed to contain and secure potential excess liquids from waste materials.

B. The Contractor shall furnish and install temporary construction fencing surrounding the waste staging pads areas in accordance with Section 01 50 00.

3.2 MANAGEMENT OF WASTE MATERIALS

A. Contractor shall perform Work such that no waste material is spilled during transfer of materials to waste staging pads and loading into disposal trucks. If spills occur, the waste shall be immediately collected and the spill area shall be appropriately cleaned.

B. Cover and secure stockpiled waste materials with plastic sheeting during inactive periods.

C. Direct surface water away from waste staging pads.

D. Excavated Soils:
1. Excavated soils shall be temporarily staged in a waste staging pad (prior to characterization and waste acceptance) or direct loaded into trucks (after characterization and waste acceptance) for off-site disposal.
2. Excavated soils designated for potential re-use will be sampled by the National Grid authorized representative for laboratory analysis.

E. Solidified Material:
1. Solidified material includes swell material and excavated material (i.e., to accommodate the surface cover/cap) from the ISS treatment area.
2. Management of solidified material shall be coordinated and sequenced with ISS activities.
3. Solidified material shall be cured into manageable pieces to facilitate handling, transportation, and off-site disposal.
4. Solidified material shall be temporarily staged at a waste staging pad for characterization prior to off-site disposal.

F. Water:
   1. Water collected during remedial action may include water pumped from excavations, excess liquids from waste materials, water collected from the waste staging pad, and decontamination water.
   2. Water generated shall be processed at an on-site treatment system in accordance with Section 31 23 19.
   3. Water generated after decommissioning of the treatment plant, if any, shall be collected and contained in a fractionation tank for characterization prior to off-site treatment/disposal.

G. Asphalt Pavement: Asphalt pavement debris generated during removal of the existing surface covers shall be staged separately for off-site recycling.

H. Miscellaneous Waste: Other miscellaneous waste streams shall be managed in accordance with applicable State and Federal regulations and shall be coordinated with the National Grid authorized representative. Local recycling requirements shall be met and recycling containers for paper, plastic, glass, and metals shall be available on-site.

I. After waste materials are removed from the Site, the Contractor shall decontaminate, decommission, remove, and/or demobilize (as appropriate) waste staging pads, water treatment plant components, and any other waste management components. Management of materials requiring off-site treatment, disposal, and/or recycling shall be coordinated with the National Grid authorized representative and performed in accordance with this Section.

3.3 WASTE CHARACTERIZATION

A. The Contractor shall perform all waste characterization sampling, transportation, and disposal of waste materials indicated for off-site disposal. Laboratory analyses shall be performed at a certified NYSDOH ELAP laboratory approved by the National Grid authorized representative.

B. The Contractor shall perform waste characterization as required in this Section and in accordance of the requirements of the selected approved disposal facilities. The Contractor will complete and submit necessary waste profiles to disposal facilities for acceptance using analytical results from the waste characterization sampling.

C. Waste characterization activities shall be performed in accordance with the CQAPP.

D. Minimum Waste Characterization Requirements: Unless otherwise specified or approved by the National Grid authorized representative, the Contractor shall, at a minimum, collect one sample from each waste stream (soil, ISS spoils, concrete, water, etc.), for laboratory testing of the following parameters:
   1. RCRA hazardous characteristics [full TCLP, Ignitability, Corrosivity (for liquids), and Reactivity]

E. Unless otherwise approved by the National Grid authorized representative, ISS Spoils Waste Characterization shall be performed as follows:
   1. General:
      a. Waste characterization samples shall be collected before the ISS spoils set up.

b. Samples shall be cured on-site and conveyed to the laboratory for testing.

2. Characterization:
   a. Contractor shall submit samples to the laboratory for testing of hazardous waste characteristics (refer to Paragraph 3.3D) and any other parameters required by the disposal facility. Sampling frequency shall be determined based on the requirements of the disposal facility.

3.4 WASTE TRANSPORTATION AND TREATMENT, DISPOSAL, AND RECYCLING

A. Contractor shall use treatment, disposal, and recycling facilities pre-approved by National Grid.

B. Confirm acceptance of waste types and forms with the treatment, disposal, and recycling facilities and notify National Grid as to restrictions imposed by the treatment, disposal, and recycling facility.

C. Waste Transportation:
   1. Waste shall be transported to an approved treatment, disposal, and recycling facilities using NYS licensed and permitted waste haulers.
   2. The Contractor shall check that transportation vehicles are properly loaded and secured and do not exceed permitted weights.
   3. All disposal vehicles and containers including dump trucks, dump trailers, and roll-off containers shall be properly lined, covered, secured, decontaminated, and inspected by the Contractor prior to leaving the Site.
   4. The Contractor shall coordinate waste transportation activities such that trips are combined and the number of trips is minimized to and from the treatment, disposal, and recycling facility.
   5. The Contractor shall prepare and supply waste manifests or bills-of-lading for waste tracking.
   6. National Grid's authorized representative will sign manifests on behalf of the generator. The Contractor shall not sign manifests on behalf of the generator.
   7. The Contractor shall manage all waste management documentation including but not limited to weight tickets, manifests, bill-of-ladings, and Certificates of Destruction/Disposal.

D. Contractor shall prepare and submit a waste tracking report on a weekly basis which includes daily disposal tonnages and waste types, method of disposal (i.e., landfilling, treatment, recycling, incineration, etc.), weight tickets, and treatment, disposal, and recycling facility information.

E. National Grid will not be held responsible for delays or stoppages associated with the transportation of waste materials from the Site.

END OF SECTION

SECTION 31 80 00

IN-SITU SOLIDIFICATION/STABILIZATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Pilot-Scale ISS Implementation
2. Full-Scale ISS implementation
3. Performance monitoring and reporting

B. Related Sections and Documents:
1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections apply to this Section.
2. Appendix M: Construction Quality Assurance Project Plan
3. Section 01 10 00 – Summary of Work
4. Section 01 33 00 – Submittal Requirements
5. Section 01 40 00 – Quality Requirements
6. Section 31 70 00 – Waste Management, Transportation and Disposal

1.2 REFERENCE STANDARDS

A. Following is a list of standards, which will be referenced in this Section. Such referenced standards shall be considered part of these specifications as if fully repeated herein.
1. API RP 13B-1 for Viscosity and Density;
2. API 13A: Specification for Oil-Well Drilling Fluid Materials (i.e., specification for Bentonite);
3. ASTM C143: Standard Test Method for Slump of Hydraulic-Cement Concrete;
4. ASTM C150: Standard Specification for Portland Cement;
5. ASTM C192: Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory;
6. ASTM D422: Particle-Size Analysis of Soils;
7. ASTM C684: Standard Test Method for Making, Accelerated Curing, and Testing Concrete Compression Test Specimens;
8. ASTM C989: Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars;
9. ASTM D1632: Standard Practice for Making and Curing Soil-Cement Compression and Flexure Test Specimens in the Laboratory;
10. ASTM D1633: Standard Test Method for Compressive Strength of Molded Soil-Cement Cylinders;
11. ASTM D2166: Standard Specification for Unconfined Compressive Strength of Cohesive Soil;
12. ASTM D4380: Standard Test Method for Density of Bentonitic Slurries;
13. ASTM D4972: Standard Test Method for pH of Soils;
14. ASTM D4832: Preparation and Testing of Controlled Low Strength Material Test Cylinders; and
15. ASTM D5084: Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.

1.3 ABBREVIATIONS AND DEFINITIONS

A. API - American Petroleum Institute

B. ASTM - American Society for Testing and Materials

C. Grout - A stable colloidal suspension of powdered cement, bentonite, additives and/or other similar materials in water.

D. Injection Ratio - A volumetric ratio of grout to soils (e.g. 100 gal/cubic yard) to be mixed in an ISS column. The grout injection ratio is determined for each column based on the column dimensions, soil density, pattern of treatment, and desired application rate.

E. ISS Column - One completed insertion, injection and mixing of the soil with the mixing auger to the design depth. This creates a column of treated soil the same diameter as the mixing auger. The column may be primary (through virgin soils) or secondary (connecting primary columns) or tertiary, etc.

F. Working Platform - The working platform is the leveled surface of stable soils from which the SM equipment operates.

G. Overlap Ratio – The ratio between the overlap distance (measured along the column diameter) and the diameter of the column. For example, a pattern of columns with a 15% overlap ratio has an overlap of 1.2 ft between two 8 ft. diameter columns.

H. Mixing Pass – Operation of the mixing auger/tool from the top of the column to the bottom and back. Generally, a number of passes are required to completely mix an ISS column.

I. Mixing Auger/Tool - The special tool that attaches to the Kelly bar and is inserted into the ground to mix the soils. The tool may be fitted with ports for injecting grout, mixing paddles, auger blades, etc.

J. Sampler – A tool and ancillary equipment capable of obtaining samples of the freshly mixed soil and grout from discrete depth intervals. The sampler should be capable of retrieving a 2 gallon sample or as approved by the National Grid approved representative.

K. Swell – The excess material resulting from adding grout to the in-situ soils. The swell is typically a mixture of soil and grout similar to the materials in the ISS column.

L. Soil Mixing (SM) – The process of mixing soil with grout and other reagents to solidify and stabilize soil.

M. In-Situ Solidification / Stabilization (ISS) – The process of soil mixing in-situ (as opposed to ex-situ).

1.4 QUALIFICATIONS

A. The ISS Contractor shall be pre-qualified before bidding on this work. Contractors shall meet the following experience criteria:

1. Project Experience: The ISS Contractor shall have at least five (5) years experience over the last ten years; and have completed at least five (5) ISS projects, with at least two (2) projects having objectives similar to those of this project.

2. Personnel Experience: The ISS Contractor's Supervisor shall have at least three (3) years on-site experience managing field operations of similar size and scope, and shall have supervised at least two (2) projects within the past five (5) years employing the technique proposed for this project. The Supervisor shall have experience and knowledge of all aspects of ISS as required for the project and shall be present at the work site at all times during SS operations.
3. The Contractor's other Personnel shall have a minimum of two (2) years of experience with projects of similar scope. Other personnel include equipment operators, batch plant operator, ISS rig operator, supervisory engineering staff, and technical staff involved with the ISS system operation.
4. Provide project staff resumes and project specific ISS experience over the last 5 years. At a minimum, the project staff shall include a project manager, site supervisor, quality control technicians, and other associated key staff. Project descriptions shall include site description, size of the stabilization areas, type of grout and equipment used.
5. Submit the qualifications of the Contractor's proposed laboratory for QC testing. The laboratory shall have previous experience with soil mixed materials, experienced laboratory technicians, and modern laboratory testing equipment.

1.5 SUBMITTALS

A. ISS Pilot-Scale Study Work Plan:
1. Name and experience of the various persons, their role and primary responsibilities.
2. Equipment set-up and site use layout: including storage areas, grout mixing plant location, haul roads, and work platform.
3. Soil mixing equipment specifications, including maximum depth capability of mixing machine, dimensions of the mixing auger/tool and capacity of grout mixing plant.
4. Construction means and methods: Listing of equipment and capabilities, construction steps, handling of excess grout and swell, layout, overlap control, control of drainage, spills, wastes, etc.
5. Description of how additives will be mixed with the soil and how the desired mix design will be achieved.
6. Calculations of quantity of components needed for each batch, number of columns/areas, mix ratio, and volume of soil to be mixed.
7. Methods to protect existing site features including, but not limited to, underground utilities and existing structures.
8. Material Safety Data Sheets for mix materials.

B. ISS Work Plan:
1. Name and experience of the various persons, their role and primary responsibilities.
2. Equipment set-up and site use layout: including storage areas, grout mixing plant location, haul roads, and work platform.
3. Soil mixing equipment specifications, including maximum depth capability of SM machine, dimensions of the mixing auger/tool and capacity of grout mixing plant.
4. Construction means and methods: Listing of equipment and capabilities, construction steps, handling of excess grout and swell, layout, overlap control, control of drainage, spills, wastes, etc.

5. Description of how additives will be mixed with the soil and how the desired mix design will be achieved.
6. Calculations of quantity of components needed for each batch, number of columns/areas, mix ratio, and volume of soil to be mixed per column/area.
7. A layout drawing showing the geometry, overlaps, and dimensions of the column overlapping pattern.
8. Schedule: A bar chart schedule showing all major activities and durations.
9. Methods to protect existing site features including, but not limited to, underground utilities and existing structures.
10. Material Safety Data Sheets for mix materials.

C. Quality Control (QC) Plan: Prepare and submit a plan that describes the methods for ensuring the requirements established in the Specifications are achieved, including but not limited to:
1. Method for collection of representative samples from a single mixed column or area at discrete depths.
2. Method(s) for controlling and measuring mix depth.
3. Method(s) for controlling and monitoring overlap.
4. Method(s) for controlling and monitoring reagent quality.
5. Method(s) for controlling and monitoring injection rates.
6. On-site QC monitoring and testing requirements. Off-site QA monitoring and testing requirements.
7. Approach to re-work areas failing performance criteria.

D. ISS Daily Records: Contractor shall provide (electronically, on a form acceptable to National Grid approved representative) a daily report summarizing the work activities including daily totals and running totals for volume of soil mixed and grout components used. Contractor shall attach daily grout mixing forms. ISS daily reports shall be submitted daily no later than 10:00 am the following day to the National Grid approved representative and shall include at a minimum the following information:
1. Description of the work completed with a sketch identifying which columns are completed.
2. Column Identification Number.
3. Date and time of beginning and completion of each column, including interruptions to the mixing process or material supply.
4. Grout batch mix records.
5. Daily totals and running totals for volume of soil mixed and grout components used.
6. Issues identified and how they have been resolved.

E. Completion Report: Prepare and submit a report documenting the ISS implementation.
1. Grout Quantities: Quantities of grout constituents delivered to the Site and used during the project with backup in the form of weigh receipts, bills of lading, flow meter records, or equivalent.
2. Certificates of Analysis: Certificates of Analysis for each load of grout component imported to the Site. If the grout is delivered pre-blended, then a certificate of analysis shall be required for each component (e.g., Portland cement) of the grout blend. All testing conducted for the Certificates of Analysis shall be performed by a laboratory that has been accredited by the American Association of State Highway and Transportation Officials (AASHTO). Provide one (1) certificate of analysis for each type of material and one (1) for each and every source. This shall be required once during the project, prior to delivery of

materials to the Site. The analysis shall ensure compliance with ASTM C150 for Portland Cement, ASTM C989 for Ground Granulated Blast Furnace Slag, and API 13A for bentonite.

3. Results of all quality control and quality assurance testing.
4. Project Modifications: Any modification to the project schedule and any modifications or deviations from the Contract Documents.
5. Spoil Disposal/Handling Methods: Description of spoil disposal and handling methods, as well as quantities managed.
6. Unforeseen Issues: Any unforeseen Site conditions or equipment problems that affected solidification efforts and how they were resolved.
7. Record Survey Drawings: Record survey drawings of the as-built lateral extent and top and bottom elevations of the ISS and QC sampling locations including any columns relocated during construction.

PART 2 PRODUCTS

2.1 GROUT

A. Grout shall consist of a stable colloidal suspension of cement, bentonite or other additives in water. The purpose of the grout is to assist in loosening the soils for mixing and to modify the soils for reduced contaminant generation, etc. The grout shall be pumpable and workable with the SM injection equipment.

2.2 BENTONITE

A. The purpose of the bentonite is to reduce the permeability of soil during remediation. The bentonite shall be adequately protected from moisture and contamination in storage at the jobsite. Reclaimed bentonite or bentonite containing deleterious matter shall not be used.

2.3 CEMENT

A. Cement used in preparing grout shall conform to ASTM C150 and/or C989. The cement shall be adequately protected from moisture and contamination in storage on the jobsite. Reclaimed cement or cement containing lumps or deleterious matter shall not be used.

2.4 WATER

A. Fresh potable water, free of excessive amounts of deleterious substances that adversely affect the properties of the grout shall be used to manufacturer grout. It is the responsibility of the Contractor that the grout resulting from the water shall always meet the standards of this specification.

2.5 ADDITIVES

A. Ad-mixtures may be used to enhance the workability or final properties of the treated soil. Additives may be added to the water or the grout. Propriety chemicals may be approved by the National Grid approved representative based on the results of the pilot-scale study.

PART 3 EXECUTION

3.1 PREPARATION

A. The ISS limits, as shown on the Drawings, shall be surveyed and staked out by a NY licensed surveyor prior to commencing ISS activities.

B. Columns shall be laid-out with a 20% minimum overlap ratio.

3.2 PERFORMANCE STANDARDS

A. Provide a minimum addition rate of Portland cement of 5% and a maximum addition rate of 12.5% by weight of wet soil (as per results of treatability study), unless otherwise approved by the National Grid approved representative. The preliminary optimal additional rate is 7.5% by weight of wet soil.

B. Provide an addition rate of bentonite of up to 1.5% by weight of wet soil (as per the results of the treatability study), unless otherwise approved by the National Grid approved representative. The preliminary optimal addition rate is 0.5% by weight of wet soil.

C. Achieve a target average hydraulic conductivity of the solidified/stabilized mass of $1x10^{-6}$ cm/s or lower, defined as the geometric mean of the measured values with no single value being greater than $1x10^{-5}$ cm/s.

D. *[TO BE FINALIZED DURING THE SUBSEQUENT DESIGN PHASE(S)]* Achieve an unconfined compressive strength (UCS) of the solidified/stabilized mass that conforms to the following requirements:

1. Achieve the UCS values of the solidified mass within the target interval of 50-100 psi.
2. 30 psi minimum (7-day UCS test) defined as the geometric mean of the measured values with no single value being less than 20 psi; and
3. 150 psi maximum (7-day UCS test) defined as the geometric mean of the measured values with no single value being greater than 200 psi.

3.3 PILOT-SCALE STUDY

A. A pilot-scale study shall be performed as the first part of the ISS implementation at a location approved by the National Grid approved representative.

B. The pilot study shall use the same equipment proposed for the full-scale ISS implementation.

C. For each proposed mix design to be used for the full-scale implementation, 3 to 5 ISS columns shall be mixed in a triangular pattern. A mix design is defined as variations of the cement addition, bentonite addition and water addition rates.

D. Each column and overlap shall be sampled as described in Section 3.7.

E. A minimum of 3 full depth mixing passes shall be performed for each column. Additional mixing passes shall be performed if visual inspection of samples indicates incomplete or non-uniform mixing of the grout and soil.

F. Full-scale implementation shall not begin until the results from the pilot study demonstrate that one or more of the proposed mix designs meets the project requirements in this specification as approved by the National Grid approved representative.

3.4 FULL-SCALE IMPLEMENTATION

A. Top of the ISS interval shall be the surface soil immediately below the existing surface cover materials (e.g., grass, asphalt or concrete).

B. Bottom of the ISS interval shall be to the depths indicated on the Design Drawings.

C. Each soil column shall be drilled while simultaneously injecting grout and then mixed by repeated passes of the mixing auger. A minimum of 3 full depth passes (up and down) shall be performed unless the results of the pilot test indicate that a greater minimum number of passes is necessary. The number of mixing passes shall be monitored and recorded for each column to ensure adequate mixing. The mixing rotation speed shall be adjusted to accommodate drilling conditions based on the degree of drilling difficulty. Additional mixing or passes may be required to evenly distribute the grout throughout the column based on the inspection of samples taken from the column. After the initial penetration, the rotation speed shall be increased to maximize mixing.

D. The grout injection rate shall be monitored and recorded for each column and adjusted as necessary for minimum drilling resistance and to accommodate the design mix. The minimum injection rate shall be calculated for each stroke based on the volume of unmixed soil in the column (whether primary, secondary or tertiary, etc.), the density of the soil, and the volume of grout required to achieve the design mix proportions. The flow of grout shall be verified periodically by observing the flow out of the mixing auger as it is suspended in the air above column. Any blockage shall be cleared prior to injection and mixing.

E. The outer portions of the ISS area shall be completed last in the event that the outer columns need to surround interior areas that do not comply with the performance standards. This sequencing will allow for the outermost columns to be completed with the benefit of potential refinements to the mix design and implementation process that are made as a result of completing the interior columns first. Sequencing the column installation in this manner (inner columns first, outer columns last) would be expected to reduce the potential for one of the outermost columns to not comply with the established performance standards.

F. After completion of ISS or performed in sequence with the ISS implementation, the ISS treatment area shall be excavated to a depth of two feet below surrounding grade, as specified in Section 31 23 16, to allow for the installation of the surface cover, as specified in Section 31 23 23.

G. Contractor shall retain a NY licensed surveyor to survey the final ISS limits.

H. Backfilling and restoration may not proceed until written authorization is provided by the National Grid approved representative to the Contractor authorizing a backfilling of the ISS area.

I. Contractor shall protect the ISS area until backfilling and restoration is completed.

3.5 OBSTRUCTIONS

A. If obstructions including boulders, bedrock or other potentially damaging materials are encountered the operator shall stop drilling until the nature of the obstruction is known.

B. Obstructions, which cannot be penetrated, may be remediated by removal, grouting or other acceptable means.

C. Obstructions which reduce the drilling rate to less than one foot of penetration per minute for at least five minutes may be accepted as refusal upon approval of the National Grid approved representative.

3.6 TOLERANCES

A. The following tolerances shall apply to the ISS dimensions and construction:
   1. The columns shall be essentially vertical. The working platform and/or crane shall be leveled to be plumb within 3% of vertical and the Kelly bar shall be measured to be within 3% of vertical.
   2. The depth of the columns shall be measured or surveyed to within six inches of the desired elevation. The depth shall be measured from the surface to the bottom of the mixing auger/tool.
   3. The pattern of overlaps shall be surveyed and staked to ensure that the overlap ratio is constructed as designed. The center of each column shall be constructed within six inches of the designated location.
   4. Construction will not be permitted when the air temperature is below 20 deg. F or when severe weather conditions may compromise the quality of the work.
   5. The injection ratio shall be calculated and checked for each column. The injection ratio may be corrected for previous overlaps in the same column. In all cases, the minimum injection ratio shall be observed.

3.7 PERFORMANCE MONITORING

A. The CQA Consultant will conduct performance monitoring to document that the ISS implementation achieves the established performance criteria specified in this Section. The Contractor shall obtain the samples during the ISS pilot-scale study and during full-scale implementation. Samples will be collected from the ISS mass immediately after the mixing of reagents into the subsurface and before the ISS column sets up as required by the CQAPP.

B. Samples will be submitted to the laboratory by the CQA Consultant, where they will be tested for hydraulic conductivity and UCS. Sampling and analysis of ISS performance samples will be conducted in accordance with procedures identified in the Project CQAPP.

C. If results do not comply with the performance standards, the Contractor shall take corrective actions, as directed by the National Grid approved representative. The corrective action may include:

   1. Analyzing the secondary samples from adjacent columns to determine if the failing sample is anomalous and isolated;
   2. Modification to the mix design;
   3. Installing new columns to surround the column(s) represented by the failing sample; and/or
   4. Re-working (e.g., re-mixing) the column(s) represented by the failing sample.

3.8 SPOILS MANAGEMENT

A. ISS swell material shall be managed at the surface and a perimeter berm shall be constructed to control potential waste migration from the ISS area.

B. Excess swell material plus an additional two feet of material below existing grade shall be removed from the ISS area and staged in the waste staging pad for management in accordance with Section 31 70 00. The spoils shall be staged in blocks or piles of manageable size so that cutting or hammering is not necessary to reduce their size for transportation to the disposal facility.

C. Supplemental ex-situ mixing may be conducted at the waste staging pad or within the footprint of the ISS treatment area, as directed by the National Grid approved representative, and then followed by additional waste characterization sampling.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVEMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Subbase Course.
   2. Asphalt Pavement Courses.

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
   2. Section 01 30 00 – Administrative Requirements
   3. Section 01 40 00 – Quality Requirements
   4. Section 01 70 00 – Execution and Closeout Requirements
   5. Section 31 23 23 – Backfill
   6. Section 31 50 00 – Site Restoration

1.2 REFERENCES

A. ASTM International:
   1. ASTM D2950 - Density of Bituminous Concrete by Nuclear Method.

B. New York State Department of Transportation (NYSDOT).
   1. 2008 Standard Specifications.
   2. Materials Method 5.16 Superpave Hot Mix Asphalt Mixture Design and Mixture Verification Procedures.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Requirements: Requirements for submittals.

B. Product Data: Submit product information and asphalt mix designs a minimum of 5 working days before use of the material, to National Grid approved representative for approval.

C. Test results of asphalt thickness and density testing, performed in accordance with Section 3.6.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with NYSDOT Standard Specifications.

B. Mixing Plant: Conform to NYSDOT Standard Specifications.

C. Obtain materials from same source throughout.

1.5 QUALIFICATIONS

A. Installer: Company specializing in performing work of this section with minimum 10 years experience.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.1 MATERIALS

A. Subbase course shall conform to Section 304 of NYSDOT, Type 2 Subbase Course.

B. Base course shall be plant mix bituminous concrete conforming to Section 400 of the NYSDOT specification and as follows:
   1. Thickness: 4 inches
   2. Item: 25 F9 Base Course HMA, 70 Series Compaction
   3. RAP Content: Maximum 20 % by weight
   4. PG Binder Type: PG 64-22

C. Surface course shall be plant mix bituminous concrete conforming to Section 400 the NYSDOT specifications and as follows:
   1. Thickness: 2 inches
   2. Item: 12.5 F3 Top Course HMA, 70 Series Compaction
   3. RAP Content: Maximum 20% by weight
   4. PG Binder Type: PG 64-22

D. All materials shall be as specified in NYSDOT § 402-2 and Materials Method 5.16. Aggregate shall conform to Subsection 401-2.02. Mixture shall conform to Section 402.

E. Prime Coat: Material and application shall conform to the requirements set forth in NYSDOT Sections 407 and 702-6.

F. Tack Coat: Material and application shall conform to the requirements set forth in NYSDOT Sections 407 and 702-6.

2.2 SOURCE QUALITY CONTROL AND TESTS

A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify compacted subgrade is dry and inspected by National Grid approved representative.

3.2 SUBBASE COURSE

A. Install 4 inches of compacted subbase course.

B. After subbase placement, the subbase surface shall be inspected and approved by the National Grid approved representative prior to continuation of work activities.

3.3 PREPARATION – PRIME COAT

A. Apply prime coat in accordance with NYSDOT Standard Specifications.

B. Apply prime coat on subbase within 12 hours of placement of base course.

C. Use clean sand to blot excess primer.

3.4 PREPARATION - TACK COAT

A. Apply tack coat in accordance with NYSDOT Standard Specifications.

B. Apply tack coat to contact surfaces of curbs and vertical surfaces.

3.5 ASPHALT PAVEMENT (BASE AND SURFACE COURSE)

A. Placement, finishing, compaction and construction of the asphalt pavement shall be performed in accordance with NYSDOT Standard Specifications.

B. Place asphalt base course within 12 hours of applying prime coat.

C. Place asphalt base course to 4 inches compacted thickness. The bituminous base course must be applied and compacted within the temperature range of 250-325ºF.

D. Place asphalt surface course within 24 hours of placing and compacting binder course. When surface course is placed more than 24 hours before placing wearing course, clean surface and apply tack coat before placing wearing course.

E. Place surface course to 2 inches compacted thickness. The bituminous surface course must be applied and compacted within the temperature range of 250-325ºF.

F. Compact each course by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

G. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

H. Place asphalt finished surface flush with existing manholes, catch basins and any other existing subgrade feature and finished asphalt surface shall be flush when adjoining existing asphalt.

3.6 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

C. Scheduled Compacted Thickness: Within 1/4 inch.

3.7 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Perform in place compaction tests in accordance with the following:
   1. Density Tests: ASTM D2922
   2. NYSDOT Standard Specifications § 402-C
   3. Frequency of Tests: Every 2,500 square feet, unless more frequent testing is requested by the National Grid approved representative.

C. The subbase course and asphalt base and surface courses shall be compacted to 95% of the maximum density. If the test results indicate compaction to less than 95% of the maximum density, the Contractor shall recompact the area and area shall be retested.

D. Thickness - Thickness measurements shall be conducted at a minimum frequency of one location per 2,500 square feet, unless more frequent testing is requested by the National Grid approved representative.

E. Where cold joints are necessary, cut back the placed and compacted asphalt a minimum of 3 inches with a concrete power saw, so that the vertical face of compacted full thickness material is exposed. Treat this surface with tack coat before proceeding with placement of new asphalt course.

F. Smoothness (Surface Course Only) - The final surface shall be a smooth, level surface suitable for truck traffic and parking. The surface must also provide positive drainage off-site and a smooth transition to the surrounding areas.

G. As directed by the National Grid approved representative, remove and replace all defective areas. Cut-out such areas and fill with fresh bituminous asphalt. Compact to the required density.

3.8 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution Requirements: Protecting finished work.

B. Immediately after placement, protect pavement for 24 hours (minimum) or until it has become properly hardened.

END OF SECTION

SECTION 32 31 13

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fence material and products for replacement of permanent fencing.

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
   2. Section 01 10 00 – Summary of Work.
   3. Section 01 30 65 – Health and Safety Requirements.
   4. Section 01 33 00 – Submittal Requirements.
   5. Section 31 70 00 –Waste Management, Transportation and Disposal
   6. Section 31 50 00 – Site Restoration.

1.2 REFERENCES

A. ASTM International:
   1. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
   2. ASTM A817 - Standard Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcelled Tension Wire.
   3. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
   4. ASTM F567 - Standard Practice for Installation of Chain-Link Fence.
   5. ASTM F900 - Standard Specification for Industrial and Commercial Swing Gates.
   6. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.
   7. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
   8. ASTM F1184 - Standard Specification for Industrial and Commercial Horizontal Slide Gates.

B. Chain Link Fence Manufacturers Institute (CLFMI):
   1. CLFMI - Product Manual.

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing fencing products specified in this section with a minimum of five (5) years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three (3) years documented experience.

1.4 QUALITY ASSURANCE

A. Supply material in accordance with CLFMI - Product Manual.

B. Perform installation in accordance with ASTM F567.

C. Perform Work in accordance with Village of Patchogue and/or Town of Brookhaven codes and regulations.

1.5 SUBMITTALS

A. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.

B. Product Data: Submit construction details, material descriptions, dimensions and all data on fabric, posts, accessories, fittings and hardware.

C. Manufacturer's Installation Instructions

D. Submit Manufacturer and Installer company information and Statement of Qualifications.

E. Shop Drawings: Show locations of fences, gates, posts, rails, tension wires, details of extended posts, extension arms, gate swing, or other operation, hardware, and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components. Include plans, gate elevations, sections, details of post anchorage, attachment, bracing, and other required installation and operational clearances.

F. Samples for Verification: For each type of chain-link fence and gate indicated.

1. Steel wire (for fabric) in six-inch (150-mm) lengths.
2. Six-inch (150-mm) lengths on shapes for posts, rail wires, and gate framing and on full sized units for accessories.

G. Product Certificates: For each type of chain-link fence, gate, signed by product manufacturer.

1. Strength test results for framing according to ASTM F 1043.

1.6 PERFORMANCE CRITERIA

A. Structural Performance: Provide chain-link fences and gates capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Minimum Post Size and Maximum Spacing for Wind Velocity Pressure: Determine based on mesh size and pattern specified, and on the following minimum design wind pressures and according to CLFMI WLG 2445:
   a. Wind Speed: 80 mph.
   b. Fence Height: 6 feet.

c. Line Post Group: IA, ASTM F 1043, Schedule 40 steel pipe .
d. Wind Exposure Category: B.

2. Determine minimum post size, group, and section according to ASTM F 1043 for framework up to 12 feet high, and post spacing not to exceed 10 feet.

B. Lightning Protection System: Maximum grounding-resistance value of 25 ohms under normal dry conditions.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver fence fabric and accessories in packed cartons or firmly tied rolls.

B. Identify each package with manufacturer's name.

C. Store fence fabric and accessories in secure and dry place.

PART 2 PRODUCTS

2.1 MATERIALS

A. Framing (Steel): ASTM F1083 Schedule 40 galvanized steel pipe, welded construction, minimum yield strength of 25ksi; coating conforming to ASTM F1043 Type A on pipe exterior and interior.

B. Fabric Wire (Steel): ASTM A392 Class 1 zinc coated steel wire.

C. Concrete: ASTM C94/C94M, Option A; Normal Portland Cement, 2,500 psi strength at 28 days.

2.2 COMPONENTS

A. Line Posts: 1.9 inch diameter.

B. Corner and Terminal Posts: 2.38 inch diameter.

C. Gate Posts: 3.5inch diameter.

D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.

E. Gate Frame: 1.66 inch diameter for welded fabrication.

F. Fabric: two (2) inch diamond mesh interwoven wire, nine (9) gage thick, top salvage knuckle end closed, bottom selvage twisted tight.

G. Tension Wire: six (6) gage thick steel, single strand, marcelled, spiraled or crimped, aluminum-coated tension wire conforming to ASTM A817.

H. Tension Band: six (6) gage thick steel.

I. Tension Strap: six (6) gage thick steel.

J. Tie Wire: Aluminum alloy steel wire.

2.3 ACCESSORIES

A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; galvanized steel.

C. Gate Hardware: Fork latch with gravity drop; two 180- degree, non-lift off, gate hinges for each leaf and hardware for padlock. Provide weather-proof, keyed alike padlocks, with two keys per lock.

2.4 GATES

A. General:
1. Replace in kind with pre-existing materials and accessories.
2. Factory assembled gates.

B. Swing Gates:
1. Fabricate gates to permit 180 degree swing.
2. Gates Construction: ASTM F900 with welded corners. Use of corner fittings is not permitted.

C. Sliding Gates:
1. Framing and Posts: ASTM F1184, Class 2 for internal rollers.
2. Rollers for overhead and cantilever sliding gates: Bearing type. Furnish non-sealed bearings with grease fitting for periodic maintenance.
3. Secure rollers to post or frame without welding.

2.5 FINISHES

A. Components and Fabric: Replace in kind with pre-existing materials and accessories.

PART 3 EXECUTION

3.1 INSTALLATION OF REPLACEMENT FENCE

A. Contractor shall install new permanent fencing to replace fencing that was removed to perform work activities or damaged during work activities.

B. Install framework, fabric, accessories and gates in accordance with ASTM F567.

C. Set intermediate, terminal, corner and gate posts plumb, in concrete footings with top of footing two (2) inches above finish grade. Trowel top of concrete forming crown to shed water.

D. Line Post Footing Depth Below Finish Grade: ASTM F567.

E. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567.

F. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.

G. Install top rail through line post tops and splice with six (6) inch long rail sleeves.

H. Install center and bottom brace rail on corner gate leaves.

I. Place fabric on inside of posts and rails.

J. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.

K. Position bottom of fabric two (2) inches above finished grade.

L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

N. Install bottom tension wire stretched taut between terminal posts.

O. Support gates from gate posts. Do not attach hinged side of gate from building wall.

P. Install gate with fabric to match fence. Install three hinges on each gate leaf, latch, catches, and drop bolt.

Q. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.

R. Install posts with six (6) inches maximum clear opening from end posts to buildings, fences and other structures.

S. Excavate holes for posts to diameter and spacing in accordance with manufacturer's instructions. Soil excavated from post-holes shall be managed in accordance with Section 31 70 00 –Waste Management, Transportation, and Disposal.

T. Center and align posts. Place concrete around posts, and vibrate or tamp for consolidation. Verify vertical and top alignment of posts and make necessary corrections.

3.2 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From Indicated Position: one (1) inch.

C. Minimum distance from property line: As specified by town codes and regulations.

END OF SECTION

SECTION 32 92 19

SEEDING AND VEGETATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Seeding
   2. Fertilization
   3. Warranty

B. Related Sections and Documents:
   1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections apply to this Section
   2. Section 01 10 00 – Summary of Work
   3. Section 01 30 00 – Administrative Requirements
   4. Section 01 33 00 – Submittal Requirements
   5. Section 01 40 00 – Quality Requirements
   6. Section 01 70 00 – Execution Requirements

1.2 REFERENCES

A. New York Standards and Specifications for Erosion and Sediment Controls

1.3 SUBMITTALS

A. Provide recommendation for fertilizer and lime application rates for specified seed mix as result of tests.

B. Product Data: Submit data for seed mix, fertilizer, mulch, and other accessories.

C. Manufacturer's Certificate of Compliance: Certify that seed mixture and fertilizer meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Seed Supplier: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

C. Furnish each material from single source throughout the Work.

D. Provide seed mixture in containers showing percentage of seed mix, germination percentage, inert matter percentage, weed percentage, year of production, net weight, date of packaging, and location of packaging.

E. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

PART 2 PRODUCTS

A. Permanent Seed Mixture, Fertilizer:
   1. Seed Mixture: NYSSESC Seed Mix #6 for "Standards and Specifications for Permanent Critical Area Plantings"
   2. Soil Amendments: Shall conform to NYSSESC "Standards and Specifications for Permanent Critical Area Plantings".

PART 3 EXECUTION

3.1 PREPARATION

A. Verify topsoil surface is ready to receive work.

3.2 SOIL AMENDMENTS

A. Apply after smooth raking of topsoil and prior to roller compaction.

B. Apply lime at application rate recommended by the topsoil analysis. Work lime into top 4 inches of soil.

C. Apply fertilizer at application rate recommended by the topsoil analysis.

D. Mix fertilizer thoroughly into upper 2 inches of topsoil. Lightly water soil to aid dissipation of fertilizer.

3.3 PERMANENT SEEDING

A. Verify that topsoil surface has been prepared in accordance with this Section and has been approved by the National Grid approved representative.

B. Install topsoil in accordance with the NYSSESC "Standards and Specifications for Topsoiling".

C. Seed, apply amendments, and mulch in accordance with the NYSSESC "Standards and Specifications for Permanent Critical Area Plantings".

3.4 WARRANTY

A. Furnish one year manufacturer warranty for ground cover.

3.5 PROTECTION OF INSTALLED WORK

A. Maintain seeded areas until grass is well established and exhibits vigorous growing condition.

END OF SECTION

SECTION 33 05 17

PERIMETER UTILITY CUT AND CAP

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Submittals
2. Qualifications
3. Quality Assurance
4. References
5. Preparation
6. Trenching.
7. Utility cutting and capping.
8. Soil and waste management.
9. Backfilling.
10. Field Quality Control
11. Protection

B. Related Sections and Documents:
1. Design Drawings and general provisions of the Contract Documents, including Technical Specification Sections and National Grid's General and Supplementary Conditions, apply to this Section.
2. Remedial Design Report, Appendix M- Construction Quality Assurance Project Plan (CQAPP)
3. Construction Quality Control Project Plan (CQCPP)
4. Section 01 10 00 – Summary of Work.
5. Section 01 30 65 – Health and Safety Requirements.
6. Section 01 33 00 – Submittal Requirements
7. Section 01 50 00 – Temporary Facilities and Controls
8. Section 33 05 18 – Utility Protection and Rerouting.
9. Section 31 23 19 – Dewatering.
10. Section 31 23 23 – Backfill.

1.2 SUBMITTALS

A. Submit information and statement of qualifications of proposed asbestos contractor.

1.3 QUALIFICATIONS

A. Asbestos Contractor: Company specializing in performing work of this Section with a minimum experience of five years.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the approved Construction Quality Control Project Plan (CQCPP) as specified in Section 01 40 00.

B. Perform Work in accordance with the Village of Patchogue and/or Town of Brookhaven codes and regulations and local utilities' codes and requirements.

1.5 REFERENCES

A. All applicable federal, state and local regulations.

B. Occupational Safety and Health Administration (OSHA) Regulations.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 PREPARATION

A. Locations of existing Site conditions indicated on the Design Drawings are approximate. The Contractor shall examine and confirm existing Site conditions prior to the start of Work.

B. Call Local Utility Line Information service, Village of Patchogue, and Suffolk County not less than three (3) working days before performing Work.
1. Request underground utilities to be located and marked within the Site and adjacent properties.
2. Do not proceed with intrusive activities until the markout is complete and confirmed.

C. The Contractor shall coordinate with the utility companies during the work to determine which utilities, presented on the Design Drawings, reference drawings, and utility mark-ups and encountered in the field, are active or inactive and which may be abandoned.

D. Protect Site structures and features indicated to remain.

E. Protect bench marks, survey control points, existing structures, fences. Benchmarks and survey marks that are missing or damaged shall be replaced by the Contractor's Surveyor.

F. The Contractor shall furnish and install temporary construction fencing surrounding the trenching and work areas in accordance with Section 01 50 00.

3.2 TRENCHING

A. All excavation work shall be performed in compliance with all appropriate Federal, State, and OSHA regulations.

B. Excavate a two to three foot wide trench along the perimeter of the Site. Excavation of overburden material from the trench will involve hand digging and heavy equipment, as necessary.

C. The Contractor shall hand excavate and probe the surface of the excavation prior to soils being removed with equipment. The depth of the manual probe will average 6 to 10 inches.

D. In order to minimize the risk to potential buried piping/lines, the amount of soil excavated from the trench with the construction equipment shall not exceed the depth of the previous manual probe. After completion of the next probe, the soils may be excavated with construction equipment.

E. Soft dig techniques (i.e., soil vacuum equipment) may be used to excavate the trench and expose subsurface utilities. Upon discovery of subsurface features, hand excavation methods or soft dig techniques will be employed to identify the feature.

F. The final depth of the trench will be limited to the deepest utility/piping or to a maximum depth of the groundwater table (8 feet bgs) or as directed by National Grid.

G. Excavation shall be benched and/or sloped as required per OSHA regulations. Excavation stability and actual sloping and benching shall be determined by a Competent Person as defined in OSHA 1926.650(b) and in accordance with 1926 Subpart P (Excavations) and the approved Excavation Support and Protection Plan.

3.3 UTILITY CUTTING AND CAPPING

A. When a utility line or piping is located, the Contractor (in consultation with National Grid), shall identify the utility/line. If the utility/line appears to be active, a representative from the pertinent utility company will be contacted to evaluate the line and terminate the service, if required.

B. For utilities/lines that are determined to be inactive, initial penetration of the utility/pipe will involve use of spark-proof drilling tools to create a small hole in the utility/pipe. Access to the interior of the line will allow initial screening of the internal atmosphere with field screening instruments to determine the potential for explosion. Once screening has identified acceptable conditions within the line, a non-sparking saw, such as a “Nibbler”, or similar, shall be utilized to cut and remove a section of pipe to the existing property line, or as close as is practical.

C. Utility/piping sections that will be cut and removed for purposes of line breaking and capping shall be visually examined for presence of asbestos or asbestos containing material. If asbestos is encountered, the Contractor will subcontract an asbestos subcontractor meeting Federal and New York State asbestos licensing and permitting requirements to address the utility/pipe. The asbestos abatement shall be performed in accordance with local, state, and federal regulations.

D. Any residual material which drains from the line shall be collected and segregated for characterization and off-site transportation and disposal.

E. Plugging of the line will require the mixing and placing of grout (hydraulic cement) into the open end of the cut line. Bentonite will be mixed with the soils being placed as backfill adjacent to the plugged lines.

3.4 SOIL AND WASTE MANAGEMENT

A. Excavated soil shall be stockpiled immediately adjacent to the trench within the Site boundary on top of plastic sheeting, tarps, or other similar barrier. The barrier will be laid over the existing grade for temporary placement of excavated soil.

B. Stockpiled soils shall conform to OSHA set-back requirements for trenches/excavations.

C. Stockpiled soils and debris will be visually inspected for the presence of NAPL and/or NAPL indicators by the Design Engineer and/or the National Grid authorized representative.

D. Within the targeted excavation areas only, soil and debris observed to contain NAPL or NAPL indicators (based on visual observation and field screening techniques) shall be reused to backfill to the trench. The location of such soils will be documented for subsequent excavation and off-site disposal.

E. Outside the targeted excavation areas, the excavated soils containing NAPL and/or NAPL indicators shall be staged separately and covered for off-site disposal.

F. Excavated soils and generated waste shall be managed, transported and disposed of in accordance with Section 31 23 16 – Excavation and Waste Management.

3.5 BACKFILLING

A. Sequence trenching and backfilling so that trench is backfilled at end of working day.

B. Backfill trenches to pre-existing grade with unfrozen fill materials.

C. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

D. Additional soils required to backfill the trench outside of the targeted excavation areas will consist of certified clean imported fill, in accordance with Section 31 23 23.

E. Place fill material in continuous layers of 8 inches and compact.

3.6 FIELD QUALITY CONTROL

A. Request visual inspection of excavated soils prior to staging on Site or loading for off-site disposal.

3.7 PROTECTION

A. Prevent displacement or loose soil from falling into excavation; maintain excavation stability.

B. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION

SECTION 33 05 18

UTILITY PROTECTION AND REROUTING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Submittals
   2. Project Conditions and Coordination
   3. Materials
   4. Preparation
   5. Utility Protection and Rerouting

B. Related Sections and Documents:
   1. Section 01 10 00 – Summary of Work.
   2. Section 01 30 65 – Health and Safety Requirements.
   3. Section 01 33 00 – Submittal Requirements.
   4. Section 01 50 00 – Temporary Facilities and Controls.
   5. Section 02 41 06 – Selective Demolition.
   6. Section 31 23 16 – Excavation.
   7. Section 31 23 19 – Dewatering.
   8. Section 31 23 23 – Backfill.
   9. Section 31 70 00 – Waste Management, Transportation, and Disposal

1.2 SUBMITTALS

A. Submit a Utility Protection and Rerouting Plan to National Grid and/or the Design Engineer, for incorporation into the design and subsequent design submittals to the NYSDEC (i.e., 95% and 100% RDR). The Plan shall detail the proposed methods for protecting and supporting the existing utilities during excavation and backfilling, sequencing for the proposed rerouting, temporary by-passes, and/or reconnecting of active utilities, and proposed methods and materials for reconnections and rerouting.

B. Provide copies of permits/approvals obtained from local authorities for working on utilities and within utility easements.

C. As-built drawings showing final configuration of all functional utilities requiring reconnection.

1.3 PROJECT CONDITIONS AND COORDINATION

A. Perform Work in accordance with the Village of Patchogue and/or Town of Brookhaven Codes.

B. Underground utilities are defined to be, but are not limited to: sanitary sewer, water, storm water, gas, cable, other piping, electrical conduits, etc. Underground structures known to National Grid and the Design Engineer are shown on the Design Drawings. This information is shown to assist the Contractor in accordance with the best information available, but is not guaranteed to be correct or complete. The Contractor shall field verify all underground utilities and structures indicated on Design Drawings. The Contractor shall verify the location of underground utilities with the appropriate agencies.

C. Surface structures are defined as all existing structures and other facilities at or above the ground surface. Surface structures include, but are not limited to, monitoring wells, piezometers, utility poles (including anchors and support cables), fire hydrants, electrical panels, curbs, piles, fencing, foundations and all other facilities that are visible above the ground surface.

D. Necessary changes in the location of the proposed remedial activities may be made by National Grid, the National Grid authorized representative and/or the Design Engineer to avoid unanticipated underground structures. If permanent relocation of an underground structure or other subsurface facility is required and is not otherwise provided for in the Contract Documents, National Grid or the National Grid authorized representative will direct the Contractor in writing to perform the necessary work.

E. The Contractor shall not interrupt utilities unless permitted in writing by National Grid authorized representative and utility owner and then only after arranging for temporary utility services, if required.

PART 2 PRODUCTS

2.1 MATERIALS

A. Materials and construction methods used for the capping and re-routing or reconnecting of the utilities shall comply with the respective utility company's requirements.

PART 3 EXECUTION

3.1 PREPARATION

A. The Contractor shall coordinate with the utility company who owns the utility during the performance of the work to determine which utilities, presented on the Design Drawings, reference drawings, and utility mark-ups and encountered in the field, are active and which may be abandoned.

B. Contractor shall coordinate work and schedules with utility owners and shall provide the utility owners, National Grid and/or the National Grid authorized representative written notice at least 48 hours before utility shutdowns.

C. Before proceeding with the work, the Contractor shall provide written permit/approval from the utility owner to National Grid, the National Grid authorized representative and the Design Engineer indicating that the methods and procedures to be used have been reviewed and approved by the utility owner. Contractor shall be responsible for all damage and expense for direct or indirect damage caused during the remedial construction activities. The Contractor shall immediately repair all damage caused by their work to the satisfaction of National Grid, the National Grid authorized representative and/or the Design Engineer.

3.2 UTILITY PROTECTION AND REROUTING

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection activities.
   1. Shore, support, and protect active utilities encountered.
   2. Support and protect all structures to remain.

B. Underground utilities (active or inactive) within or adjacent to the areas where remedial activities will be performed shall be sustained in place and protected from direct or indirect damage. Such sustaining and supporting shall be done carefully and as directed by the party owning the structure or utility.

C. Contractor shall prevent interruption of existing utility service to occupied or active facilities, except when authorized in writing by authorities having jurisdiction and except where existing utilities will be temporarily disconnected by the property owner and utility owner.

D. The Contractor shall perform hand excavation to expose the utility. If it is an active utility, the Contractor shall support and protect the utility to prevent damage and to prevent interruption to the services that the utility provides. The Contractor shall be liable for damages to an active utility and is responsible to have it repaired promptly.

E. Perform construction necessary to complete rerouting connections or reconnections to existing utilities, including test pits to locate existing utilities and structures that may be encountered.

F. Keep existing active utilities in operation, unless otherwise specifically permitted, in writing, by the National Grid and/or the National Grid authorized representative and utility company, if applicable.

G. Contractor shall perform all rerouting and capping activities so as to avoid interference with other construction activities.

H. Contractor shall complete all necessary preparatory work and shall keep shutdown periods to a minimum. Contractor shall obtain approval of shutdown periods, in writing, prior to starting work.

I. Contractor is responsible for the design of the rerouted active utilities, if proposed. Any damage resulting from the failure of the rerouted utilities shall be repaired or replaced, to the satisfaction of the National Grid and the utility company.

J. The Contractor will protect and support existing utilities and on-site utility poles that are to remain in place during the performance of the work in accordance with the requirements of the utility company.

K. Any residual material which drains from the utility lines/pipes shall be collected and segregated for characterization and off-site transportation and disposal in accordance with Section 31 70 00.

END OF SECTION

Appendix K: Maintenance and Protection of Traffic Plan (MPTP)

DRAFT

Maintenance and Protection of Traffic Plan
NYSDEC Site No. 1-52-182
Village of Patchogue
Suffolk County, New York

Prepared for
National Grid
175 East Old Country Road
Hicksville, New York 11801

November 2012

Project Number: 142128.550.001

This is a draft and is not intended to be a final representation
of the work done or recommendations made by Brown and Caldwell.
It should not be relied upon; consult the final report.

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Table of Contents

List of Figures ii
1. Introduction 1-1
   1.1 Site Description 1-1
   1.2 Overview of Proposed Remedial Action 1-1
   1.3 Potential Impacts to Pedestrian and Vehicular Traffic 1-2
2. Traffic Control 2-1
   2.1 General 2-1
   2.2 Truck Traffic 2-1
   2.3 Traffic Control Measures 2-2
References REF-1

List of Figures

Figure 2-1. Truck Traffic Route

Figure 2-2. Traffic Control Plan

Section 1
Introduction

This *Maintenance and Protection of Traffic Plan* (MPTP) has been prepared by Brown and Caldwell Associates on behalf of National Grid to support the proposed remedial design and implementation of the remedy at the Patchogue Former Manufactured Gas Plant (MGP) site located at 234 West Main Street in the Village of Patchogue, Town of Brookhaven, Suffolk County, New York (the Site). This MPTP describes the Site location and surroundings, the need for traffic control during the implementation of the proposed remedial work and the procedures that will be used to maintain vehicular and pedestrian traffic. The safety of motorists, road workers and pedestrians was among the chief concerns when preparing this MPTP. This plan has been prepared in conformance with the *Federal Highway Administration Manual on Uniform Traffic Control Devices* (MUTCD); United States Department of Transportation (USDOT) [USDOT, 2009].

1.1 Site Description

The Patchogue Former MGP Site is located at 234 West Main Street in the Village of Patchogue, Town of Brookhaven, Suffolk County, New York. The Site is located in a mixed commercial and residential area, and is currently undeveloped and vacant. The perimeter of the Site is secured with a locked perimeter fence. The Site is generally rectangular in shape and encompasses approximately 3.6 acres with a maximum length (north-south) of approximately 680 feet and a maximum width (east-west) of 180 feet. The Site has relatively flat topography with a typical elevation of approximately five feet above mean sea level (msl). The Site is, in general, bordered as follows:

- To the north by West Main Street beyond which is a property occupied by Briarcliff College and Patchogue Lake;
- To the east by an unpaved access driveway and two commercial properties beyond which is the Patchogue River;
- To the south by a residential area and an overflow pond to the south/southwest; and
- To the west by a steep slope beyond which are a residential area and a municipal storage yard.

1.2 Overview of Proposed Remedial Action

The proposed remedial action will be performed on the 3.6 acre property owned by National Grid and the property to the west owned by Above All Storefronts. The remedial action is anticipated to include:

- Off-site excavation on the Above All Storefronts property (off-site excavation area) of soils impacted by the operation of the former MGP. This excavation will require the delivery and installation of an excavation support systems such as sheet piling;
- Excavation of on-site surface soils for the placement of a clean surface cap across the Site;
- In-Situ stabilization (ISS) of on-site impacted soils. ISS will require the delivery of a stabilizing reagent (i.e. cement);
- Transportation and disposal of excavated impacted material to an appropriate off-site treatment facility;

- Restoration of all excavated areas with certified clean fill material. This material will be trucked in from a certified clean fill source(s).
- Removal of MGP related structures (i.e. former tanks, foundations or piping) encountered during excavation activities.

1.3 Potential Impacts to Pedestrian and Vehicular Traffic

Some of the remedial activities to be implemented at the Patchogue Former MGP have the potential to impact vehicular and/or pedestrian traffic along West Main Street and a portion of Above All Storefronts property. Temporary traffic control measures will be required at certain times during the implementation of the remedial action to facilitate the delivery and pickup of construction materials and equipment, the management and transportation of remediation-derived wastes to be subject to off-site disposal and for the delivery of clean fill materials to the Site during backfill and restoration activities. These activities will result in additional, temporary traffic associated with the remedy implementation activities that will generally occur within daylight hours. Traffic along West Main Street and the Site entrance will be regulated to ensure the safety of all involved vehicular and pedestrian traffic throughout the duration of the implementation of the remedial action.

Section 2

Traffic Control

This MPTP establishes the minimum requirements for the maintenance and protection of vehicular and pedestrian traffic during the implementation of the proposed remedial action including traffic and pedestrian control measures.

2.1 General

All temporary traffic control measures, lane/sidewalk closures, and necessary permits and approvals will be obtained by the Remedial Contractor selected to implement the work prior to the start of the construction activities. Each of these measures shall be performed in accordance with:

- The MUTCD;
- A Vehicular and Pedestrian Traffic Control Plan to be prepared by the Remedial Contractor and submitted and reviewed by National Grid, Brown and Caldwell (National Grid's Design Engineer) and/or other National Grid designees (i.e., Construction Manager, etc.) prior to mobilization; and
- Any applicable Town of Brookhaven or Village of Patchogue code(s).

The Remedial Contractor will notify the City Engineer or a designated representative and obtain the proper permits prior to any scheduled temporary lane or sidewalk closures.

2.2 Truck Traffic

There is one mandatory access/egress route that truck-related construction vehicles will have to take while remedial work is being performed. This route will provide access/egress to both the Site and the adjacent off-site property where the remedial activities will be performed. The mandatory traffic routes for all construction related vehicles accessing and regressing from these three areas is depicted on Figure 2-1. The mandatory designated routes to and from the Site for truck-related traffic are as follows:

To The Patchogue Former MGP Site:

From the Long Island Expressway

- Take Exit 62 towards Nicolls Road/ Blue Point/ Stony Brook (0.2 miles);
- Merge onto Expressway Drive South (0.1 miles);
- Take County Road 97/ Nicolls Road South Ramp to Blue Point (0.2 miles);
- Merge onto County Road 97/ Nicolls Road South (4.7 miles);
- Turn left onto County Road 85 (1.5 miles);
- After 1.5 miles on County Road 85/ West Main Street, the site will be on the right (234 West Main Street).

Leaving the Patchogue Former MGP Site:

For truck-related traffic leaving the Site, the directions from the Site to the nearest highway (Long Island Expressway) are as follows:

- From the Site exit/entrance, turn right onto County Road 85/ West Main Street (0.2 miles);
- Turn left onto County Road 19/ Holbrook Road (0.4 miles);
- At the traffic circle, continue straight onto County Road 19/ Waverly Avenue (0.8 miles);
- Turn left onto Sunrise Highway North Service Road (0.3 miles);
- Continue onto NY454 West (0.4 miles);
- Take ramp onto County Road 97 North/ Nicolls Road (3.4 miles);
- Take the exit toward I-495 West/ New York (0.2 miles);
- Merge onto Expressway Drive North (0.4 miles);
- Merge onto I-495 (Long Island Expressway) West via ramp on left to New York.

2.3 Traffic Control Measures

Traffic control measures will be required on West Main Street at various times throughout the duration remedial action construction work. Lane/sidewalk closures and regulated traffic may be required at different times to maintain a safe work environment. To regulate these traffic changes, flag persons, cones, signs, and barricades may be used. Appropriate traffic devices will be used in order to appear visible to both pedestrian and vehicular traffic at all times, including evening or low-light times. No excavation is proposed within West Main Street. West Main Street contains sidewalks in close proximity to the entrance/exit to the Site that will need to be regulated. Lane closures are not expected for an extended period of time. Due to proposed off-site excavation near the Above All Storefronts building, pedestrian traffic into and out of this building may be regulated or restricted for certain time periods during construction activities. The existing access road which accesses the both the Site and the Above All Storefronts building will require periodic traffic control into and out of the parking lot area.

As recommended in the MUTCD, appropriate warning and guidance devices will be installed and maintained by the Remedial Contractor throughout the implementation of the remedial action. All applicable devices will conform to the MUTCD regulations. Anticipated traffic and safety control devices, at a minimum, include:

- Cones, tubular markers, drums, and/or barricades will be installed as needed on West Main Street to temporarily divert vehicular and pedestrian traffic and warn travelers of nearby work activities and work vehicles accessing/regressing from Site roadways.
- Flag persons with flagger symbols will be deployed on West Main Street near the Site exit/entrance to regulate the flow off traffic from within and nearby the Site. This includes ensuring all parties' safety while construction or remedial action related vehicles are entering and exiting the site.
- An existing chain link fence around the Site will serve as a physical barrier between remedial action construction activity work area and adjacent roadways and land. This fence will also serve as a site security fence and prevent unwarranted access to the site. Temporary fencing will also be installed around the perimeter of the construction area on the Above All Storefronts property.
- "Road Work Ahead" signs will be installed on roadways adjacent or nearby the Site and the additional work area on the adjacent property. The signs will be installed at a minimum of 100 feet from the work area extents in areas of low speed limits.

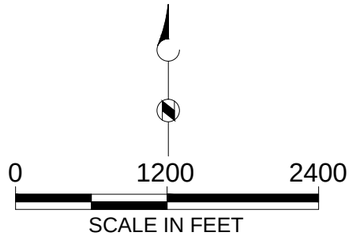
The approximate locations of the aforementioned traffic and safety control devices are shown on Figure 2-2. The Remedial Contractor will establish the locations of these devices once work is underway, with the approval of the Village of Patchogue, Town of Brookhaven, National Grid, BC and/or any other National Grid-appointed designees. The location of traffic devices may change due to changes in work activities or access points.

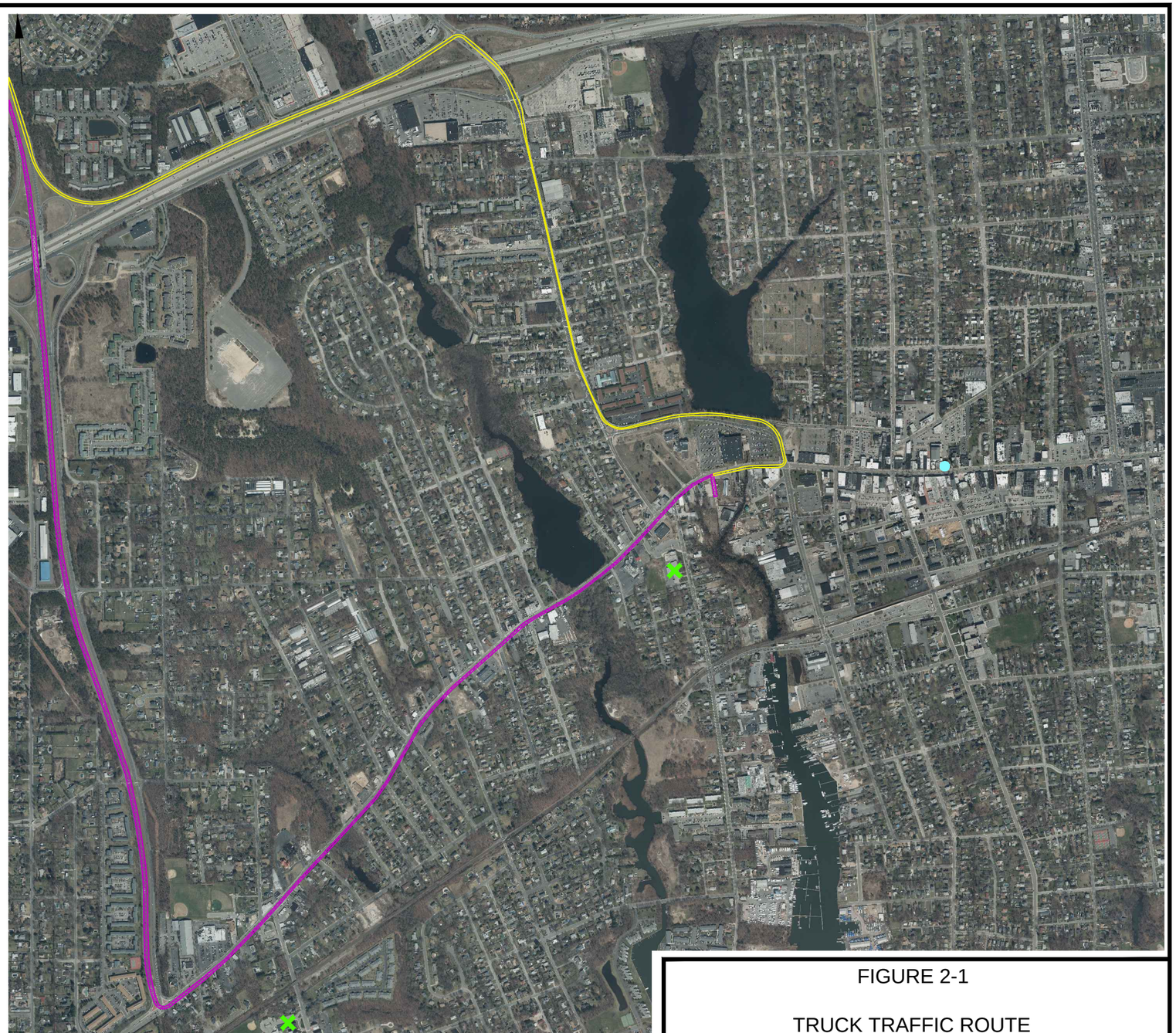
References

USDOT, 2009. Federal Highway Administration Manual on Uniform Traffic Control Devices, United States Department of Transportation, Federal Highway Administration, December 2009.

Figures

\\BCALLDC01\PROJECTS\NATIONAL_GRID\PATCHOGUE\142128_PATCHOGUE_UCWP_RDWP_IMPLEMENT\CADD\2-SHEETS\C-CIVIL\FIG-1-1.DWG 04/23/2012 03:06:44PM By:mhellyer XREFS: TBlock-11x17
XREF: TBLOCK-11X17





LEGEND:

- TRUCK ROUTE (ENTERING SITE)
- TRUCK ROUTE (LEAVING SITE)
- PUBLIC LIBRARY
- SCHOOL

FOR VEHICLES ENTERING THE SITE, THE DIRECTIONS FROM THE LONG ISLAND EXPRESSWAY ARE AS FOLLOWS:

- TAKE EXIT 62 TOWARDS NICOLLS RD/BLUE POINT/STONY BROOK (0.2 MI.)
- MERGE ONTO EXPRESSWAY DR SOUTH (0.1 MI.)
- TAKE COUNTY RD 97/NICOLLS RD SOUTH RAMP TO BLUE POINT (0.2 MI.)
- MERGE ONTO COUNTY RD 97/NICOLLS RD SOUTH (4.7 MI.)
- TURN LEFT ONTO COUNTY RD 85 (1.5 MI.)
- AFTER 1.5 MILES ON COUNTY RD 85/WEST MAIN ST, THE SITE WILL BE ON THE RIGHT (234 WEST MAIN ST)

FOR VEHICLES LEAVING THE SITE, THE DIRECTIONS ARE:

- FROM THE SITE EXIT, TURN RIGHT ONTO COUNTY RD 85/WEST MAIN ST (0.2 MI.)
- TURN LEFT ONTO COUNTY RD 19/HOLBROOK RD (0.4 MI.)
- AT THE TRAFFIC CIRCLE, CONTINUE STRAIGHT ONTO COUNTY RD 19/ WAVERLY AVE (0.8 MI.)
- TURN LEFT ONTO SUNRISE HIGHWAY NORTH SERVICE RD (0.3 MI.)
- CONTINUE ONTO NY-454 W (0.4 MI.)
- TAKE RAMP ONTO COUNTY RD 97 N/ NICOLLS RD (3.4 MI.)
- TAKE THE EXIT TOWARD I-495 W/ NEW YORK (0.2 MI.)
- MERGE ONTO EXPRESSWAY DR N (0.4 MI.)
- MERGE ONTO I-495 W VIA RAMP ON LEFT TO NEW YORK.

DRAFT

FIGURE 2-1

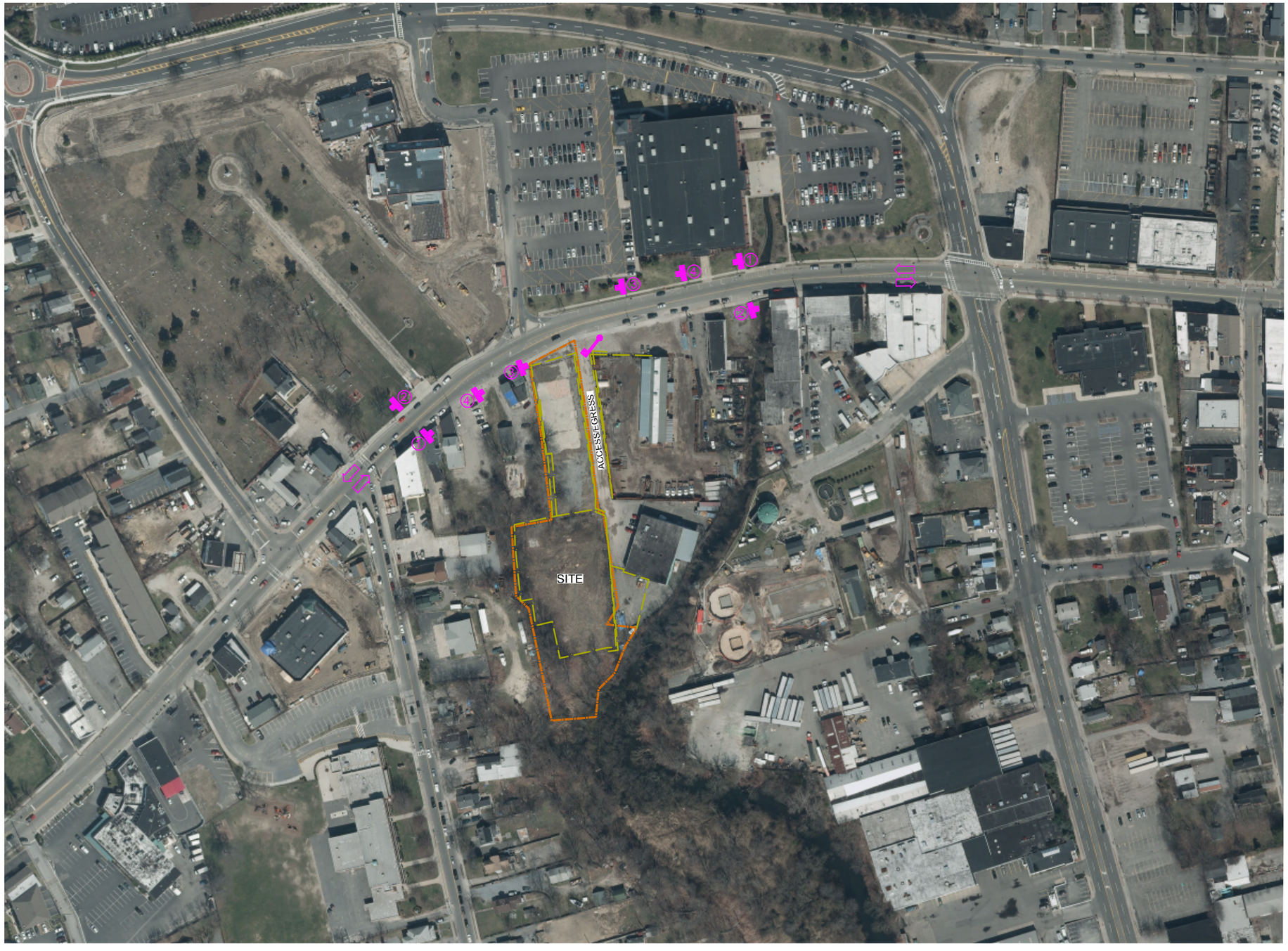
TRUCK TRAFFIC ROUTE

PATCHOGUE (WEST MAIN STREET)
FORMER MGP SITE
PATCHOGUE, NEW YORK

DATE	PROJECT NUMBER
4-12	142128

Brown AND Caldwell

BROWN AND CALDWELL ASSOCIATES
ALLENDALE, NEW JERSEY



SIGN LEGEND:

1 — ROAD WORK AHEAD

2 — END ROAD WORK

3 — CONSTRUCTION VEHICLE ENTRANCE EXIT

4

LEGEND:

- SITE BOUNDARY
- FLAGGER AS NEEDED
- TWO WAY TRAFFIC
- 1 — SIGN (SHOWN FACING LEFT) AND ID
- FENCING

Brown AND Caldwell

SCALE: 1" = 200'

DATE: October 16, 2012

PATCHOGUE (WEST MAIN STREET)
FORMER MGP SITE
PATCHOGUE, NEW YORK

TRAFFIC CONTROL PLAN

FIGURE
2-2

Path: P:\National_Grid\Patchogue\142128_Patchogue_UCWP_RDWP_Implement\CADD\2-SHEETS\C-CIVIL File Name: Traffic-Control-Plan Plot Date: October 16, 2012 3:42 PM Cadd User: James, Richard

Appendix L: Storm Water Pollution Prevention Plan (SWPP)

DRAFT

Stormwater Pollution Prevention Plan
NYSDEC Site No. 1-52-182
Village of Patchogue
Suffolk County, New York

Prepared for
National Grid
175 East Old Country Road
Hicksville, New York 11801

December 2012

Project Number: 142128.550

This is a draft and is not intended to be a final representation
of the work done or recommendations made by Brown and Caldwell.
It should not be relied upon; consult the final report.

Brown and Caldwell Associates
2 Park Way, Suite 2A
Upper Saddle River, New Jersey 07458

Table of Contents

List of Abbreviations ii
1. Introduction 1-1
    1.1 Purpose and Scope 1-1
    1.2 Site Background 1-1
    1.3 Summary of Remedial Activities 1-1
2. Soil Erosion and Sediment Control Plan 2-1
    2.1 Soil Erosion and Sediment Control Measures 2-1
        2.1.1 Temporary Stabilized Construction Entrance(s)/Exit(s) 2-1
        2.1.2 Decontamination Area 2-1
        2.1.3 Silt Fence/Hay Bale Dikes 2-2
        2.1.4 Material Staging Areas 2-2
        2.1.5 Dust and Odor Control Measures 2-2
        2.1.6 Good Housekeeping Practices 2-3
    2.2 Inspection and Maintenance of SESC Measures 2-3
    2.3 Site Restoration 2-4
    2.4 Construction Sequence 2-4
3. Pollution Prevention Plan 3-1
    3.1 Spill Prevention Plan 3-1
    3.2 Spill Response Plan 3-1
References REF-1

List of Abbreviations

BC	Brown and Caldwell Associates
bgs	Below ground surface
BMP	Best Management Practice
DNAPL	Dense non-aqueous phase liquid
DPW	Department of Public Works
CQAPP	Construction Quality Assurance Project Plan
MGP	Manufactured Gas Plant
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
PPE	Personal Protective Equipment
POTW	Publicly Owned Treatment Works
SESC	Soil erosion and sediment control
SPDES	State Pollutant Discharge Elimination System
SWPPP	Stormwater Pollution Prevention Plan
UST	Underground Storage Tank

Section 1
Introduction

1.1 Purpose and Scope

This Storm Water Pollution Prevention Plan (SWPPP) has been prepared by Brown and Caldwell Associates (BC), on behalf of National Grid, for the Patchogue (W. Main Street) Former Manufactured Gas Plant (MGP) Site (referred to as the "Site"). This SWPPP has been prepared to identify the storm water management practices to be implemented during remedial action construction activities to 1) control potential impacts (i.e., erosion and sediment loading) to Site-related storm water runoff and 2) achieve the following objectives:

- Minimize potential erosion of existing soil/sediments within active work areas;
- Minimize the potential for the conveyance of sediment-laden storm water beyond the project work limits; and
- Minimize accumulation of water within active work areas.

1.2 Site Background

Site background is presented in the Remedial Design Report "Remedial Design Report (50-75% Submission), Patchogue Former MGP Site, Patchogue, Suffolk County, New York, Site No. 1-52-182" prepared by Brown and Caldwell Associates and submitted to the NYSDEC on December 27, 2012.

1.3 Summary of Remedial Activities

The remedial activities will include the following:

- Selective Demolition;
- Dewatering and On-Site Water Treatment;
- Installation of Temporary Shoring;
- Excavation;
- In-Situ Solidification
- Backfilling and Compaction;
- Construction of Environmental Cap; and
- Site Restoration.

These activities are further described in the Remedial Design Report "Remedial Design Report (50-75% Submission), Patchogue Former MGP Site, Patchogue, Suffolk County, New York, Site No. 1-52-182" prepared by Brown and Caldwell Associates and submitted to the NYSDEC on December 27, 2012.

Section 2

Soil Erosion and Sediment Control Plan

Prior to commencement of land disturbance and demolition activities, temporary soil erosion and sediment control (SESC) measures will be installed. The elements of the proposed SESC measures will be installed in accordance with the New York State Standards and Specifications for Erosion and Sediment Control.

SESC measures will be employed utilizing Best Management Practices (BMPs) including silt fencing, hay bale dikes, storm drain inlet protection, stabilized construction entrances/exits and dust control measures. The SESC measures will be installed as shown on Design Drawing C-500 and in strategic locations based on visual observation of flow patterns and the topography of work areas to control sediment entrained stormwater from exiting work areas. During remedial construction, SESC measures will be inspected and maintained on a daily basis and following precipitation events. Accumulated sediment will be removed from the erosion and sediment controls, as needed. Sediment that originates from excavated areas and removed from SESC measures will be added to the stockpile for off-site disposal. Sediment will be removed from behind the silt fence and hay bales when it accumulates to a depth greater than 0.5 feet behind the barrier.

2.1 Soil Erosion and Sediment Control Measures

The following subsections of this SWPPP discuss the various types of SESC measures that may be utilized at the Site during the implementation of the remedial action.

2.1.1 Temporary Stabilized Construction Entrance(s)/Exit(s)

Stabilized construction entrances/exits consisting of smoothly graded areas large enough to accommodate equipment and truck traffic will be constructed. The stabilized construction entrances/exits will consist of crushed coarse aggregate stone underlain by non-woven geotextile fabric and will be maintained and redressed while in use.

A single ingress/egress point is proposed for the remediation activities and will require a stabilized construction entrance/exit. The ingress/egress point to the Site will be from West Main Street. The proposed ingress/egress location is indicated on Drawing C-500. The necessary municipal permits, if any, to maintain a construction entrance/exit will be obtained for the duration of the project by the Remedial Contractor. These permits will be obtained by the Remedial Contractor prior to mobilization to the Site.

2.1.2 Decontamination Area

During the implementation of the remedial construction activities, the Site will be divided into three primary zones: the exclusion zone, the contamination reduction zone, and the support zone. These locations will be identified in the field during the implementation of the remedial activities. The decontamination area will be located within the contamination reduction zone and will include the personnel decontamination station and the equipment decontamination pads. The purpose of the pad

will be to provide an area where dirt, debris and any other contaminated material can be removed from vehicles or equipment prior to departure from the work zones and the Site. The pad will be in an area with a bermed perimeter and consist of a crushed stone layer underlain by a geotextile layer and two plastic liners, with a collection sump. The trucks will be cleaned via mechanical means to remove dirt and debris, and, if needed, water sprayers will be used. Heavy machinery, trucks, equipment and personnel exiting the exclusion zone will be subject to the decontamination procedures. A construction detail for the decontamination pad is included on Drawing C-501.

2.1.3 Silt Fence/Hay Bale Dikes

At a minimum, silt fence/hay bale dikes will be installed to delineate the limit of the remedial work area (installed on the down slope side) and around the perimeter of any stockpile areas. The SESC measures will be installed as shown on Drawing C-500 (Appendix A) and in strategic locations based on visual observation of flow patterns and the topography of work areas to control sediment entrained storm water from existing and entering work areas.

2.1.4 Material Staging Areas

The construction equipment required to implement the remedial construction activities will be mobilized to the Site, as necessary based on the construction schedule. Equipment staging areas will be located so as to facilitate equipment ingress and egress and allow for proper sequencing of the remedial construction work.

Material staging areas will be established for excavated material, debris, clean backfill, and liquid wastes (if generated). Staging areas will be underlain by plastic sheeting with perimeter berms to contain run-on and run-off. Liners beneath the stockpiles as well as plastic sheeting used to cover stockpiles will be of sufficient thickness to minimize rips caused by debris and/or the movement of materials and to be protective from the elements. Damaged or ripped liners/sheeting will be repaired or replaced, as necessary. The staging areas will be physically segregated to prevent cross-contamination or commingling of materials. To the extent feasible, materials intended for off-site transportation and disposal will be staged in areas of the Site that are not proximate to existing off-site roadways in order to minimize the potential for off-site impacts. Staging areas for excavated soils and impacted debris destined for off-site disposal will be principally located in the remaining areas of the Site subject to excavation.

Excavated soils and impacted debris will be covered with plastic to minimize odors as well as the effects of weather. A construction detail for the stockpile area is included on Drawing C-501. Odor suppressing foam will be applied to stockpiles, as necessary, to minimize the potential for odors generated by the impacted soils. The locations of the staging areas are shown on Drawing C-108.

2.1.5 Dust and Odor Control Measures

Dust and odor control measures will include the use of water spraying, covering stockpiles and open excavations with sheeting and/or tarps and odor suppressant foams. As part of the removal of former MGP features, dust control measures will include the spraying of water or misting the work areas to ensure the concrete and brick is moist.

Dust control measures will be implemented to minimize the potential for dust generation during soil excavation and handling, stockpiling and placement of fill. The primary method of dust control will be the application of water spray using water trucks and/or flat hose(s) connected to a water supply. Heavily traveled truck routes will be wet down by the water truck to minimize dust emissions. Truck routes on-site will be continuously monitored for excessive build-up of site soils or dust. In the event of excessive build-up of site soils, the Remedial Contractor shall remove the excess soils and add them to the stockpile for off-site disposal. In the case of excessive build-up of dust, implement response

procedures in accordance with the CAMP. During freezing temperatures, calcium chloride will be spread in lieu of water to minimize the potential for ice at the Site. Additional dust control measures will include covering open excavations and stockpiles of soil, as required, to minimize erosion and dust generation.

Proper cleaning of trucks exiting the Site will aid in minimizing potential off-site impacts from dust. Stabilized construction entrances/exits consisting of smoothly graded areas large enough to accommodate equipment and truck traffic will be constructed at exit points to clean tires of transport trucks exiting the Site. The base will be covered with non-woven geotextile and coarse aggregate and will be maintained and redressed while in use.

Truck routes on- and off-site will be inspected continuously during high truck traffic periods for accumulation of excessive soil or dust. Proper cleaning of trucks exiting the Site will eliminate dusty conditions on adjacent roadways. Transport trucks exiting the Site will pass through an inspection area and/or be inspected to ensure tires and undercarriages are clean and that tarps are secured. Excessive mud and loose soil observed on the trucks will be manually removed with brooms and brushes, as necessary.

Odor will be monitored during excavation and handling of impacted soils from the Site. In the event that excessive odors are detected in the opinion of National Grid or the Construction Manager, controls will be implemented. Odor controls will include the use of odor suppressing foam and foaming devices or tarps to cover open excavations or stockpiles. Odors will also be controlled by sequencing excavation in a manner that will result in manageable areas of open excavation. Odors will be mitigated, if necessary, by placing a layer of non-odorous soils or polyethylene sheeting over the excavation area or stockpile (overnight and off-hours). In addition, foam application equipment and an adequate supply of odor reducing foaming agent will be available for application to the excavation area, during waste handling and management activities or stockpiles, as needed. Odor control may also be performed through the use of odor-suppressing sprays such as BioSolve® sprayed during remedial construction and waste handling activities.

2.1.6 Good Housekeeping Practices

Good housekeeping practices will be implemented to reduce the potential for construction materials becoming entrained in storm water discharges from the Site. Throughout construction, the Remedial Contractor will be responsible for maintaining the Site in a neat and orderly condition. This will include, but not be limited to: routine waste management activities (e.g. the collection and disposal of trash, rubbish, construction waste, and sanitary wastes); prompt cleanup of any spills of impacted materials (liquid or dry); and prompt clean up of any materials tracked by construction vehicles.

2.2 Inspection and Maintenance of SESC Measures

SESC measures at the Site will be inspected and maintained daily and following precipitation events to confirm that the SESC plan is being properly implemented and to assess whether any maintenance or improvements are necessary to optimize the SESC measures for current Site conditions. Inspections of the SESC measures will be performed by the Remedial Contractor. In addition, the Remedial Contractor will prepare a weekly inspection report summarizing the results of the inspections performed during the weekly period. The minimum requirements for weekly inspection reports are presented in Section 31 25 13 of the Technical Specifications.

If it is determined during the inspection that any maintenance to the existing SESC measures or installation of additional SESC measures are necessary, maintenance/installation activities will be initiated as soon as possible and completed prior to completion of the next inspection report. If Site

conditions (e.g., weather, ground conditions, etc.) prevent maintenance/installation activities from being completed prior to submittal of the subsequent inspection report, site conditions will be noted in the inspection report and maintenance/installation activities will be completed as soon as Site conditions permit.

SESC measures throughout the Site will be maintained for the duration of the remedial construction until all soil disturbing activities and site restoration activities have been completed.

2.3 Site Restoration

Restoration activities will consist of site grading and construction of a Site-wide environmental cap; re-establishing current pavement types on-site; and re-establishing chain-link fencing. A final Site inspection will be performed by BC to verify that all site restoration activities have been completed properly. Once it is confirmed that the Site has been restored in conformance with the design drawings and specifications, the Remedial Contractor will remove any SESC measures which are no longer needed.

2.4 Construction Sequence

The following sections detail the components of the remedy selected to address the impacts at the Site in accordance with the requirements of the ROD. In general, the work will be implemented in the following sequence of events:

1. Submittals/Preparation of Final RDR (100%)
2. Mobilization
3. Site Preparation Activities
4. Remedial Activities
5. Post-Remedial Action Activities

In addition this section presents a detailed discussion of specific activities that will occur during the implementation of the Remedial Activities as follows:

- Air Monitoring;
- Odor Control and Vapor Management;
- Decontamination;
- Waste Management; and
- Discharge Requirements for Water Disposal.

Section 3

Pollution Prevention Plan

In addition to the Soil Erosion and Sediment Control Plan described in Section 2.0, the Remedial Contractor will be required to prepare and implement a Pollution Prevention Plan, as part of the Contingency Plan for the Site, in accordance with the minimum requirements identified in this section. The Contractor's Pollution Prevention Plan will include a Spill Prevention Plan identifying measures to be taken to prevent spills from occurring and a Spill Response Plan identifying measures to be implemented in the event of a spill or spill-related emergency. Both the Spill Prevention Plan and Spill Response Plan are further described below.

3.1 Spill Prevention Plan

The Remedial Contractor will inspect all equipment prior to their mobilization for potential sources of spills by inspecting the condition of hydraulic cylinders, hoses, gaskets, fuel tanks, etc. If a potential spill source is identified, the Remedial Contractor will conduct the necessary repairs or replace the piece of equipment prior to mobilizing equipment to the Site.

At a minimum, the preventative measures listed below will be implemented by the Remedial Contractor to minimize potential spills of fuel during the remedial construction:

- Conduct refueling activities in a designated area on level ground away from steep slopes and utilize a drip rag or container to catch any potential spills during refueling;
- Do not leave equipment unattended during refueling;
- Do not refill internal combustion engine fuel tanks with a flammable liquid while the engine is running;
- Replace fuel caps before starting the engine;
- Secure (i.e., lock) fuel pump dispensers when not in use to avoid accidental fuel release;
- Keep fuel storage tanks within secondary containment (i.e., bermed containment);
- Conduct visual inspections of equipment/fuel tanks to check for leaks. If leaks are observed, transfer the tank contents to an alternate tank and replace or repair the leaking tank, as appropriate;
- Maintain all equipment in accordance with the manufacturer's specifications; and,
- Operate all vehicles and equipment safely, and park them a safe distance away from site hazards and sensitive resources, to the extent practicable.

3.2 Spill Response Plan

The Remedial Contractor will develop and implement appropriate spill response procedures in case an unplanned release occurs. These procedures are to be followed in response to spills of oil, products, materials, etc. The Contractor will maintain an emergency contact list for the Contractor; fire official(s), ambulance service, local, county and State Police, and local hospitals. The Contractor will also identify responsible personnel who will be in position at all times to receive incoming phone calls and to dispatch Contractor personnel and equipment in the event of an emergency situation. In addition, the Contractor will maintain a spill kit on-site, throughout remedial construction activities, containing at a minimum: absorbent pads, absorbent booms, fire extinguishers, personal protective equipment (PPE) and shovels.

The following lists the minimum requirements for the procedures the Remedial Contractor will include and implement in their Spill Response Plan:

- **Stopping Usage of the Affected Equipment:** The equipment will be shut off immediately and/or all valves closed and the leak stopped, if possible.
- **Containing the Spill:** If the spilled material is floating on water, absorbent pads/booms will be placed surrounding the spill. If the spilled material sinks below the water surface, a dam, weir, or other containment will be used to stop the flow of the spilled material. If the spill occurs on land, a containment unit will be constructed to stop the flow of the spilled material. Absorbent material will be applied, as necessary.
- **Cleaning the Spill:** Spills in water will be recovered using pumps, sorbent materials, vacuum trucks, etc. until the spilled material is fully recovered and no sheen or other evidence of the spill is observed. Spills on land will be recovered using pumps, sorbent materials, shovels and heavy equipment, as necessary, until the spilled material is fully recovered. All sorbent materials used to clean up the spill will be disposed of in an appropriate manner. All equipment used will be decontaminated with an approved cleaning solution on the decontaminated pad.
- **Containerizing Spill Materials:** Spill materials, impacted soil, sorbent pads, etc. will be containerized in New York State Department of Transportation (NYSDOT) approved containers. The containers will be labeled with the waste type and date of accumulation in accordance with applicable regulations. Samples will be collected to characterize the spilled materials for disposal. All materials will be disposed of at a National Grid-approved, properly permitted off-site disposal facility.
- **Disposal of Spill Materials:** Recovered spill materials and impacted spill cleanup debris will be disposed of at a facility permitted to accept the materials and approved by National Grid. The Contractor will be responsible for coordinating disposal activities.
- **Performing Post-Spill Maintenance:** Following cleanup of the spill, the Contractor will verify that all used spill cleanup material and equipment have been disposed of or decontaminated, as appropriate. If the equipment that caused the spill cannot be properly repaired, replacement equipment will be obtained.

References

NYSDEC, New York State Standards and Specifications for Erosion and Sediment Control, August 2005.

Appendix M: Construction Quality Assurance Project Plan (CQAPP)

DRAFT

Construction Quality Assurance Project Plan
NYSDEC Site No. 1-52-182
Village of Patchogue
Suffolk County, New York

Prepared for:
National Grid
175 East Old Country Road
Hicksville, New York 11801

December 2012

Project Number: 142128.550

This is a draft and is not intended to be a final representation
of the work done or recommendations made by Brown and Caldwell.
It should not be relied upon; consult the final report.

Brown and Caldwell Associates
2 Park Way, Suite 2A
Upper Saddle River, New Jersey 07458

Table of Contents

Appendices iii

Tables iii

Figures iii

Project Directory i

1. Introduction 1-1
   - 1.1 Background 1-1
   - 1.2 Summary of Remedial Activities 1-1
   - 1.3 Definitions and Terms 1-2
   - 1.4 Scope of Construction Quality Assurance Plan 1-2
2. Project Organization 2-1
   - 2.1 Project Team 2-1
     - 2.1.1 Project Owner 2-1
     - 2.1.2 National Grid Duly Appointed Field Representative 2-1
     - 2.1.3 Design Engineering Firm/Design Engineer 2-2
     - 2.1.4 Construction Quality Assurance Firm 2-2
       - 2.1.4.1 CQA Site Manager (Construction Observer) 2-3
     - 2.1.5 RA Contractor 2-3
     - 2.1.6 Analytical Laboratory 2-4
     - 2.1.7 Soils Laboratory 2-4
     - 2.1.8 Surveyor 2-4
     - 2.1.9 Suppliers 2-4
     - 2.1.10 Transporter(s) 2-4
     - 2.1.11 TSD Facility(s) 2-4
   - 2.2 Qualifications 2-4
     - 2.2.1 Field Representative/Construction Manager 2-4
     - 2.2.2 Design Engineer 2-5
     - 2.2.3 Construction Quality Assurance Firm 2-5
     - 2.2.4 RA Contractor 2-5
     - 2.2.5 Analytical Laboratory 2-5
     - 2.2.6 Soils Laboratory 2-5
     - 2.2.7 Surveyor 2-5
     - 2.2.8 Supplier(s) 2-5
     - 2.2.9 Transporter 2-5
     - 2.2.10 TSD Facility 2-6
3. General Project Control and Coordination 3-1
   - 3.1 Meetings 3-1
     - 3.1.1 Pre-Construction/Site Mobilization Meeting 3-1

3.1.2 Weekly Progress Meetings 3-2
3.1.3 Problems or Work Deficiency Meetings 3-2
3.1.4 Substantial Completion Meeting 3-2
3.2 Inspections 3-2
3.2.1 Pre-Construction Inspection 3-2
3.2.2 Construction Monitoring 3-2
3.2.3 Post-Restoration Inspection 3-3
3.3 Documentation 3-3
4. Remedial Action CQA 4-1
4.1 Construction Materials CQA 4-1
4.1.1 Imported Fill Materials CQA 4-1
4.1.2 Material Re-Use CQA 4-2
4.1.3 Asphalt Pavement Materials CQA 4-3
4.1.4 Geosynthetics Materials CQA 4-3
4.2 Site Preparation CQA 4-4
4.3 Temporary Facilities CQA 4-4
4.3.1 Office Trailer 4-4
4.3.2 Temporary Utilities 4-5
4.3.3 Equipment and Material Staging Areas 4-5
4.3.4 Decontamination Pad 4-5
4.3.5 Waste Staging Area 4-6
4.4 Temporary Controls CQA 4-6
4.4.1 Stormwater Management and Erosion and Sediment Controls 4-6
4.4.2 Dust, Odor, and Vapor Monitoring and Controls 4-7
4.4.3 Site Security 4-7
4.5 Utility Protection and Perimeter Utility Cut and Cap CQA 4-8
4.6 Structure Demolition CQA 4-8
4.6.1 Field Screening of Masonry/Concrete Debris 4-9
4.7 Excavation CQA 4-9
4.7.1 Field Screening of Excavated Soil 4-10
4.8 ISS CQA 4-11
4.8.1 ISS Reagents 4-11
4.8.2 Collection of Depth-representative Samples 4-11
4.8.3 Verification of Homogeneity 4-12
4.8.4 Preparation of Composite Samples 4-12
4.8.5 Selection of Samples for Geotechnical Confirmation Testing 4-13
4.9 Dewatering and On-Site Water Treatment CQA 4-14
4.10 Backfilling and Fill Placement CQA 4-14
4.11 Asphalt Pavement Placement CQA 4-15
4.12 Waste Management CQA 4-16
4.13 Site Breakdown, Final Restoration, and Demobilization CQA 4-16
5. Documentation 5-1

5.1 Document Management 5-1
5.2 CQA Documentation 5-1
5.2.1 Daily Field Reports 5-1
5.2.2 Meeting Minutes 5-2
5.2.3 Inspection Reports 5-2
5.2.4 ISS Quality Assurance and Documentation 5-2
5.2.5 Memoranda of Discussion with RA Contractor and Subcontractor 5-2
5.2.6 Problem or Work Deficiency Sheets 5-2
5.2.7 Surveying 5-3
5.2.8 Photographic Records 5-3
5.2.9 Design and/or Technical Specification Deviations 5-3
5.2.10 Monthly Progress Reports 5-3
5.2.11 Final Engineering Report 5-4

Appendices

Appendix A Quality Assurance Project Plan

Tables

Table 4-1 Laboratory Parameters for ISS and Soil Samples

Figures

Figure 4-1 ISS CQA/CQC Project Plan

Project Directory

Contact information for personnel working on the implementation of the remedial action (RA) at the Patchogue (West Main St.) Site is listed in this section. **Emergency Contact information can be found in the project-specific Health and Safety Plan.**

Project Owner: National Grid

William J. Ryan Project Manager Site Investigation and Remediation Department National Grid 175 East Old Country Road Hicksville, NY 11801		
Phone: (516) 545-2586 Mobile: (516) 790-1660		

NG Duly Appointed Field Representative: To Be Determined (TBD) [1]

TBD	TBD	TBD
Phone: (xxx) xxx-xxxx Fax: (xxx) xxx-xxxx	Phone: (xxx) xxx-xxxx Fax: (xxx) xxx-xxxx	Phone: (xxx) xxx-xxxx Fax: (xxx) xxx-xxxx

Design Engineering Firm[1]: Brown and Caldwell Associates

2 Park Way, Suite 2A Upper Saddle River, NJ 07458	234 Hudson Avenue Albany, NY 12210	
Phone: (201) 574-4700 Fax: (201) 236-1607	Phone: (518) 472-1988 Fax: (518) 472-1986	

The following lists Engineering personnel for the project:

- Keith Bogatch, P.E. (Upper Saddle River, NJ office) – Project Manager
- Jeffrey Caputi, P.E. (Upper Saddle River, NJ office) – Engineer of Record
- Catherine E. Trent, PE (Upper Saddle River, NJ office) – Project Engineer
- Marek Ostrowski, PE (Upper Saddle River, NJ office) – Project Engineer
- Jonathan Howland, PE (Albany, NY office) – Geotechnical Engineer
- Robert O'Neill, P.G. (Upper Saddle River, NJ office) – Project Hydrogeologist

Construction Quality Assurance (CQA) Firm[1]: To Be Determined (TBD)

TBD	TBD	TBD
Phone: (xxx) xxx-xxxx	Phone: (xxx) xxx-xxxx	Phone: (xxx) xxx-xxxx

[1] One firm may fulfill the roles of the Field Representative/Construction Manager and CQA Firm. Furthermore, the Design Engineering Firm can serve as either or both the Field Representative/Construction Manager and/or the CQA Firm.

Fax:	**(xxx) xxx-xxxx**	**Fax:**	**(xxx) xxx-xxxx**	**Fax:**	**(xxx) xxx-xxxx**

The following lists CQA personnel for the project:

- TBD – Project Manager
- TBD – Engineer of Record
- TBD – CQA Site Manager (a.k.a., Construction Observer)
- TBD – Other CQA Personnel

Remedial Action Contractor: TBD

TBD		**TBD**		**TBD**	
Phone: **Fax:**	**(xxx) xxx-xxxx** **(xxx) xxx-xxxx**	**Phone:** **Fax:**	**(xxx) xxx-xxxx** **(xxx) xxx-xxxx**	**Phone:** **Fax:**	**(xxx) xxx-xxxx** **(xxx) xxx-xxxx**

The following lists Contractor personnel for the project:

- TBD – Project Manager
- TBD – Site Superintendent
- TBD – Site Health and Safety Officer

Section 1
Introduction

This Construction Quality Assurance Project Plan (CQAPP) has been prepared by Brown and Caldwell Associates (BC) to present the Construction Quality Assurance (CQA) procedures associated with the Remedial Action (RA) for the Patchogue (West Main Street) Site located in the Village of Patchogue, Town of Brookhaven, Suffolk County, New York (hereafter referred to as the "Site").

The Remedial Design (RD) for the RA is presented in the Remedial Design Report (RDR) for the Site and includes construction drawings and specifications.

The CQAPP is divided into the following sections:

- Introduction
- Project Organization
- General Project Control and organization
- Remedial Action CQA
- Documentation

This CQAPP has been prepared to be consistent with National Grid's Site Investigation and Remediation (SIR) Manual, including requirements identified for the role of the Field Representative and Construction Observer.

1.1 Background

Site background is presented in the Remedial Design Report "Remedial Design Report (50-75% Submission), Patchogue Former MGP Site, Patchogue, Suffolk County, New York, Site No. 1-52-182" prepared by Brown and Caldwell Associates and submitted to the NYSDEC on December 27, 2012.

1.2 Summary of Remedial Activities

The remedial activities will include the following:

- Selective Demolition;
- Dewatering and On-Site Water Treatment;
- Installation of Temporary Shoring;
- Excavation;
- In-Situ Solidification
- Backfilling and Compaction;
- Construction of Environmental Cap; and
- Site Restoration.

These activities are further described in the Remedial Design Report "Remedial Design Report (50-75% Submission), Patchogue Former MGP Site, Patchogue, Suffolk County, New York, Site No. 1-52-182" prepared by Brown and Caldwell Associates and submitted to the NYSDEC on December 27, 2012.

1.3 Definitions and Terms

Construction Quality Control (CQC) and Construction Quality Assurance (CQA) are defined as follows:

- CQC refers to those actions taken by the Contractor, subcontractors, suppliers and testing agencies so that the materials and quality of work meet the requirements of the RA Construction Drawings (referred to as the "Drawings") and the RA Technical Specifications (referred to as the "Specifications").
- CQA refers to the means and actions taken by the CQA Consultant and testing agencies to assess the conformance of the RA implementation activities to this CQAPP, the Drawings, and the Specifications. CQA is provided by a party autonomous of the RA Contractor in charge of implementing the RA activities.

1.4 Scope of Construction Quality Assurance Plan

This CQAPP addresses the CQA procedures for the RA implementation and is to be used by the project CQA personnel in conjunction with the Drawings and Specifications to assess the conformance of the RA implementation with the RD.

This CQAPP does not address CQC procedures, installation specifications, or selection of materials or other components, since the CQC requirements are addressed by the Drawings and Specifications. CQC will be the responsibility of the selected RA Contractor.

This CQAPP does not address quality assurance requirements associated with sampling, analysis, and data quality of environmental samples. The "Generic Quality Assurance Project Plan for Site Investigations at Non-Owned Former MGP Sites" (QAPP) (Foster Wheeler, November 2002), which has served as the QAPP for investigation activities at the Site, will also serve as the QAPP for sampling and analysis performed during RA activities. The QAPP is included as Appendix A to this CQAPP.

Section 2
Project Organization

This section identifies the project team organization and qualifications.

2.1 Project Team

2.1.1 Project Owner

The Project Owner is responsible for the Project Site. For this project the term "Project Owner" refers to National Grid.

2.1.2 National Grid Duly Appointed Field Representative

The Project Owner will assign an on-site Duly Appointed Field Representative (Field Representative) who is responsible for acting on behalf of the Owner during field construction and serving as the construction manager. The Field Representative for this project is TBD.

The role of the Duly Appointed Field Representative is to act on behalf of the Project Owner during field construction. This person shall be on Site on a daily basis as directed by the Project Owner and will serve as liaison between the Project Owner, Design Engineer, CQA Firm, Regulatory Agency Representative, and the RA Contractor on all matters relating to the Project.

The Field Representative/Construction Manager shall perform construction management activities, which may include, but are not limited to:

- Monitoring and coordinating the performance of the field activities by the Contractor and other parties as necessary;
- Providing on-site field oversight of all aspects of the remedial activities required by the Contract Documents;
- Maintain a working understanding of the technical submittals provided by the Contractor to the Design Engineer and CQA Firm, including the status of such submittals in terms of their acceptability to the Design Engineer and CQA Firm.
- Monitoring and documenting that the Contractor's field activities are in conformance with the design documents based on field observations and input from the Design Engineer and/or CQA Firm. To the extent possible, resolve nonconformance items with the Contractor, involving as necessary the Design Engineer and/or CQA Firm. Any unresolved issues are to be brought to the attention of the Owner.
- Monitoring technical, quality, safety, and environmental compliance and working with the Design Engineer and/or CQA Firm and Contractor to correct deficiencies;
- Monitoring the Contractor's compliance with the project schedule, identifying if the project schedule will not be met, working with the Contractor to the extent possible to remedy schedule delays, and notifying the Project Owner of the schedule status and any unresolved delays;
- Reviewing and verifying the accuracy of invoices and providing a written recommendation for payment to the Project Owner;
- Attending, conducting, and documenting project progress meetings;
- Preparing progress reports as required and reviewing Daily Logs prepared by the CQA Firm;

- Providing document control; and
- Providing community relations management for on-site personnel, as authorized by the Project Owner.

Note: One firm may fulfill the roles of the Field Representative/Construction Manager and CQA Firm. Furthermore, the Design Engineering Firm can serve as either or both the Field Representative/Construction Manager and/or the CQA Firm.

2.1.3 Design Engineering Firm/Design Engineer

The Design Engineering Firm is responsible for the preparation of the RD, including Drawings, Specifications, and supporting project plans (including the CQAPP), and providing guidance and interpretation on technical matters or issues regarding the approved RD during RA implementation. For this project the Design Engineering Firm or "Design Engineer" is Brown and Caldwell Associates (BC). If needed, the Design Engineer may also provide technical support to the CQA Firm for interpreting field and laboratory testing data, assuring construction activities are in accordance with the RD drawings, and making final determinations of the acceptability of materials and/or installed work.

2.1.4 Construction Quality Assurance Firm

The CQA Firm is a party independent from the RA Contractor or supplier who is responsible for managing, coordinating, and implementing the CQA activities as outlined in this CQAPP. The CQA Firm is responsible for documenting the RA implementation activities.

The CQA Firm provides CQA personnel who are located at the Site throughout the implementation of the RA activities. The CQA Firm will involve the Design Engineer where appropriate. The role/duties of the CQA personnel are presented in the following sections.

The CQA Firm will be responsible for:

- Administering the CQAPP, i.e., assigning and managing the CQA personnel, reviewing field reports, and providing engineering review of CQA-related issues;
- Providing quality control of the CQA personnel, including Site visits;
- Gaining understanding of Drawings and Specifications;
- Reviewing changes to the Drawings and Specifications;
- Gaining understanding of other site-specific documentation and overseeing the implementation of project work plans, including:
  - Community Air Monitoring Plan (CAMP)
  - Maintenance and Protection of Traffic Plan (MPTP)
  - Waste Management Plan (WMP)
  - Stormwater Pollution Prevention Plan (SWPPP)
  - Contractor-prepared plans, including the Contractor Health and Safety Plan, Contractor Construction Management Plan, Contractor Contingency Plan, Dust and Odor Control Plan, and Vehicular and Pedestrian Traffic Control Plan.
  - Suppliers', manufacturers' and installers' product specifications and data;
- Attending the construction meeting(s);
- Reviewing the CQA and CQC documentation generated through RA implementation; and
- Preparation of the Final Engineering Report (FER).

2.1.4.1 CQA Site Manager (Construction Observer)

The CQA Site Manager (a.k.a., Construction Observer) is an employee of the CQA Firm and their role, including their support personnel, includes the following responsibilities:

- Act as the on-site representative of the CQA Firm;
- Attend and participate in the pre-construction walkover and meeting with the Contractor and other parties;
- Attend and participate in the Site mobilization meeting;
- Maintain written records of field activities, including daily logs of the work performed and photographs of the work in progress;
- Collect appropriate documentation from the Contractor for inclusion in the FER. Documentation generated by the Contractor includes, but is not limited to, daily contractor field notes, analytical results of sampling activities conducted by the Contractor (e.g., waste characterization data), and other documentation required by the RD to be submitted by the Contractor;
- Obtain digital photographs of the ongoing project activities taken at key times and locations during the work. Digital photographs will be maintained in the project files;
- Observe the Contractor's performance to determine if the remedial activities are being conducted in conformance with the requirements of the Contract Documents.
- Provide notification to the Field Representative/Construction Manager if deviations or modifications from the Design Documents are identified;
- Confirm the necessity for additional work (as identified by the Contractor) to the Field Representative/Construction Manager and evaluate whether the Contractor has performed additional work consistent with the requirements of the Design Documents;
- Perform visual observations of environmental and Site control systems installed by the Contractor (e.g., erosion and sedimentation controls, decontamination areas, materials and equipment staging areas, access roads, noise and dust controls) and document these observations in the daily logs;
- Monitor the Contractor's development of as-built drawings documenting the construction activities, including documentation of in-field modifications;
- Attend daily safety meetings along with other onsite personnel. The daily safety meetings are discussed in the Health and Safety Plan (HASP);
- Attend the weekly progress meetings;
- Identify the need for and attend problem or work deficiency resolution meetings.
- Attend the substantial completion meeting; and
- Conduct a Site post-restoration walkover to observe and document post-remediation conditions following Site restoration and the Contractor's demobilization from the site. Prepare and distribute a memorandum summarizing the walkover.

2.1.5 RA Contractor

The RA Contractor (also referred to herein as the "Contractor") is the remediation contractor selected to implement the RA. The RA Contractor is responsible for implementing the RA work in accordance with the Drawings and Specifications. The RA Contractor is also responsible for any work performed by subcontractors of the RA Contractor.

2.1.6 Analytical Laboratory

The Analytical Laboratory represents an independent analytical laboratory (i.e., independent from the Project Owner, Design Engineer, CQA Consultant, and other project team entities) that is responsible for conducting tests to analyze the chemical composition of samples collected from the Site and submitted to the Analytical Laboratory. Samples will be collected from location(s) designated by the CQA Firm for shipment to the Analytical Laboratory under strict chain-of-custody protocols. The laboratory will communicate directly with the Contractor regarding the analytical results and reporting. The laboratory will be responsible for providing all labels, sample jars, field blank water, trip blanks, shipping coolers, and laboratory documentation.

2.1.7 Soils Laboratory

The Soils Laboratory represents an independent laboratory (i.e., independent from the Project Owner, Design Engineer, CQA Firm, and other project team entities) that is responsible for conducting tests in the laboratory on samples of soil and geotechnical materials. Samples will be collected from location(s) designated by the CQA Firm for shipment to the Soils Laboratory under strict chain-of-custody protocols.

2.1.8 Surveyor

The Surveyor represents an independent surveyor (i.e., independent from the Project Owner, Design Engineer, CQA Firm, and other project team entities) that is, at minimum, responsible for establishing control points, providing control during RA implementation, and providing final record documentation for all portions of the RA work.

2.1.9 Suppliers

The suppliers are responsible for the production of the materials identified in Drawings and Specifications to be used during implementation of the RA work.

2.1.10 Transporter(s)

The transporter(s) are those responsible for transportation of the materials from the supplier(s) to and from the Site or for transportation of materials from the Site to an off-site location (e.g., waste haulers).

2.1.11 TSD Facility(s)

The Treatment, Storage, and/or Disposal (TSD) facility(s) represent the facilities identified to receive waste materials transported from the Site.

2.2 Qualifications

The following qualifications are required of entities involved with the remedial design and construction.

2.2.1 Field Representative/Construction Manager

The Field Representative/Construction Manager shall have experience working on similar projects and shall possess in-field construction management experience. The Field Representative/Construction Manager qualifications shall meet the specific requirements of the Project Owner.

2.2.2 Design Engineer

The Design Engineer will be an engineer, registered as a professional engineer in the State of New York and working for an engineering firm that is authorized to provide engineering services in the State of New York. The Design Engineer must have a history which demonstrates familiarity with the type of construction activities to be preformed for this project, including design methods and procedures provided in the RD.

2.2.3 Construction Quality Assurance Firm

The CQA Firm will be an engineering firm with engineer(s), registered as a professional engineer(s) in the State of New York and authorized to provide engineering services in the State of New York. The CQA Firm must have demonstrated experience in CQAPP preparation and implementation and providing field oversight for activities specifically related to the RD/RA. The Design Engineer may also serve as the CQA Firm.

2.2.4 RA Contractor

The RA Contractor and/or subcontractor(s) working on the RA shall be on National Grid's approved contractor list and shall have demonstrated experience in successfully performing remediation construction and ISS projects of similar scope and scale.

2.2.5 Analytical Laboratory

The Analytical Laboratory will have experience in performance of the required laboratory tests, meet applicable regulatory requirements, and shall be certified by the New York State Department of Health Environmental Laboratory Accreditation Program (ELAP).

2.2.6 Soils Laboratory

The Soils Laboratory will have experience in performance of the required laboratory tests, meet applicable regulatory requirements, and will be familiar with ASTM and other applicable standards. The Soils Laboratory will be capable of providing test results in accordance with the requirements of the technical specifications.

2.2.7 Surveyor

The certifying surveyor is to be retained by the RA Contractor. The certifying surveyor will be a registered land surveyor in the State of New York and be employed by a surveying firm authorized to provide surveying services in the State of New York.

2.2.8 Supplier(s)

Supplier(s) will be able to provide construction materials and qualified personnel to meet the demands of the project. The supplier will be required to submit certification(s) of specified materials required in the RD drawings and specifications.

2.2.9 Transporter

Waste haulers shall be authorized to transport waste materials in New York State, shall comply with all local, state, and federal regulations pertaining to waste transportation, and shall be a National Grid-approved waste hauler. All personnel responsible for the loading/unloading and transport of materials shall have appropriate training and certifications.

2.2.10TSD Facility

TSD facilities shall be authorized to accept waste materials from New York State, shall comply with all local, state, and federal regulations pertaining to waste TSD, and shall be a National Grid-approved TSD facility. All personnel responsible for handling waste materials shall have appropriate training and certifications.

Section 3
General Project Control and Coordination

This section identifies the activities that will be implemented to provide overall project control and coordination, including project meetings, inspections, testing, and documentation.

3.1 Meetings

To provide requisite quality during the RA implementation, clear, open channels of communication are essential. Project meetings are a critical element in the establishment of communication throughout the RA implementation. This section will describe meetings to be held throughout the RA implementation to provide coordination between entities responsible for the successful completion of the RA.

3.1.1 Pre-Construction/Site Mobilization Meeting

A Site Mobilization Meeting will be held at the Site prior to initiation of RA activities by the RA Contractor. The meeting will be attended by representatives from the Project Owner, Field Representative/ Construction Manager, Design Engineer, CQA Firm, RA Contractor, subcontractor(s), and NYSDEC or their representative. Items addressed at the Site Mobilization Meeting include:

- Summary of work.
- Summary of RD Documents and Contract Documents.
- Use of premises by Project Owner and Contractor and Limit of Work.
- Property Owner requirements.
- Project Owner requirements.
- Review the responsibilities of each party.
- Review lines of authority and communication.
- Discuss project details:
  - Construction facilities.
  - Temporary controls.
  - Temporary utilities.
  - Utility management and protection and perimeter cut and cap.
  - RA implementation and work sequencing.
  - Construction quality control.
  - Surveying.
  - Security and housekeeping procedures.
- Project Schedule.
- Subcontractors.
- Procedures for maintaining record documents.

The meeting will be documented by the Field Representative/Construction Manager. A summary of meeting minutes will be provided to the meeting attendees.

3.1.2 Weekly Progress Meetings

A weekly progress meeting will be held and attended by the Field Representative/Construction Manager, the CQA Site Manager, RA Contractor, and potentially other Project Team members. The progress meeting will be used to discuss the current progress of the project, planned activities for the next week, any changes or revisions to the RA work, and issues or problems. The Field Representative will log the issues, problems, or questions and the resolutions arising at the progress meeting. Any matter requiring action which is raised in the progress meeting will be reported to the appropriate entities.

3.1.3 Problems or Work Deficiency Meetings

A special meeting will be held when and if a problem or deficiency is present or likely to occur. The meeting will be attended by the Field Representative/Construction Manager, the CQA Site Manager, the RA Contractor, and potentially other Project Team members. If the problem requires a design modification, the Design Engineer will also be present. The purpose of the meeting is to define and resolve the problem or work deficiency as follows:

- Define and discuss the problem or deficiency;
- Review alternative solutions; and
- Implement an action plan to resolve the problem or deficiency.

The meeting will be documented by the Field Representative. A summary of meeting minutes will be provided to the meeting attendees.

3.1.4 Substantial Completion Meeting

A Substantial Completion Meeting will be held at the Site when RA construction is substantially complete. The meeting will be attended by the Field Representative/Construction Manager, the CQA Site Manager, RA Contractor, and potentially other Project Team members. The meeting will be used to discuss the status of RA construction, any outstanding items, plans for completing RA construction, and demobilization. The meeting will be documented by the Field Representative. A summary of meeting minutes will be provided to the meeting attendees.

3.2 Inspections

Inspections will be performed by the CQA personnel associated with the CQA Firm to document the quality of RA implementation and verify that the work is completed in accordance with RD documents.

3.2.1 Pre-Construction Inspection

A pre-construction inspection shall be performed by the CQA Site Manager, Field Representative/Construction Manager, and the RA Contractor to document the existing conditions at the Site. The inspection shall note and thoroughly document the condition of site cover materials, buildings, utilities, vegetation, and any other site conditions that could be affected by RA implementation. The results of the inspection will be documented by the CQA Site Manager in an inspection report, which will be reviewed by the Field Representative/Construction Manager. The inspection report will be provided to the inspection attendees and Project Owner.

3.2.2 Construction Monitoring

The CQA Site Manager will perform daily on-site inspection and documentation of RA construction activities, including site preparation, installation and status of temporary facilities and controls, RA implementation, waste management, and restoration.

As discussed in Section 2.1, the CQA Site Manager and CQA personnel shall:

- Maintain written records of field activities, including daily logs of the work performed and photographs of the work in progress.
- Collect appropriate documentation from the Contractor for inclusion in the FER. Documentation generated by the Contractor includes, but is not limited to, daily contractor field notes, analytical results of sampling activities conducted by the Contractor (e.g., waste characterization data), and other documentation required by the RD to be submitted by the Contractor.
- Obtain digital photographs of the ongoing project activities taken at key times and locations during the work. Digital photographs will be maintained in the project files.
- Observe the Contractor's performance to determine if the remedial activities are being conducted in conformance with the requirements of the Contract Documents.
- Provide notification to the Field Representative/Construction Manager if deviations or modifications from the Design Documents are identified.
- Confirm the necessity for additional work (as identified by the Contractor) to the Field Representative/Construction Manager and evaluate whether the Contractor has performed additional work consistent with the requirements of the Design Documents.
- Perform visual observations of environmental and Site control systems installed by the Contractor (e.g., erosion and sedimentation controls, decontamination areas, materials and equipment staging areas, access roads, noise and dust controls) and document these observations in the daily logs.
- Monitor the Contractor's development of as-built drawings documenting the construction activities, including documentation of in-field modifications.

3.2.3 Post-Restoration Inspection

A post-restoration inspection (walk-through) will be conducted by the CQA Site Manager to observe and document post-remediation conditions following Site restoration and the Contractor's demobilization from the site. The inspection will be used to verify the completeness of the RA. Following the Site walkover, the CQA Site Manager will prepare and distribute an inspection report summarizing the walkover.

The results shall be provided to the RA Contractor and the Field Representative, in order to develop a plan and schedule for completing outstanding work items. Following completion of outstanding items, a follow-up inspection may be required to verify completion of outstanding work items. If a follow-up inspection is performed the results shall be documented in an addendum to the post-restoration inspection report.

3.3 Documentation

CQA documentation during RA construction includes the following:

- Meeting Minutes from project meetings identified in Section 3.1.
- Inspection Reports from inspections identified in Section 3.2.
- Daily Field Reports from daily construction monitoring identified in Section 3.2.
- Test reports and documentation provided by the RA Contractor.
- Monthly Progress Reports for submittal to NYSDEC.
- Final Engineering Report (FER) for submittal to NYSDEC.

CQA documentation is discussed in greater detail in Section 5 of this CQAPP.

Section 4
Remedial Action CQA

This section of the CQAPP addresses the components of the site-wide RA and outlines the CQA procedures to be used by the CQA personnel for verifying the implementation of those RA components, including materials testing, field testing, field inspections, and correction of deficiencies. As discussed in Section 1, this CQAPP does not address CQC procedures, installation specifications, or selection of materials or other components, since the CQC is addressed by the Drawings and Specifications and the implementation is the responsibility of the selected RA Contractor.

As discussed in Section 1, this CQAPP does not address quality assurance requirements associated with sampling, analysis, and data quality of environmental samples. The "Generic Quality Assurance Project Plan for Site Investigations at Non-Owned Former MGP Sites" (QAPP) (Foster Wheeler, November 2002), which has served as the QAPP for investigation activities at the Site, will also serve as the QAPP for sampling and analysis performed during RA activities. The QAPP is included as Appendix A to this CQAPP.

4.1 Construction Materials CQA

This section identifies the CQA procedures for the primary materials to be used or incorporated into the construction activities. For materials not specifically addressed by this section, it shall be confirmed prior to importing the material to the Site and incorporating the material into the work that the material(s) conforms to the requirements identified in the Drawings and Specifications.

Refer to other subsections within this Section for the CQA requirements for placement of these materials.

4.1.1 Imported Fill Materials CQA

Imported fill materials identified for this project include:

- Common Fill
- Gravel Fill
- Crushed Stone Aggregate

The CQA Firm shall confirm that the RA Contractor has provided the QC documentation for soil and aggregate materials as required in the Specifications. This includes required documentation on soil and aggregate suppliers, soil and aggregate quality, and geotechnical properties. Soil and aggregate imported to the Site shall meet the requirements set forth in 6 NYCRR 375-6.7(d), DER-10 Section 5.4(e), and the Specifications.

Prior to importing soil or aggregate from a particular source, the CQA personnel responsibilities include the following:

- Review and retain RA Contractor's submittals pertaining to soil or aggregate materials and check for conformance to the Specifications, including requirements for material quality, gradation, and other properties.
- Request additional testing, as needed, to document conformance with the Specifications.

- Once the RA Contractor has provided the required information to support the use of soil or aggregate material from a particular source, coordinate with Project Owner to transmit the required information to the NYSDEC Project Manager for approval of the source of the material before it is used on the site.
- If a Beneficial Use Determination (BUD) has been issued by the NYSDEC for the re-use of earthwork materials imported from off-site (e.g., thermally treated soil), then confirm that sampling, testing, approvals, and placement of the material shall also comply with the BUD.
- After receiving approval of the source from the NYSDEC, provide a written response to the RA Contractor indicating approval of the material for use on the Site. This response shall also identify on-going testing requirements to support continued use of material from the source (i.e., analyses, sample frequency). **No fill materials shall be imported to the Site until NYSDEC approval is obtained for the source and the Contractor is authorized in writing by the CQA personnel.**

During soil/aggregate importing, the CQA personnel responsibilities include the following:

- Obtain, review, and retain copies of Bills of Lading to document that the material delivered was from an approved source and to document the imported quantity of imported material.
- Visually inspect soil and aggregate material being imported to the Site.
- Check that source material testing is being conducted at the frequency required by the Specifications and as required by the NYSDEC.
- Review and retain RA Contractor's submittals pertaining to the imported soil/aggregate, including the results of additional testing required to support on-going importing and use of soil/aggregate from a particular source.

4.1.2 Material Re-Use CQA

During the excavation activities, excavated soil will be field screened (visual, olfactory, and PID screening) and, based on the results from field screening by National Grid's on-site CQA personnel in consultation with NYSDEC, the soil shall be segregated for off-site treatment/disposal (herein referred to as Category 1 Soil), further testing (herein referred to as Category 2 Soil), or on-site re-use (herein referred to as Category 3 Soil). Refer to Section 4.7.1 for field screening of excavated soil.

Prior to re-use of excavated soil, the CQA personnel responsibilities include the following:

- Confirm that the RA Contractor has properly segregated the excavated soil and collected composite samples at the minimum frequency identified above and in the Specifications.
- Document correspondence with NYSDEC personnel regarding observed soil quality and categorization of soil.
- Review and retain copies of analytical testing on Category 2 Soil;
- Based on results from analytical testing, coordinate with the Field Representative , CQA Firm, Project Owner, and RA Contractor on the subsequent management of Category 2 soil (i.e., re-use or off-site treatment/disposal);
- Request additional testing, as needed, to document conformance with the Specifications.
- **No soil materials shall be re-used at the Site until the Contractor is authorized in writing by the CQA personnel.**

During activities that involve soil re-use, the CQA personnel responsibilities include the following:

- Document that the material re-used is taken from a stockpile authorized for re-use.
- Document the weight of material re-used (as measured by an on-site truck scale).
- Visually inspect soil material being re-used at the Site.

- Check that material testing is being conducted at the frequency required by the Specifications and as required by the NYSDEC.
- Review and retain RA Contractor's submittals pertaining to the re-use of soil, including the results of analytical testing.

4.1.3 Asphalt Pavement Materials CQA

Asphalt pavement materials identified for use on this project may include:

- Subbase Material
- Hot Mix Asphalt (HMA) Base Course
- HMA Binder Course
- HMA Top Course

The CQA Firm shall confirm that the RA Contractor has provided the QC documentation for asphalt pavement materials as required in the Specifications. This includes required documentation on material suppliers, gradation, and certifications of conformance to NYSDOT specifications.

Prior to importing asphalt pavement materials from a particular source, the CQA personnel responsibilities include the following:

- Review and retain RA Contractor's submittals pertaining to asphalt materials and check for conformance to the Specifications, including requirements for material quality, gradation, and other properties.
- Request additional testing, as needed, to document conformance with the Specifications.
- Once the RA Contractor has provided the required information to support the use of asphalt pavement materials, provide a written response to the RA Contractor indicating approval or rejection of the asphalt materials. **No asphalt materials shall be used at the Site until the Contractor is authorized in writing by the CQA personnel.**

During asphalt paving activities, the CQA personnel responsibilities include the following:

- Obtain, review, and retain copies of any Bills of Lading to document that the material delivered was from the approved source and to document the imported quantity of materials.
- Visually inspect asphalt materials being imported to the Site.
- Review and retain RA Contractor's submittals pertaining to the asphalt materials.

4.1.4 Geosynthetics Materials CQA

Geosynthetics materials identified for use on this project may include:

- Non-woven geotextile as a separation layer between a surface cap and compacted subgrade.
- Non-woven geotextile beneath compacted asphalt pavement subbase.
- Non-woven geotextile and membrane liner incorporated into baseliner of the Waste Staging Area and decontamination pad.

The CQA Firm shall confirm that the RA Contractor has provided the QC documentation for geosynthetics materials as required in the Specifications. This includes required documentation on material suppliers, material properties, and any certifications/warranties from the suppliers.

Prior to importing geosynthetics materials to the Site, the CQA personnel responsibilities include the following:

- Review and retain RA Contractor's submittals pertaining to geosynthetics and check for conformance to the Specifications, including requirements for material type, thickness, and other properties.

- Request additional testing, as needed, to document conformance with the Specifications.
- Once the RA Contractor has provided the required information to support the use of geosynthetics, provide a written response to the RA Contractor indicating approval or rejection of the geosynthetics. **No geosynthetics shall be used at the Site until the Contractor is authorized in writing by the CQA personnel.**

While geosynthetics materials are being imported to the Site, the CQA personnel responsibilities include the following:

- Obtain, review, and retain copies of any shipping records to document that the material delivered was from the approved supplier and to document the imported quantity of materials.
- Visually inspect geosynthetics being imported to the Site.
- Review and retain RA Contractor's submittals pertaining to the geosynthetics.
- Confirm that the RA Contractor is storing the materials per the manufacturer's recommendations.
- Confirm that each roll/sheet is marked or tagged to identify the Manufacturer's name, product identification, lot or batch number, roll/sheet number, roll/sheet weight, and roll/sheet dimensions.

4.2 Site Preparation CQA

Site preparation includes pre-mobilization activities and activities performed after mobilization but prior to RA implementation. Site preparation activities may be performed concurrently with other components of the RA implementation as the remediation progresses from one area to the next.

During Site Preparation activities, the CQA personnel responsibilities include the following:

- Perform and document the results of the pre-construction inspection;
- Document that utility markout activities have been completed;
- Document that pre-remediation surveying has been completed to stake out remediation areas and temporary facilities;
- Document the installation of temporary facilities (refer to Section 4.3).
- Document the installation and deployment of temporary controls (refer to Section 4.4).
- Document work zone delineation has been completed.
- Document the abandonment/protection of monitoring wells in accordance with Drawings and Specifications.

4.3 Temporary Facilities CQA

Temporary facilities implemented during Site preparation and shall include office trailers, temporary utilities, equipment staging areas, material staging areas, decontamination areas and pads, waste staging areas, and temporary access road(s).

Potential locations for temporary facilities are shown on the Drawings and are subject to change. The final location of temporary facilities shall be in an area approved by the Project Owner.

4.3.1 Office Trailer

The field office shall be furnished and installed by the RA Contractor and shall meet the requirements identified in the Specifications.

CQA personnel responsibilities include the following:

- Document that the office trailer conforms to the requirements outlined in the Specifications;
- Document the size and location of the office trailer and amenities; and
- Document any related issues/resolutions.

4.3.2 Temporary Utilities

The RA Contractor shall be responsible for providing temporary utilities at the Site to facilitate RA construction and service temporary facilities in accordance with the Specifications.

CQA personnel responsibilities include the following:

- Document that temporary utility installation conforms to the requirements outlined in Specifications;
- Document the type and location of temporary utilities; and
- Document any related issues/resolutions.

4.3.3 Equipment and Material Staging Areas

Equipment staging areas shall be established by the RA Contractor at locations approved by the Project Owner. Equipment staging areas shall be located so as to facilitate equipment ingress and egress, allow for proper sequencing of the RA work, and minimize the impact to on-site traffic and operations. Construction equipment shall be mobilized on an as-needed basis.

Material staging areas refers to staging areas for materials to be incorporated in the RA work. Materials staging does not include waste staging. Material staging areas shall be established by the RA Contractor at locations approved by the Project Owner. Material staging areas shall be located so as to facilitate equipment ingress and egress, allow for proper sequencing of the RA work, and minimize the impact to on-site traffic and operations. The material staging areas shall be physically segregated from waste material staging to prevent cross-contamination or commingling of materials.

CQA personnel responsibilities include the following:

- Document that equipment and material staging areas are established in the approved locations;
- Document the location and dimensions of staging areas; and
- Document any related issues/resolutions.

4.3.4 Decontamination Pad

Decontamination pad(s) shall be constructed by the RA Contractor as part of the Site preparation activities at location(s) approved by the Project Owner. The purpose of the pad(s) will be to provide a location to remove dirt, debris and any other potentially contaminated material from vehicles or equipment prior to departure from the work zones.

CQA personnel responsibilities include the following:

- Document Decontamination Pad construction conforms to the requirements outlined in the Drawings, Specifications, and project-specific Health and Safety Plans.
- Document the location, dimensions, and construction details of the Decontamination Pad;
- Document decontamination activities and associated waste management; and
- Document any related issues/resolutions.

4.3.5 Waste Staging Area

The Waste Staging Area shall be constructed by the RA Contractor as part of the Site preparation activities at a location approved by the Project Owner. The purpose of the waste staging area is to provide a location for handling, screening, segregating, stockpiling, and conditioning potentially impacted media generated during the RA activities, including soil, debris, pipes, and liquids. The Waste Staging Area shall be located so as to facilitate equipment ingress and egress, allow for proper sequencing of the RA work, minimize the impact to on-site traffic and operations, and minimize the potential for off-site impacts. The Waste Staging Area shall include a staging pad or multiple pads (e.g., for soil and debris staging), staging area for tanks (e.g., for liquid storage), and a staging area for drums. The Waste Staging Area construction shall meet the requirements identified in the Drawings and Specifications.

CQA personnel responsibilities include the following:

- Document that Waste Staging Area construction conforms to the requirements outlined in the Drawings and Specifications.
- Document the location, dimensions, and construction details of the Waste Staging Areas;
- Inspect and document subgrade conditions before geosynthetics installation. Report any issues to the Field Representative/Construction Manager and RA Contractor;
- Inspect geosynthetics materials for damages. Report any damages or flaws to the Field Representative/Construction Manager and RA Contractor;
- Document that geosynthetics are handled in accordance with Manufacturer requirements and the Specifications;
- Record geosynthetics roll/batch identifier and the location of placement;
- Inspect and document geosynthetics seaming activities;
- Observe and document geosynthetics testing activities and review and retain geosynthetics testing reports. Report non-conformance to the Field Representative/Construction Manager and RA Contractor;
- Request re-testing if result do not comply with Specifications;
- Document waste staging procedures; and
- Document any related issues/resolutions.

4.4 Temporary Controls CQA

Temporary controls shall be implemented during Site preparation and during RA activities. Temporary controls, which are discussed in the following subsections, include stormwater management, erosion and sediment controls, dust, odor, and vapor controls, and site security.

4.4.1 Stormwater Management and Erosion and Sediment Controls

Stormwater management and Erosion and Sediment Control (ESC) during RA implementation shall be performed in accordance with the SWPPP. A prominent component of the SWPPP is the Erosion and Sediment Control (ESC) Plan, which includes provisions for ESC during construction activities.

Prior to commencement of land disturbance and demolition activities, temporary erosion and sediment control (ESC) measures shall be installed. The elements of the proposed ESC measures shall be designed and installed in accordance with the New York State Standards and Specifications for Erosion and Sediment Control (NYSSSESC).

ESC measures shall be employed utilizing Best Management Practices (BMPs) including silt fencing, hay bale dikes, storm drain inlet protection, stabilized construction entrances/exits and dust control measures. The ESC measures shall be installed as indicated in the Drawings, Specifications, and approved SWPPP.

CQA personnel responsibilities include the following:

- Document stormwater control and ESC measures procedures conform to the requirements outlined the Drawings, Specifications, and the SWPPP;
- Document the type, location, and construction details of ESC measures;
- Document the results of inspection activities; and
- Document any related issues/resolutions.

4.4.2 Dust, Odor, and Vapor Monitoring and Controls

Air monitoring shall be performed during the implementation of the remedial actions to protect the health and safety of Site workers (work-zone air monitoring) and to confirm that air impacts from site-related activities are not migrating off-site (perimeter air monitoring). The monitoring program shall include monitoring for vapors, odors, and dust. Air monitoring shall be performed in accordance with Health and Safety Plans (HASPs) (i.e., work zone air monitoring), the Community Air Monitoring Plan (CAMP), and the Dust and Odor Control Plan.

Air emission controls shall be implemented pro-actively and in response to the results from air monitoring. The requirements for dust, odor, and vapor control are addressed in the Specifications.

CQA personnel responsibilities include the following:

- Document that dust, odor, and vapor monitoring and controls conform to the requirements outlined the Specifications, CAMP, OCP, and site-specific HASPs;
- Obtain and retain copies of Daily Air Monitoring Reports associated with CAMP implementation and air monitoring data provided by the RA Contractor;
- Document the air monitoring activities;
- Document the use of control measures;
- Document exceedances of action levels and associated response actions; and
- Document any related issues/resolutions.

4.4.3 Site Security

Site security shall be required at the Site 24 hours per day and seven days per week. Site security shall be the responsibility of the RA Contractor and may be performed by the RA Contractor's personnel or a subcontracted security company.

Site workers, subcontractors and visitors shall be required to sign a daily log. A list of persons authorized for Site entry shall be maintained at the Site entrance.

The RA Contractor shall also install temporary chain link fencing with gates and locks to secure the active working areas, material staging areas, waste staging areas, and decontamination pads.

CQA personnel responsibilities include the following:

- Document that Site security measures conform to the requirements outlined the Specifications.
- Document the site security measures employed, including the location of fencing; and
- Document any related issues/resolutions.

4.5 Utility Protection and Perimeter Utility Cut and Cap CQA

Utilities (overhead and underground utilities) within the work area or affected by the work shall be identified and protected, temporarily isolated, relocated, or abandon, as appropriate, prior to and/or during RA implementation in accordance with the Drawings and Specifications. All work performed on utilities shall be in accordance with applicable requirements from utility purveyors.

Soil generated from utility protection/re-routing activities shall be managed in accordance with the Specification.

CQA personnel responsibilities include the following:

- Document that utility protection and cut and cap measures conform to the requirements outlined the Drawings and Specifications;
- Document the utility protection and cut and cap measures employed and location of utility protection and cut and cap work;
- Document correspondence with utility purveyors;
- Document waste management of materials generated during utility protection and cut and cap work (refer to Section 4.12); and
- Document any related issues/resolutions.

4.6 Structure Demolition CQA

Subsurface structures or foundations that are located within the remediation areas shall be inspected and demolished, if necessary, in accordance with the Drawings and Specifications. The demolition of structures shall be sequenced with remediation activities to reduce the area of bare soil that is exposed. If present, fill or waste materials shall be removed from structures and pipes entering the structures shall be drained. CQA personnel shall visually inspect structures to confirm that waste materials have been removed to the extent practical.

Waste materials shall be managed in accordance with the Specifications. Following inspection, the foundations and structures shall then be demolished, as necessary, to facilitate their removal from the subsurface.

CQA personnel responsibilities include the following:

- Document that structure demolition conforms to the requirements outlined in the Drawings, Specifications , and approved Contractor Construction Management Plan;
- Document the location, materials of construction, and dimensions of structures;
- Document the presence of contents within the structure and the nature of structure contents;
- Estimate and document the quantity of waste materials;
- Coordinate with the RA Contractor, CQA Firm, Project Owner, and the treatment/disposal facility on the waste characterization requirements;
- Document the collection of waste characterization samples (refer to Section 4.12);
- Visually inspect structures to confirm that waste materials have been removed to the extent practical and document the inspection results;
- Document the demolition activities;
- Inspect the demolition debris to determine subsequent management (refer to Section 4.6.1);
- Estimate and document the quantity of demolition debris; and
- Document any related issues/resolutions.

4.6.1 Field Screening of Masonry/Concrete Debris

Masonry/concrete debris resulting from demolition of surface and subsurface structures and foundations shall be field screened for visual indications of NAPL and, based on the results from field screening by CQA personnel in consultation with NYSDEC, the debris shall be segregated into two main categories:

- **Category 1 Debris: Debris containing visible tar or NAPL** - debris in Category 1 shall be stockpiled separately for off-site disposal. The debris shall be crushed to manageable size (and to meet the disposal facility acceptance criteria), characterized, and transported off-site for disposal.
- **Category 2 Debris: Debris containing no visible tar or NAPL** – debris in Category 2 shall be stockpiled for subsequent on-site crushing (to six-inch minus size) and re-use as backfill material within the excavation areas and below the two-foot bgs elevation (i.e., to allow for a minimum of two feet of imported fill material at the surface).

CQA personnel responsibilities include the following:

- Coordinate with DEC personnel on the categorization of debris;
- Coordinate with RA Contractor on the segregation, staging, and conditioning of debris;
- Perform the CQA requirements identified in Section 4.12 for the off-site treatment/disposal of debris;
- Document any related issues/resolutions.

4.7 Excavation CQA

The horizontal and vertical limits of the proposed excavation are depicted on the Drawings. The shoring and stabilization requirements are also shown on the Drawings and addressed by the Specifications.

Excavation shall be completed to remove soil to the horizontal and vertical limits indicated on the Drawings). Sequencing of the excavation and backfill may be conducted to limit dewatering volumes, limit excavation shoring requirements, reduce surface water run-on, reduce vapors/odors, and to provide sufficient area for materials staging and soil handling during the excavating, segregating, stockpiling, loading and backfill activities. The excavation limits may be expanded during RA based on field observations and in consultation with the DEC. However, the additional excavation shall not extend beneath existing buildings that shall remain in place. Applicable field observations that would provide a basis for laterally or vertically extending the excavation in MGP-impacted areas include the following:

- Soil partially to fully saturated with NAPL
- NAPL extensively (or continuously) coating soil materials
- NAPL flowing into excavations

Conversely, soils that shall not be subject to excavation as a result of the following observations (in the absence of any of the observations listed above) include the following:

- Hardened or brittle tar
- Sporadic intervals of NAPL-coated soil grains
- Sporadic blebs, droplets, or small lenses of NAPL
- Stained soils
- Sheen on water in excavation

CQA personnel responsibilities include the following:

- Document the completion of Site preparation activities, including utility markout, temporary facilities installation, temporary controls installation, monitoring well decommissioning, and pre-excavation surveying.

- Document clearing and grubbing and surface demolition activities.
- Document that excavation activities conforms to the requirements outlined in the Drawings, Specifications, and approved Contractor Construction Management Plan;
- Document the excavation sidewall stabilization methods (sloping and shoring) and installation. Document that excavation stabilization methods conform with the requirements outlined in the Drawings and the Specifications;
- Document that excavation dewatering is conducted in accordance with the Drawings and Specifications. Refer to Section 4.9 for dewatering CQA requirements.
- Document the presence of structures or pipes and mitigation of such features;
- Field screen the excavated soil to determine subsequent management of excavated materials (refer to Section 4.7.1);
- Document that saturated soils are staged adjacent to the excavation area and allowed to drain by gravity back into the excavation until the soil is suitable for handling;
- Determine the extent of the excavation based on field observations and in consultation with the CQA Firm, Project Owner, and DEC;
- Document the completion of progress and final surveying to document excavation limits;
- Estimate and document the quantity of excavated materials;
- Coordinate with the RA Contractor, Construction Manager, CQA Firm, Project Owner, and the treatment/disposal facility on the waste characterization requirements;
- Document the collection of waste characterization samples (refer to Section 4.12); and
- Document any related issues/resolutions.

4.7.1 Field Screening of Excavated Soil

During the excavation activities, excavated soil shall be field screened (visual, olfactory, and PID screening) and, based on the results from field screening by on-site CQA personnel in consultation with NYSDEC, the soil shall be segregated into three main categories:

- **Category 1 Soil: Soil containing visible tar or NAPL** - soil in Category 1 shall be stockpiled for subsequent waste characterization and off-site treatment/disposal.
- **Category 2 Soil: Soil without visible tar or NAPL that exhibits odor or elevated PID readings** – soil in Category 2 shall be stockpiled and composite samples shall be collected and analyzed for total PAHs, reactive cyanide and reactive sulfide. If one or more of these analytes meet the MGP source material criteria as described in Section 1.3.1 of the RDR, then the soil shall be segregated for off-site treatment/disposal and may be combined with Category 1 soil. If each of the analytes does not meet MGP source material criteria, then the soil may be combined with Category 3 soil for re-use as backfill within the excavation area and below the two-foot bgs elevation (i.e., to allow for a minimum of two feet of imported clean fill material at the surface).
- **Category 3 Soil: Soil without visible tar or NAPL, odor, or elevated PID readings** – soil in Category 3 shall be stockpiled for subsequent re-use as backfill within the excavation area and below the two foot bgs elevation (i.e., to allow for a minimum of two feet of imported fill material at the surface).

As indicated above, soil from Category 3 will be eligible for re-use and soil from Category 2 will be eligible for re-use only after sampling and analytical testing indicates that the soil does not meet MGP source material criteria. Sampling Category 2 soil to determine its eligibility for re-use shall consist of one composite soil sample per approximately 500 cubic yards (i.e., composite discrete grab samples collected from 3 to 5 locations biased toward areas with the relatively higher degree of impacts for impacts based on field screening).

CQA personnel responsibilities include the following:

- Coordinate with DEC personnel on the categorization of excavated soil;
- Coordinate with RA Contractor on the segregation, staging, and conditioning of excavated material;
- Estimate and document the quantity of soil in each category;
- Perform the material CQA requirements identified in Section 4.1.2.1 for re-use of excavated soil;
- Perform the CQA requirements identified in Section 4.12 for the off-site disposal of excavated soil;
- Document any related issues/resolutions.

4.8 ISS CQA

ISS of impacted soil will include all areas of MGP-related source material and associated soil, with the deepest targeted treatment depth being 23 feet below grade (bgs). The limits of ISS are shown on the Design Drawings. The soil will be mixed in place with portland cement and/or other materials to form an low permeability, solid mass to prevent migration of MGP-related contaminants. The area to be solidified will extend laterally beyond the limits of contamination to encapsulate the impacts. The method of ISS will be determined during the remedial design. The Contractor will be responsible for verifying that the prepared grout mixture and the injected grout volume are as specified in the design.

CQA personnel responsibilities include the following:

- Document that the horizontal and vertical limits of ISS treatment are as specified in the design;
- Document that the proper amount of grout constituents is added to each column;
- Document that the proper number of mixing passes are made on each column;
- Document that each column is a homogeneous mixture of soil and grout;
- Document that sufficient overlap exists between adjacent columns so that the entire area is solidified and no soil is left untreated.
- Document that the solidified soil meets the performance criteria stipulated in the Specifications.

4.8.1 ISS Reagents

The reagents will be tested by the supplier prior to each delivery for pilot studies and full scale treatment and meet the following specifications:

- ASTM C150 – Standard Specification for Portland Cement;
- API 13-A – Specification for bentonite.

Proof of material conformance shall be maintained by the CQA Site Manager.

Compliance with the approved grout mixture will be confirmed by measuring and recording the amount of cement, bentonite, additive(s), and water used for each batch of grout. Specific gravity of the grout will be measured by the batch plant operator every third batch of mixed grout using a mud balance

4.8.2 Collection of Depth-representative Samples

The Contractor will collect depth-representative samples from an average of one out of every ten columns, with a minimum of one set of depth-representative samples per day. The columns to be sampled will be identified immediately after mixing of the selected column has been completed. Sample columns will be selected and distributed in a manner to achieve representative coverage across the site as practicable. Sampling of the treated soil should occur as soon after the column is mixed as possible, and in no case longer than one hour after mixing.

After mixing the column and reagents as required by the Specifications, the Contractor will use an in-situ sampler to obtain depth-discrete samples of the soil-cement mixture from the selected column. One in-situ sample per 5 feet of depth will be collected. Additional samples may be collected at the discretion of the CQA Site Manager dependent on total depth of column and recovery of the sampling tool.

Following collection, each depth-discrete sample will be removed from the sampler and placed in its own 5-10 gallon bucket to confirm column depths.

4.8.3 Verification of Homogeneity

The CQA Site Manager will evaluate and document the color, homogeneity, and pH of each depth-discrete sample and verify the absence of free product in each sample. The results of these evaluations will be recorded. The procedures for evaluating these criteria are explained below.

- **Homogeneity:** The treated material will first be visually inspected for overall mixing. The material should be thoroughly mixed into a homogeneous mass and be free from large lumps (greater than 3 inches) or pockets of fines, sand or gravel. Occasional lumps of up to 3 inches in their largest dimension will be permitted. The dimensions, properties, and amounts of clods/lumps will be recorded on the ERS form. Insufficiently homogeneous mixtures will be rejected, and the column will be remixed and re-sampled.
- **Absence of Free Product:** The treated material will be inspected to ensure that no free product is present within it. If free product is visibly present the column will be remixed and re-sampled.
- **pH:** The pH of the treated material from each depth interval will be measured using short (6-9 and 9-12) range pH strips. Samples with a pH less than 10.5 standard units (S.U.) will be considered not adequately mixed. If the pH is below 10.5 S.U., then the grout quantity will be checked, the column remixed (with added grout, if needed), and re-sampled.
- **Color:** Once the column's set of depth-discrete samples has passed for homogeneity, absence of free product, and pH, an aliquot of each sample will be spread to a uniform thickness of between 0.125 to 0.25 inches on a light-colored background and compared to a standard Munsell color chart. The color values for each sample from each depth interval will be recorded. One photograph will be made of the color smears, and another photograph will be made of the buckets of depth-discrete samples (to document the homogeneity of the samples). Column ID, date, sample interval, and pH of each sample interval will be recorded on a card within the view of each photograph.

The samples from each representative depth will be comparable as far as these characteristics are concerned. The CQA Site Manager will perform these evaluations; photograph the samples, and document conformance or failures. A value for each criterion at different depths will be compared with the pre-defined criteria mentioned above. A grade of Pass or Fail shall be given to each sample inspected and recorded on the form. Should the materials from any depth fail one or more of these criteria, the column will be considered not adequately mixed, and the Contractor will be instructed to reprocess it. Reprocessing will be completed within one working day of sample rejection. Following re-mixing of the column, another set of depth-representative samples will be collected from the remixed column and subjected to the visual inspection described above.

4.8.4 Preparation of Composite Samples

Once samples from a column have passed the evaluation detailed in Section 4.8.3, they will be considered uniformly mixed. The Contractor will then prepare a single composite sample made up of equal quantities of mixed soil from each depth to generate a single sample representative of all depths of the sampled column. The samples will be composited in a 5-gallon bucket for performance criteria testing. The soil will be manually mixed just enough to combine the samples into a single composite.

Samples will be molded into a set of plastic cylinders by the CQA Site Manager immediately after visual evaluation. Prior to placement into the cylinders the CQA Site Manager will pass the soil-cement mix through a No. 4 (0.187 inch) sieve. Once sized, the soil-cement mix shall be added with a trowel or similar into the soil-cement cylinders in 2-inch lifts. Following placement of each lift a ¼-inch tamper rod shall be used to remove air pockets from the soil grout mix. If mix is fluid enough to be poured into the molds, it may be placed in greater than 2-inch lifts, and the entire cylinder should be gently tapped on a hard flat surface to remove entrained air from the cylinder.

At least 8 molded specimens will be made from the composite sample: one (1) 3 "x 6" cylinder for penetrometer testing, four (4) 3" x 6" cylinders for UCS testing and three (3) 2"x4" cylinders for permeability testing. This number of cylinders will ensure that a minimum of one set of archive samples will be available as backup in case any laboratory sample set is lost, damaged, or needs to be re-tested. Once cylinders have been molded they will be placed into a humid, environment and held at room temperature for a minimum of 2 days for accelerated curing samples and 7 days for all other samples.

4.8.5 Selection of Samples for Geotechnical Confirmation Testing

Samples of treated material will be selected by the CQA Site Manager for laboratory confirmation testing by those methods listed in Table 4-1 to evaluate the effectiveness of solidification. The sample testing frequency is stated in the Specifications. For better sample handling, the test specimens will be shipped once they have attained a compressive strength of 20 psi, as measured using a pocket penetrometer. Regardless of when sufficient strength is achieved for sample shipment, the cylinder molded for pocket penetrometer testing will continue to be tested by the CQA Site Manager after approximately 4, 7, 14, and 28 days of curing and the results will be recorded.

After 2 days, or when sufficient strength for shipment has been achieved, 2 cylinders for UCS testing (ASTM D 2216) will be shipped to the laboratory for 7 days of accelerated curing (modified ASTM C 684). All other cylinders will remain in the water bath where space will allow. Overflow archive cylinders may alternatively be stored on-site in humid, sealed plastic bags. The temperature in the storage location will be regulated to between 60 and 80 degrees Fahrenheit.

The cylinders submitted for UCS testing will be analyzed (including for the presence/absence of free liquids along the fracture plane). If passing lab results are received for the UCS tests, then two cylinders (one to test, one lab archive) for permeability testing will be shipped to the laboratory. Analytical methods and parameters for permeability testing are listed in Table 4-1.

If a sample fails any of the geotechnical confirmation criteria (listed in the Specifications), the deficiency will be recorded and the following steps will be taken to remedy the problem:

1. CQA Site Manager shall notify Contractor of the laboratory geotechnical results.
2. Duplicate cylinders from the failed sample set, as well as sample sets from columns nearby (either in location or time completed) to where the failed sample was collected will be analyzed. Samples will be submitted at the sole discretion of the CQA Site Manager.
3. If the duplicate cylinder(s) meet(s) the confirmation criteria, it will be assumed that molding, storage, curing or transport damaged the failed cylinder and that no remixing is required.
4. If the duplicate cylinder(s) or cylinders from nearby columns fail the confirmation testing, then remixing, with additional grout, is required for any columns deemed by the CQA Site Manager to be Non-Conforming work.

4.9 Dewatering and On-Site Water Treatment CQA

Dewatering is anticipated to be required in all of the excavation areas due to the elevation of ground water within the overburden soils and the need to excavate to bedrock. The flow rate and volume of water generated from dewatering would depend on many factors including antecedent conditions, weather conditions, excavation means and methods (including sequencing and sidewall stabilization), and dewatering methods. Water generated from dewatering shall be treated on-site using a temporary treatment system and discharged to surface water under a SPDES permit equivalent. The temporary treatment system shall also treat other water streams generated during RA construction, including water collected from Waste Staging Areas and decontamination water.

CQA personnel responsibilities include the following:

- Document that dewatering and on-site treatment is performed in accordance with the requirements outlined in the Drawings, Specifications, approved Contractor Construction Management Plan, and applicable permits or permit equivalents;
- Document the installation, location, and configuration of dewatering system and water treatment system components;
- Document the installation of stormwater diversions;
- Inspect and document that dewatering is achieving drawdown to the bottom of the excavation;
- Document the operation, maintenance, and monitoring of the dewatering system;
- Review Daily Dewatering Field Reports prepared by the RA Contractor;
- Document system start-up activities;
- Document the collection of compliance samples in accordance with discharge permits/permit equivalents; and
- Document any related issues/resolutions.

4.10 Backfilling and Fill Placement CQA

Backfilling of excavation areas and placement of fill materials (including the environmental cap) shall be performed using either imported materials or materials generated from on-site that are approved for use as backfill. Refer to Section 4.1 for fill materials and the associated CQA requirements.

During fill placement, CQA personnel responsibilities include the following:

- Document that backfilling and fill placement is performed in accordance with the requirements outlined in the Drawings, Specifications, and approved Contractor Construction Management Plan;
- Execute the CQA requirements identified in Section 4.1 during the use of fill materials to confirm and document that material quality is maintained;
- Inspect excavation areas prior to backfill to confirm and document that conditions are suitable for fill placement per the Specifications.
- Document the placement and compaction of fill materials. Document the lift height and confirm compliance with Specifications. Document material compaction (compaction method, equipment, and number of passes) and compaction testing and confirm compliance with Specifications;
- Document the that the material and placement of geotextile material is in accordance with drawings and Specifications;
  - Inspect and document subgrade conditions before geosynthetics installation. Report any issues to the Field Representative/Construction Manager and RA Contractor;

  - Inspect geosynthetic materials for damage. Report any damage or flaws to the Field Representative/Construction Manager and RA Contractor;
  - Document that geosynthetics are handled in accordance with Manufacturer requirements and the Specifications;
  - Record geosynthetics roll/batch identifier and the location of placement;
  - Inspect and document geosynthetics seaming activities;
  - Observe and document geosynthetics testing activities and review and retain geosynthetics testing reports. Report non-conformance to the Field Representative/Construction Manager and RA Contractor;
  - Request re-testing if results do not comply with Specifications;
- Document the sequencing of backfilling activities;
- Document the quantity of fill materials placed;
- Document any related issues/resolutions.

4.11 Asphalt Pavement Placement CQA

Asphalt pavement shall be installed at the locations indicated on the Drawings. During asphalt paving activities, CQA personnel responsibilities include the following:

- Document that asphalt paving is performed in accordance with the requirements outlined in the Drawings, Specifications, and approved Contractor Construction Management Plan;
- Execute the CQA requirements identified in Section 4.1 during the use of asphalt pavement materials to confirm and document that material quality is maintained;
- Inspect subgrade areas prior to paving to confirm and document that conditions are suitable for paving per the Specifications;
- Document the placement and compaction of asphalt pavement materials. Document the lift height and confirm compliance with Specifications. Document material compaction and compaction testing and confirm compliance with Specifications;
- Document the that the material and placement of geotextile material is in accordance with drawings and Specifications;
  - Inspect and document subgrade conditions before geosynthetics installation. Report any issues to the Field Representative/Construction Manager and RA Contractor;
  - Inspect geosynthetic materials for damage. Report any damage or flaws to the Field Representative/Construction Manager and RA Contractor;
  - Document that geosynthetics are handled in accordance with Manufacturer requirements and the Specifications;
  - Record geosynthetics roll/batch identifier and the location of placement;
  - Inspect and document geosynthetics seaming activities;
  - Observe and document geosynthetics testing activities and review and retain geosynthetics testing reports. Report non-conformance to the Field Representative/Construction Manager and RA Contractor;
  - Request re-testing if results do not comply with Specifications;
- Document the quantity of asphalt pavement materials placed;
- Document any related issues/resolutions.

4.12 Waste Management CQA

Waste materials generated during RA activities shall be staged in a designated Waste Staging Area(s). The major waste streams to be generated during RA include:

- Soil/Sludge Containing Visible Tar or NAPL or soil/sludge that meets MGP source material criteria, as described in Section 1.3.1 of the RDR.
- Tar/NAPL-Impacted Masonry/Concrete Debris
- Wastewater
- NAPL
- Miscellaneous Debris and Waste

ISS spoils are not anticipated, as ISS areas will be pre-excavated to accommodate for ISS swell.

Waste Management shall be performed in accordance with applicable regulations, Specifications, Waste Management Plan, and approved and treatment/disposal facility requirements.

For Waste Management activities, CQA personnel responsibilities include the following:

- Document that waste management is performed in accordance with applicable regulations, Waste Management Plan and Specifications;
- Document waste conditioning activities and confirm compliance with Specifications;
- Document the collection of waste characterization samples at the required frequency;
- Review and retain analytical reports for waste characterization samples.
- Coordinate with the RA Contractor, CQA Firm, Project Owner, and the treatment/disposal facility during waste profiling;
- Review and retain copies of waste management documentation (manifests, bills of lading, disposal certificates, weight tickets);
- Estimate and document the quantity of waste materials (utilize on-site truck scale, flow meters/totalizers, and other available information);
- Review and retain weekly Waste Tracking Reports prepared by the RA Contractor;
- Execute CQA requirements for temporary on-site treatment system identified in Section 4.9; and
- Document any related issues/resolutions.

4.13 Site Breakdown, Final Restoration, and Demobilization CQA

After remedial action activities are completed, Site breakdown, final restoration, and demobilization shall be performed. During this phase the CQA personnel shall:

- Confirm and document that RA activities and restoration activities (including re-establishment of utilities) are completed;
- Confirm and document that all temporary controls and facilities have been removed from the Site;
- Confirm and document that all waste management activities have been completed;
- Perform and document the results of the post-restoration inspection;
- Document the final Site cleaning;
- Document the final Site conditions; and
- Document any related issues/resolutions.

Section 5
Documentation

The CQA Site personnel will collect and review documentation from the RA Contractor and will prepare documentation that verifies that construction quality requirements have been addressed and satisfied.

This section details the documentation associated with the CQA activities.

5.1 Document Management

The CQA documentation will be maintained in the field office. While the CQA Site Manager is responsible for implementing and maintaining the document management system, each member of the CQA team is responsible for document management. Without the collective cooperation of every member of the team, document management and control cannot be effective.

All project documentation shall include the date, project name, location, and the preparer's name and affiliation.

Electronic files from the field office server and digital job photo storage will be backed up on a weekly basis and maintained at secure off-site location. These data files will be copied monthly and sent to the CQA Firm to be stored as permanent record.

5.2 CQA Documentation

5.2.1 Daily Field Reports

Standard reporting procedures will include preparation of a Daily Field Report by the CQA Site Manager, which include the following information:

- Date;
- Weather Conditions;
- On-site personnel (including visitors)
- Equipment used;
- Description and location of work performed (reference to Drawings as appropriate);
- Description and summary of testing results;
- Summary of off-site materials received, including quality control documentation;
- Summary of waste materials transported off-site, including quality control documentation;
- Issues/resolutions;
- Decisions made regarding acceptance of units of work, and/or corrective actions to be taken in instances of substandard quality; and
- The CQA Site Manager or CQA Monitor(s)'s signature.

Attachments to the Daily Field Report may include, as appropriate:

- Field sketches or reduced-scale plans marked-up;
- Photographs;
- Testing results;
- Summary tables (e.g., imported material quantities or exported waste material quantities); and

- Any other documentation to convey the day's RA activities.

Daily Field Reports will be submitted daily to the Field Representative/Construction Manager and the CQA firm.

5.2.2 Meeting Minutes

Meeting minutes provided by the Field Representative for meetings identified in Section 3.1 and any other project construction meetings shall be reviewed by all parties and retained in the on-site files. Any omissions or discrepancies in the meeting minutes shall be communicated to the Field Representative for resolution.

5.2.3 Inspection Reports

Site Inspection Reports, which document specific Site inspection activities identified in Section 3.2 and any other inspections completed during RA construction, shall be retained in the on-site files.

5.2.4 ISS Quality Assurance and Documentation

The CQA Site Manager shall take daily field notes on operation aspects of the ISS operations, including column start and stop times, number of passes, columns sampled, batch plant CQA testing, proportion verifications and down times of the ISS rig. Those notes shall be compared daily with the Contractor's Daily Reports for any inconsistencies. Daily ISS volumes shall be reconciled with Contractors QC Officer and mutually agree upon.

The CQA Site Manager shall also maintain an up to date ISS column as-built drawing indicating columns completed for each day, columns sampled, and total columns completed to date.

5.2.5 Memoranda of Discussion with RA Contractor and Subcontractor

A memorandum will be prepared, as needed, summarizing discussions between the CQA Site Manager and RA Contractor. The memorandum will include the following information:

- Date, project name, location, and other identification;
- Names of parties to discussion;
- Relevant subject matter or issues;
- Activities planned;
- Constraints or suggestions;
- Schedule; and
- Signature of the CQA Site Manager.

5.2.6 Problem or Work Deficiency Sheets

Sheets shall be prepared, as needed, to document problem or work deficiencies and their resolutions. These memoranda shall include:

- An identifying Drawing sheet number for cross-referencing and document control;
- A description of the situation or deficiency;
- The location and probable cause of the situation or deficiency;
- How and when the situation or deficiency was found or located;
- Documentation of the response to the situation or deficiency;
- Final results of any responses;
- Any measures taken to prevent a similar situation from occurring in the future; and

- The signature of the CQA Site Manager.

The CQA Firm and the Field Representative shall be made aware of any significant recurring non-conformance with the RD/RA plans and technical specifications. The CQA Firm shall then assess the cause of the non-conformance and recommend appropriate changes in RD and/or technical specifications. When this type of evaluation is made, the results shall be documented and any revision to RD and/or technical specifications shall be approved by the Project Owner, Design Engineer, and NYSDEC (as appropriate).

5.2.7 Surveying

Certification surveying will be performed to provide documentation for record drawings, to verify quantities of materials, to verify that the geometric requirements of the RA are met, and that erosion and sediment control measures have been achieved. The RA Contractor will be responsible for the work and coordination with the surveyor. The RA Contractor is also responsible for providing all information to the CQA Firm.

5.2.8 Photographic Records

Digital photographs taken during RA construction will be cross-referenced with Daily Field Reports, Inspection Reports, Problem or Work Deficiency sheets, or other project documentation.

These photographs will serve as a visual record of work progress, problems and mitigation activities. The basic file will contain numbered digital photographs and a record log with the following information:

- Photograph number;
- Date taken; and
- Description of activities in the photograph.

At the completion of the project, a photographic log will be prepared that documents the key stages of the RA construction.

5.2.9 Design and/or Technical Specification Deviations

Design and/or technical specifications changes may be required during the RA implementation activities. In such cases, the CQA Site Manager will notify the CQA Firm and the Field Representative/Construction Manager.

Design and/or technical specifications changes will be made only with the written agreement of the CQA Firm, the Design Engineer, and/or the Project Owner, and will take the form of an addendum to the RD and/or Specifications.

5.2.10 Monthly Progress Reports

The CQA Firm or the Field Representative/Construction Manager will prepare monthly progress reports for submittal to NYSDEC.

Per NYSDEC “Technical Guidance for Site Investigation and Remediation” (DER-10), the progress reports shall report on the progress of the remedial actions accomplished during the reporting period and, at a minimum, discuss the following items:

1. Any request for modifications to the approved RD must be identified in the progress report, along with the status of the requested modifications.
2. The periodic progress report should include:
    a. a discussion of project progress and significant activities during the reporting period, including the status of any requisite permits;

b. a discussion of pending/planned significant project activities during the next two months, unless another time frame is authorized;
c. the approved remedial action schedule and proposed modifications to the remedial action schedule, resulting from new information and/or unforeseen conditions;
d. a discussion of any problems or delays in the implementation of the remedial action relative to the work and/or the remedial action schedule;
e. proposed actions to correct any identified problems, including how to mitigate any adverse schedule impacts; and
f. any additional, pertinent documentation that is available (e.g., photographs) that helps communicate progress/issues facing the project.
g. a summary of sample results from the reporting period;
h. a summary of waste characterization testing;
i. a summary of waste management activities

A draft of the Monthly Progress Reports shall be submitted electronically to the Project Owner within one week after the specified reporting period. The report shall be finalized after incorporating comments from the Project Owner and potentially other project team members and submitted electronically to the NYSDEC Department of Environmental Remediation (DER) Project Manager.

5.2.11 Final Engineering Report

As per the requirements of NYSDEC DER-10, Chapter 5, Section 5.8, the implementation of the site-wide RA described in this RDR will be documented in a FER, prepared by the CQA Firm. The FER will be certified by a Professional Engineer licensed in the State of New York and will include, but not be limited to, the following:

- Description of the remedy as constructed pursuant to the approved RD;
- Description of problems encountered during construction and a discussion of their resolution;
- Description of changes to the design documents and a description as to why the changes were made;
- Quantities and concentrations of contaminants removed or treated;
- Listing of the waste streams, quantity of materials disposed and facility where such materials were disposed;
- Restoration actions;
- List of the remedial action objectives applied to the remedial action;
- Description of the applicable areas of RA compliance identified in section 5.4 of DER-10, including air monitoring results, RA performance documentation, site restoration, fill source quality (off-site sources and on-site re-use), and monitoring well decommissioning;
- "As-built" drawings bearing a NYS Professional Engineer's or Surveyor's stamp and signature on each drawing; and
- Waste management documentation.

A draft of the FER shall be submitted electronically to the Project Owner within a timeframe that conforms to the project schedule. The report shall be finalized after incorporating comments from the Project Owner and potentially other project team members and submitted NYSDEC.

Appendix A: Quality Assurance Project Plan (QAPP)

GENERIC
QUALITY ASSURANCE PROJECT PLAN

FOR

SITE INVESTIGATIONS

AT NON-OWNED FORMER MGP SITES

Prepared for:
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NOVEMBER 2002

Reviewed and Approved by: _____ _____
(Project Quality Assurance Manager) (Signature) (Date)

Site Specific
Revisions Attached: Supplement No. _____ Date _____

TABLE OF CONTENTS
GENERIC QUALITY ASSURANCE PROJECT PLAN

Section No.	Title	Page No.
1.0	GENERAL	1-1
2.0	PROJECT DESCRIPTION	2-1
3.0	PROJECT ORGANIZATION	3-1
4.0	QA/QC OBJECTIVES FOR MEASUREMENT OF DATA	4-1
	4.1 Precision	4-1
	4.2 Accuracy	4-2
	4.3 Representativeness	4-2
	4.4 Completeness	4-3
	4.5 Comparability	4-3
5.0	SAMPLING PROCEDURES	5-1
	5.1 Sampling Program	5-1
	5.2 Sampling Procedures and Handling	5-1
	5.3 Quality Assurance Samples	5-2
6.0	SAMPLE TRACKING AND CUSTODY	6-1
	6.1 Field Sample Custody	6-1
	6.2 Laboratory Sample Custody	6-2
	6.3 Sample Tracking System	6-2
7.0	CALIBRATION PROCEDURES AND FREQUENCY	7-1
	7.1 Field Instrumentation and Calibration	7-1
	7.2 Laboratory Instrumentation and Calibration	7-1
8.0	ANALYTICAL PROCEDURES	8-1
9.0	DATA REDUCTION, VALIDATION, AND REPORTING	9-1
	9.1 Chain-of-Custody Records	9-1
	9.2 Data Handling	9-1
	9.3 Data Validation	9-1
	9.3.1 Full Data Validation	9-1
	9.3.2 Data Usability Summary Report (DUSR)	9-2
10.0	INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY	10-1
	10.1 Quality Assurance Batching	10-1
	10.2 Organic Standards and Surrogates	10-1
	10.3 Laboratory Quality Control Samples	10-1
11.0	QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS	11-1
	11.1 System Audits	11-1
	11.2 Performance Audits	11-2

TABLE OF CONTENTS (CONT'D)

Section No.	Title	Page No.
12.0	PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES	12-1
12.1	Preventive Maintenance Procedures	12-1
12.2	Schedules	12-1
12.3	Records	12-1
12.4	Spare Parts	12-2
13.0	ASSESSMENT PROCEDURES FOR DATA ACCEPTABILITY	13-1
13.1	Accuracy	13-1
13.2	Precision	13-1
13.3	Completeness	13-1
14.0	CORRECTIVE ACTION	14-1
15.0	QUALITY ASSURANCE REPORTS	15-1

LIST OF TABLES

Table 1	Sample Containerization
Table 2	Laboratory Analysis Program
Table 3	Target Analytes and Contract Required Quantitation (CRQ) Limits

LIST OF FIGURES

Figure 1	Data Reduction, Validation and Reporting
Figure 2	Sample Custody
Figure 3	Chain-of-Custody Record
Figure 4	Daily Status and Monitoring Report
Figure 5	Corrective Action Request Form

LIST OF ATTACHMENTS

Attachment 1 Field PAH and PCB Soil Test Technical Guides and Test Kit Instructions

1.0 GENERAL

This Generic Quality Assurance Project Plan (QAPP) has been prepared to specify procedures that will provide data of known, documented quality, and which will be legally defensible, should the need exist. This document specifically supplements the Generic Field Sampling Plan (FSP), also attached as an appendix to the Site-Specific Work Plan. To the extent discrepancies exist between this Generic QAPP and the Site-Specific Work Plan, the Site-Specific Work Plan shall control.

2.0 PROJECT DESCRIPTION

The project sites are Former Non-owned Manufactured Gas Plant (MGP) sites. The purpose of the investigations is to gather sufficient data to enable the New York State Department of Environmental Conservation (NYSDEC) and Niagara Mohawk, a National Grid Company (NM) to characterize chemical substances which are or may be present at the Sites and to enable the NYSDEC and NM to determine whether such substances pose a significant threat to public health or the environment.

The data collected as a result of these investigations will be used to support the Site Characterizations and Remedial Investigation/Feasibility Studies (RI/FS) as described in the Site-Specific Work Plans. The types, numbers, and locations of environmental samples to be collected are also described in the Site-Specific Work Plans. Field procedures for all environmental sampling activities are detailed in the FSP.

3.0 PROJECT ORGANIZATION

The project organization is described in detail in the Site-Specific Work Plan. The project organization describes the relationship between the NM Project Manager, NYSDEC Project Manager, NM's Engineering Consultant, and subcontractors (e.g. laboratories, data validators, drillers, etc.).

For the purpose of quality control, the Engineering Consultant's Project Quality Assurance Manager (PQAM) will be responsible for review of data upon receipt from the analytical laboratory. The PQAM will assure that data validation screening is performed by trained and experienced data validators using the applicable criteria specified in the NYSDEC 2001 Analytical Services Protocol (ASP). For the purposes of this document, all references to ASP indicate the 2001 NYSDEC Analytical Services Protocol. The specific requirements for data validation screening are given in Section 9.3. The PQAM will be responsible for ensuring that all analytical data are in conformance with requirements of this QAPP.

4.0 QA/QC OBJECTIVES FOR MEASUREMENT OF DATA

The overall quality assurance (QA) objective for the project is to develop and implement procedures which will provide data of known, documented quality. Field and laboratory quality assurance/quality control (QA/QC) requirements defined in the NYSDEC ASP and other applicable guidelines ensure acceptable levels of data quality will be maintained throughout the sampling and analysis program.

The QA/QC objectives for all measurement data include precision, accuracy, representativeness, completeness, and comparability. The data reduction, validation, and reporting scheme is presented in Figure 1. The quality assurance samples to be collected (type and frequency of collection) are specified in the Site-SpecificWork Plans.

4.1 Precision

Precision is an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Specifically, it is a quantitative measurement of the variability of a group of measurements compared to their average value (USEPA, 1987). Precision is usually stated in terms of standard deviation, but other estimates such as the coefficient of variation (relative standard deviation), range (maximum value minus minimum value), and relative range are common. For this project, precision will be evaluated by recording duplicate measurements of the same parameter on similar sample aliquots under the same conditions and calculating the relative percent difference (RPD) between the values. The formula for calculating RPD is presented in Section 13.2.

RPDs can only be calculated when the duplicate samples both contain detectable concentrations of the analyte. If an analyte is considered not detected at the detection limit, then RPD cannot be calculated. Instead, the results of the analysis of the two-spiked laboratory samples will be used to determine precision.

Measurement data for this project will include field data as well as laboratory analytical data. Laboratory precision will be performed according to the requirements described in the associated analytical methods. The field measurement data may include immunoassay polycyclic aromatic hydrocarbon (PAH) and/or polychlorinated biphenyl (PCB) screening, pH, conductivity, temperature, turbidity, organic vapor readings, and water level measurements. The objective for precision of field data collection methods is to take replicate (minimum of two for every 20 samples) measurements for field parameters to determine the reproducibility of the measurements.

Precision of the immunoassay screening will be evaluated by the field analysis of replicate samples as equivalent levels of PAHs/PCBs. As the screening is not quantitative (i.e., the screening determines if the constituents are present above or below standard values and does not provide a numeric result), RPDs cannot be calculated on the field-analyzed samples. Therefore, measurement of equivalent levels of constituent (i.e., detected below the same standard or within the same range of two standards) will be considered as denoted precision of the screening test.

For the pH meter, precision will be tested by multiple readings in the medium of concern. Consecutive

readings should agree within 0.1 pH units after the instrument has been field calibrated with standard buffers before each use. The thermometer will be visually inspected prior to each use to ensure its condition is satisfactory. Consecutive measurements of a given sample should agree to within 1°Celsius. After calibration, the conductivity meter will be tested for precision at ± 1% of full-scale, depending on the meter/scale. The organic vapors will be measured using a Photovac Microtip (or equivalent) photoionization detector (PID). Daily background and upwind readings of drilling and sampling activities will be measured prior to commencing work and at periodic intervals throughout each day's activities. The natural variation/fluctuation in measurements at background or upwind locations will be used for baseline background values, and the variability will be noted. Water level indicator readings will be precise within 0.01 feet for duplicate measurements or additional water level measurements will be collected to determine whether the difference is due to operator or instrument error. Turbidity measurements will be calibrated to a precision of ± 2% nephelometric turbidity units (NTUs).

4.2 Accuracy

Accuracy is a measure of the difference between a measured value and the "true" or accepted reference value. The accuracy of an analytical procedure is best determined by the analysis of a sample containing a known quantity of material and is expressed as the percent of the known quantity, which is recovered, or measured. The recovery of a given analyte is dependent upon the sample matrix, method of analysis, and the specific compound or element being determined. The concentration of the analyte relative to the detection limit of the analytical method is also a major factor in determining the accuracy of the measurement. Concentrations of analytes that are close to the detection limits are less accurate because they are affected by such factors as instrument "noise". Higher concentrations will not be as affected by instrument or other variables and thus will be more accurate.

The accuracy of laboratory-measured data will be evaluated by determining the percent recovery of both matrix and blank spike samples as described in Section 13.1. For the measurement of organics by gas chromatography (GC) or GC/mass spectroscopy (MS), the recovery of a surrogate spiked into each sample, blank, and standard will also be used to assess accuracy.

Accuracy between the immunoassay screening and the laboratory analytical results will be evaluated by the confirmatory testing of 10 percent (i.e., one in ten) of the environmental samples at the off-site laboratory. The rate of potential false positives and negatives should be less than 15 percent. Screening samples will not be spiked in the field by the addition of known parameter concentrations. However, the confirmatory samples sent to the off-site laboratory will undergo surrogate spiking and recovery evaluation and, to the extent possible, may be chosen as the site-specific matrix spike sample(s) for additional accuracy determination.

The objective for accuracy of the other field measurements is to achieve and maintain factory equipment specifications for the field equipment. Field measurements cannot be assessed for accuracy by spiking the medium with the analytical parameter and measuring the increase in response;

therefore, these instruments can only be assessed for accuracy by the response to a known sample (such as a calibration standard) used to standardize them. The pH meter, conductivity meter, and turbidity meter are calibrated with solutions traceable to the National Institute of Standards and Technology (NIST, formerly the National Bureau of Standards).

All volatile organic detectors (such as the PID) will be calibrated to an appropriate standard daily prior to use.

4.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that is most concerned with the proper design of the sampling program. Samples must be representative of the environmental media being sampled. Selection of sample locations and sampling procedures will incorporate consideration of obtaining the most representative sample possible.

Field and laboratory procedures will be performed in such a manner as to ensure, to the degree that is technically possible, that the data derived represents the in-place quality of the material sampled. Every effort will be made to ensure chemical compounds will not be introduced into the sample via sample containers, handling, or analysis. Decontamination of sampling devices and digging equipment will be performed between samples as outlined in the FSP. Laboratory sample containers will be thoroughly cleaned in accordance with procedures outlined in Section 5.2. Analysis of field blanks, trip blanks, and method blanks will also be performed to monitor for potential sample contamination from field and laboratory procedures.

The assessment of representativeness also must consider the degree of heterogeneity in the material from which the samples are collected. Sampling heterogeneity will be evaluated through the analysis of field duplicate samples, coded to ensure the samples are treated and analyzed as separate samples. The analytical laboratory will make every reasonable effort to assure the samples are adequately homogenized prior to taking aliquots for analysis, so the reported results are representative of the sample received. Many means of homogenization expose the sample to significant risk of contamination or loss through volatilization, and these should be avoided if possible.

Chain-of-custody procedures will be followed to document that contamination of samples has not occurred during container preparation, shipment, and sampling. Details of blank/duplicate and chain-of-custody procedures are presented in Sections 5.3 and 6.1.

4.4 Completeness

Completeness is defined as the percentage of measurements made which are judged to be valid. The QC objective for completeness is generation of valid data for 100 percent of the analysis requested. Any data deficiencies and their impact on project goals will be evaluated during data validation and discussed in the Data Usability Summary Report (DUSR) (see Section 9.3.2).

4.5 Comparability

Comparability expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured by:

- Using identified standard methods for both sampling and analysis phases of this project;
- Ensuring traceability of all analytical standards and/or source materials to USEPA or NIST;
- Verifying all calibrations with an independently prepared standard from a source other than that used for calibration;
- Using standard reporting units and reporting formats including the reporting of QC data;
- The validation of all analytical results, including the use of data qualifiers in all cases where appropriate; and
- The requirement that all validated flags be used any time an analytical result is used for any purpose whatsoever.

These steps will ensure all future users of either the data or the conclusions drawn from them will be able to judge the comparability of these data and conclusions.

5.0 SAMPLING PROCEDURES

5.1 Sampling Program

The objective of the sampling program is to provide current data concerning the presence and nature and extent of contamination of groundwater, surface water, soils (surface and subsurface), and/or sediment. Sampling and analysis may include as identified in the Site-SpecificWork Plan:

- groundwater samples
- surface water samples
- sediment samples
- surface and/or subsurface soil samples
- air samples

5.2 Sampling Procedures and Handling

Sample Container Preparation

Sample containers will be properly washed and decontaminated by the factory or laboratory prior to use. All preservatives will be added to containers prior to shipment by the laboratory. The types of containers and preservation techniques are shown in Table 1. Records of the sources of bottles and preservatives will be kept by the analytical laboratory.

Methods of Sampling

As a minimum, sampling procedures will be in accordance with the most recent NYSDEC or USEPA guidelines and/or regulations, as appropriate. Alternate techniques will be utilized when such guidelines and/or regulations are inappropriate or non-existent. Alternate techniques will be implemented only after consultation with NYSDEC, whenever possible.

Referenced sampling procedures are listed below. All procedures will be the latest in effect as of the date of this Generic QAPP.

- USEPA - 600-4-79-020, "Methods for Chemical Analysis of Water and Wastes"
- National Water Well Association - "Manual of Ground-water Sampling Procedures"
- USEPA - 600-4-83-040, "Characterization of Hazardous Waste Sites - a Methods Manual: Volume II. Available Sampling Methods"
- USEPA - OSWER - 9950.1 "RCRA Ground-water Monitoring Technical Enforcement Guidance Document"
- USEPA - 540/S-95/504, "Low-Flow (Minimal Drawdown) Ground Water Sampling Procedures"

- NYSDEC – "Technical and Administrative Guidance Memoranda" (TAGMs)

All sampling methods are explained in detail in the FSP.

5.3 Quality Assurance Samples

Field Quality Control Samples

To assess field sampling and decontamination performance, two types of "blanks" will be collected and submitted to the laboratory for analyses. The blanks will include:

Trip Blank - A trip blank will be prepared by the laboratory, and will consist of 40-ml volatile organic analysis (VOA) vials containing distilled, deionized water which accompanies the other sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of water samples for which analysis for Target Compound List (TCL) volatiles or benzene, toluene, ethylbenzene and total xylenes (BTEX) is planned. The trip blank will be analyzed for TCL volatile organic compounds or BTEX to assess any contamination introduced as a result of sampling and transport, , handling and storage.

Equipment Blank - Equipment blanks will be taken at a minimum frequency of one per 20 field samples per sample matrix as specified in the Site-SpecificWork Plan. Equipment blanks are used to determine the effectiveness of the decontamination procedures for sampling equipment. It is a sample of deionized, distilled water provided by the laboratory, which has passed through or over the sampling apparatus. It is usually collected as a last step in the decontamination procedure, prior to collecting a sample. The equipment blanks will be analyzed for the same parameters as the matrix being sampled.

In addition, the precision of field sampling procedures will be assessed by collecting coded field duplicates and matrix spike (MS)/matrix spike duplicates (MSD)/matrix duplicates (MD).

The duplicates will consist of:

Field Duplicate - To determine the reproducibility and homogeneity of samples, coded field duplicates will be collected. The samples are termed "coded" because they will be labeled in such a manner that the laboratory will not be able to determine that they are a duplicate sample. This will eliminate any possible bias that could arise. The frequency of collection of these samples is one per 20 field samples as specified in the Site-SpecificWork Plans. The criteria for assessing coded field duplicates are given in Section 6.0.

Matrix Spike/Matrix Spike Duplicate/Matrix Duplicate (MS/MSD/MD) - MS/MSD/MD samples (MSD for organics; MD for inorganics) will be collected at a frequency of one pair per 20 field samples per seven day sample delivery group (SDG). The reproducibility and homogeneity of the samples can be assessed by determining the

RPD for both spike and non-spike compounds as described in Section 13.0. The MS, MSD, and MD samples should be Site-Specific, unless otherwise authorized by the Engineering Consultant's Project Manager and/or PQAM after consultation with NM and NYSDEC personnel whenever possible.

6.0 SAMPLE TRACKING AND CUSTODY

Sample chain-of-custody (COC) will be initiated by the laboratory with selection and preparation of the sample containers. To reduce the chance for error, the number of personnel handling the samples will be minimized.

In-situ or on-site monitoring data will be controlled and entered in permanent logbooks. Personnel involved in the COC and transfer of samples will be trained on the purpose and procedures prior to implementation.

Evidence of sample traceability and integrity will be provided by COC procedures. These procedures document the sample traceability from the selection and preparation of the sample containers by the laboratory, to sample collection, to sample shipment, to laboratory receipt and analysis. The sample custody flowchart is shown in Figure 2. A sample will be considered to be in a person's custody if the sample is:

- In a person's possession;
- Maintained in view after possession is accepted and documented;
- Locked and tagged with custody seals so that no one can tamper with it after having been in physical custody; or
- In a secured area which is restricted to authorized personnel.

6.1 Field Sample Custody

A COC record will accompany the sample from time of collection to receipt by the analytical laboratory. If samples are split and sent to different laboratories, COC records will be sent with each sample. Figure 3 is a typical example of a chain-of-custody record. The "remarks" column will be used to record specific considerations associated with sample acquisition such as: sample type, container type, sample preservation methods, and analyses to be performed. Two copies of this record will accompany the samples to the laboratory. The laboratory will maintain one file copy, and the completed original will be returned to the Engineering Consultant's Project Manager.

Individual sample containers, provided by the laboratory, will be used for shipping/couriering samples. The shipping containers are insulated, and ice will be used to maintain samples at approximately four degrees Celsius until samples are returned and in the custody of the laboratory. All sample bottles within each shipping container will be individually labeled and controlled.

Each sample shipping container will be assigned a unique identification number by the laboratory, and will be marked with indelible ink on the outside of the shipping container. This number will be recorded on the COC record. The field sampler will indicate each individual sample designation/location number in the space provided on the appropriate COC form for each sample collected. The shipping container will then be closed, and a seal provided by the laboratory affixed to the latch. This seal must be broken to open the container. Tampering may be indicated if the seal

is broken before receipt at the laboratory. The laboratory will contact the FOL or Engineering Consultant's Project Manager, and the associated samples will not be analyzed if tampering is apparent.

6.2 Laboratory Sample Custody

The FOL will notify the laboratory of upcoming field sampling activities and the subsequent transfer of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The laboratory sample program will meet the following criteria:

- The laboratory will designate a sample custodian who is responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.
- Upon receipt of the samples, the custodian will check the original chain-of-custody documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian will sign the COC record and record the date and time received.
- Care will be exercised to annotate any labeling or descriptive errors. In the event of any discrepancy in documentation, the laboratory will immediately contact the Engineering Consultant's Project Manager and/or PQAM as part of the corrective action process. A qualitative assessment of each sample container will be performed to note any anomalies, such as broken or leaking bottles. That assessment will be recorded as part of the incoming COC procedure.
- The samples will be stored in a secured area at a temperature of approximately four degrees Celsius until analyses are to commence.
- A laboratory tracking record will accompany the sample or sample fraction through final analysis for control.
- A copy of the tracking form will accompany the laboratory report and will become a permanent part of the project records.

6.3 Sample Tracking System

A sample tracking system will be implemented to monitor the status of sampling events and laboratory analysis of samples. Sample numbers, types, analytical parameters, sampling dates, and sample delivery group (SDG) designations for samples, and required due dates for receipt of analytical results will be entered into the system. The Engineering Consultant's Project Manager will use the tracking system to monitor the project sampling schedules and the status of analytical reports, and to implement any penalty clauses for late delivery per standard laboratory subcontracts when necessary.

A description of the sample tracking system follows:

1. For each day that samples are collected, the Field Operations Lead (FOL) or designee will complete a COC form (Figure 3) and a Daily Status and Monitoring Report (Figure 4) listing all appropriate samples.
2. The FOL or designee will retain the client copy of the COC, and forward the laboratory copy of the COC with the sample shipment.
3. The FOL or designee will fax copies of the completed COC form and Daily Status and Monitoring Report to the Engineering Consultant's PM. The Engineering Consultant's PM or a designated employee will confirm sample shipment with the laboratory and resolve any sample transfer issues.
4. The status of analytical results will be tracked by the Engineering Consultant's PM or designee using the information provided on the completed COC form and Daily Status and Monitoring Report. The information shall be summarized in a computerized database, as warranted.

Upon receipt of the analytical results from the laboratory, the Engineering Consultant's PM or designee will review the data package for completeness and contract compliance. The Engineering Consultant's PM will then forward the result package to the data validator for validation. The data validator shall be required to submit a complete set of validated data to the Engineering Consultant's PM within 60 days of receipt of the data package report.

The Engineering Consultant's Project Manager or a designated representative will maintain day-to-day contact with the laboratory concerning specific samples and analyses directly or by assignment.

7.0 CALIBRATION PROCEDURES AND FREQUENCY

7.1 Field Instrumentation Calibration

The FOL will be responsible for ensuring that instrumentation are of the proper range, type and accuracy for the test being performed, and that all of the equipment are calibrated at their required frequencies, according to their specific calibration protocols/procedures.

All field measurement instruments must be calibrated according to the manufacturer's instructions prior to the commencement of the day's activities. Exceptions to this requirement shall be permitted only for instruments that have fixed calibrations pre-set by the equipment manufacturer. Calibration information shall be documented on instrument calibration and maintenance log sheets or in a designated field logbook. The calibration information (log sheet or logbook) shall be maintained at the site during the on-site investigation and, once the field work is completed, shall be placed in the Engineering Consultant's project files. Information to be recorded includes the date, the operator, and the calibration standards (concentration, manufacturer, lot number, expiration date, etc.). All project personnel using measuring equipment or instruments in the field shall be trained in the calibration and usage of the equipment, and are personally responsible for ensuring that the equipment has been properly calibrated prior to its use.

In addition, all field instruments must undergo response verification checks at the end of the day's activities and at any other time that the user suspects or detects anomalies in the data being generated. Verification checks may also be performed at the request of NM or NYSDEC representatives. The checks consist of exposing the instrument to a known source of analyte (e.g., the calibration solution), and verifying a response. If an unacceptable instrument response is obtained during the check (i.e., not within specifications), the data shall be labeled suspect, the problem documented in the site logbook, and appropriate corrective action taken.

Any equipment found to be out of calibration shall be re-calibrated. When instrumentation is found to be out of calibration or damaged, an evaluation shall be made to ascertain the validity of previous test results since the last calibration check. If it is necessary to ensure the acceptability of suspect items, the originally required tests shall be repeated (if possible), using properly calibrated equipment, to acquire replacement data for the measurement in question.

Any instrument consistently found to be out of calibration shall be repaired or replaced within 24 hours or field work will be terminated until the malfunctioning equipment is repaired/replaced.

7.2 Laboratory Instrumentation Calibration

Personnel at the laboratory will be responsible for ensuring that analytical instrumentation are of the proper range, type and accuracy for the test being performed, and that all of the equipment are calibrated at their required frequencies, according to specific protocols/procedures.

Off-site laboratory equipment shall be calibrated using certified/nationally recognized standards and according to the applicable methodologies and the laboratory Standard Operating Procedures (SOPs).

In addition, these methods/procedures specify the appropriate operations to follow during calibration or when any instrument is found to be out of calibration.

8.0 ANALYTICAL PROCEDURES

All off-site laboratory samples will be analyzed according to the methods provided in Exhibit D of the NYSDEC ASP. QA/QC procedures given in Exhibit E and I of the ASP will be followed. Regardless of the method used, all analytical and extraction holding times must meet the NYSDEC ASP requirements for that analytical group (i.e., volatile analyses, including BTEX, have a holding time of seven days, if unpreserved). Holding times will be calculated from verified time of sample receipt at the laboratory. For NYSDEC ASP, samples must be received at the laboratory within 48 hours of sample collection. The analytical laboratory chosen for the project will be certified, and must maintain certification, under the New York State Department of Health's Environmental Laboratory Approval Program for analyses of solid and hazardous waste. The breakdown of investigative samples is detailed in the Site-Specific Work Plan. Laboratory analytical methods and quantitation limits are presented in Tables 2 and 3 of this Generic QAPP. The method detection limits (MDLs) for the analytes will be specified by the laboratory selected for the project based on its most recent MDL studies, and subject to approval by the NYSDEC.

Field screening samples will be analyzed according to the NYSDEC ASP and the manufacturer's instructions. Unless site-specific requirements dictate a change in concentration limits (which would be explained within the Site-Specific Work Plan), the standard levels for the PAH and PCB screening will be 1 ppm and 10 ppm. The test system user shall be technically qualified individual who has received training in the immunoassay analysis requirements, procedures and potential risks prior to field screening of samples. Use of the field screening test kits will only occur in a controlled environment, following the storage and handling procedures outlined in the NYSDEC ASP and the manufacturer's instructions. Additional technical information on the field screening testing are presented in Attachments 1 and 2.

9.0 DATA REDUCTION, VALIDATION, AND REPORTING

The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the ASP.

The data package provided by the laboratory will contain all items specified in the ASP, as appropriate to the analyses performed. Category B reporting will be used.

9.1 Chain-of-Custody Records

Completed copies of the COC records accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the report of analytical testing.

9.2 Data Handling

One complete copy and one additional copy of the analytical data summary report will be provided by the laboratory. One set of the analytical data will be forwarded directly to the data validator by the laboratory. The Engineering Consultant's Project Manager will immediately arrange for filing of the complete package, after the QA/QC reviewer checks the package to ensure all deliverables have been

provided. The second data summary report will be used to generate summary tables. These tables will form the foundation of a working database for assessment of the site contamination condition.

The Engineering Consultant's Project Manager will maintain close contact with the QA/QC reviewer to ensure all non-conformance issues are acted upon prior to data manipulation and assessment routines. Once the QA/QC review has been completed, the Engineering Consultant's Project Manager may direct the team leaders or others to initiate and finalize the analytical data assessment.

9.3 Data Validation

9.3.1 Full Data Validation

Data validation is a basic step in the control and processing of the project data generated by the laboratory. The data validation process will consist of a systematic review of the analytical results and QC documentation, and will be performed in accordance with the guidelines identified in Section 9.3.1. All off-site laboratory data will undergo full validation, unless otherwise stated in the Site-Specific Work Plan. On the basis of this review, the data validator will make judgments and express concerns and comments on the quality and limitations of specific data, as well as on the validity of the overall data package. The data validator will prepare documentation of his or her review and conclusions in a Data Usability Summary Report (DUSR; see Section 9.3.2).

The data validator will inform the Engineering Consultant's Project Manager of data quality and limitations, and assist the Project Manager in interacting with the laboratory to correct data omissions and deficiencies. The laboratory may be required to rerun or resubmit data depending on the extent of the deficiencies, and their importance in meeting the data quality objectives within the overall context of the project. The validated laboratory data will be reduced into a computerized tabulation which will be suitable for inclusion in the Site Characterization and RI Reports and will be designed to facilitate comparison and evaluation of the data. The data tabulations will be sorted by classes of constituents and by sample matrix. Each individual table will present the following information:

- Sample matrix, designations, and locations;
- Sample dates;
- Constituents for which positive results were obtained;
- Reported constituent concentrations in the field and/or trip blanks associated with the samples;
- Constituent concentration units;
- Name and location of laboratory which performed the analyses;
- Data qualifiers provided by the laboratory; and
- Data qualifiers and comments provided by the data validator, if any.

9.3.1 Data Usability Summary Report (DUSR)

A Data Usability Summary Report (DUSR) will be prepared after reviewing and evaluating the analytical data. The parameters to be evaluated in reference to compliance with the analytical method protocols includes all sample chain-of-custody forms, holding times, raw data (instrument print out data and chromatograms), calibrations, blanks, spikes, controls, surrogate recoveries, duplicates and sample data. If available, the field sampling notes should also be reviewed and any quality control problems should be evaluated as to their effect on the usability of the sample data.

The DUSR will describe the samples and analysis parameters reviewed. Data deficiencies, analytical method protocol deviations and quality control problems will be described and their effect on the data will be discussed in the DUSR.

Resampling/reanalysis recommendations, if applicable, will be made. Data qualifications are documented for each sample analyte following the NYSDEC ASP guidelines.

This work will be performed by trained and experienced data validators who meet the NYSDEC

approval criteria. The Environmental Scientist preparing the DUSR must submit a resume to the NYSDEC Quality Assurance Unit documenting relevant experience in environmental sampling and analysis methods and data review and documentation of a Bachelors Degree in Natural Science or Engineering. The results of the data validation screening (i.e. missed holding times or data rejected due to blank contamination) will be incorporated into the data summary tables used in the final investigative report. The DUSR identifies data gaps caused by non-compliant or rejected data, and will indicate what steps have been or will be taken to fill these gaps.

10.0 INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

10.1 Quality Assurance Batching

Each set of samples will be analyzed concurrently with calibration standards, method blanks, MS, MSD or MD, and QC check samples (if required by the protocol). The MS/MSD/MD samples will be designated by the field personnel. If no MS/MSD/MD samples have been designated, then the laboratory must contact the Project Quality Assurance Officer (PQAO) or Engineering Consultant's Project Manager for corrective action.

10.2 Organic Standards and Surrogates

All standard and surrogate compounds are checked by the method of mass spectrometry for correct identification and gas chromatography for degree of purity and concentration. When the compounds pass the identity and purity tests, they are certified for use in standard and surrogate solutions. Concentrations of the solutions are checked for accuracy before release for laboratory use. Standard solutions are replaced monthly or earlier based upon data indicating deterioration.

10.3 Laboratory Quality Control Samples

The quality control samples included are detailed below.

Method Blanks/Preparation Blanks: Analyses for organic compounds (method blank) and inorganics (preparation blank) include a blank analysis of the laboratory reagent water. The blank is analyzed with each set of samples or more often as required to verify that contamination has not occurred during the analytical process. The concentration of target compounds in the blanks must be less than or equal to the method detection limits specified in the ASP for the selected method of analysis.

Matrix Spike/Matrix Spike Duplicate Analysis - This analysis is used to determine the effects of matrix interference on analytical results. Spikes of analytes are added to aliquots of sample matrix in the manner specified in the ASP. Selected samples are spiked to determine accuracy as a percentage recovery of the analyte from the sample matrix and precision as RPD between the MS and MSD samples. A matrix duplicate is prepared in the same manner as the matrix spike sample.

Analytical Duplicate Samples - Replicate samples are aliquots of a single sample that are split on arrival at the laboratory, or upon analysis. Significant differences between two replicates, split in a controlled laboratory environment, will result in flagging the affected analytical results.

Surrogate Spike Analyses - Surrogate spike analyses are used to determine the efficiency of recovery of organic analytes in the sample preparations and analyses. Calculated percentage recovery of the spike is used as a measure of the accuracy of the total analytical method.

Laboratory Control Sample/ (Spike Blank) - For each method which requires a laboratory control sample (LCS) or spike blank, a LCS spike blank will be prepared with each quality control batch and analyzed according to criteria specified in the ASP. These samples support an assessment of the ability of the analytical procedure to generate a correct result without matrix effects or interference affecting the analysis.

11.0 QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS

Quality assurance audits may be performed by the Project Quality Assurance Manager (PQAM) or personnel designated by the PQAM. The PQAM and his or her designees function as an independent body and report directly to Engineering Consultant's quality assurance management. The PQAM may plan, schedule, and approve system and performance audits based upon the Engineering Consultant's procedure customized to the project requirements. These audits may be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). At times, the PQAM may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits.

Formal audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual and project criteria. Formal audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by lead auditors after gathering and evaluating all resultant data. Items, activities, and documents determined by lead auditors to be in noncompliance will be identified at exit interviews conducted with the involved management. Noncompliances will be logged, documented, and controlled through audit findings which are attached to and are a part of the integral audit report. These audit finding forms will then be directed to management to satisfactorily resolve the noncompliance in a specified and timely manner. All audit checklists, audit reports, audit findings, and acceptable resolutions must be approved by the PQAM prior to issue. QA verification of acceptable resolutions will be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the PQAM will close out the audit report and findings.

It is the Engineering Consultant's Project Manager's overall responsibility to verify that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports must be submitted to the Engineering Consultant's Project Manager within 15 days of completion of the audit. Serious deficiencies must be reported to the Engineering Consultant's Project Manager within 24 hours.

Serious deficiencies identified during an audit will be reported to NM and NYSDEC as part of the DUSR or Site investigation and/or RI Reports.

11.1 System Audits

System audits, performed by the PQAM or designated auditors, may encompass evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation may be audited. These audits may be performed once during the performance of the project. However, if conditions adverse to quality are detected or if the Engineering Consultant's Project Manager requests the PQAM to perform unscheduled audits, these activities will be instituted.

11.2 Performance Audits

In accordance with the requirements for NYSDOH ELAP CLP certification, the laboratory will participate in all performance evaluation testing.

Also, one field audit may be performed by the PQAM or designated auditor during collection of the field samples to verify that field samplers are following established sampling procedures. Performance of a field audit will be based on the type of investigation activities being performed, the length of the field project, and any available information concerning prior inspections of the project or sampling team. The Site-Specific Work Plan will provide details on the performance of a field audit.

12.0 PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES

12.1 Preventive Maintenance Procedures

Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendations and written procedure developed by the operators. Analytical instruments will be serviced at intervals recommended by the manufacturer. An instrument repair/maintenance log book will be kept for each instrument, and this log will be available on-site during field activities and, at the completion of the investigation, be placed in the project files. Entries include the date of service, type of problem encountered, corrective action taken, and initials and affiliation of the person providing the service.

The instrument use log book will be monitored by the analysts to detect any degradation of instrument performance. Changes in response factors or sensitivity are used as indications of potential problems. These are brought to the attention of the laboratory supervisor and preventive maintenance or service is scheduled to minimize down time. Back-up instrumentation and an inventory of critical spare parts are maintained to minimize delays in completion of analyses.

Use of equipment in need of repair will not be allowed, and field work will be terminated until the malfunction is repaired or the instrument replaced.

12.2 Schedules

Written procedures, where applicable, will identify the schedule for servicing critical items in order to minimize the downtime of the measurement system. It will be the responsibility of the operator to adhere to this maintenance schedule and to arrange any necessary and prompt service as required. Service to the equipment, instruments, tools, gauges, etc. shall be performed by qualified personnel.

12.3 Records

Logs shall be established to record and control maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. Records produced shall be reviewed, maintained, and filed by the operators at the laboratories and by the data and sample control personnel when and if equipment, instruments, tools, and gauges are used at the sites. The Engineering Consultant's Project Manager or the PQAM may audit these records to verify complete adherence to these procedures.

12.4 Spare Parts

Where appropriate, a list of critical spare parts will be identified by the operator in consultation with the equipment manufacturer. These spare parts will be stored for availability and use in order to reduce the downtime. In lieu of maintaining an inventory of spare parts, a service contract for rapid instrument repair or backup instruments will be available.

13.0 ASSESSMENT PROCEDURES FOR DATA ACCEPTABILITY

Procedures used to assess data precision and accuracy will be in accordance with the appropriate laboratory method, and as periodically updated.

13.1 Accuracy

The percent recovery is calculated as below:

$$\% = \frac{Ss - So}{S} \times 100$$

So = The background value, i.e.; the value obtained by analyzing the sample

S = Concentration of the spike added to the sample

Ss = Value obtained by analyzing the sample with the spike added

% = Percent Recovery

13.2 Precision

The relative percent difference (RPD) is calculated as below:

$$RPD = \frac{|V1 - V2|}{0.5\ (V1 + V2)} \times 100$$

V1, V2 = The two values obtained by analyzing the duplicate samples

13.3 Completeness

Completeness is the measure of the amount of valid data obtained from a measurement system compared to the total amount expected to be obtained under ideal conditions. A target of 100 percent completeness, calculated for each analysis method, has been established as the overall project objective.

$$PC = \frac{NA}{NI} \times 100$$

where:

PC = Percent completeness
NA = Actual number of valid analytical results obtained
NI = Theoretical number of results obtainable under ideal conditions

14.0 CORRECTIVE ACTION

The following procedures have been established to assure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

When a significant condition adverse to quality is noted on-site, at the laboratory, or at a subcontractor location, the cause of the condition will be determined and corrective action taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the FOL, Engineering Consultant's Project Manager, and involved subcontractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action. All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality.

At a minimum, corrective actions may be initiated:

- When predetermined acceptance standards are not attained
- When procedure or data compiled are determined deficient
- When equipment or instrumentation is found faulty
- When samples and test results are questionably traceable
- When quality assurance requirements have been violated
- When designated approvals have been circumvented
- As a result of system and performance audits
- As a result of a management assessment
- As a result of laboratory/inter-field comparison studies
- As required by NM
- As required by NYSDEC ASP, 2001

Procedure Description

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, monitor on-going work performance in the normal course of daily responsibilities.

Work may be audited at Engineering Consultant's office, Site, laboratory, and subcontractor locations by the PQAM and/or designated auditor. Items, activities, or documents ascertained to be in noncompliance with quality assurance requirements will be documented and corrective actions mandated through audit finding sheets attached to the audit report. Audit findings are logged,

maintained, and controlled by the PQAM (Section 11.0).

Technicians assigned quality assurance functions will also control noncompliance corrective actions by having the responsibility of issuing and controlling the appropriate Corrective Action Request Form (Figure 5). All project personnel may identify a noncompliance; however, the technician is responsible for documenting, numbering, logging, and verifying the closeout action. It is the Engineering Consultant's Project Manager's responsibility to verify that all recommended corrective actions are produced, accepted, and received in a timely manner.

The Corrective Action Request (CAR) identifies the adverse condition, reference document(s), and recommended corrective action(s) to be administered. The issued CAR is directed to the responsible manager in charge of the item or activity for action. The individual to whom the CAR is addressed returns the requested response promptly to the technician in charge, affixing his signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The technician maintains the log for status control of CARs and responses, confirms the adequacy of the intended corrective action, and verifies its implementation. The technician will issue and distribute CARs to specified personnel, including the originator, responsible project management involved with the condition, the Engineering Consultant's Project Manager, involved subcontractor, and the FOL, at a minimum. CARs are transmitted to the project file for the records.

15.0 QUALITY ASSURANCE REPORTS

Quality assurance reports to management may consist of the reports on audits, reports on correction of deficiencies found in audits, a final QA report on field sampling activities, and the data validation report.

At the end of the project, the PQAM may submit a lessons leaned report to the Engineering Consultant's Project Manager which will discuss the QA activities. That report may include discussions of any conditions adverse or potentially adverse to quality, such as responses to the findings of any field or laboratory audits; any field, laboratory, or sample conditions which necessitated a departure from the methods or procedures specified in this QAPP; field sampling errors; and any missed holding times or problems with laboratory QC acceptance criteria; and the associated corrective actions undertaken. This report shall not preclude immediate notification to project management of such problems when timely notice can reduce the loss or potential loss of quality, time, effort, or expense.

These reports, if prepared, shall be reviewed by the Engineering Consultant's Project Manager for completeness and the appropriateness of any corrective actions, and they shall be retained in the project files.

In the final investigative report, laboratory and field QC data will be presented, including a summary of QA activities and any problems and/or comments associated with the analytical and sampling effort. Any corrective actions taken in the field, results of any audits, and any modifications to laboratory protocols will be discussed.

Attachment 1

NYSDEC ASP Methods 4035 (PAHs) and 4020 (PCBs)

Attachment 2

Field PAH and PCB Soil Test Technical Guides and Test Kit Instructions

TABLE 3
TARGET ANALYTES AND CONTRACT REQUIRED QUANTITATION (CRQ) LIMITS[1]

	Contract Required Quantitation Limit Water Samples (ug/L)	Contract Required Quantitation Limit Soil Samples (ug/kg)
NYSDEC ASP TCL Volatile Organic Compounds (by 2001-1)		
Acetone	10	10
Benzene	10	10
Bromodichloromethane	10	10
Bromoform	10	10
Bromomethane	10	10
2-Butanone	10	10
Carbon disulfide	10	10
Carbon tetrachloride	10	10
Chlorobenzene	10	10
Chloroethane	10	10
Chloroform	10	10
Chloromethane	10	10
Dibromochloromethane	10	10
1,1-Dichloroethane	10	10
1,2-Dichloroethane	10	10
1,1-Dichloroethene	10	10
1,2-Dichloroethene (cis and trans)	10	10
1,2-Dichloropropane	10	10
cis-1,3-Dichloropropene	10	10
trans-1,3-Dichloropropene	10	10
Ethylbenzene	10	10
2-Hexanone	10	10
4-Methyl-2-pentanone	10	10
Methylene chloride	10	10
Styrene	10	10
1,1,2,2-Tetrachloroethane	10	10
Tetrachloroethene	10	10
Toluene	10	10
1,1,1-Trichloroethane	10	10
1,1,2-Trichloroethane	10	10
Trichloroethene	10	10
Vinyl chloride	10	10
Total Xylenes	10	10

NOTES

1. Specific detection limits are highly matrix dependent. The detection limits listed herein are provided for guidance and may not always be achievable. Quantitation limits listed for soil are based on wet weight.
2. If the information provided in this table differs from the most recent version of the ASP (2001), the ASP requirements will take precedence. In addition, if site-specific requirements dictate a change in quantitation limits, the Site-Specific Work Plan (which will include this information) will take precedence.

TABLE 3 (Cont'd)
TARGET ANALYTES AND CRQ LIMITS[1]

	Contract Required Quantitation Limit Water Samples(ug/L)	Contract Required Quantitation Limit Soil Samples(ug/kg)
NYSDEC ASP TCL - Semivolatile Organic Compounds (by 2001-2)		
Base/Neutral Extractables		
Acenaphthene	10	330
Acenaphthylene	10	330
Anthracene	10	330
Benzo(a)anthracene	10	330
Benzo(b)fluoranthene	10	330
Benzo(k)fluoranthene	10	330
Benzo(g,h,i)perylene	10	330
Benzo(a)pyrene	10	330
bis(2-Chloroethoxy)methane	10	330
bis(2-Chloroethyl)ether	10	330
bis(2-ethylhexyl)phthalate	10	330
4-Bromophenyl phenyl ether	10	330
Butyl benzyl phthalate	10	330
Carbazole	10	330
4-Chloroaniline	10	330
2-Chloronaphthalene	10	330
4-Chlorophenyl phenyl ether	10	330
Chrysene	10	330
Dibenz(a,h)anthracene	10	330
Dibenzofuran	10	330
Di-n-butylphthalate	10	330
1,2-Dichlorobenzene	10	330
1,3-Dichlorobenzene	10	330
1,4-Dichlorobenzene	10	330
3,3'-Dichlorobenzidine	10	330
Diethyl phthalate	10	330
Dimethyl phthalate	10	330
2,4-Dinitrotoluene	10	330

NOTES

1. Specific detection limits are highly matrix dependent. The detection limits listed herein are provided for guidance and may not always be achievable. Quantitation limits listed for soil are based on wet weight.
2. If the information provided in this table differs from the most recent version of the ASP (2001), the ASP requirements will take precedence. In addition, if site-specific requirements dictate a change in quantitation limits, the Site-Specific Work Plan (which will include this information) will take precedence.

TABLE 3 (Cont'd)
TARGET ANALYTES AND CRQ LIMITS[1]

	Contract Required Quantitation Limit Water Samples(ug/L)	Contract Required Quantitation Limit Soil Samples(ug/kg)
NYSDEC ASP TCL - Semivolatile Organic Compounds (by 2001-2, Cont.)		
2,6-Dinitrotoluene	10	330
Di-n-octylphthalate	10	330
Fluoranthene	10	330
Fluorene	10	330
Hexachlorobenzene	10	330
Hexachlorobutadiene	10	330
Hexachlorocyclopentadiene	10	330
Hexachloroethane	10	330
Indeno(1,2,3-cd)pyrene	10	330
Isophorone	10	330
2-methyl Naphthalene	10	330
Naphthalene	10	330
2-Nitroaniline	25	800
3-Nitroaniline	25	800
4-Nitroaniline	25	800
Nitrobenzene	10	330
N-Nitroso-diphenylamine	10	330
N-Nitroso-dipropylamine	10	330
2,2' Oxybis(1-chloropropane)	10	330
Phenanthrene	10	330
Pyrene	10	330
1,2,4-Trichlorobenzene	10	330

NOTES

1. Specific detection limits are highly matrix dependent. The detection limits listed herein are provided for guidance and may not always be achievable. Quantitation limits listed for soil are based on wet weight.
2. If the information provided in this table differs from the most recent version of the ASP (2001), the ASP requirements will take precedence. In addition, if site-specific requirements dictate a change in quantitation limits, the Site-Specific Work Plan (which will include this information) will take precedence.

TABLE 3 (Cont'd)
TARGET ANALYTES AND CRQ LIMITS[1]

	Contract Required Quantitation Limit Water Samples(ug/L)	Contract Required Quantitation Limit Soil Samples(ug/kg)
NYSDEC ASP TCL - Semivolatile Organic Compounds (by 2001-2, Cont.) **Acid Extractables (cont.)**		
4-Chloro-3-methylphenol	10	330
2-Chlorophenol	10	330
2,4-Dichlorophenol	10	330
2,4-Dimethylphenol	10	330
4,6-Dinitro-2-methylphenol	25	800
2,4-Dinitrophenol	25	800
2-Methylphenol	10	330
4-Methylphenol	10	330
2-Nitrophenol	10	330
4-Nitrophenol	25	800
Pentachlorophenol	25	800
Phenol	10	330
2,4,5-Trichlorophenol	25	800
2,4,6-Trichlorophenol	10	330
NYSDEC ASP TCL Pesticides and PCBs (by 2001-3)		
Aldrin	0.05	1.7
alpha-BHC	0.05	1.7
beta-BHC	0.05	1.7
delta-BHC	0.05	1.7
gamma-BHC (Lindane)	0.05	1.7
Chlordane (alpha &/or gamma)	0.05	1.7
4,4'-DDD	0.10	3.3
4,4'-DDE	0.10	3.3
4,4'-DDT	0.10	3.3
Dieldrin	0.10	3.3
Endosulfan I	0.05	1.7
Endosulfan II	0.10	3.3
Endosulfan sulfate	0.10	3.3

NOTES

1. Specific detection limits are highly matrix dependent. The detection limits listed herein are provided for guidance and may not always be achievable. Quantitation limits listed for soil are based on wet weight.
2. If the information provided in this table differs from the most recent version of the ASP (2001), the ASP requirements will take precedence. In addition, if site-specific requirements dictate a change in quantitation limits, the Site-Specific Work Plan (which will include this information) will take precedence.

TABLE 3 (Cont'd)
TARGET ANALYTES AND CRQ LIMITS[1]

	Contract Required Quantitation Limit Water Samples(ug/L)	Contract Required Quantitation Limit Soil Samples(ug/kg)
NYSDEC ASP TCL - Pesticides and PCBs (by 2001-3, Cont.)		
Endrin	0.10	3.3
Endrin Aldehyde	0.10	3.3
Endrin Ketone	0.10	3.3
Heptachlor	0.05	1.7
Heptachlor Epoxide	0.05	1.7
Methoxychlor	0.50	17.0
Toxaphene	5.0	170.0
Aroclor-1016	1.0	33.0
Aroclor-1221	2.0	67.0
Aroclor-1232	1.0	33.0
Aroclor-1242	1.0	33.0
Aroclor-1248	1.0	33.0
Aroclor-1254	1.0	33.0
Aroclor-1260	1.0	33.0
NYSDEC ASP TAL Metals and Cyanide (by CLP-M)		
Aluminum	200	
Antimony	60	
Arsenic	10	
Barium	200	
Beryllium	5	
Cadmium	5	
Calcium	5000	
Chromium	10	
Cobalt	50	
Copper	25	
Iron	100	
Lead	3	
Magnesium	5000	

NOTES

1. Specific detection limits are highly matrix dependent. The detection limits listed herein are provided for guidance and may not always be achievable. Quantitation limits listed for soil are based on wet weight.
2. If the information provided in this table differs from the most recent version of the ASP (2001), the ASP requirements will take precedence. In addition, if site-specific requirements dictate a change in quantitation limits, the Site-Specific Work Plan (which will include this information) will take precedence.

TABLE 3 (Cont'd.)
TARGET ANALYTES AND CRQ LIMITS[1]

	Contract Required Quantitation Limit Water Samples(ug/L)	Contract Required Quantitation Limit Soil Samples(ug/kg)
NYSDEC ASP TAL Metals and Cyanide (by CLP-M) (Cont.)		
Manganese	15	
Mercury	0.2	
Nickel	40	
Potassium	5000	
Selenium	5	
Silver	10	
Sodium	5000	
Thallium	10	
Vanadium	50	
Zinc	20	
Cyanide	10	

NOTES

1. Specific detection limits are highly matrix dependent. The detection limits listed herein are provided for guidance and may not always be achievable. Quantitation limits listed for soil are based on wet weight.
2. If the information provided in this table differs from the most recent version of the ASP (2001), the ASP requirements will take precedence. In addition, if site-specific requirements dictate a change in quantitation limits, the Site-Specific Work Plan (which will include this information) will take precedence.

These CRQLs are the instrument detection limits obtained in pure water that must be met using the procedure in Exhibit E. The quantitation limits for samples may be considerably higher depending on the sample matrix.

TABLE 1
SAMPLE CONTAINERIZATION

Analysis	Bottle Type	Preservation[1]	Holding Time[2]
Aqueous Samples			
Volatile Organics (BTEX)	40 ml glass vial with Teflon-lined septa	Cool to 4°C	7 days
PCBs/Pesticides	1000 ml amber glass	Cool to 4°C	5 days*
Semivolatile Organics (PAHs)	1000 ml amber glass	Cool to 4°C	5 days*
Metals	1000 ml polyethene	HNO_3 to pH <2	6 months (Mercury 26 days)
Cyanide	1000 ml polyethene	NaOH to pH >12	12 days
Soil & Sediment Samples			
Volatile Organics (BTEX)	Wide-mouth glass w/ teflon-lined septa [3]	Cool to 4°C	7 days
Semivolatile Organics (PAHs)	Wide-mouth glass w/ teflon cap [3]	Cool to 4°C	5 days*
Pesticide/PCBs	Wide-mouth glass w/ teflon cap [3]	Cool to 4°C	5 days*
Metals, Cyanide	Wide mouth glass w/ teflon cap [3]	Cool to 4°C	Metals - 6 months Mercury - 26 days Cyanide - 12 days

NOTES

1. All samples to be preserved in ice at 4°C during collection and transport.
2. Days from verified time of sample receipt (VTSR) by the laboratory.
3. Sized appropriately for the analytical method.
4. If the information provided in this table differs from the most recent version of the ASP (2001), the ASP requirements will take precedence. In addition, if site-specific requirements dictate a change in containerization requirements, the Site-Specific Work Plan (which will include this information) will take precedence.

* Extraction of water samples for pesticides/PCB analysis by separating funnel must be completed within five days of VTSR. Continuous liquid-liquid extraction is the required extraction for water samples for semivolatiles. Continuous liquid-liquid extraction of water samples, or sonication or soxhlet procedures for semivolatile and pesticides/PCB analyses, shall be started within five days. If a re-extraction and reanalysis must be performed, the extraction must start within 10 days and completed within 12 days of VTSR. Extracts of either water or soil/sediment samples must be analyzed within 40 days of VTSR.

TABLE 2
LABORATORY ANALYSIS PROGRAM

Matrix	Parameter [1]	Analytical Method [2]
Water	BTEX	Method 8260B*
	VOC	2001-1
	SVOC	2001-2
	PAHs	Method 8270C*
	PCBs and Pesticides	2001-3
	Metals	CLP-M (various for individual metals)
	Cyanide	CLP-M
Soil & Sediments	BTEX	Method 8260B*
	VOC	2001-1
	SVOC	2001-2
	PAHs	Method 8270C*
	Pesticides and PCBs	2001-3
	Metals	CLP-M (various for individual metals)
	Cyanide	CLP-M
	TCLP	Method 1311; Method Series 7000, 8000
Waste Characteristics		Methods 1010/1020A; 9040B/9041A; Section 7.3

NOTES

1. Abbreviations: BTEX = Benzene, Toluene, Ethylbenzene, Xylene; VOCs = Volatile organic compounds; SVOCs = Semivolatile organic compounds; PAHs = Polycyclic aromatic Hydrocarbons; TCLP = Toxicity Characteristic Leaching Procedure; PCBs = Polychlorinated Biphenyls; CLP = Contract Laboratory Program.
2. NYSDEC Analytical Services Protocol, 2001, Category B deliverables.
   Analyses must meet NYSDEC ASP holding time specified for Methods in Exhibit I Part II.
3. If the information provided in this table differs from the most recent version of the ASP (2001), the ASP requirements will take precedence. In addition, if site-specific requirements dictate a change in analytical requirements, the Site-Specific Work Plan (which will include this information) will take precedence

* BTEX and PAH analyses must meet NYSDEC ASP holding time specified for Methods 2001-1 and 2001-2, respectively.

FIGURE 1

DATA REDUCTION, VALIDATION AND REPORTING

Figure 1

DATA REDUCTION, VALIDATION & REPORTING SCHEME

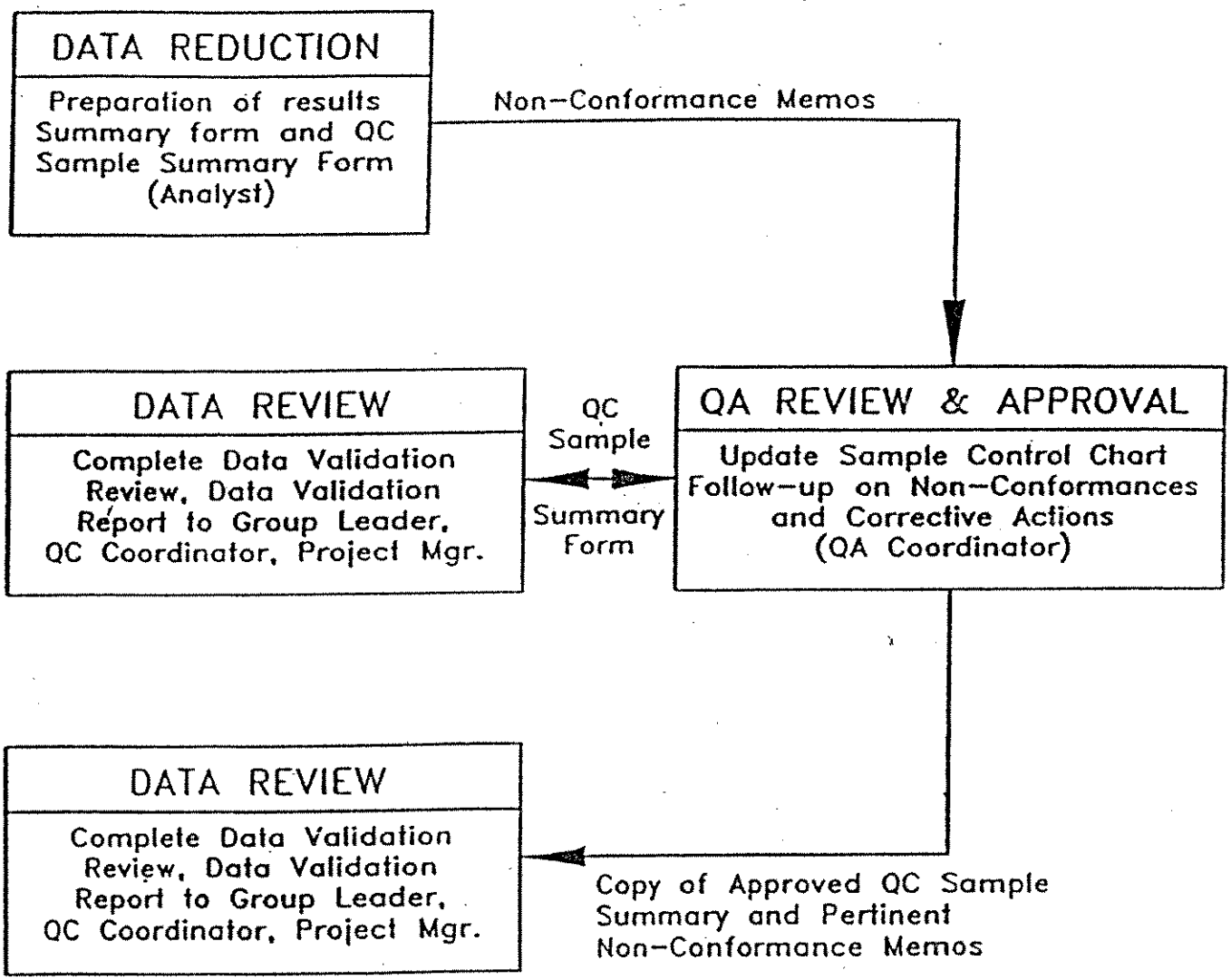
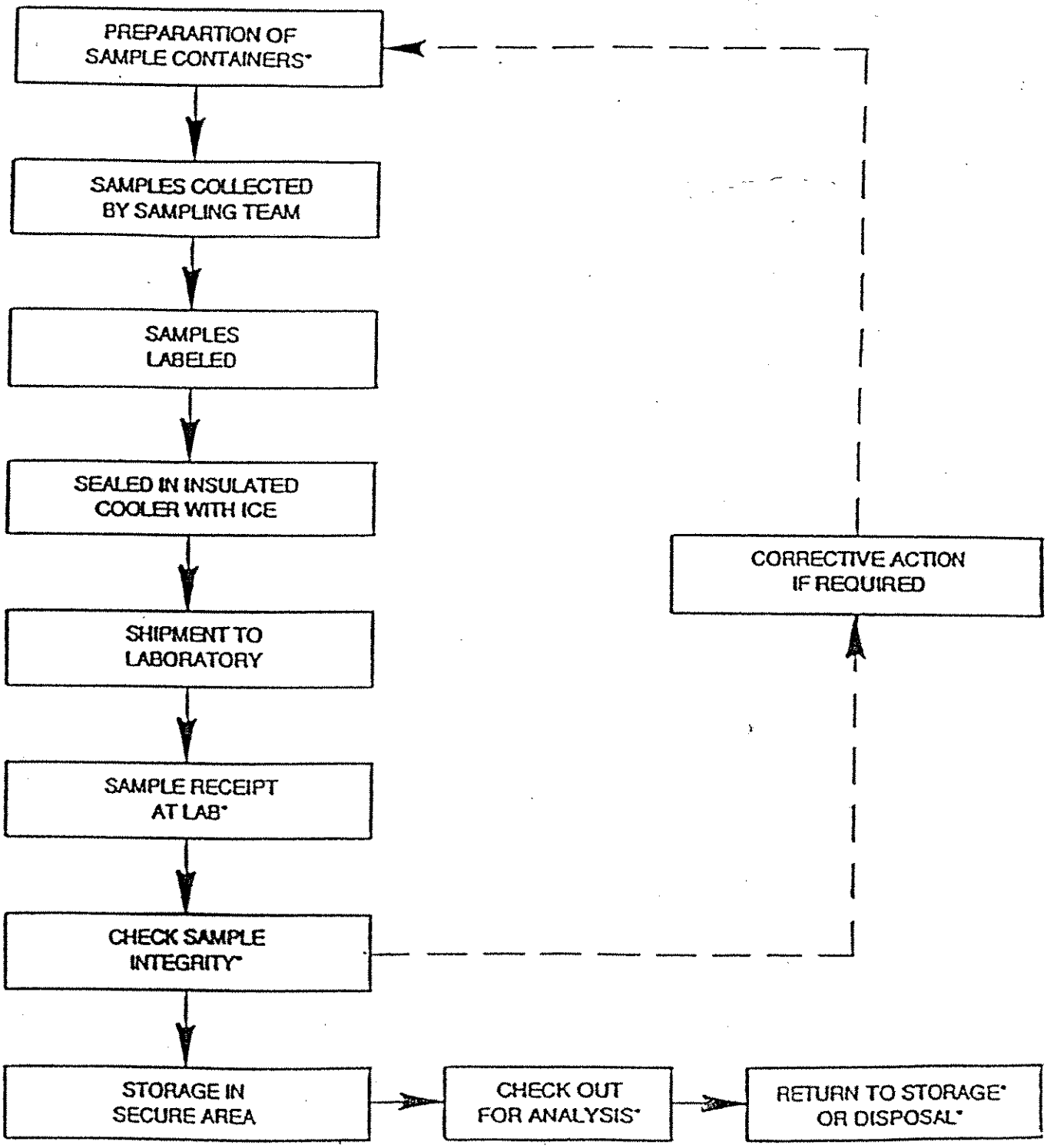


FIGURE 2

SAMPLE CUSTODY

Figure 2

SAMPLE CUSTODY



* Requires sign-off on Chain of Custody Form.

FIGURE 3

CHAIN-OF-CUSTODY RECORD

Severn Trent Laboratories
200 Monroe Turnpike
Monroe CT 06468
Tel: (203) 261-4458
Fax: (203) 268-5346

Committed To *Your* Success

CHAIN OF CUSTODY RECORD

PAGE OF NO.

STL JOB #:

CLIENT:

PROJECT ID:

STL PROJECT MGR:

RUSH ☐ YES ☐ NO DUE DATE

TESTS

BOTTLE TYPE AND PRESERVATION

REMARKS

BOTTLE SET #	CLIENT SAMPLE ID.	DATE / TIME SAMPLED	MATRIX	LAB (STL)	QC (Y / N)	FIELD FILTERED / CIRCLE Y or N								SAMPLE REMARKS
						Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	

MATRIX CODES

A - AIR
AQ - AQUEOUS
C - COMPLEX
D - DRUM WASTE
OI - OIL
S - SOIL
SL - SLUDGE
W - WIPE
O - OTHER
FB - FIELD BLANK
TB - TRIP BLANK

BOTTLES PREPARED BY	DATE / TIME	BOTTLES REC'D BY	DATE / TIME
SIGNATURE		SIGNATURE	
SAMPLES COLLECTED BY	DATE / TIME	RECEIVED IN LAB BY	DATE / TIME
SIGNATURE		SIGNATURE	

REMARKS ON SAMPLE RECEIPT

☐ BOTTLES INTACT ☐ CUSTODY SEALS
☐ PRESERVED ☐ SEALS INTACT
☐ CHILLED ☐ SEE REMARKS

LABORATORY COPY

FIGURE 4

DAILY STATUS AND MONITORING REPORT

DAILY STATUS & MONITORING REPORT
Niagara Mohawk SIR & MSA Programs

Date:_____ Site Name:_____

Project Manager:_____ Project Field Operations Lead:_____

Description of Field Work Performed:

Media	Sample Number	Types of Analyses	Sample Sent to Lab? (Y/N)	Comments

Means of Sample Shipment to Laboratory? Name and Location of Laboratory:

Issues/Concerns Raised:

Work to be Performed Tommorrow:

Name of Preparer:_____

FIGURE 5

CORRECTIVE ACTION REQUEST FORM

Figure 5

CORRECTIVE ACTION REQUEST	CAR NO. _____ DATE _____
PROJECT NO./TITLE _____ _____ _____ TASK NO./TITLE _____ _____	REFERENCE(S) _____ _____ REPLY DUE DATE _____
SUBJECT _____ _____	PREPARED BY _____
DESCRIPTION OF CONDITION	APPROVED BY _____ PROJECT MANAGER
_____ _____ _____ _____ _____	
CAUSE AND CORRECTIVE ACTION (Include Effective Date) _____ _____ _____ _____ _____ _____ _____ _____	
_____ TASK MANAGER DATE	_____ PROJECT QA OFFICER DATE
_____ PROJECT MANAGER DATE	
CLOSEOUT ACTION _____ _____ _____ _____ _____ _____ _____ _____	
_____ PROJECT QA OFFICER DATE	_____ PROJECT MANAGER DATE
SEE REVERSE SIDE FOR INSTRUCTIONS	

ATTACHMENT 1

ENSYS FIELD PAH AND PCB SOIL TEST TECHNICAL GUIDES AND TEST KIT INSTRUCTIONS

STRATEGIC DIAGNOSTICS INC.

PAHEnSys®
12T SOIL TEST SYSTEM 70613

RAPID IMMUNOASSAY SCREEN

User's Guide

This method correctly identifies 95% of samples that are PAH-free and those containing 1ppm or greater of PAHs. A sample that develops less color than the standard is interpreted as positive. It contains PAHs. A sample that develops more color than the standard is interpreted as negative. It contains less than 1 ppm PAHs.

IMPORTANT NOTICE

This test system should be used only under the supervision of a technically qualified individual who is capable of understanding any potential health and environmental risks of this product as identified in the product literature. The components must only be used for the analysis of soil samples for the presence of PAHs. After use, the kits must be disposed of in accordance with applicable federal and local regulations.

TROUBLE SHOOTING GUIDE

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

Wash Step - Lack of vigorous washing may result in false positives or negatives depending on whether the wash error was committed on standard or sample tubes. *Solution*: Make sure that the operator washes four times vigorously.

Pipette Calibration - An out-of-calibration pipette may result in false positives or negatives depending on whether the amount is greater or less than the specified transfer volume. *Solution*: Check the calibration at least daily and after any extreme mechanical shock (such as dropping). An indication that the pipette is out of calibration is if the gold barrel is loose and will turn. (When set on 30 µl there should be about 1/4 of an inch between the white plunger and the end of the clear pipette tip.)

Air bubbles in the pipette - the presence of air bubbles in the pipette tip when transferring extracts may result in false positives or negatives depending on whether the error was committed on standard or sample tubes. *Solution*: quickly examine the pipette tip each time an aliquot is withdrawn and go back to the source and take another aliquot to displace the bubble if necessary.

Mixing - Lack of thorough mixing, when instructed, can cause inconsistent results. *Solution*: observe the mixing times in the instructions and to mix with sufficient force to ensure that the liquid is homogeneous.

Timing - it is important to follow the timing steps in the instructions carefully. The incubation step in the antibody tubes can vary a bit without harm to the test. The color development step timing is critical and should be no less than 2 minutes and no greater than 3 minutes.

Addition of Drops - it is important to carefully count the drops added to color development steps. The addition of ±1 drop to the instructed 5 drops can cause variability in the results RIGHT AROUND THE DETECTION LEVELS OF INTEREST. One drop less could result in a darker color (a less dilute solution) and result in a false negative. One drop more could result in a lighter color (a more dilute solution) and result in a false positive

Wiping the Tubes - wiping of the tubes should be done before they are read in the spectrophotometer because smudges and fingerprints on the tubes can give potentially false negative readings.

Mixing Lot #'s - never mix lots! Each kit's components are QC'd together for optimal performance and may give inaccurate results with components from other kits, that are not of the same lot #. Also, the user must NEVER mix components from different types of kits (ex: Petro kit buffer tubes can't be used with a PAH kit).

Storage and Operating Temperatures - temperature requirements are very important and should be strictly adhered to. This information can be found in the kit User's Guide.

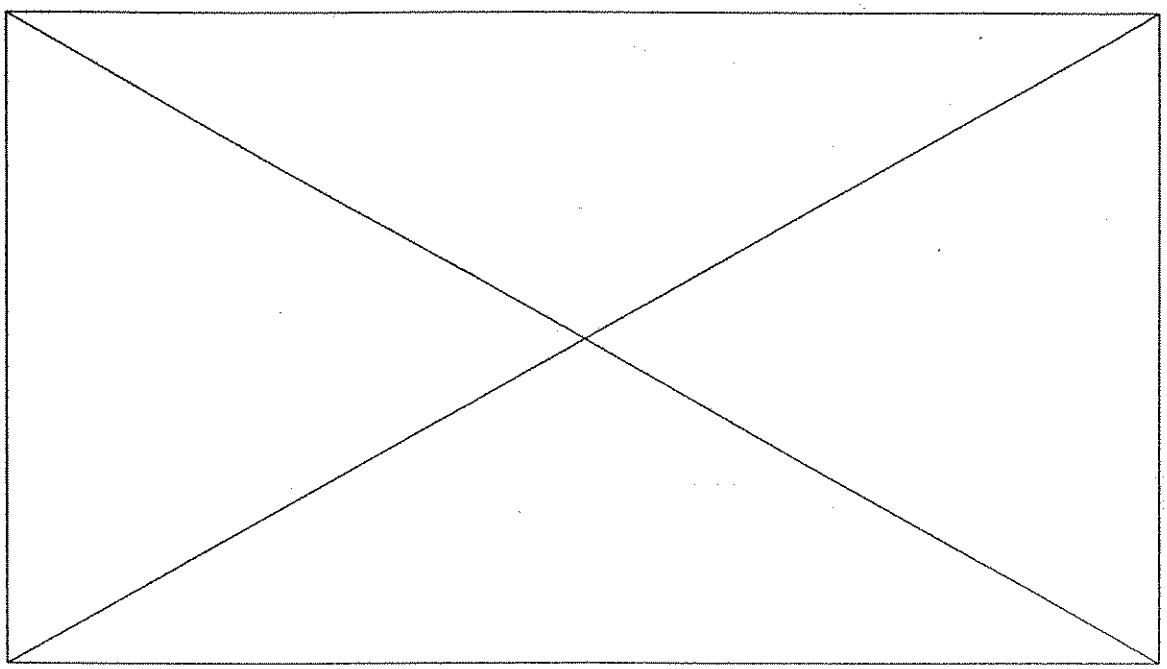
Shelf-life - each kit label contains the kit expiration date. To achieve accurate results, kits must be used prior to expiration.

WORKSTATION SET-UP

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

WORKSTATION SET-UP

- **Mechanical pipette tips**
- **Stop solution**
- **Standard vial**
- **4 antibody coated tubes**
- **Substrate A**
- **Filtration barrel & plunger**
- **1 and 10 ppm**
- **dilution ampules**
- **Substrate B**
- **Bulb pipette**
- **4 blue buffer tubes**
- **4 conjugate tubes**



READ BEFORE PROCEEDING

- Follow diagram above to setup workstation.
- Items that you will need that are not provided in the test kit include:
  a permanent marking pen, laboratory tissue (or paper towels), a liquid waste container, and disposable gloves.
- This User's Guide was written for analyzing soil samples for PAHs at 1 and 10 ppm.



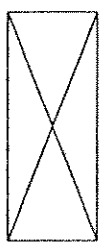
PAH Standard



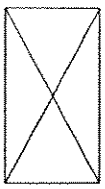
Ampule Cracker

TEST PREPARATION

- Label amber vial "PAH standard" and the current date; Standard is usable for up to 2 weeks from this date. Open PAH Standard ampule by slipping ampule cracker over top, and then breaking top at scored neck. Transfer to empty amber vial with bulb pipette. Always cap tightly when finished using Standard.



Bulb Pipette

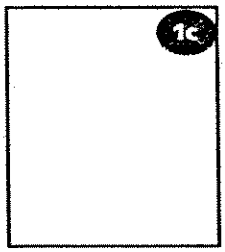


Amber Vial

PHASE 1 SAMPLE EXTRACTION & PREPARATION

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

WEIGH SAMPLE

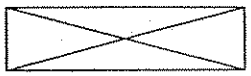


1a Place unused weigh boat on pan balance.

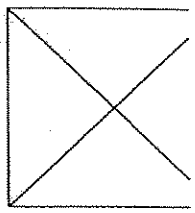
1b Press ON/MEMORY button on pan balance. Balance will beep and display 0.0.

1c Weigh out 10 + / - 0.1 grams of soil.

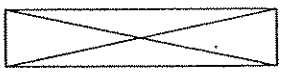
1d If balance turns off prior to completing weighing, use empty weigh boat to retare, then continue.



Pan balance

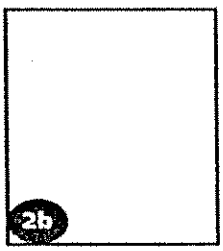


Weigh Boat



Wooden spatula

EXTRACT PAHS

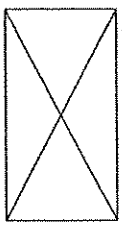


2a Uncap extraction jar and place on flat surface. Without contacting solvent, puncture foil seal with ampule cracker or sharp object. Peel the remainder of the seal off extraction jar.

2b Using wooden spatula, transfer 10 grams of soil from weigh boat into extraction jar.

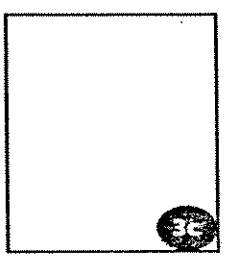
2c Recap extraction jar tightly and shake **vigorously** for one minute.

2d Allow to settle for one minute. Repeat steps **1a -2c** for each sample to be tested.



Sample extraction jar

FILTER SAMPLE

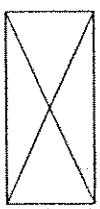


3a Remove lid from extraction jar.

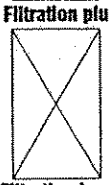
3b Disassemble filtration plunger from filtration barrel.

3c Insert bulb pipette into top (liquid) layer in extraction jar and draw up sample. Transfer **at least** 1/2 bulb capacity into filtration barrel. **Do not use more than one full bulb.**

3d Press plunger firmly into barrel until adequate filtered sample is available (place on table and press if necessary).



Filtration plunger



Filtration barrel

Bulb pipette

READ TO AVOID COSTLY MISTAKES

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

SAMPLE DILUTION PROGRAM FOR DETECTION LEVELS OTHER THAN 1 & 10PPM

1. The sample dilution procedure on the next page is for standard detection levels. The following diagram represents the sample dilution procedure for all other detection levels.

2. At your request, your kit may include extra dilution ampules to reach high detection levels.

3. **EVERY AMPULE PROVIDED MUST BE USED!**

If there are any questions concerning the dilution procedure please call Technical Services before running the samples to help avoid costly mistakes.
1-800-544-8881.

EXAMPLE:

Lowest ppm	Intermediate ppm	Highest ppm	Dilution Ampules

NOTE: Your order may include additional ampules in order to achieve your test levels. Always transfer filtered sample to the dilution ampule labeled with the lowest PPM level and then transfer from this ampule to the next higher level dilution tube.

PHASE 2 SAMPLE & STANDARD PREPARATION

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

READ BEFORE PROCEEDING

- Label the glass conjugate and plastic antibody coated tubes with a permanent marking pen.
- When using the mechanical pipette always withdraw and dispense below the liquid level. Instructions for operating the Mechanical Pipette are found on page 13.
- "Shake tubes" means to thoroughly mix the contents with special care not to spill or splash.

DILUTE AND BUFFER SAMPLE FOR 1 PPM AND 10 PPM DETECTION LEVELS

4a Uncap enough blue buffer, conjugate, and antibody coated tubes for Samples and Standards.

4b Empty a blue buffer tube into each conjugate tube.

4c Assemble new tip onto mechanical pipette.

4d Open 1 and 10 ppm dilution ampules by slipping ampule cracker over tip, and then breaking top at scored neck.

PHASE 2 SAMPLE & STANDARD PREPARATION

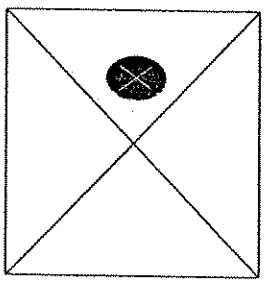
READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

DILUTE AND BUFFER SAMPLE

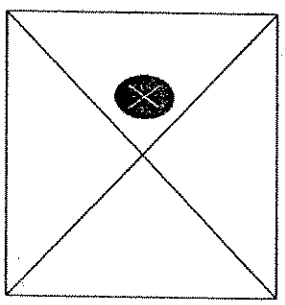


4e Withdraw 75 µL of filtered sample using mechanical pipette and dispense below the liquid level in 1 ppm dilution ampule. Gently shake ampule for 5 seconds.

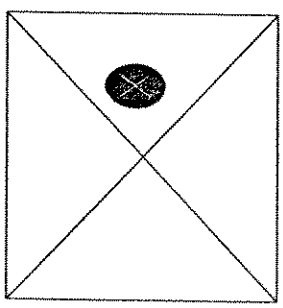
4f Withdraw 75 µL of diluted sample from the 1 ppm dilution ampule and dispense below the liquid level in the 10 ppm dilution ampule. Gently shake ampule for 5 seconds.



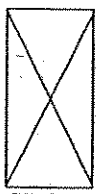
4g Withdraw 75 µL of diluted sample from 10 ppm dilution ampule and dispense below the liquid level in corresponding conjugate tube. Always wipe tip after dispensing into conjugate tube. Withdraw 75µL of 1ppm sample and dispense into corresponding conjugate tube.



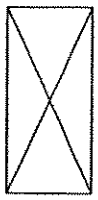
4h Assemble new tip onto mechanical pipette and withdraw 75µl of PAH Standard and dispense below the liquid level in two conjugate tubes. Immediately replace cap on PAH Standard vial.



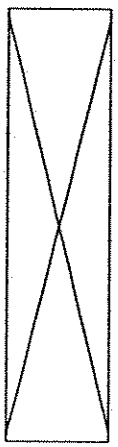
4i Gently shake conjugate tubes for 5 seconds.



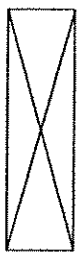
Dilution ampules (1 & 10 ppm)



Plastic Safety Sleeve



Mechanical pipette



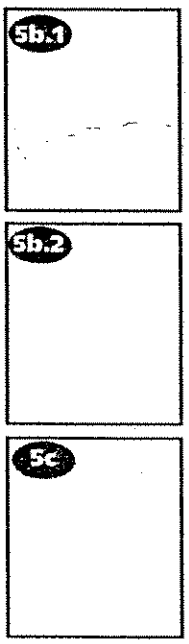
Mechanical pipette tip

READ BEFORE PROCEEDING

PHASE 3 THE IMMUNOASSAY

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

TRANSFER FROM CONJUGATE TUBE TO ANTIBODY COATED TUBE



5a. Set timer for 10 minutes.

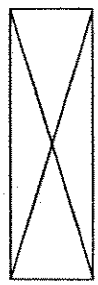
5b. Working left to right in the workstation:

1. Fit all antibody coated tubes firmly on top of all corresponding conjugate tubes.

2. **Start timer and immediately** invert **all** connected tube pairs so that the liquid is poured into the antibody coated tubes. Return the tube pairs to the appropriate workstation row making sure the larger (antibody coated) tube is on the bottom.

5c. Invert all tube pairs several more times making sure the pair is returned to the workstation with the larger (antibody coated) tube on the bottom.

5d. Disconnect and discard the smaller glass conjugate tubes. [It is not important to worry about drops of liquid adhering to lips of tubes].



Antibody coated tubes (contained in resealable "zip-seal" aluminized pouch)

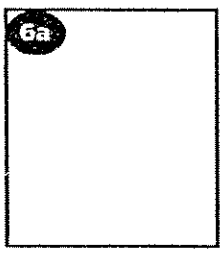
PHASE 3 THE IMMUNOASSAY

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

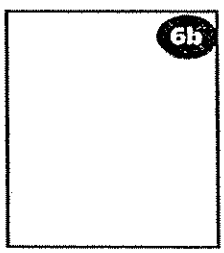
DILUTE AND BUFFER SAMPLE

4e Withdraw 75 µL of filtered sample using mechanical pipette and dispense below the liquid level in 1 ppm dilution ampule. Gently shake ampule for 5 seconds.

4f Withdraw 75 µL of diluted sample from the 1 ppm dilution ampule and dispense below the liquid level in the 10 ppm dilution ampule. Gently shake ampule for 5 seconds.



4g Withdraw 75 µL of diluted sample from 10 ppm dilution ampule and dispense below the liquid level in corresponding conjugate tube. Always wipe tip after dispensing into conjugate tube. Withdraw 75µL of 1ppm sample and dispense into corresponding conjugate tube.



Wash bottle

4h Assemble new tip onto mechanical pipette and withdraw 75µl of PAH Standard and dispense below the liquid level in two conjugate tubes. Immediately replace cap on PAH Standard vial.

4i Gently shake conjugate tubes for 5 seconds.

PHASE 3 THE IMMUNOASSAY

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

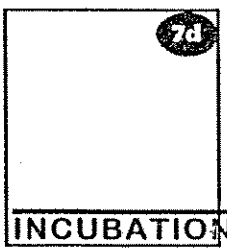
READ BEFORE PROCEEDING

- This phase of the procedure requires critical timing and care in handling the antibody coated tubes.

ADD ENZYME

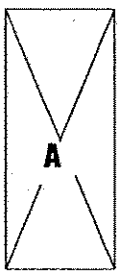
6a Dispense first drop from enzyme dropper into liquid waste container.

Note: before dispensing drops, tap capped tip on hard surface to avoid dispensing air bubbles.

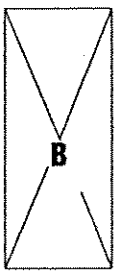


6b Dispense 3 drops of enzyme into each blue buffer tube by squeezing the dropper.

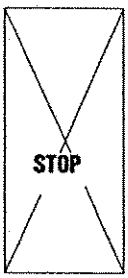
6c Shake buffer tubes for 5 seconds.



Substrate A



Substrate B



Stop

INCUBATION

7a Set timer for 10 minutes.

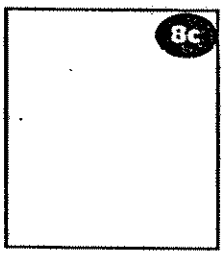
7b Start timing and immediately pour solution from each blue buffer tube into appropriate antibody coated tube.

7c When pouring is complete, gently shake all 4 tubes for 5 seconds.

PHASE 4 INTERPRETATION

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

SELECT STANDARD



8a Wipe outside of all antibody coated tubes.

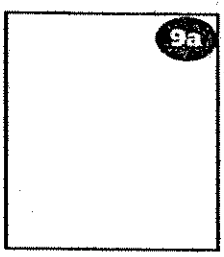
8b Place both Standard tubes in photometer.

8c Switch tubes until the photometer reading is negative or zero. Record reading.

If reading is greater than - 0.3 in magnitude , results are outside QC limits. Retest the sample(s).

8d Remove and discard tube in right well. The tube in the left well is the more conservative standard and should be used.

MEASURE SAMPLE



9a Place 1 ppm tube in right well of photometer and record reading shown on display.

If photometer reading is negative or zero, PAHs are present.

If photometer reading is positive, concentration of PAHs are less than 1 ppm.

9b Place 10 ppm tube in right well of photometer and record reading shown on display.

If photometer reading is negative or zero, PAHs are present.

If photometer reading is positive, concentration of PAHs are less than 10 ppm.

QUALITY CONTROL

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

How It Works

Standards, Samples, and color-change reagents are added to test tubes coated with a chemical specific to PAHs. The concentration of PAHs in an unknown **Sample** is determined by comparing its color intensity with that of a **Standard.**

Note: PAHs concentration is inversely proportional to color intensity; the lighter the color development of the sample, the higher the concentration of PAHs.

Quality Control

Standard precautions for maintaining quality control:

- Do not use reagents or test tubes from one Test System with reagents or test tubes from another Test System.
- Do not use the Test System after its expiration date.
- Each analysis must include 2 **Standards,** with no more than a total of 12 antibody coated tubes.
- Do not exceed incubation periods prescribed by the specific steps.
- Results may not be valid if photometer reading for **Standards** exceed 0.3 in magnitude.

Storage and Handling Precautions

- Wear protective gloves and eyewear.
- Store kit at room temperature and out of direct sunlight (less than 80°F).
- Keep aluminized pouch (containing unused antibody coated tubes) sealed when not in use.
- If liquid from the extraction jar, or PAH Standard comes into contact with eyes, wash thoroughly with cold water and seek immediate medical attention.
- Operate test at temperatures greater than 40° F/4 °C and less than 90° F/32° C.
- After use, dispose of kit components in accordance with applicable federal and local regulations.

System Description

Each PAH RISc Soil Test System contains enough material to perform four complete tests, each at 1 and 10 ppm.

The PAH RISc Soil Test is divided into four phases. The instructions and notes should be reviewed before proceeding with each phase.

Hotline Assistance

If you need assistance or are missing necessary Test System materials, call toll free:

1-800-544-8881.

Validation and Warranty Information

Product claims are based on validation studies carried out under controlled conditions. Data has been collected in accordance with valid statistical methods and the product has undergone quality control tests of each manufactured lot.

PAH-free soil and soil containing 1 ppm and 10 ppm of PAHs were tested with the EnSys® PAH analytical method. The method correctly identified 95% of these samples. A sample that has developed less color than the standard is interpreted as positive. It contains PAHs. Either a 1 ppm or a 10 ppm sample that has developed more color than the standard is interpreted as negative. It contains less than the indicated level of PAHs (1 ppm or 10 ppm).

The company does not guarantee that the results with the EnSys® PAH Soil Test System will always agree with instrument-based analytical laboratory methods. All analytical methods, both field and laboratory, need to be subject to the appropriate quality control procedures.

Strategic Diagnostics Inc. warrants that this product conforms to the descriptions contained herein. No other warranties, whether expressed or implied, including warranties of merchantability and of fitness for a particular purpose shall apply to this product.

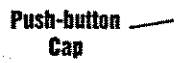
SDI neither assumes nor authorizes any representative or other person to assume for it any obligation or liability other than such as is expressly set forth herein.

Under no circumstances shall SDI be liable for incidental or consequential damages resulting from the use or handling of this product.

MECHANICAL PIPETTE

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

HOW TO OPERATE THE MECHANICAL PIPETTE



To Set Or Adjust Volume

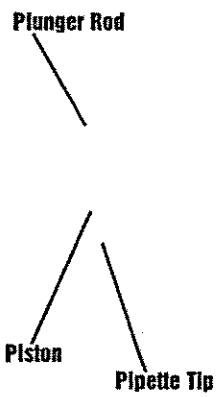
Remove push-button cap and use it to loosen volume lock screw. Turn lower part of push-button to adjust volume up or down. Meter should read "075". Tighten volume lock screw and replace push-button cap.

To Assemble Pipette Tip

Slide larger mounting end of pipette tip onto end of pipette. Holding tip in place, press push-button until plunger rod enters pipette tip. Ensure no gap exists between piston and plunger rod (see illustration).

To Withdraw Sample

With tip mounted in position on pipette, press push-button to first stop and hold it. Place tip at bottom of liquid sample and slowly release push-button to withdraw measured sample. Ensure that no bubbles exist in liquid portion of sample. If bubbles exist, dispense sample and re-withdraw sample.



To Dispense Sample

Place tip into dispensing vessel (immersing end of the tip if vessel contains liquid) and slowly press push-button to first stop. (Do not push to second stop or tip will eject).

Remove tip from vessel and release push-button.

To Eject Tip

Press push-button to second stop. Tip is ejected.

For additional information regarding operation and use of pipette, please refer to your pipette manual.

ON-SITE QUALITY CONTROL/QUALITY ASSURANCE RECOMMENDATIONS SDI EnSys® TEST SYSTEM

Please read the following before proceeding with field testing.

SAMPLING

The result of your screening test is only as valid as the sample that was analyzed. Samples should be homogenized thoroughly to ensure that the 10 grams you remove for field testing is representative of the sample as a whole. All other applicable sample handling procedures should be followed as well.

PRIOR TO TESTING SAMPLES

Carefully follow the instructions in the User's Guide included with every test kit. This is the key element in obtaining accurate results. In addition, store your unused test kits at room temperature and do not use them past their expiration date (see label on each test kit).

INTERNAL TEST QC

Two standards are analyzed with each sample to provide internal test system quality control. With both standards inserted in the photometer, a valid test is indicated when the magnitude of the displayed number (irrespective of the sign, + or -) is less than the value given in the User's Guide. Test runs resulting in a greater number should be repeated to ensure valid conclusions.

QA/QC

The validity of field test results can be substantially enhanced by employing a modest, but effective QA/QC plan. SDI recommends that you structure your QA/QC plan with the elements detailed below. These have been developed based on the data quality principles established by the U.S. Environmental Protection Agency.

A. **Sample Documentation**
   1. Location, depth
   2. Time and date of collection and field analysis

B. **Field analysis documentation** - provide raw data, calibration, any calculations, and final results of field analysis for all samples screened (including QC samples)

C. **Method calibration** - this is an integral part of EnSys RIS® immunoassay tests; a duplicate calibration is performed for each set of samples tested (see the instructions in the User's Guide)

D. **Method blank** - analyze methanol from the extraction jar.

E. **Site-specific matrix background field analysis** - collect and field analyze uncontaminated sample from site matrix to document matrix effect

F. **Duplicate sample field analysis** - field analyze duplicate sample to document method repeatability; at least one of every 20 samples should be analyzed in duplicate

G. **Confirmation of field analysis** - provide confirmation of the quantitation of the analyte via an EPA-approved method different from the field method on at least 10% of the samples; choose at least two representative samples testing above the action level; provide chain of custody and documentation such as gas chromatograms, mass spectra, etc.

H. **Performance evaluation sample field analysis (optional, but strongly recommended)** - field analyze performance evaluation sample daily to document method/operator performance

I. **Matrix spike field analysis (optional)** - field analyze matrix spike to document matrix effect on analyte measurement

FURTHER QUESTIONS?

SDI's technical support personnel are always prepared to discuss your quality needs to help you meet your data quality objectives. 1-800-544-8881.

Data for PAH EnSys® Soil Test

Operator: _____ Date: _____ Location: _____

Sample ID	ΔOD	OD sample	Interpretation	OD sample	Interpretation	N O T E S
	Standards	_____ ppm		_____ ppm		

STRATEGIC DIAGNOSTICS INC.

PCB EnSys® 12T SOIL TEST SYSTEM

70203

RAPID IMMUNOASSAY SCREEN

User's Guide

IMPORTANT NOTICE

This method correctly identifies 95% of samples that are PCB-free and those containing 1 ppm or greater of PCBs. A sample that develops less color than the standard is interpreted as positive. It contains PCBs. A sample that develops more color than the standard is interpreted as negative. It contains less than 1 ppm PCBs.

This test system should be used only under the supervision of a technically qualified individual who is capable of understanding any potential health and environmental risks of this product as identified in the product literature. The components must only be used for the analysis of soil samples for the presence of polychlorinated biphenyls. After use, the kits must be disposed of in accordance with applicable federal and local regulations.

TROUBLESHOOTING GUIDE

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

WASH STEP

Lack of vigorous washing may result in false positives or negatives depending on whether the wash error was committed on standard or sample tubes. Solution: Make sure to wash four times vigorously, washing the whole set of 12 tubes at once.

PIPET CALIBRATION

An out-of-calibration pipet may result in false positives or negatives depending on whether the amount is greater or less than the specified transfer volume. *Solution*Check the calibration at least daily and after any extreme mechanical shock (such as dropping). An indication that the pipet is out of calibration is if the gold barrel is loose and will turn. (When set on 30 µl there should be about a 1/4 of an inch between the white plunger and the end of the clear pipet tip.)

AIR BUBBLES IN THE PIPET

The presence of air bubbles in the pipet tip when transferring extracts may result in false positives or negatives depending on whether the error was committed on standard or sample tubes. *Solution*Quickly examine the pipet tip each time an aliquot is withdrawn and go back to the source and take another aliquot to displace the bubble if necessary.

MIXING

Lack of thorough mixing, when instructed, can cause inconsistent results. *Solution*Observe the times in the instructions and mix with sufficient force to ensure that the liquid is homogenous.

TIMING

It is important to follow the timing steps in the instructions carefully. The incubation step in the antibody tubes can vary a bit without harm to the tests. The color development step timing is critical and should be no less than 2 minutes and no greater than 3 minutes.

WIPING THE TUBES

Wiping of the tubes should be done before they are read in the spectrophotometer because smudges and fingerprints on the tubes can give potentially false negative readings.

MIXING LOT #'S

Never mix lots! Each kit's components are matched for optimal performance and may give inaccurate results with the components from other kits with different lot #'s. Also, NEVER mix components from different types of kits (ex: Petro kit buffer can not be used with a PAH kit).

STORAGE AND OPERATING TEMPERATURES

Temperature requirements are very important and should be strictly adhered to. This test kit should be stored at less than 80°F/27°C and operated between 40°F/4°C and 90°F/32°C.

SHELF-LIFE

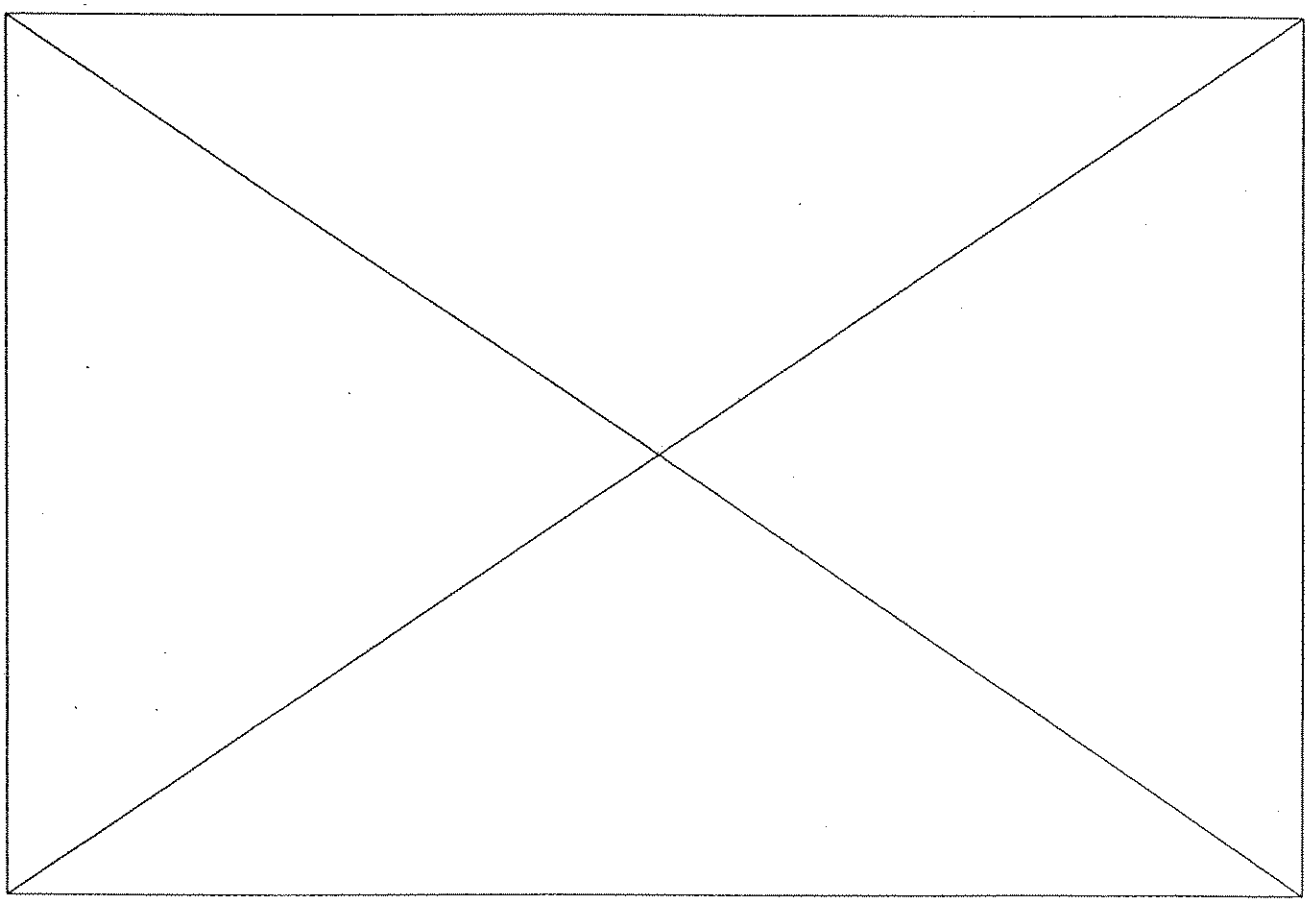
Each kit label contains the kit expiration date. To achieve accurate results, kits must be used prior to expiration.

WORKSTATION SET-UP

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

WORKSTATION SET-UP

- Mechanical pipet tips
- Filter barrels & plungers
- Ampule cracker
- Glass PCB buffer tubes
- Substrate A
- Eppendorf pipet tips
- Bulb pipets
- PCB standard
- Antibody coated tubes
- Substrate B
- Extraction jars
- 1 & 10 ppm dilution ampules
- Stop Solution



Workstation shows components for 3 samples tested at 2 levels

TEST PREPARATION

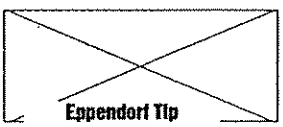
READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

READ BEFORE PROCEEDING

- Do not attempt to run more than 12 tubes, two of which must be standards.
- Items that you will need that are not provided in the test kit include: a permanent marking pen, laboratory tissue (or paper towels), a liquid waste container, and disposable gloves.
- This User's Guide was written for analyzing soil samples for PCBs at 1 and 10 ppm. See table on page 10 for sensitivity to various Aroclors.

TEST PREPARATION

- Label all Eppendorf repeater tips. Tips can be reused for future analyses. Label the first 5mL tip "A", the second 5mL tip "B" and the third 5mL tip "Stop".

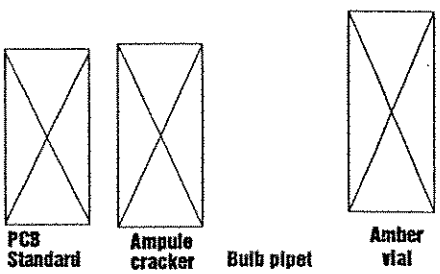


- Label the 12.5 mL tip "Buffer".

STANDARD PREPARATION

- Open PCB Standard ampule by slipping ampule cracker over top, and then breaking tip at scored neck. Transfer solution to empty vial with Bulb Pipets.

- Label vial with current date. Standard is usable for 2 weeks. Always cap tightly when finished using standard.



PHASE 1 EXTRACTION & PREPARATION OF THE SAMPLE

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

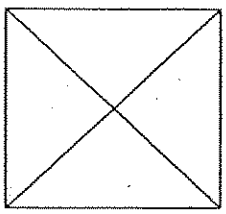
WEIGH SAMPLE

1a. Place unused weigh boat on pan balance.

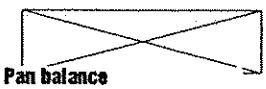
1b. Press ON/MEMORY button on pan balance. Balance will beep and display 0.0.

1c. Weigh out 10 ⁄ 0.1 grams of soil.

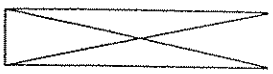
1d. If balance turns off prior to completing weighing, use empty weigh boat to retare, then continue.



Weigh Boat



Pan balance



Wooden spatula

EXTRACT PCBS

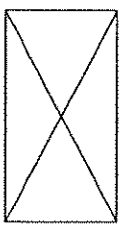
2a. Uncap extraction jar and place on a flat surface. Without contacting solvent puncture foil seal with ampule cracker or sharp object. Peel the remainder of the seal off extraction jar.

2b. Using wooden spatula, transfer 10 grams of soil from weigh boat into extraction jar.

2c. Recap extraction jar tightly and shake **vigorously** for one minute.

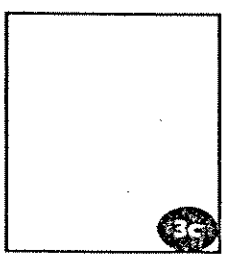
2d. Allow to settle for one minute.

Repeat steps 1a - 2c for each sample to be tested.



Extraction Jar

FILTER SAMPLE

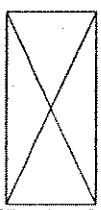


3a. Disassemble filtration plunger from filtration barrel.

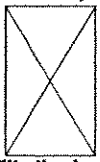
3b. Insert bulb pipet into top (liquid) layer in extraction jar and draw up sample. Transfer **at least ½** bulb capacity into filtration barrel. **Do not use more than one full bulb.**

3c. Press plunger firmly into barrel until adequate filtered sample is available (place on table and press if necessary).

Repeat steps **3a - 3c** for each sample to be tested.



Filtration plunger



Filtration barrel

Bulb pipet

READ TO AVOID COSTLY MISTAKES

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

SAMPLE DILUTION PROGRAM

1. The sample dilution procedure on the next page is for standard detection levels. The following diagram represents the sample dilution procedure for all other detection levels.

2. Your kit may include extra dilution ampules to reach high detection levels.

3. **EVERY AMPULE PROVIDED MUST BE USED!**

   If there are any questions concerning the dilution procedure please call SDI Technical Services before running the samples to help avoid costly mistakes. (1-800-544-8881)

EXAMPLE:

Lowest ppm	Intermediate ppm	Highest ppm	Dilution Ampules

NOTE: Your Kit may include additional ampules in order to achieve your test levels. Always transfer filtered sample to the dilution ampule labeled with the lowest PPM level and then transfer from this ampule to the next higher level dilution tube.

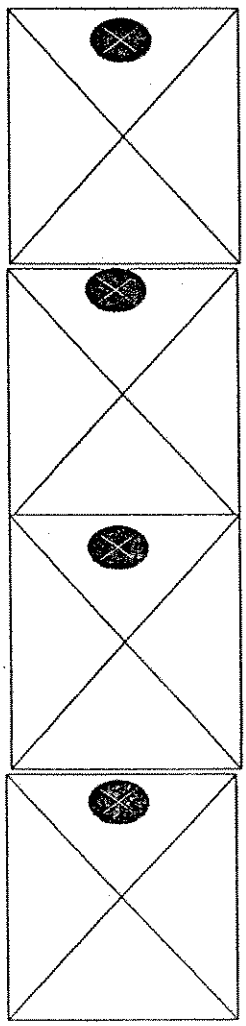
PHASE 2 SAMPLE & STANDARD PREPARATION

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

READ BEFORE PROCEEDING

- Label the plastic antibody coated tubes with a permament marking pen.
- When using the mechanical pipet always withdraw and dispense below the liquid level.
- "Shake tubes" means to thoroughly mix the contents with special care not to spill or splash.

DILUTE SAMPLES AND STANDARDS



4a. Set the Eppendorf Repeater on 4, assemble the "Buffer" tip and fill with Buffer.

4b. Dispense 1 mL of Buffer into each glass buffer tube.

4c. Open 1 and 10 ppm dilution ampules by slipping ampule cracker over top, and then breaking top at scored neck.

4d. Withdraw 60 µL of filtered sample using mechanical pipet and dispense below the liquid level in "1 ppm" dilution ampule. Gently shake ampule from side to side for 5 seconds to mix thoroughly.

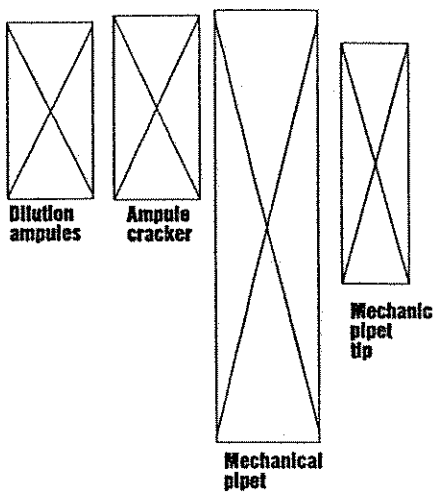
4e. Withdraw 60 µL from the "1 ppm" dilution ampule using mechanical pipet and dispense below the liquid level in "10 ppm" dilution ampule. Gently shake ampule from side to side for 5 seconds to mix thoroughly.

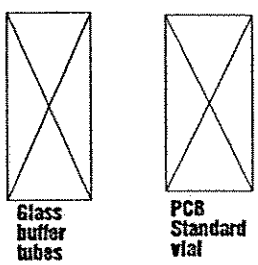
4f. Transfer 60 µL from each dilution ampule into glass buffer tubes. Always wipe tip after dispensing into buffer tube.

4g. Change pipet tip and repeat 4d - 4f for each sample.

4h. Assemble new pipet tip on mechanical pipet and transfer 60 µL from Standard vial into two glass buffer tubes. Immediately replace cap on PCB Standard vial.

4i. Shake all glass buffer tubes for 5 seconds.

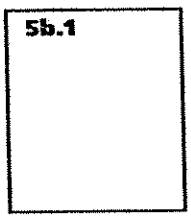


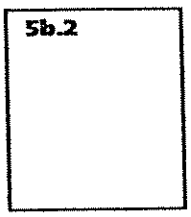


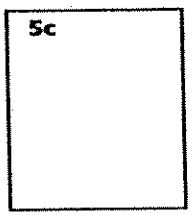
PHASE 3 THE IMMUNOASSAY

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

TRANSFER FROM DILUTION TUBE TO ANTIBODY COATED TUBE







5a. Set timer for 10 minutes

5b. Working left to right in the workstation:

1. Fit all antibody coated tubes firmly on top of all corresponding glass buffer tubes.

2. Start timer and immediately invert all connected tube pairs so that the liquid is poured into the antibody coated tubes. Return the tube pairs to the appropriate workstation row making sure the larger (antibody coated) tube is on the bottom.

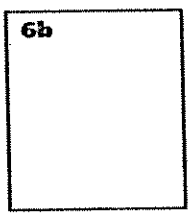
5c. Invert all tube pairs several more times making sure the pair is returned to the workstation with the larger (antibody coated) tube on the bottom.

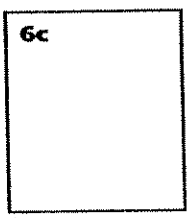
5d. Disconnect and discard the smaller (dilution) tubes. It is not important to worry about drops of liquid adhering to lips of tubes.

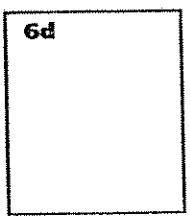
5e. Place conjugate tubes behind antibody tubes in workstation. Remove grey caps and discard.

TRANSFER OF CONJUGATE TO ANTIBODY COATED TUBES

AFTER 10 MINUTES, IMMEDIATELY:







6a. Set timer for 5 minutes.

6b. Working left to right in the workstation:

Start timer and immediately:

Dissolve the conjugate pellets by horizontally connecting the antibody coated tubes and conjugate tubes and **tilt the liquid up to pour it onto the conjugate.**

6c. Return the connected tubes to the appropriate workstation row making sure **the larger (antibody coated) tube is on the bottom. It is important that this step is completed within one minute for all tubes.**

6d. In order to adequately mix solution, **invert** all connected tube pairs **several more times** making sure that the pair is returned to the workstation with the larger (antibody coated) tube on the bottom.

6e. Disconnect and discard the conjugate tubes. It is not important to worry about the loss of liquid adhering to lip of tubes.

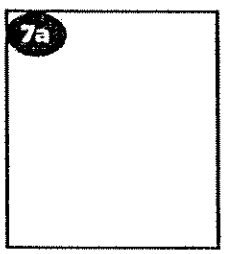
PHASE 3 THE IMMUNOASSAY

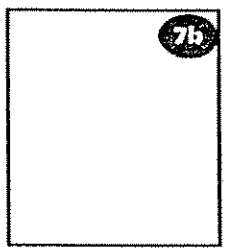
READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

READ BEFORE PROCEEDING
WASH PROCEDURE

- An accurate test requires a vigorous wash accomplished by directing a strong stream into the antibody coated tubes.
- The wash solution is a harmless, dilute solution of detergent.

WASH



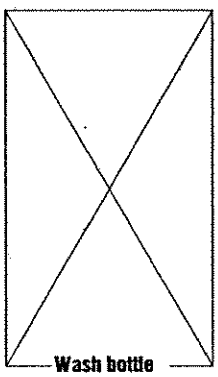


7a After the 5 minute incubation, empty antibody coated tubes into liquid waste container.

7b Wash antibody coated tubes by vigorously filling and emptying a total of 4 times.

7c Tap antibody coated tubes upside down on paper towels to remove excess liquid. Residual foam in the tubes will not interfere with test results.

Note: When running up to 12 antibody coated tubes, tubes can be washed in two groups - one group immediately following the other group.



PHASE 3 THE IMMUNOASSAY

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

COLOR DEVELOPMENT

8a. Set the Eppendorf Repeater on 2, assemble the "A" tip and fill with Substrate A (TMB, yellow label).

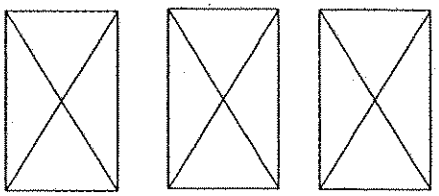
8b. Dispense once (200 µL) into each antibody coated tube.

8c. Set timer for exactly 2 1/2 minutes.

8d. Assemble "B" tip, fill with Substrate B, start timer, and dispense once (200 µL H_2O_2, green label) into each antibody coated tube.

8e. Shake all tubes for 5 seconds. Solution will turn blue in some or all antibody coated tubes.

8f. Assemble "Stop" tip, fill with Stop Solution (red label), and stop reaction at end of 2 1/2 minutes by dispensing once (200 µL) into each antibody coated tube.



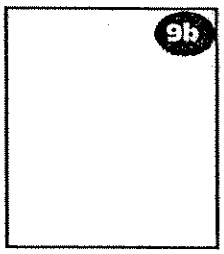
AROCLOR SENSITIVITY

Aroclor	Lowest Detection Level
1248	1.0 ppm
1254	0.5 ppm
1260	0.5 ppm
1242	2.0 ppm
1232	4.0 ppm
1016	4.0 ppm

PHASE 4 ANALYSIS OF RESULTS

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

SELECT STANDARD



9a. Wipe outside of all antibody coated tubes.

9b. Place both Standard tubes in photometer.

9c. Switch tubes until the photometer reading is negative or zero. Record reading.

If reading is greater than - 0.3 in magnitude (reading is less than or lower than - 0.3), results are outside QC limits. Retest the sample(s). (See QC Example)

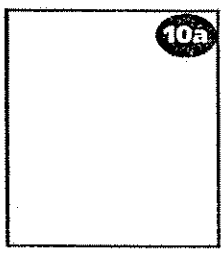
9d. Remove and discard tube in right well. The tube in the left well is the conservative standard.

QC Check Example:

If the photometer reading (with both Standard tubes) is **-0.34 or 0.34**, results are outside the QC limits, and the samples should be retested.

If the photometer reading (with both Standard tubes) is **-0.27 or 0.27**, results are within the QClimits, and testing may proceed.

MEASURE SAMPLE



10a. Place 1 ppm tube in right well of photometer and record reading.

If photometer reading is negative or zero, PCBs are present.

If photometer reading is positive, concentration of PCBs is less than 1 ppm.

10b. Place 10 ppm tube in right well of photometer and record reading.

If photometer reading is negative or zero, PCBs are present.

If photometer reading is positive, concentration of PCBs is less than 10 ppm.

QUALITY CONTROL

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

System Description

Each SDI PCB Ensys® Soil 12 Test Case contains enough material to perform 12 test samples, each at two detection levels.

The SDI PCB EnSys Soil Test is divided into four phases. The instructions and notes should be reviewed before proceeding with each phase.

Hotline Assistance

If you need assistance or are missing necessary Test System materials, call toll free: 1-800-544-8881.

Validation and Warranty Information

Product claims are based on validation studies carried out under controlled conditions. Data has been collected in accordance with valid statistical methods and the product has undergone quality control tests of each manufactured lot.

PCB-free soil and soil containing 1 ppm or greater of PCBs were tested with the SDI EnSys PCB analytical method. The method correctly identified 95% of these samples. A sample that has developed less color than the standard is interpreted as positive. It contains PCBs. A sample that has developed more color than the standard is interpreted as negative. It contains less than 1 ppm PCBs.

SDI does not guarantee that the results with the PCB EnSys Soil 12 Test System will always agree with instrument-based analytical laboratory methods. All analytical methods, both field and laboratory, need to be subject to the appropriate quality control procedures.

How It Works

Standards, Samples, and color-change reagents are added to test tubes, coated with a chemical specific to PCBs. The concentration of PCBs in an unknown **Sample** is determined by comparing its color intensity with that of a **Standard**.

Note: PCB concentration is inversely proportional to color intensity; the lighter the color development of the sample, the higher the concentration of PCBs.

Quality Control

Standard precautions for maintaining quality control:

- Do not use reagents or test tubes from one Test System with reagents or test tubes from another Test System.
- Do not use the Test System after any portion has passed its expiration date.
- Do not attempt the test using more than 12 antibody coated tubes (two of which are Standards) at the same time.
- Do not exceed incubation periods prescribed by the specific steps.
- Always follow the procedure in this user's guide.
- Use EPA Method 8080 or Code of Federal Regulations Title 40, Part 136, Appendix A, Method 680 to confirm results.

Storage and Handling Precautions

- Wear protective gloves and eyewear.
- Store kit at room temperature and out of direct sunlight (less than 80°F).
- Keep aluminized pouch (containing unused antibody coated tubes) sealed when not in use.
- If Stop Solution or liquid from the extraction jar comes into contact with eyes, wash thoroughly with cold water and seek immediate medical attention.
- Standard Solution contains PCBs. Test samples may contain PCBs. Handle with care.

REPEATER PIPET & MECHANICAL PIPET

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

HOW TO OPERATE THE REPEATER PIPET

To Set Or Adjust Volume

To determine the pipetting volume, the dial setting (1-5) is multiplied by the minimum pipetting volume of the tip.

To Assemble Pipet Tip

Slide filling lever down until it stops. Then raise the locking clamp and insert the tip until it clicks into position. Be sure the tip plunger is fully inserted into the barrel before lowering the locking clamp to affix the tip in place.

To Fill Tip

With tip mounted in position on pipet, immerse end of tip into solution. Slide filling lever upward slowly.

To Dispense Sample

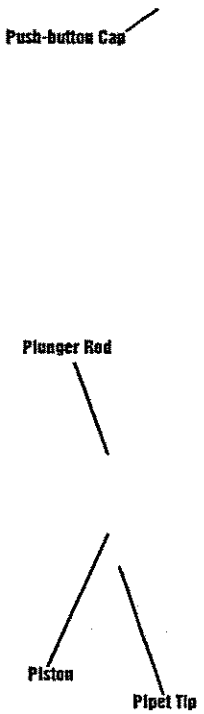
Check the volume selection dial to ensure pipetting volume. Place tip inside test tube so that tip touches the inner wall of tube. Completely depress the pipetting lever.

To Eject Tip

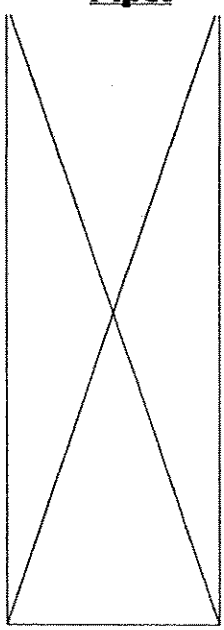
Empty tip of any remaining solution into appropriate container. Raise locking clamp upward, and remove the tip.

For additional information regarding operation and use of repeater, please refer to your Repeater pipet manual.

Mechanical Pipet



Repeater Pipet



HOW TO OPERATE THE MECHANICAL PIPET

To Set Or Adjust Volume

Remove push-button cap and use it to loosen volume lock screw. Turn lower part of push-button to adjust volume up or down. Meter should read "060". Tighten volume lock screw and replace push-button cap.

To Assemble Pipet Tip

Slide larger mounting end of pipet tip onto end of pipet. Holding tip in place, press push-button until plunger rod enters pipet tip. **Ensure no gap exists between piston and plunger rod.**

To Withdraw Sample

With tip mounted in position on pipet, press push-button to first stop and hold it.

Place tip at bottom of liquid sample and slowly release push-button to withdraw measured sample. Ensure that no bubbles exist in liquid portion of sample. If bubbles exist, dispense sample and re-withdraw sample.

To Dispense Sample

Place tip into dispensing vessel (immersing end of the tip if vessel contains liquid) and slowly press push-button to first stop. (Do not push to second stop or tip will eject).

Remove tip from vessel and release push-button.

To Eject Tip

Press push-button to second stop. Tip is ejected.

For additional information regarding operation and use of pipet, please refer to your pipet manual.

ON-SITE QUALITY CONTROL/QUALITY ASSURANCE RECOMMENDATIONS SDI EnSys® 12 TEST SYSTEM

Please read the following before proceeding with field testing.

PRIOR TO TESTING SAMPLES

Carefully follow the instructions in the User's Guide included with every test kit. This is the key element in obtaining accurate results. In addition, store your unused test kits at room temperature and do not use them past their expiration date (see label on each test kit).

INTERNAL TEST QC

Two standards are analyzed with each sample to provide internal test system quality control. With both standards inserted in the photometer, a valid test is indicated when the magnitude of the displayed number (irrespective of the sign, + or -) is less than the value given in the User's Guide. Test runs resulting in a greater number should be repeated to ensure valid conclusions.

QA/QC

The validity of field test results can be substantially enhanced by employing a modest, but effective QA/QC plan. SDI recommends that you structure your QA/QC plan with the elements detailed below. These have been developed based on the data quality principles established by the U.S. Environmental Protection Agency.

A. **Sample Documentation**
   1. Location, depth
   2. Time and date of collection and field analysis

B. **Field analysis documentation** - provide raw data, calibration, any calculations, and final results of fieldanalysis for all samples screened (including QC samples)

C. **Method calibration** - this is an integral part of SDI's EnSys immunoassay tests; a duplicate calibration is performed for each set of samples tested (see the instructions in the User's Guide)

D. **Method blank** - analyze methanol from the extraction jar.

E. **Site-specific matrix background field analysis** - collect and field analyze uncontaminated sample from site matrix to document matrix effect

F. **Duplicate sample field analysis** - field analyze duplicate sample to document method repeatability; at least one of every 20 samples should be analyzed in duplicate

G. **Confirmation of field analysis** - provide confirmation of the quantitation of the analyte via an EPA-approved method different from the field method on at least 10% of the samples; choose at least two representative samples testing above the action level; provide chain of custody and documentation such as gas chromatograms, mass spectra, etc.

H. **Performance evaluation sample field analysis (optional, but strongly recommended)** - field analyze performance evaluation sample daily to document method/operator performance

I. **Matrix spike field analysis (optional)** - field analyze matrix spike to document matrix effect on analyte measurement

FURTHER QUESTIONS?

SDI's technical support personnel are always prepared to discuss your quality needs to help you meet your data quality objectives. (1-800-544-8881)

Data for SDI PCB EnSys® 12T Soil Test

Operator: _____ Date: _____ Location: _____

Sample ID	ΔOD	OD sample	Interpretation	OD sample	Interpretation	Comments
	Standards	_____ ppm		_____ ppm		

Appendix N: Waste Management Plan

DRAFT

Waste Management Plan
Patchogue (W. Main Street) Former Manufactured Gas Plant (MGP) Site

Prepared for
National Grid
175 East Old Country Road
Hicksville, New York 11801

December 2012

Project Number: 142128.550

This is a draft and is not intended to be a final representation of the work done or recommendations made by Brown and Caldwell. It should not be relied upon; consult the final report.

Brown and Caldwell Associates
2 Park Way, Suite 2A
Upper Saddle River, New Jersey 07458

Table of Contents

Appendices i
List of Abbreviations ii
1. Introduction 1-1
1.1 Site Background 1-1
1.2 Summary of Remedial Activities 1-1
1.3 Applicable Rules and Regulations 1-1
2. Waste Management 2-1
2.1 Soil 2-1
2.1.1 Soils Potentially Subject to Reuse 2-2
2.1.2 Soils Subject to Off-Site Treatment/Disposal 2-2
2.2 Wastewater 2-2
2.3 NAPL 2-2
2.4 Demolition Debris 2-3
2.5 Miscellaneous Construction Debris 2-3
3. Transportation and Disposition 3-1
3.1 Waste Profiles and Manifests 3-1
3.2 Transportation 3-1
References REF-1

Appendices

Appendix A DER-4 Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment from Former Manufactured Gas Plants
Appendix B National Grid US Companies Environmentally Approved Waste Disposal and Recycling Facilities
Appendix C National Grid Environmental Procedure No. 1 Waste Management

List of Abbreviations

BC	Brown and Caldwell Associates
DNAPL	Dense non-aqueous phase liquid
ELAP	Environmental Laboratory Approval Program
MGP	Manufactured Gas Plant
NAPL	Non-aqueous phase liquid
NIOSH	National Institute of Occupational Safety and Health
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYDOL	New York State Department of Labor
NYSDOT	New York State Department of Transportation
OSHA	Occupational Safety and Health Administration
PAHs	Polycyclic aromatic hydrocarbons
PPE	Personal protective equipment
RDR	Remedial Design Report
ROD	Record of Decision
SPDES	State Pollution Discharge Elimination System
TAGM	Technical and Administrative Guidance Memorandum
TCLP	Toxic Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
WMP	Waste Management Plan

Section 1
Introduction

This Waste Management Plan (WMP) has been prepared by Brown and Caldwell Associates (BC), on behalf of National Grid, to support the implementation of the selected remedy for the Patchogue (W. Main Street) Former Manufactured Gas Plant (MGP) Site (referred to as The Site). The Site is located at 234 West Main Street in the Village of Patchogue, Town of Brookhaven, Suffolk County, New York. The selected remedy is detailed in the document entitled "Record of Decision, K-Patchogue MGP, Patchogue, Suffolk County, Site No. 152182" (ROD). This WMP describes the characterization, management, handling, treatment/disposal, and re-use requirements for the wastes anticipated to be generated during the remedial activities.

1.1 Site Background

Site background is presented in the Remedial Design Report "Remedial Design Report (50-75% Submission), Patchogue Former MGP Site, Patchogue, Suffolk County, New York, Site No. 1-52-182" prepared by Brown and Caldwell Associates and submitted to the NYSDEC on December 27, 2012.

1.2 Summary of Remedial Activities

The remedial activities will include the following:

- Selective Demolition;
- Dewatering and On-Site Water Treatment;
- Installation of Temporary Shoring;
- Excavation;
- In-Situ Solidification
- Backfilling and Compaction;
- Construction of Environmental Cap; and
- Site Restoration.

These activities are further described in the Remedial Design Report "Remedial Design Report (50-75% Submission), Patchogue Former MGP Site, Patchogue, Suffolk County, New York, Site No. 1-52-182" prepared by Brown and Caldwell Associates and submitted to the NYSDEC on December 27, 2012.

1.3 Applicable Rules and Regulations

The handling, transport, and disposal of waste materials will be performed in accordance with the following:

- Occupational Safety and Health Administration (OSHA) rules and regulations, including Title 29 of the Code of Federal Regulations (CFR) Parts 1920 and 1926;
- United States Environmental Protection Agency (USEPA) rules and regulations, including 40 CFR;
- United States Department of Transportation (USDOT) rules and regulations, including 49 CFR Parts 171 and 172;
- National Institute of Occupational Safety and Health (NIOSH) recommendations;

- New York State Department of Environmental Conservation (NYSDEC) rules and regulations, including Title 6 of the Official Compilation of Codes, Rules, and Regulations (6 NYCRR) Parts 360, 364, 370, 374, and 376;
- "DER-4 Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment from Former Manufactured Gas Plants," (MGPs), DER-4; NYSDEC 2002a, included herein as Appendix A;
- "DER-10 Technical Guidance for Site Investigation and Remediation," DER-10; NYDEC 2010;
- New York State Department of Labor (NYDOL) rules and regulations, including 12 NYCRR Part 56;
- New York State Department of Transportation (NYSDOT) rules and regulations;
- New York State Department of Health (NYSDOH) rules and regulations;
- Applicable federal, state, and local government regulations;
- National Grid USA Waste Management and Recycling Procedures for conducting Work at Company Facilities;
- National Grid Supplementary Conditions;
- National Grid Contractor Environmental Requirements;
- National Grid Safety Procedures; and
- National Grid Contractor Safety Requirements.
- National Grid Environmental Procedure No. 1 Waste Management

Whenever there is a conflict or overlap of the above-referenced rules and regulations, the most stringent provision shall be applicable.

Section 2

Waste Management

It is anticipated that the following waste materials will be generated during the implementation of the remedial activities:

- Soil;
- Water;
- Non-aqueous phase liquid (NAPL);
- Demolition debris; and
- Miscellaneous construction debris.

All wastes designated for off-site treatment and/or disposal will be transported to one or more National Grid-approved facilities, listed in Appendix B, unless otherwise noted. Facilities will be selected based on the type of waste material, characterization results, and local flow provisions.

Laboratory analysis of any samples collected to characterize waste materials will be performed by a laboratory certified by the New York State Department of Health (NYSDOH), Environmental Laboratory Approval Program (ELAP), and approved by National Grid. The handling/management and disposal requirements for each type of waste materials are discussed in the following subsections of this WMP.

Waste materials intended for off-site transportation and disposal will be staged in designated areas of the Site that are not proximate to off-site roadways in order to minimize the potential for off-site impacts. All staging of excavated soil and impacted debris will be performed on staging areas that are underlain by plastic sheeting with perimeter berms to contain run-on and run-off. Excavated soils and impacted debris will be covered with plastic sheeting to minimize the potential for impacts from odors as well as the effects of weather. Odor suppressing foam will be applied to waste stockpiles, as necessary, to minimize the potential for impacts from odors generated by the impacted soils. Waste materials will be staged in areas that are underlain by plastic sheeting and encompassed within perimeter berms to contain run-on and run-off. The staged materials will be covered with plastic sheeting during non-active periods and during non-work hours. Liners will be properly anchored to prevent uplift due to wind conditions and will be installed to minimize ponding of precipitation.

2.1 Soil

The remedial activities include the excavation of approximately 3,800 cubic yards of soil and ISS material. A portion of this volume may be suitable for re-use on-site as backfill; the remainder will be subject to off-site disposal at a National Grid-approved disposal facility. Excavated soils resulting from the implementation of the remedial action are not expected to be classified as hazardous waste for disposal.

Excavated soils, destined for off-site disposal, will be characterized either in-situ prior to excavation activities or using samples obtained from stockpiled excavated soils. The Remedial Contractor will be responsible for coordinating with off-site disposal facilities, approved by National Grid, to profile soils according to the requirements of the individual facilities. The Remedial Contractor shall notify the National Grid and/or BC (the Design Engineer) as to any restrictions imposed by the disposal facility.

2.1.1 Soils Potentially Subject to Reuse

In accordance with the ROD and as detailed in the Remedial Design Report (RDR), excavated targeted materials that do not contain visual dense non-aqueous phase liquids (DNAPL), sheens, and/or substantial odor indicative of MGP wastes or possible purifier wastes, may be reused as backfill. Excavated targeted materials that do not contain NAPL but exhibit visible sheens or odors will be in accordance with the Specifications. If these materials do not contain concentrations of total polycyclic aromatic hydrocarbons (PAHs) above 500 mg/kg, reactive cyanide concentrations above 250 mg/kg and/or reactive sulfide concentrations 500 mg/kg, they may be used as backfill. No piping, construction debris, brick, wood or other deleterious materials will be used as backfill; these materials will be removed prior to the use of the soil as backfill.

2.1.2 Soils Subject to Off-Site Treatment/Disposal

Removed soils are not expected to be classified as hazardous waste for disposal as indicated by the results of waste characterization performed during pre-design investigation activities. Excavated soils subject to off-site disposal will be managed/transported in a manner consistent with non-hazardous waste pursuant to the requirements of the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4061 (NYSDEC 2001), "Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment from Former Manufactured Gas Plants" (aka DER-4).

Pursuant to the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4061 (NYSDEC 2001) "Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment from Former Manufactured Gas Plants" (aka DER-4), soil, sediment and waste contaminated with coal tar from a former MGP which exhibits toxicity characteristic for benzene may be conditionally excluded from New York State's hazardous waste management regulatory program (6 NYCRR Parts 370-374 and 376) if they are destined for thermal treatment. Soils that exceed the Resource Conservation Recovery Act (RCRA), Toxicity Characteristic Leachate Procedure (TCLP) criteria for any other parameter except benzene are considered a characteristic or classified waste and, therefore, are considered hazardous materials, will be transported to a National Grid-approved facility, as listed in Appendix B.

2.2 Wastewater

Wastewater is anticipated to be generated during remedial activities from decontamination activities, subsurface structure/pipe removal, dewatering activities, and decontamination efforts. These wastewaters may be potentially contaminated with chemical constituents from on-site sources. Wastewater will be treated in an on-site temporary treatment facility to be constructed by the Remedial Contractor, and will be discharged to the Patchogue River under a State Pollutant Discharge Elimination System (SPDES) Equivalency Permit or containerized for off-site disposal. Wastewater will be sampled for the appropriate effluent criteria as stipulated in SPDES permit to ensure compliance.

2.3 NAPL

NAPL generation may occur as part of the excavation and/or dewatering activities. NAPL generated as part of the excavation of soils will remain commingled with the soil matrix and disposed off-site with the impacted soil. NAPL generated as part of dewatering activities will be separated as part of the treatment process, containerized, characterized and disposed off-site.

2.4 Demolition Debris

The anticipated debris to be generated during the remedial activities will consist of concrete, steel, and other demolition debris. The debris will be segregated, decontaminated, and processed, as necessary, to meet the selected disposal or recycling facility's acceptance criteria. These materials will be staged in roll-offs containers or similar containers during the work and will be removed from the Site, as soon as practicable.

2.5 Miscellaneous Construction Debris

Other construction debris generated during the remedial activities may include the following:

- Construction access road materials (e.g., fill materials and geosynthetics);
- Waste staging and decontamination areas (e.g., fill materials and geosynthetics);
- Temporary erosion and sediment control measures (e.g., silt fencing, straw bales, etc.);
- Disposable tools and equipment; and
- Personal protective equipment (PPE).

These materials will be placed in 55-gallon drums, roll-off or similar containers during the work and will be removed from the Site, as soon as practicable. The construction debris will be characterized and processed by the Remedial Contractor as required by the waste transportation and disposal/recycling facilities.

Section 3

Transportation and Disposition

During the implementation of remedial construction activities, the Remedial Contractor will coordinate and manage transportation and disposal of generated wastes to disposal facilities that have been approved by National Grid. Approved disposal facilities have been reviewed for permitting and licensing requirements, licenses and regulatory enforcement status by National Grid.

To avoid the potential for work delays, the Remedial Contractor will indentify and coordinate with the appropriate treatment/disposal facilities prior to initiating remedial activities.

National Grid will be identified as the generator of all solid wastes transported from the Site.

3.1 Waste Profiles and Manifests

All waste profiles will be prepared by the Remedial Contractor and reviewed/signed by National Grid or an authorized representative. When preparing waste profiles, the Remedial Contractor will determine if the waste materials can be transported/disposed of under an existing National Grid waste profile (if one exists) or if a new waste profile is required. A Manifest and/or Bill of Lading corresponding to each shipment of waste will be prepared by the Remedial Contractor and reviewed/signed by National Grid or an authorized representative. The Remedial Contractor will provide copies of the completed waste profiles and countersigned manifests to National Grid and BC (the Design Engineer) for the project file. The Remedial Contractor shall prepare and submit weekly waste tracking reports summarizing daily disposal tonnages, waste types, manifests, and weight tickets.

3.2 Transportation

All wastes designated for off-site disposal will be transported to solid, liquid, and hazardous waste treatment/disposal facilities that have been approved by National Grid, using New York State-licensed waste transportation companies. The trucks and/or roll-off containers will be fully lined and covered with solid covers. Safety latches will be used on the gates of transport trucks to prevent spills and/or releases to the environment. All transporters will be reviewed for up-to-date permitting requirements and licensing (pursuant to New York Codes, Rules and Regulations (NYCRR) Part 364). Those permits will be maintained on-site of the duration of the project. The Remedial Contractor shall ensure that transportation vehicles do not exceed permitted weights. Prior to leaving the Site, the vehicles will be inspected by the Remedial Contractor and cleaned, within the decontamination area, of any visible soil or debris. The trucks will then follow the approved truck route and requirements detailed in the Maintenance and Protection of Traffic Plan.

References

NYSDEC, 2002, DER-4 Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment from Former Manufactured Gas Plants (MGPs), January.

NYSDEC, 2010, DER-10 Technical Guidance for Site Investigation and Remediation, May.

NYSDEC, 2011. "Record of Decision, K-Patchogue MGP, Patchogue, Suffolk County, Site No. 152182", March 31.

Appendix A: DER-4 Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment from Former Manufactured Gas Plants

Management Of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment (DER-4)

Issuance Date: January 11, 2002

Abstract:

This guidance outlines the criteria wherein coal tar waste and soils and sediment that have been contaminated with coal tar waste from former manufactured gas plants (MGPs) only exhibiting the toxicity characteristic for benzene (D018) may be conditionally excluded from the requirements of 6 NYCRR Parts 370 -374 and 376 when they are destined for permanent thermal treatment. This is an amended version of the document effective on September 13, 2001. The only modification is to the Responsibility Section. Additions are underlined and deletions are stricken.

I. Purpose

This guidance memorializes an exercise of enforcement discretion, effective immediately, with regard to the conditional exclusion of soils, sediments, and waste contaminated with coal tar from the site of former Manufactured Gas Plants ("MGPs") which exhibit the toxicity characteristic for benzene (D018) from New York State's hazardous waste management regulatory program. The intent of this exercise is to facilitate the permanent treatment of these materials in an environmentally sound manner.

This change will be proposed as part of the next rulemaking which includes 6 NYCRR Part 371. This Enforcement Directive supersedes Program Policy DER - 3 (TAGM 4060) entitled "Management of Soil and Sediment Contaminated with Coal Tar From Former Manufactured Gas Plants." Specifically, that guidance allows for the decharacterization of coal tar contaminated soil and sediment which exhibit the D018 hazardous characteristic, that were destined for thermal treatment. That guidance did not allow for the decharacterization of coal tar that failed the D018 hazardous characteristic, requiring that it be managed as a hazardous waste.

II. Background

Historically, MGP contaminated soils, sediments or waste were regulated as hazardous if they exhibited a hazardous waste characteristic. On April 21, 2000, a court decision (*Association of Battery Recyclers Inc. vs. United States Environmental Protection Agency* -

April 21, 2000) vacated the use of the Toxicity Characteristic Leaching Procedure (TCLP) test to determine if, under federal law, MGP waste and contaminated soils exhibited a characteristic of hazardous waste. The United States Environmental Protection Agency (USEPA) has not challenged the decision and has clarified its position in a letter to Vectren Corporation, dated October 19, 2000, and a memo to USEPA Senior Resource Conservation and Recovery Act (RCRA) personnel. These documents acknowledge that the TCLP test cannot be used to determine if MGP waste, contaminated soil, or contaminated sediment exhibits a characteristic of a hazardous waste and since these materials typically do not exhibit any other hazardous characteristic, they will unlikely be classified as a hazardous waste under the federally administered program.

USEPA also acknowledged that many states have regulations that are broader in scope than the federal regulations, and may regulate MGP wastes as hazardous under their own state requirements.

The *Battery Recyclers* case does not directly affect New York's hazardous waste management regulatory program since its program derives from state, not federal, law. However, USEPA has authorized the State program to be administered in lieu of the federal RCRA program. New York's hazardous waste management regulatory program currently uses TCLP to determine if MGP contaminated soil exhibits a characteristic of a hazardous waste.

The Department of Environmental Conservation (DEC) recognizes that mixing of soil or sediment occurs through the normal consolidation of contaminated soil or sediment from various portions of a site during the course of remedial activities or in the course of normal earthmoving and grading activities, and does not consider this to be a form of impermissible dilution. However, mixing cannot be allowed to merely dilute the hazardous constituents into a larger volume so as to lower the constituent concentration in order to avoid treatment.

III. Policy

Applicability

This guidance applies to former MGP sites being remediated under the oversight of the DEC, either through a Consent Order, Voluntary Cleanup Agreement or State funded project, in instances where soil or sediment contaminated with coal tar related residuals will be thermally treated (as in a combustion boiler unit or in a thermal desorber) at an off-site (including out-of -state) facility permitted to receive non-hazardous contaminated soil or at

an on-site facility. This guidance does not apply to coal tar contaminated materials which contain significant quantities of purifier wastes or any quantity of other hazardous wastes. A significant quantity of purifier waste is defined as any quantity that would cause the MGP site remediation waste mixture, sent for thermal treatment, to contain in excess of 3.5 % sulfur by weight. Other hazardous waste includes listed hazardous wastes and wastes exhibiting a characteristic of a hazardous waste except for MGP related remediation waste exhibiting the Toxicity Characteristic for benzene. MGP site remediation waste meeting the applicability requirements that are being sent out of state must comply with the rules and regulations of the receiving state.

Requirements

A. Management of Soil/Sediment: Management of MGP site remediation waste meeting the applicability requirements, that is under DEC oversight is not subject to the DEC's hazardous waste management regulatory program {6 NYCRR Parts 370 to 374 and 376} if that soil or sediment is thermally treated at a facility permitted to receive non-hazardous contaminated soil or sediment. The following activities are exempt from the hazardous waste management requirements, however they continue to be subject to the solid waste management requirements {6NYCRR Parts 360 and 364}:

   a. Excavation and storage at the point of generation;
   b. Transportation to the thermal treatment facility or unit;
   c. Handling and storage prior to thermal treatment at the facility;
   d. Thermal treatment; and
   e. Management of treated materials.

   Materials transported off-site, and are stored outside the shipping container at locations other than the site of generation or the treatment facility, must be placed on an impervious surface such as asphalt, concrete or other impervious material and covered with plastic or other impervious material. Storage at the treatment facility must be in compliance with the facility's permit.

   MGP site remediation waste meeting the applicability requirements can be mixed with coal fines, carbon, onsite soil, sediment or other materials deemed necessary to facilitate and ensure proper operation of the final treatment technology as approved by the DEC.

There must be a demonstration that MGP site remediation wastes do not contain a significant quantity of purifier wastes, do not contain any listed waste or do not exhibit a characteristic of a hazardous waste (except for TCLP benzene) and are not otherwise incompatible with proper and effective thermal treatment. Soil or sediment which contains discernible amounts of purifier material must be tested for hazardous characteristic of reactivity, total cyanides and sulfur.

B. Permit Requirements: No solid waste management permit is required for the thermal treatment of coal tar contaminated soil or sediment from a former MGP site by a corporate entity acting pursuant to a Consent Order or a Voluntary Cleanup Agreement, provided that the thermal treatment occurs either at that site or at another former MGP site owned by the same corporate entity and provided that the applicable substantive regulatory requirements are met. Coal tar contaminated soil or sediment may also be transported to a facility for thermal treatment which has received a permit to accept this type of contaminated material. Coal tar contaminated soil or sediment must be transported by a 6 NYCRR Part 364 permitted transporter.

C. Land Disposal Restrictions: Coal tar contaminated materials which meet the applicability requirements and the respective treatment residuals are not subject to the LDRs.

IV. Responsibility

The person(s) remediating the site is(are) responsible for complying with all applicable regulations. This includes the LDRs if the materials are not destined for permanent thermal treatment. The Project Manager assigned to oversee the remediation of the former MGP site, is responsible for reviewing and accepting any demonstration that the materials are being managed in accordance with this policy. The Project Manager's supervisor must concur with the Project Manager's determination.

Appendix B: National Grid US Companies Environmentally Approved Waste Disposal and Recycling Facilities

National Grid USA Companies
Environmentally Approved Hazardous Waste
Disposal and Recycling Facilities

Vendor	Facility Location			Phone	EPA ID Number
American Ref-Fuel Company of Niagara Facility	100 Energy Blvd at 56th St	Niagara Falls, NY	14304	(716) 284-0031	NYD986930543
AMREC	130 Route 20	Charlton, MA	01508	(508) 248-3777	MAD982201055
Aggregate Industries (formerly Bardon Trimount)	1101 Turnpike Street	Stoughton, MA	02072	(781) 344-1100	MAD981213531
Aggregate Industries (formerly Bardon Trimount)	651 Lake Street	Shrewsbury, MA	01545	(781) 344-1100	MAD985277862
Aggregate Industries (formerly Bardon Trimount)	30 Danvers Road	Salem, MA	01970	(781) 344-1100	MAD001014984
American Lamp Recycling, LLC.	26 Industrial Way	Wappingers Falls, NY	12590	(800) 315-6262	NYR000129015
Bridgeport United Recycling	50 Cross Street	Bridgeport, CT	06610	(203) 334-4812	
Brox Paving Materials Inc.	1471 Methuen St.	Dracut, MA	01826	(978) 454-9105	MAD985267798
Brox Paving Materials Inc.	181 Mill Street	Marlboro, MA	01752	(508) 485-7382	MAD985276559
Cable Recycling Inc. **(NY use Only)**	220 John Street	Barrie, Ont.	L4N 2L2	(705)728-1622)	ON1599101
CID Landfill, Inc.	10860 Olean Road	Chaffee, NY	14030	(716) 496-5514	NYD000517458
Capitol Environmental	8229 Boone Boulevard	Vienna, VA	22182	(703)-356-3135	
Carbon Service and Equipment Co.	1037 Route 519	Eighty Four, PA	15330		N/A
Chemical Waste Management	Highway 17	North Emelle, AL	35459	(205) 652-8086	ALD000622464
Chemical Waste Management	1550 Balmer Road	Model City,	14107	(716) 754-8231	NYD049836679
Ciment St-Laurent	1945 Graham Boulevard	Mount Royal, Quebec	H3R1H1		N/A
City of Albany Landfill	525 Rapp Road	Albany, 12202	12202	(518) 869-3651	N/A
Clean Harbors Inc.	1 Hill Avenue	Braintree, MA	02184	(781) 849-1807	MAD053452637
Clean Harbors Inc.	51 Broderick Road	Bristol , CT	06010	(860) 583-8917	CTD000604488
Clean Harbors Inc.	37 Rumery Road	S. Portland, ME	04106	(207) 799-8111	MED980672182
Clean Harbors (Baltimore)	1910 Russell Street	Baltimore, MD	21230		MDD980555189
Clean Harbors – Murphy's	252 Salem Street	Woburn, MA	01801	(781) 935-9066	MAD066588005
Clean Harbors – Cleveland	2900 Broadway	Cleveland, OH	44115	(216) 429-2401	OHD000724153
Clean Harbors Grassy Mountain, LLC	P.O. Box 22750	Salt Lake City, UT	84122	(801) 323-8900	UTD991301748
Clean Harbors – Kimball	HC54 Box 28	Kimball, NE	69145	(308)235-4012	NED981723513
Clean Harbors (formerly Rollins)	2027 Battleground Road	Deer Park, TX	77536	(281) 930-2300	TXD055141378
Clean Harbors - PPM-Ashtabula OH	1302 West 38th Street	Ashtabula, OH	44004	(440) 992-8665	OHD981093420
Clean Harbors - PPM-Philadelphia	4105 Whitaker Avenue	Philadelphia, PA	19124	(215) 425-5144	PAD981113749
Clean Harbors PCB Serv. USPCIOHT	1672 East Highland	Twinsburg, OH	44087	(330) 425-3825	OHD986975399
Clean Harbors Env. Services, Inc.	309 American Circle	El Dorado, AR	71730	(870) 863-7173	ARD069748192
Colonie Landfill	Memorial Town Hall	Newtonville, NY	12128	(518) 783-2827	
CRT (Consolidated Recycling Technologies)	1 Depot Street	Bridgewater, MA	02324	(508) 697-1860	MAD985290717
DANC (Rodman Landfill)	NYS Route 177	Rodman, NY	13682	(315) 785-2593	NONHAZ
EnerSys (formerly YUASA)	16 Celina Ave.	Nashua, NH	03060	(800) 343-5526	N/A
Environmental Soil Management, Inc.	304 Towpath Road	Fort Edward, NY	12828	(518) 747-5500	N/A
EnviroTech	798 Hartwell Avenue	East Syracuse, NY	13057	(315) 463-7178	N/A
ESMI	67 International Drive	Loudon, NH	03301	(603) 783-0228	NH5986485852
G&S Technologies	1800 Harrison Ave.	Kearny, NJ	07032	(201) 998-9244	NJD011370525
Green Environmental (Environmental & Industrial Contracting Services Inc.)	8335 Quarry Road	Niagara Falls, NY	14304	(716) 298-8876	NYR000013086

National Grid USA Companies
Environmentally Approved Hazardous Waste
Disposal and Recycling Facilities

Vendor	Facility Location			Phone	EPA ID Number
Hiacres Landfill	425 Perinton Parkway	Fairport, NY	14450	(716) 223-6132	NONHAZ
Industrial Oil Tank	120 Dry Road	Oriskany, NY	13424	(315) 736-6080	NYR000005298
Ingenco - CHP Plant	2369 Lanier Rd.	Rockville, VA	23146	(804) 749-4774	VAR000006759
INMETCO	245 Portersville Road	Ellwood City, PA	16117	724 758-5515	PAD087561015
Lakeview Landfill	851 Robinson Road East	Erie, PA	16509	(814) 825-8588	NONHAZ
Maxymillian RESOIL	E Street	North Adams, MA	01247	(413) 499-3050	MAV000018385
Mercury Waste Solutions	21211 Durand Avenue	Union Grove, WI	53182	(262) 878-2599	WIR000000356
Modern Disposal	4746 Model City Road	Model City, NY	14107	716-754-8226	NY0986921237
MV Medical Services Co. (BFI)	0 Farley Street	Lawrence, MA	01843	(978) 687-2775	MAD991302266
Norlite Corporation	628 South Saratoga Street	Cohoes, NY	12047	(518) 235-0401	NYD080469935
NovaPb, Inc.	1200 Garnier St.	St. Catherine, Quebec		(781) 849-1807	Ship thru CHI
Ondrick Construction	58 Industry Road	Chicopee Falls, MA	01021	(413) 592-2081	MV4135922081
Ontario County Sanitary Landfill	3555 Post Farm Road	Stanley, NY	14561		N/A
Veolia (formerly Chemical Waste Management)	P.O. Box 2563	Port Arthur, TX	77643	(409) 736-2821	TXD000838896
Veolia (CWM Sauget, IL)	7 Mobile Avenue	Sauget, IL	62201	(618) 271-2804	ILD098642424
Veolia (formerly Global Recycling)	218 Canton St.	Stoughton, MA	02072	(781) 341-6080	MA5000004713
Optech Waverly	370 Route 34	Waverly, NY	14892	(607) 565-8891	NYR000101220
Ovide Rouillard, Inc. Recuperation Materioux Secs	8750, bowl. Bourque	Deauville (Quebec)	J1N3G1		N/A
Piney Creek LTD Partnership	428 Power lane	Clarion, PA	16214	(410) 820-9836	PAR000012450
Rodman Landfill (Development Authority of North Country Solid Waste Management Facility)	23400 NYS Route 177	Rodman, NY	13682		N/A
Safety-Kleen Systems Inc.	17 Green Mountain Road	Cohoes, NY	12047	(518) 783-8080	NYD986872869
Seneca Meadows Landfill	1786 Saloman Road	Waterloo, NY	13165	(315) 539-5624	N/A
Stericycle Inc.	369 Park East Drive	Woonsocket, RI	07895	(401) 769-5801	RID600008763
TCI	39 Falls Road Industrial Park	Hudson, NY	12534	(518) 828-9997	NYD986899912
Trans-Cycle Industries (TCI)	101 Parkway East	Pell City, AL	35125	(205) 338-9997	ALD983167891
United Oil Recovery Inc. (UOR)	136 Gracey Avenue	Meriden, CT	06450	(203) 238-6745	CTD021816889
Waste Management – Turnkey	97 Rochester Neck Road	Rochester, NH	03867	(603) 332-2386	N/A

National Grid USA Companies Approved Hazardous Waste Disposal and Recycling Facilities by Waste Stream		
Waste Stream	Facility Location	Comments
ASBESTOS		
Waste Management-Turnkey	Rochester, NH	Asbestos/special wastes
Chemical Waste Management	Model City, NY	
Hiacres Landfill	Fairport, NY	
Lakeview Landfill	Erie, PA	
Seneca Meadows Landfill	Waterloo, NY	
CID Landfill, Inc.	Chaffee, NY	
BALLAST RECYCLING		
ONYX/Superior Special Services (formerly Global Recycling Technologies)	Stoughton, MA	
ONYX/Superior Special Services (formerly SalesCo)	Phoenix, AZ	
BATTERY RECYCLING		
EnerSys (formerly YUASA/EXIDE)	Nashua, NH	Lead Acid Batteries/Gel Cell
INMETCO	Ellwood City, PA	Nickel Cadmium and Lithium Batteries
NovaPb, Inc.	St. Catherine, Quebec	Non-intact Lead Acid Batteries
ONYX/Superior Special Services (formerly Global Recycling Technologies)	Stoughton, MA	Lead Acid/Universal Waste Batteries (Broker)
COAL TAR SOILS		
American Ref-Fuel Company of Niagara	Niagara Falls, NY	Non-Haz coal tar sludge
ESMI	Loudon, NH	Non-Haz Coal Tar Soils
ESMI –	Fort Edward, NY	
Maxymillian RESOIL	North Adams, MA	Non-Haz Coal Tar Soils
Clean Harbors	Kimball, Nebraska	Hazardous Coal Tar Soils and RCRA Wastes
American Ref-Fuel Company of Niagara Facility	100 Energy Blvd Niagara Falls, NY 14304	Non-Haz Coal Tar Soils
DANC (Rodman Landfill)	NYS Route 177, Rodman, NY 13682	Non-Haz Coal Tar Soils
Piney Creek Power Plant	428 Power lane Clarion, PA 16214	Up to 25% lends of non-haz. Tars and oils
FLUORESCENT LAMP RECYCLING		
ONYX/Superior Special Services (formerly Global Recycling Technologies)	Stoughton, MA	
American Lamp Recycling, Inc.	Wappingers Falls, NY	
ONYX/Superior Special Services (formerly SalesCo)	Phoenix, AZ	
INCINERATION		
Onyx Environmental Services, LLC (formerly Chemical Waste Management)	Port Arthur, TX	TSCA,RCRA
ENSCO	El Dorado, AR	RCRA
Norlite	Cohoes, NY	RCRA, Non-PCB Oil
Clean Harbors/Rollins	Deer Park, TX	TSCA, RCRA
Clean Harbors (Kimball)	Kimball, NE	RCRA

National Grid USA Companies Approved Hazardous Waste Disposal and Recycling Facilities by Waste Stream		
Waste Stream	Facility Location	Comments
LAB PACKS		
Clean Harbors Environmental Services Inc.	Braintree, MA	
LANDFILL		
BFI	Fall River, MA	"Urban Soils" only
Chemical Waste Management	Emelle, AL	TSCA, RCRA
Chemical Waste Management	Model City, NY	TSCA, RCRA, Special Wastes
Waste Management – Turnkey	Rochester, NH	Special Wastes, Asbestos
Colonie Landfill	Albany, NY	Petroleum Contaminated Wastes < 2 ppm PCB
Clean Harbors – Grassy Mountain	P.O. Box 22750 Salt Lake City, UT 84122	PCB Landfill
City of Albany Landfill	Albany, NY	Petroleum Contaminated Wastes < 2 ppm PCB
Hiacres Landfill	Fairport, NY	Asbestos
Lakeview Landfill	Erie, PA	Asbestos & Non-Haz. Soils < 2 ppm PCB
Seneca Meadows Landfill	Waterloo, NY	Asbestos & Non-Haz. Soils < 2 ppm PCB
Rodman Landfill	Rodman, NY	C & D, petroleum Contaminated soil
Ontario County Landfill	Stanley, New York	Solid Waste Landfill
CID Landfill, Inc.	Chaffee, NY	Asbestos & Non-Haz. Soils < 2 ppm PCB
MEDICAL WASTE INCINERATION		
Merrimack Valley Medical Services Co. (BFI)	Lawrence, MA	Medical Waste Only
Envirotech	East Syracuse, NY	Medical Waste Only
Stericycle Inc.	Woonsocket, RI	Medical Waste Only
MERCURY RECOVERY and DISPOSAL		
ONYX/Superior Special Services (formerly Global Recycling Technologies)	Stoughton, MA	
Mercury Waste Solutions	Union Grove ,WI	Mercury Regulator Recycling
MISCELLANEOUS RCRA WASTES		
OIL FILTER RECYCLING		
Consolidated Recycling Technologies (CRT)	Bridgewater, MA	
Murphy's Waste Oil (Clean Harbors Env. Services)	Woburn, MA	
OIL RECYCLING (NON-TRANSFORMER OIL)		
Clean Harbors Environmental Services Inc.	So. Portland, ME	
Murphy's Waste Oil (Clean Harbors Env. Svcs.)	Woburn, MA	
United Oil Recovery Inc. (UOR)	Meriden, CT	
OILY SOIL RECYCLING (BATCH/THERMAL TREAT.)		
AMREC	Charlton, MA	COLD MIX
Aggregate Industries (formerly Bardon Trimount)	Stoughton, MA	HOT & COLD MIX
Aggregate Industries (formerly Bardon Trimount)	Shrewsbury, MA	HOT & COLD MIX
Aggregate Industries (formerly Bardon Trimount)	Salem, MA	COLD MIX

National Grid USA Companies Approved Hazardous Waste Disposal and Recycling Facilities by Waste Stream		
Waste Stream	Facility Location	Comments
Brox Paving Materials Inc.	Marlboro, MA	HOT MIX
Brox Paving Materials Inc.	Dracut, MA	HOT MIX
ESMI	Loudon, NH	Thermal Treatment
Environmental Soil Management, Inc.	Fort Edward, NY	Thermal Treatment
Maxymillian Technologies RESOIL	North Adams, MA	Thermal Treatment
Ondrick Construction	Chicopee Falls, MA	COLD MIX
PARTS CLEANER		
Clean Harbors - Cohoes NY	Cohoes, NY	
TRANSFORMER RECYCLING		
Environmental Protection Services	Wheeling, WV	PCB Oils and Cont. Equip.
TCI	Hudson, NY	Non-PCB Transformers
Trans-Cycle Industries (TCI)	Pell City, AL	PCB Transformers
PPM-Philadelphia-Clean Harbors	Philadelphia, PA	Transformer Disposal
S Kleen PCB Serv. USPCIOHT	Twinsburg, OH	PCB Wastes
Clean Harbors - PPM-Ashtabula OH	Ashtabula, OH	Transformers >50
G & S Technologies	Kearny, NJ	Non-PCB & empty PCB-Contam. Transformers
USED OIL FUEL BURNERS		
Ingenco - CHP Plant	Rockville, VA	Non-PCB MODF only
Norlite	Cohoes, NY	Non-PCB MODF only (< 25 ppm PCB)
WASTE BROKERS		
Capitol Environmental	Vienna, VA	Waste only to listed disposal and recycling facilities.
Clean Harbors Environmental Services Inc.	Braintree, MA	same as above
Clean Harbors Environmental Services Inc.	Bristol, CT	same as above
TCI	Hudson, NY	same as above
WASTEWATER TREATMENT (WWT)		
Clean Harbors Environmental Services Inc.	Bristol, CT	
Clean Harbors Environmental Services Inc.	Cleveland, OH	
Chemical Waste Management	Model City, NY	
Clean Harbors Environmental Services Inc.	So. Portland, ME	Non-RCRA wastewaters
Environmental Prod. & Services	Syracuse, NY	
Industrial Oil Tank	Oriskany, NY	Non-Haz. Wastewaters
North Tonawanda WW Treatment Plant	Tonawanda NY	Non-Haz. Wastewaters
WOOD RECYCLING		
Ciment St-Laurent	Mount Royal, Quebec	Wood Waste
Ovide Rouillard, Inc. Recuperation Materioux Secs	Deauville, Quebec	Wood Waste

National Grid Approved Scrap Metal Facilities					
Vendor	Facility Location	Phone	Scrap Metal Approval		
			Lead Cable	Tanks	All Other Metal
D&D Welding & Salvage Corp.	146 Ashland Ave. Southbridge, MA 01550	(508) 765-5119	no	no	yes
James G. Grant Co.	28R Wolcott St. P.O. Box 54 Boston, MA 02137	(617) 361-2716	yes	yes	yes
Mid City Scrap Iron and Salvage Co., Inc.	P.O. Box 157 Westport, MA 02790	(508) 675-7831	no	yes	Yes
William Reisner Corp. Iron & Steel Scrap	33 Elm St. Clinton, MA 01510-2307	(978) 365-4585	no	no	Yes
Cable Recycling Inc. **(NY use Only)**	220 John Street Barrie, Ont. L4N 2L2	(705) 728-1622)	yes	yes	Yes
Arnold Scrap Processors	2216 Angling Road Batavia, NY 13503-0353	(585)762-9080	no	yes	Yes
Ange's Scrap Metal	2133 Maple Ave Niagara Falls, NY 14305-1714	(716)284-8729	no	yes	Yes
Roth Steel	PO Box 1354, Hiawatha Blvd Syracuse, NY 13201-1354	(315)475-8431	no	yes	Yes
Matlow Co. Inc	PO Box 297 Syracuse, NY 13209-0297	(315)488-3171	no	yes	Yes
Empire Recycling	PO Box 353 Utica,NY13503-0353	(315)724-7161	no	yes	Yes
Cap Scrap	RD#2 West River Road Frankfort,NY 13340	(315)735-4451	no	yes	Yes
Hudson River Recycling	2216 Angling Road Albany, NY 12202	(518)465-2288	no	yes	Yes
Kimco Steel	PO Box 300 Kingston, Ontario Canada K7L4W1	(800)267-0902	no	yes	Yes
Bristol Metals	PO Box Bristol, Rhode Island 02809	(401)253-4070	no	yes	Yes

Appendix C: National Grid Environmental Procedure No. 1 Waste Management

FOREWORD

National Grid is committed to conducting business in a manner that preserves the quality of the environment by continuously seeking ways to minimize the environmental impact of past, present and future operations. We believe that aggressively addressing environmental issues is good business and in the best interest of the communities we serve, our employees, our shareholders, and all our other stakeholders.

National Grid will promote continual improvement in our environmental management systems (EMS) and environmental performance and will develop internal standards to guide activities when no appropriate laws or regulations exist. This Environmental Procedure (EP) No. 1, Waste Management, provides information and direction on regulatory and company policy requirements for the management of waste material. This EP addresses Solid Waste, Hazardous Waste, Universal Waste and other wastes, such as asbestos, medical waste and remediation waste. The management of waste includes generation, storage, transportation and disposal.

This EP supports the Environmental Policy commitment to "minimize and properly manage the waste we generate, and reuse or recycle waste materials whenever economically feasible."

Questions or inquiries regarding information provided in this EP should be referred to your respective Environmental Director.

Approved by: Vice President, Environmental Services

Record of Change		
Date of Review/Revision:		
Revision	Date	Description
0	04/01/06	Complete revision of Waste Management.
1	03/27/07	Clarifications of Section 3.5 regarding Land Disposal for MGP wastes.
2	05/15/07	Chapter 3 was revised in 3.3.1 to include examples of hazardous waste labels and their associated National Grid Stockroom codes.
3	07/25/07	Revised 6.2.8 to allow for shipment to a scrap metal dealer. Revised Table 5.
4	10/29/08	Revised sections 6.1.7, 6.1.8, and 6.2.11 to include recycling requirements for NE States.
5	01/26/10	Revised fluorescent lighting waste in Chapter 5, Temp. EPA ID Numbers in Section 3.2, Figure 3.1 & 3.2, Table 5.2, 5.3 & 5.4, and SQG one-time exceedance in Chapter 3.
6	08/11/10	Revisions to Rhode Island Universal Waste.
7	01/04/12	Revised Section 11.10. Removed web links in lieu of included citations. Update link URL addresses in 7.3.1.
8	07/03/12	Updated to be consistent with the DEC policy for the management of contaminated rags and clothing (specifically Table 6.1, page 90).

Table of Contents

1.0 Introduction

2.0 Applicability

3.0 Hazardous Waste Management
- 3.1 Identification of Hazardous Waste
- 3.2 Hazardous Waste Generator Requirements
- 3.3 Hazardous Waste Accumulation
- 3.4 Hazardous Waste Shipping
- 3.5 Land Disposal Restrictions
- 3.6 Hazardous Waste Disposal

TABLES
- Table 3.1: Generator Classification Criteria
- Table 3.2: DOT Hazard Classes
- Table 3.3: DOT Placard Tables
- Table 3.4: Generator Paperwork Requirements Table

FIGURES
- Figure 3.1: DOT Labels
- Figure 3.2: DOT Placards
- Figure 3.3: Uniform Hazardous Waste Manifest Example
- Figure 3.4: TSCA Manifest Continuation Form Example

4.0 PCB Waste Management

5.0 Universal Waste and Lighting Waste
- 5.1 Management of Lighting Wastes
- 5.2 Management of Batteries
- 5.3 Mercury Management
- 5.4 Federal Universal Waste Rule
- 5.5 Universal Waste – All National Grid Facilities
- 5.6 Universal Waste in Massachusetts
- 5.7 Universal Waste in New Hampshire
- 5.8 Universal Waste in Vermont
- 5.9 Universal Waste in New York
- 5.10 Universal Waste in Rhode Island

Table of Contents – (Continued)

TABLES

Table 5.1: Lighting Type and Waste Generated From Each Lighting Type
Table 5.2: National Grid Management of Spent Lighting Materials
Table 5.3: National Grid New England Spent Lighting Materials Inventory Sheet
Table 5.4: National Grid Battery Recycling Program
Table 5.5: Summary of Massachusetts Universal Waste Management Regulations

6.0 Waste Minimization and Recycling
- 6.1 Overview of Waste Minimization and Recycling Regulations
- 6.2 National Grid Waste Minimization and Recycling Programs
- 6.3 Waste Oil Recycling

7.0 Solid Waste Management
- 7.1 Federal Regulations Pertaining to Solid Wastes
- 7.2 State Regulations Pertaining to Solid Wastes
- 7.3 Solid Waste Management Practices

8.0 Medical and Infectious Waste
- 8.1 Definitions
- 8.2 Massachusetts
- 8.3 Rhode Island
- 8.4 New Hampshire
- 8.5 New York

9.0 Manhole, Vault, and Secondary Containment Sludge/Sediment Waste Management
- 9.1 Asbestos
- 9.2 PCBs/Oil
- 9.3 3rd Party Contaminated Site Impacts
- 9.4 Lead

10.0 Investigation and Remediation Waste Management
- 10.1 General Requirements for On-site Management of All Wastes
- 10.2 Investigation-derived Wastes
- 10.3 Remediation Waste/IDW Management

Table of Contents – (Continued)

11.0 Asbestos Waste Management
- 11.1 Definitions
- 11.2 Training
- 11.3 Notifications
- 11.4 Storage
- 11.5 Transportation & Disposal
- 11.6 Regulatory Requirements
- 11.7 Records
- 11.8 Disposal
- 11.9 Asbestos Fiber Release
- 11.10 References

TABLES

Table 11.1: Massachusetts Requirements
Table 11.2: Rhode Island Requirements
Table 11.3: New Hampshire Requirements
Table 11.4: Vermont Requirements
Table 11.5: New York Requirements

1.0 INTRODUCTION

This procedure provides guidance on how to manage the various waste streams generated by National Grid's activities in accordance with applicable federal, state and local laws. This EP addresses the various hazardous, solid and special wastes generated by National Grid.

2.0 APPLICABILITY

This procedure is applicable to the generation, transportation, or disposal of solid or hazardous waste from National Grid's facilities.

3.0 HAZARDOUS WASTE MANAGEMENT

3.1 Identification of Hazardous Waste

A material becomes a waste at the point at which it is no longer suitable for the purpose for which it was purchased, or when it is no longer intended to be used. Examples may include oil drained from transformers, soil contaminated with oil from a spill, and unused degreasers.

3.1.1 Identification Procedure

Waste Determination

A material is classified as a waste if it meets the definition provided in:

Federal	40 CFR 261.2
RI	RI Rule 3
MA	310 CMR 30.010
NH	Env-Wm 110.01(b)(130)
VT	Hazardous Waste Management Regulation 7-101 to 7-916
NY	6 NYCRR 371.1

Some states use the term "waste," whereas the EPA regulations use the term "solid waste."

The term "solid waste" is not limited to materials in a solid state, but includes solids, liquids and gases. Solid wastes include materials that are discarded by being abandoned (disposed of, burned, or incinerated), that are accumulated, stored or treated prior to being abandoned, or that are recycled.

The regulations exclude certain materials from the definition of a solid waste depending on the types of materials and how they are managed. Materials listed in Table 1 of 40 CFR 261.2, which are not marked with an asterisk, are not considered to be a solid waste when managed in the manner listed at the top of the column. Also, certain materials are not considered to be solid wastes when they are recycled as specified in 40 CFR 261.2(e).

3.1.2 Hazardous Waste Determination

Once a waste has been determined to meet the definition of a solid waste, the waste must be evaluated to determine if it meets the definition of a hazardous waste. The states incorporate EPA's *Hazardous Waste Identification Procedure*. The procedure outlined below must be followed to determine if a solid waste is an EPA or state regulated hazardous waste.

1. Determine if the waste is **excluded** (40 CFR 261.4; 310 CMR 30.104; Env-Wm 401.03: 7-203; 6 NYCRR 371.1(e)). If the waste is excluded, it is not hazardous. If it is not excluded, continue to the next step in the procedure.

2. Determine if the waste is **listed** in any of the lists in the hazardous wastes (40 CFR 261.31 - 261.33; 310 CMR 30.130 - 30.136; Env-Wm 402.04 - 402.07; 7-211; 6 NYCRR 371.4). This includes F, K, P, and U wastes. If the waste is listed, it is a hazardous waste. If it is not listed, continue to the next step in the procedure.

   Before the four lists are reviewed, it is important to gather as much information as is available concerning the waste being evaluated. In most cases, analyses are not required to determine if the waste is listed. However, detailed information concerning the type of process generating the waste and the raw materials utilized in the process, including chemical constituent names and percentages, is needed. This information is often available from materials safety data sheets (MSDSs) and manufacturer contacts.

   The search for the appropriate waste number can be narrowed down by determining if the waste is a spent material from a manufacturing process or is an unused chemical, which must be disposed of. The F and K lists apply only to spent or used materials. The U and P lists apply to only unused, off-specification and residues of chemicals.

   - **F-Listed Wastes:** The F list is found in 40 CFR 261.31; 310 CMR 31.131; Env-Wm 402.06 (a); 7-210; 6 NYCRR 371.4(b). It applies to wastes from non-specific sources. For the F listed solvents F001, F002, F004, and F005, a waste meets the listing only if the raw material contained at least ten percent of the listed solvent or combination of listed solvents. This is called the "ten percent rule." For F003 listed solvents, a waste meets the listing only if the raw material contained the technical grade (or essentially 100 percent) of the F003 listed solvent or solvents. Based on interpretations by EPA, the F003 listing also applies to mixtures containing ten percent or more of the solvents listed in F001, F002, F004 and F005 with any amount of F003. In addition, for a waste to meet any of the definitions under F001 through F005, it must have been a solvent used for its solvent properties (i.e., to dissolve or mobilize other materials).

   - **K-Listed Wastes:** The K list is found in 40 CFR 261.32; 310 CMR 30.132; Env-Wm 402.07 (a); 7-212; 6 NYCRR 371.4(c). It applies to wastes generated from specific industrial sources and are categorized as such.

   - **P-Listed Wastes:** The P list is found in 40 CFR 261.33(e); 310 CMR 30.136; Env-Wm 402.02 (b); 7-213; 6 NYCRR 371.4(d)(5). It applies to discarded commercial chemical products, off-specification products, container residues and spill residues resulting from spills of products. All of the wastes appearing on the P list are considered to be acutely hazardous wastes.

- **U-Listed Wastes:** The U list is found in 40 CFR 261.33(f), 310 CMR 30.133; Env-Wm 402.05 (b); 7-214; 6 NYCRR 371.4(d)(6). Like the P list, the U list applies to discarded commercial chemical products, off-specification products, container residues and spill residues resulting from spills of products. However, U listed wastes are not considered to be acutely hazardous.

3. Determine if the waste exhibits a **characteristic** defined in 40 CFR 261.21 - 261.24; 310 CMR 30.122 - 30.125B; Env-Wm 403.03 - 403.06; 7-205 to 7-208; 6 NYCRR 371.3. Characteristics include ignitability, corrosivity, reactivity, and toxicity. If the waste is characteristic, it is a hazardous waste. These are identified as **I** (ignitability), **C** (corrosivity), **R** (reactivity) and **T** (toxicity). If it is not, continue to the next step in the procedure.

   - **Ignitability:** Wastes which meet the ignitable hazardous waste characteristic definition (40 CFR 261.21; 310 CMR 30.122; Env-Wm 403.03; 7-205; 6 NYCRR 371.3(b)) are identified with the EPA waste number D001. Ignitable wastes include wastes which exhibit any of the following properties:

     - Liquids, other than aqueous solutions containing less than 24 percent alcohol by volume, with flash points less than 60 C (140 F).

     - Non-liquid materials that are capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burn so vigorously and persistently that they create a hazard.

     - Ignitable compressed gases as defined in 49 CFR 173.300.

     - Oxidizers as defined in 49 CFR 173.151.

     Refer to the regulations for details and test methods.

   - **Corrosivity:** Wastes which meet the definition of a corrosive hazardous waste (40 CFR 261.22; 310 CMR 30.123; Env-Wm 403.04; 7-206; 6 NYCRR 371.3(c)) are identified with the EPA waste number D002. Corrosive wastes include wastes which exhibit any of the following properties:

     - Aqueous solutions with a pH $\leq$ 2 or $\geq$ 12.5.

     - Liquids that corrode SAE 1020 steel at a rate greater than 0.25 inches (6.35 mm) per year at a temperature of 55 C (130 F).

     Refer to the regulations for more details and test methods.

- **Reactivity:** Wastes that meet the definition of a reactive waste (40 CFR 261.23; 310 CMR 30.124; Env-Wm 403.05; 7-207; 6 NYCRR 371.3(d)) are identified with the EPA waste number D003. Reactive wastes include those which exhibit any of the following properties:

  - Wastes which are normally unstable and readily undergo violent changes without detonating.

  - Wastes which react violently with water.

  - Wastes which form potentially explosive mixtures with water.

  - Wastes which, when mixed with water, generate toxic gases, vapors or fumes in quantities sufficient to present a danger to human health or the environment.

  - Cyanide or sulfide bearing wastes which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in quantities sufficient to present a danger to human health or the environment.

  - Wastes which are capable of detonation or explosive reaction if subjected to a strong igniting source or if heated under confinement.

  - Wastes which are readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

  - Wastes which are forbidden explosives as defined in 49 CFR 173.51, or Class A explosives as defined in 49 CFR 173.53 or Class B explosives as defined in 49 CFR 173.88.

- **Toxicity Characteristic:** A waste is considered to be toxic under the toxicity characteristic (40 CFR 261.24; 310 CMR 30.125B; Env-Wm 403.06; 7-208; 6 NYCRR 371.3[e]) if a representative sample contains any of the regulated contaminants in a concentration equal to or in excess of the regulatory level established for that contaminant based on the *Toxicity Characteristic Leaching Procedure* (TCLP) test. The TCLP test has been designed to determine the mobility of contaminants in solid, liquid, or multi-phase waste, and is intended to simulate the conditions in a sanitary landfill.

4. Determine if the waste is a **state-regulated hazardous waste** (RI Rule 3; 310 CMR 30.130 - 30.131; Env-Wm 402.06 (b), 402.04 (c), 403.04 (b)(3), 404; 7-211; 6 NYCRR 371.4). If the waste is a state-regulated hazardous waste, it is a hazardous waste. These wastes may include oily wastes and PCB wastes. It should be noted that PCBs are regulated by EPA under the Toxic Substances Control Act

(TSCA) as a toxic substance. Listed below are examples of state waste codes for oils and PCBs for states in which National Grid is located.

State	Oil and Oily Wastes	PCBs (50 ppm)
MA	MA01, MA97, MA98	MA02
NH	NH01	NA
RI	R010, R014	R007
VT	VT02	VT01
NY	N006[1]	B001-B007

1 - Non-hazardous waste.

Aside from these, several other state-regulated wastes that may be generated at National Grid include the following:

- Ethylene glycol in Vermont (VT08);
- Liquid wastes with a flash point less than 200 F or solid wastes with a flash point less than 100 F in Rhode Island (R003);
- Wastes containing "U" or "P" constituents at concentrations above 5 ppm for acutely hazardous or specifically identified carcinogens, or 100 ppm for all other constituents in New Hampshire (NH11).

5. If none of the above applies, the material is not hazardous. **Please note that when a waste has been determined to be non-hazardous based on the procedure presented in this section, it does not necessarily mean it can be managed or disposed of by any means. Other regulations are likely to apply for different management methods such as sewer discharge, surface water discharge, solid waste, medical waste, asbestos, recycling, and universal waste regulations, etc. Please refer to the appropriate sections within this manual for guidance on these topics.**

3.1.3 Special Hazardous Waste Identification "Rules" and "Policies"

Questions often arise regarding identification of wastes, hazardous waste spill residues, etc. The EPA has established several "rules" and "policies" within the definition of hazardous wastes to address these questions. These include the "mixture" rule, "derived from" rule, and the "contained in" policies. Each is described below.

"Mixture" Rule

Mixtures of hazardous wastes are addressed in 40 CFR 261.3(a); 310 CMR 30.102 and 30.140; Env-Wm 404.01; 6 NYCRR 371(d)(1)(ii)(c+d). In

general, the regulations state that mixtures of "toxic" and "acutely hazardous" wastes (mostly EPA listed hazard wastes) with other wastes are considered hazardous and are identified with the waste number corresponding to the listed hazardous waste. Mixtures of characteristic hazardous wastes (non-toxic wastes, i.e., wastes which are not "toxic" or "acutely hazardous") with other wastes are only hazardous if the mixture exhibits a characteristic. Any mixing process, which is conducted for the purpose of rendering a waste nonhazardous, is considered treatment.

"Derived From" Rule

40 CFR 261.3 (c)(2); 310 CMR 30.140 (2); Env-Wm 404.02; 6 NYCRR 371.1(d)(3) states that any waste generated ("derived") from treatment, storage, disposal, or use of a hazardous waste is a hazardous waste. For listed wastes, this remains true until it has been determined that the waste is not hazardous under the procedures for petitions. For characteristic hazardous wastes, this remains true unless the waste no longer exhibits a characteristic. Wastes meeting the "derived from" rule may include sludges, spill residues, ash, emission control dust, or leachate, etc.

"Contained In" Policy

Contaminated environmental media (soil, ground water, surface water and sediments), of itself, is not hazardous waste and, generally, is not subject to regulation under RCRA. Contaminated environmental media can be subject to regulation under RCRA if they "contain" hazardous waste. EPA considers contaminated environmental media to contain hazardous waste: (1) when they exhibit a characteristic of a hazardous waste; or, (2) when they are contaminated with concentrations of hazardous constituents from listed hazardous waste that are above health-based levels. It should be noted that this policy has not been codified. In general, site-specific evaluations should be made (considering the EPA and state requirements and policies) on a case-by-case basis with regard to this policy.

Empty Containers

Containers which previously held hazardous wastes are not considered to be hazardous if they meet the regulatory definition of "empty" (all product is removed that can be, and there is less than one inch of product remaining) in 40 CFR 261.7; 310 CMR 30.010; Env-Wm 401.03 (b)(12) 7-203; 6 NYCRR 371.1(h) and DEM Rule 5.8.

In Vermont, the following alternative performance standard exists for determining if a container is considered empty when all material is removed that can be:

- Less than 3 % by weight if the container is less than 110 gallons
- Less than 0.3 % by weight if the container is greater than 110 gallons

Containers or inner liners which held acutely hazardous wastes are considered empty if the container or inner liner has been triple-rinsed using a solvent capable of removing the chemical product.

Containers which held compressed gases are considered to be empty when the pressure in the container approaches atmospheric.

3.1.4 Sampling and Analysis Requirements

40 CFR 262.11; 310 CMR 30.302; Env-Wm 502.01; 7-202; 6 NYCRR 372.2(a)(2) requires generators to properly identify their wastes based on the procedures described above. Analysis is not specifically required; however, it is often necessary to have some analyses conducted in order to properly classify certain waste materials.

As can be determined from the procedures described above, listed hazardous wastes can generally be identified without conducting analyses because these determinations are usually made on the type of manufacturing processes and constituents of raw materials used in the process. However, when determining whether or not a waste meets one of the four hazardous waste characteristics, it is necessary to know specific information about the waste itself. 40 CFR 262.11; 310 CMR 30.302; Env-Wm 502.01; 7-202; 6 NYCRR 372.2(a)(2) indicate that generators must determine if wastes exhibit any of the hazardous waste characteristics by either (1) testing the waste, or (2) applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used.

Therefore, identification of waste can be based on knowledge of the waste and the processes and the raw materials involved in the waste generation. MSDSs are a good source of information for potential waste characteristics if the waste material generated is essentially the same as the product used. However, it is important to note that chemical manufacturers are not required to report constituents on MSDSs unless they are present in amounts exceeding 1% (0.1% for carcinogens). Therefore, since the toxicity characteristic contaminants are regulated as hazardous at concentrations well below 1%, it is possible they may be present in a product, but not reported on the MSDS. Other sources of information on potential waste characteristics are chemical dictionaries, reference books, etc.

3.1.5 Record Keeping

40 CFR 262.40; RI Rule 5.6; 310 CMR 30.331 (3); Env-Wm 512.01; 7-710 require that generators maintain documentation of waste determinations on file for at least three years. This documentation must include copies of waste analysis and copies of any tests or other determinations made regarding the waste's content. Since laboratory analyses are not always required for identification purposes, hazardous waste identification documentation may include notes concerning the generating process, raw materials, constituent information, etc.

3.1.6 Typical Company Hazardous Wastes

Refer to the Waste Profile List on the Infonet for information on hazardous wastes typically generated by Company facilities.

3.1.7 Discovery of Unclassified Wastes

The discovery of unknown waste on a Company right-of-way or easement may constitute a threat of a release. Notifications to regulatory agencies may be required.

3.2 Hazardous Waste Generator Requirements

3.2.1 Waste Generator Classifications

Classification is determined based on the quantity of hazardous waste routinely generated during a given month and the amount accumulated on site at one time. The volume of wastes manifested per month should not be used to determine generator classification. Table 3.1, Generator Classification Criteria, lists the quantities of wastes that define generator status in Massachusetts, New Hampshire, New York, Vermont and Rhode Island. In addition, the following criteria apply specifically to the following states:

National Grid facility EPA Identification Numbers are listed on the Infonet.

In this procedure, the terms Very Small Quantity Generator (VSQG), Small Quantity Generator (SQG) and Large Quantity Generator (LQG) are used. Please note that:

i. In New Hampshire, a large quantity generator is called a full quantity generator
ii. In Vermont, a large quantity generator is called a Generator and a VSQG is called a Conditionally Exempt Generator
iii. In Rhode Island, all generators are regulated as LQGs.
iv. In New York, a VSQG is called a Conditionally Exempt Small Quantity Generator (CESQG).

3.2.2 EPA Generator ID Number

Company facilities which generate hazardous waste on a continuing basis, regardless of status, e.g., LQG, SQG, VSQG, must be assigned an EPA Identification (ID) Number. If waste is generated for more than one year at a location, this constitutes a "continuing basis."

The Environmental Department is responsible for securing EPA ID Numbers when required and for notifying the appropriate environmental agency when the EPA ID Number is no longer needed

When waste is generated in field locations that do not have an EPA ID Number (e.g., Substation, spill site, or manhole), the following guidance should be followed:

RI A temporary ID Number must be obtained from RIDEM.

NH A temporary ID Number must be obtained from NHDES.

MA Each of the Operating Companies in MA has been assigned an EPA ID Number to be specifically used for spills and off site locations in the specific companies' territories. Temporary numbers should not be needed.

VT National Grid operations in VT are limited to substations. All substations in VT have EPA ID Numbers.

NY Most all substations and Facilities have EPA ID Numbers. A new EPA ID Number will be obtained for a new generation point if required.

3.2.3 Temporary ID Numbers

A temporary ID Number may be obtained for Company locations that have applied for, but not yet been issued a permanent EPA ID Number, or to transport and dispose of hazardous waste from a single non-recurring waste generating event at a non-EPA ID numbered site. The temporary ID Number is valid for up to 30 days from issue in Massachusetts, New Hampshire, New York and Vermont, and for up to 90 days in Rhode Island.

Massachusetts: Each Operating Company in Massachusetts has been assigned an EPA ID Number by the MA DEP for waste generated in the field and from spills.

New Hampshire: For shipment of spill cleanup debris during regular working hours (8 a.m.-4 p.m.) a temporary EPA ID Number must be obtained from NH DES RIMS (603.271.2921). For shipments of oil spill cleanup debris during off hours, an EPA Number of NHD999999998 may be used. The EPA ID Numbers for the Salem and Lebanon offices will not be used for material that is generated from offsite locations.

New York: A temporary identification number may be obtained by contacting the EPA at (212) 637-4106.

Rhode Island: A temporary identification number may be obtained in Rhode Island by contacting the Rhode Island Department of Environmental Management at (401) 222-6822.

Vermont: A temporary identification number may be obtained in Vermont by contacting the Secretary of Natural Resources at (802) 241-3866.

3.2.4 Emergency Preparedness and Prevention

All hazardous waste generator facilities shall be maintained and operated to minimize the possibility of a fire, explosion or any unplanned, sudden release of hazardous wastes to the environment. The facility must be equipped with the proper emergency equipment as required by the applicable State hazardous waste regulations. Please refer to your State's regulation to meet this requirement. Below is a list of common alarms and equipment etc. that might be required by some of the State's in National Grid's territory:

- Internal communication or alarm system capable of providing immediate emergency instruction (voice or signal) to facility personnel.

- Communication devices available at all main accumulation areas, capable of summoning outside assistance. The device shall be located within a reasonable distance of the waste management area so waste management operators will be able to summon outside assistance in a timely manner.

- Fire control equipment, spill control equipment, and decontamination equipment.

- Water at adequate pressure and volume to supply hoses and other fire suppression equipment.

- Emergency coordinators at the facility or on call must be able to reach the facility quickly (one hour in Massachusetts).

- Marking of all emergency exits.

- A list posted at the nearest communication device (telephone) which provides:

  - Name, and work and home phone numbers, of primary and alternate emergency coordinators;
  - Phone numbers of the fire department, police department, hospital, and emergency response teams;
  - Location of fire extinguishers, spill control equipment, and fire alarm (if present);
  - Evacuation routes (MA only); and,
  - In NH, each LQG shall also post a list of the steps to be taken if an emergency occurs.

3.2.5 Inspection and Testing of Equipment

All hazardous waste generator communications and alarm systems, fire protection equipment, spill control equipment, and decontamination equipment shall be tested in accordance with applicable State Regulations and maintained as necessary to ensure they are functional.

3.2.6 Contingency and Emergency Response Planning Requirements

All Company hazardous waste "generators" must comply with applicable regulations associated with the development and maintenance of a contingency plan containing emergency notification and response procedures designed for mitigation of emergencies resulting from fire, explosion, spills, and other releases of hazardous materials to the environment. The contingency plan may be incorporated into an existing SPCC plan or incorporated into an "Integrated Contingency Plan."

The plan shall be updated when changes affecting a facility's ability to respond to emergencies occur. This includes changes in facility design or operation that substantially increase the potential for emergencies; when the list of emergency coordinators or specific information about current emergency coordinators changes; or the list of emergency equipment changes. Immediately following any updates, LQGs must send copies to all companies/agencies who initially received a copy of the plan.

The plan shall address the requirements of the applicable State Regulation which might include some of the following requirements:

- How the design of the facility minimizes the threat to public health, safety, and welfare or the environment from fire, explosion, spills and other release to the environment.
- A clear outline of lines of communication and procedures for hazardous waste generator personnel to follow in the event of an emergency.
- Documentation of arrangements made with local agencies (police, fire, ambulance, local officials, etc.) for support services in the event of an emergency.
- Identify a Primary Emergency Coordinator responsible for directing all emergency response actions at the hazardous waste generator. The Primary Emergency Coordinator or an alternate shall be available on site within one hour of the discovery of an emergency. The plan shall contain a list of all persons qualified to act as Alternate Emergency Coordinators. The list shall identify the emergency coordinators, their work and home telephone numbers and home addresses.
- A description of procedures, structures and equipment used at the hazardous waste generator for prevention of releases of hazardous wastes and response to releases should they occur.
- An evacuation plan including signals to begin evacuation, evacuation route, and alternate routes.

As required by applicable state regulations, SQGs need not develop the plan but must attempt to make arrangements to familiarize police, fire, local boards of health, and emergency response teams with the layout of the site, properties and hazards of hazardous waste handled at the site, and other site specifics such as entrances and evacuation routes.

3.2.7 Release Response

Requirements for response actions required to address releases of oil and/or hazardous materials are found in the National Grid Environmental Procedure No. 5 Release Response. However, it should be noted that Vermont's (7-105) and New York's (373.3)

hazardous waste regulations require notification, the conduct of emergency action and submittal of reports in the event of a release of a hazardous waste.

3.2.8 Training Program Requirements

Hazardous waste management training must be provided to employees who handle hazardous waste as part of their job responsibilities. This training must be described in a Personnel Training Plan as is discussed in the environmental procedure on training.

3.2.9 Recordkeeping Requirements

All hazardous waste generators shall maintain records related to the management of hazardous waste, substances and PCBs. Refer to the EP No. 15 for document/record maintenance.

3.3 Hazardous Waste Accumulation

Hazardous waste generators must ensure that wastes are accumulated and stored in compliance with applicable regulations while on-site. These regulations can be found primarily in 40 CFR 262.34. In addition, state-specific hazardous waste regulations must be complied with:

Massachusetts	310 CMR 30.340 LQGs 310 CMR 30.350 SQGs and VSQGs
New Hampshire	Env-Wm 507 - 509
New York	6 NYCRR 372, 373-1 and 373-3
Rhode Island	Rules 5.2 and 5.4
Vermont	7-310

Storage regulations include requirements such as labeling, storage time limitations, inspection requirements, container management, etc. The applicable requirements vary depending on whether the waste is collected in containers or tanks. In general, a container is considered to be a portable device and a tank is considered to be a stationary device designed to contain hazardous waste.

The following sections describe the hazardous waste accumulation regulations applicable to generators.

Attachment A, located at the end of this chapter, provides a summary of National Grid Policy and state-specific hazardous waste generator requirements, including a list of state hazardous waste codes.

3.3.1 General Accumulation Requirements

Accumulation Time

Allowable accumulation time varies depending on where the waste is stored and the category of generator. The accumulation time clock starts when waste is first added to a container or tank. The only exception to this is for satellite accumulation containers, where the clock starts when the container is full (up to 55 gallons). Generators who accumulate wastes in satellite accumulation areas may accumulate these wastes for an indefinite period of time until the container is full, provided that all of the requirements applicable to satellite accumulation areas are complied with.

Please note: PCBs have a 30 day accumulation time limit for main and satellite accumulation areas unless stored in a TSCA 761.65(b) storage facility. Also, the clock starts when the waste is first added to a container or tank, regardless of whether it is stored in main accumulation storage or satellite storage.

General Accumulation Time Limits		
Generator Category	**Type of On-Site Storage Area**	**On-Site Storage Time Limit**
LQG	Main Accumulation Storage	90 Days
SQG	Main Accumulation Storage	180 days
VSQG	Main Accumulation Storage	No Limit

New Hampshire Accumulation Time Limits
Full quantity generators may accumulate hazardous waste on-site for 90 days or less without being subject to the requirements applicable to TSDFs.
Small quantity generators that never accumulate more than 100 kilograms of hazardous waste (or 1 kilogram of acutely hazardous waste) may accumulate hazardous wastes on-site for an unlimited amount of time without being subject to the requirements applicable to TSDFs provided they comply with the requirements of Env-Wm 508.02.

New Hampshire Accumulation Time Limits
Small quantity generators that accumulate between 100 and 1,000 kilograms of hazardous waste may accumulate hazardous wastes on-site for up to one year without being subject to the requirements applicable to TSDFs provided they comply with the requirements of Env-Wm 508.03. This includes a provision for never accumulating more than one 55-gallon drum of each unique non-acutely hazardous waste stream on-site. In addition, when such a container is filled, it must be marked with an

accumulation start date and shipped off-site within 90 days. **Please note: the one year limit is from the original start of accumulation**.

New York Accumulation Time Limits		
Generator Category	Type of On-Site Storage Area	On-Site Storage Time Limit
LQG	Main Accumulation Storage	90 Days
SQG	Main Accumulation Storage	180 days
CESQG	Main Accumulation Storage	No Limit

Rhode Island Accumulation Time Limits
Generators may accumulate hazardous waste on-site for 90 days or less without being subject to the requirement applicable to TSDFs.

Vermont Accumulation Time Limits
Large Quantity Generators may accumulate hazardous waste on-site in the main accumulation area for 90 days or less without being subject to the requirement applicable to TSDFs.
Small Quantity Generators may accumulate hazardous waste on-site in the main accumulation area for 180 days without being subject to the requirements applicable to TSDFs.
Conditionally Exempt Generators do not have a limit on the amount of time which they can accumulate hazardous waste on site in the main accumulation area without being subject to the requirements applicable to TSDFs.

Ignitable, Reactive or Incompatible Waste Accumulation

Ignitable, reactive or incompatible wastes are required to be separated and protected from sources of ignition or reaction, such as open flames, smoking, cutting, welding, hot surfaces, frictional heat, sparks, spontaneous ignition and radiant heat. The intent is to prevent accidental ignition or reaction of ignitable or reactive wastes.

Smoking and open flames must be confined to designated areas while ignitable or reactive wastes are being handled. "No Smoking" signs must be posted wherever there is a potential hazard from ignitable or reactive wastes.

Signs and Markings

All main accumulation areas where hazardous wastes are accumulated must have signs indicating the presence of hazardous waste storage. State-specific sign requirements are described in the table below. Signs shall be in a format to meet individual state regulations.

Massachusetts	HAZARDOUS WASTE
New Hampshire	HAZARDOUS WASTE DANGER – UNAUTHORIZED PERSONNEL KEEP OUT
New York	HAZARDOUS WASTE
Rhode Island	HAZARDOUS WASTE
Vermont	DANGER – HAZARDOUS WASTE STORAGE AREA – AUTHORIZED PERSONNEL ONLY

Satellite accumulation areas in Massachusetts and Conditionally Exempt generators in Vermont are not required to have a sign as described above.

ALL storage and accumulation areas containing PCB wastes ≥ 50 ppm must have a PCB mark posted in the accumulation area.

In **Massachusetts**, main accumulation areas must also be clearly marked (i.e., by a line or a piece of tape on the floor, a gate, fence or sign at the boundary of a clearly distinguishable area) so that they are distinguished from any satellite accumulation areas and other areas at the facility.

Security

Main storage areas shall be secured by a fence or other means of restricting access to prevent unknowing and unauthorized entry. General facility security fencing can serve as a means of preventing unknowing and unauthorized entry.

Outdoor main accumulation areas shall be adequately secured. Installation of a fence is not mandatory, but recommended with a locked gate unless the entire facility is fenced and secured (24 hours per day).

Satellite Accumulation Definition

The primary purpose of satellite accumulation is to allow generators to accumulate a waste near the process which generates the waste, without being subject to a time limitation, until up to 55 gallons of non-acutely hazardous waste are generated. This prevents generators from having to ship very small quantities of waste off-site to meet the central storage area time limitations because the waste is generated at a slow rate. Satellite accumulation areas must be maintained in compliance with the requirements described below:

Satellite Accumulation Area Requirements	MA	NH	RI	VT	NY
Satellite accumulation containers must be maintained in good condition and handled in a manner which will not cause them to rupture or leak. **NH also requires the use of DOT authorized containers**.	X	X	X	X	X
Containers used for satellite accumulation must be compatible with the hazardous wastes placed in them.	X	X	X	X	X
Satellite accumulation containers must be maintained closed at all times except when adding or removing wastes.	X	X	X	X	X
Satellite containers must be stored on an impervious surface**.**	X	X			

Satellite Accumulation Area Requirements	MA	NH	RI	VT	NY
Satellite accumulation containers must be stored away from functional floor drains unless secondary containment is provided as described in Section 4.2.3. In addition, containers stored outdoors should be under cover and stored at least 50 feet from any surface waters.[1]	X[1]	X	X[1]	X[1]	
Satellite accumulation area containers must be marked with:					
• The words "Hazardous Waste" and other words that describe the contents of the container[2]	X	X	X	X	X
• Associated hazards of the waste	X				
• Initial accumulation start date[3]		X			X
• EPA or state waste number		X			
Satellite accumulation containers must be inspected weekly.	X	X			
Aisle space must be provided to allow for inspections and to comply with any applicable National Fire Protection Codes.	X				
When a satellite accumulation container becomes full, the date must be marked on the container. The generator must comply with all other requirements applicable to the central storage containers within three days.	X	X	X		X

Notes:

1. Some States require secondary containment for all containers of liquid hazardous waste, even when indoors if there is potential for a spill to reach the outside environment (see Section 4.2.3).
2. If materials with a PCB content of 50 ppm or greater are stored in the container, the container shall also be labeled with a PCB mark.

3. The initial accumulation start date must be indicated on all containers of PCB-containing wastes (≥ 50 ppm).

New Hampshire

- NH SQGs may not accumulate hazardous wastes at satellite locations for greater than one year from the original start date of accumulation.
- NH DES also recognizes another type of accumulation area under Env-Wm 507.01(f) which allows generators to accumulate wastes at the point of generation and to transport that waste to a designated hazardous waste storage area at the end of every work shift. The type of container used is required to satisfy the following requirements:
  - The container must be labeled with the words "Hazardous Waste" and the contents of the container;
  - The container must be under control of a trained employee;
  - The container must be emptied at the end of every work shift, which does not exceed 12 hours; and,
  - The container must be no greater than 10 gallons in capacity, and no more than one container of each non-acutely hazardous waste may actively collect the waste at each point of generation.

Hazardous Waste Container Storage Requirements - Main Storage Areas

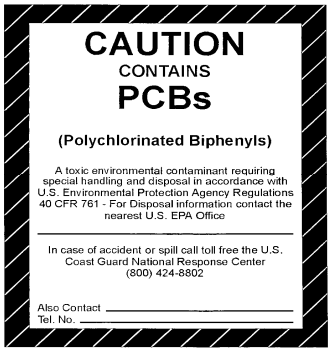
This section provides a description of the requirements applicable to generators that store hazardous wastes in containers. Container is defined as any portable device in which a material is stored, transported, treated, disposed of, or otherwise handled.

Container Labeling

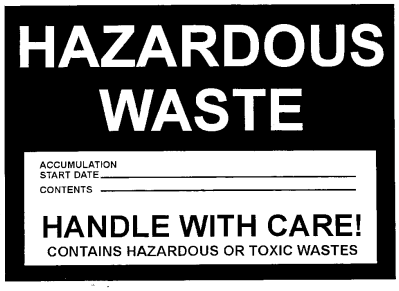
Containers must be clearly labeled on-site. All labels on containers shall be affixed on the upper third of the container when possible. If more than one label is required, they shall be placed in close proximity to one another. Labels must not be hidden by walls or other containers and must be clearly visible for inspection. **Note that prior to off-site shipment, all containers must meet DOT pre-transport requirements which include additional labeling information.** Containers that store materials with a PCB content of ≥ 50 ppm shall also be marked with a PCB mark.

Common examples of labels include:

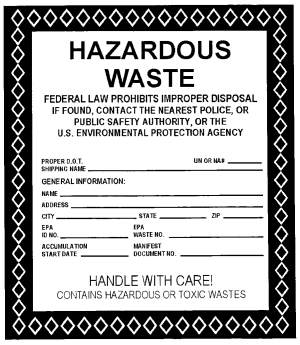
PCB Mark
STORES CODE 467242



Hazardous Waste Sticker
Stores Code 467238



Hazardous Waste Mark
Stores Code 467239
(Includes D.O.T. Pre-transport Information)



State-Specific Hazardous Waste Container Labeling Requirements					
Labeling Requirement	**MA**	**NH**	**RI**	**VT**	**NY**
The words "Hazardous Waste" and other words which identify the contents of the container.	X	X	X	X	X
Type of hazard associated with the waste	X				
Accumulation start date	X	X	X	X[1]	X
EPA or state waste code		X	X	X[1]	
Generator's name and address			X	X[1]	
Uniform Hazardous Waste Manifest Document Number (prior to off-site shipment)			X		
Proper DOT label			X		
The wording "Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency."			X	X[1]	
Information required by DOT marking regulations (including the shipping name, UN or NA ID number, RQ information if applicable, technical names if applicable and hazardous waste wording).			X		

Note: 1 – Not required for Conditionally Exempt Generators.

Container Management

Containers used to hold waste may include drums, roll-offs, boxes and other types. The type of container that can be used depends on the material to be kept in it. Non-bulk containers, such as drums, shall be used only once for hazardous waste disposal.

Hazardous material containers are generally single trip containers. Some manufacturers offer refunds on returned containers. Drums which previously held a hazardous material (e.g., unused oil) may be reused for on-site storage of similar materials and for the off-site shipment of similar materials provided the container is approved for transport by the DOT regulations. Containers may not be used for other purposes (e.g., trash containers) without permission from the Environmental Department.

Empty packaging may be reused for shipping hazardous wastes from a generator to a TSDF without complying with reuse and reconditioning requirements in 49 CFR 173.28 and Part 178 as long as the following requirements are complied with:

a. Before reuse, each packaging must be inspected and may not be reused unless free from incompatible residue, rupture, or other damage which reduces its structural integrity.

b. The waste is packaged in accordance with all other applicable DOT requirements.

c. Packaging may be used only once under these provisions.

Container Secondary Containment Requirements

In Massachusetts and New Hampshire, containers of liquid hazardous waste must have secondary containment when stored outdoors. Containers of liquid hazardous waste when stored indoors near functional floor drains, manholes, or when near doorways where a release could enter the environment must also have secondary containment. In Rhode Island, **all** containers of liquid hazardous waste in the main hazardous waste accumulation area must have containment.

Containers containing no fluids do not require a containment system. Secondary containment requirements for containers of fluid are summarized in the table below.

In New York, containers of liquid hazardous waste exceeding 185 gallons in total require secondary containment in the counties of Kings, Nassau, Queens, and Suffolk, or over the Schenectady/Niskayuna Aquifer System in Schenectady, Saratoga and Albany Counties, or the Clinton Street Ball Park Valley Aquifer System in Broome and Tioga Counties.

Container Inspections

Inspections of main storage areas and satellite accumulation areas of the facility must be conducted and documented. Very Small Quantity Generators in Vermont and New York are exempt from inspection requirements. Containers and their accumulation areas are to be inspected at a minimum for:

- Container condition;
- Condition of storage area;
- Adequate aisle space;
- Compliance with labeling and marking requirements; and,
- Storage Times.

When conducting inspections, the following guidance should be considered:

- Inspections must be conducted in accordance with the frequency established in the applicable regulations and documented.

- Inspection reports/forms should be completed **during** the inspection with all deficiencies noted and corrective actions documented.
- The inspector should complete the inspection report/form during the inspection. The completed inspection report/form must contain the **date, time**[(1)] **and identity** of the inspector. Initials are acceptable as long as the initials adequately identify the inspector.
- Completed inspection reports/forms should not be copied and utilized for future inspections. A **blank** form/report should be utilized for each inspection period.
- The inspection report/form should not be filled out, initialed or dated by anyone other than the person who personally conducted the inspection.
- Inspection reports/forms may not be backdated to cover inspections conducted but not documented in the past.

Note: [(1)] – Not required in New York.

Subpart CC Container Air Emission Standards

40 CFR Part 265, Subpart CC applies generally to wastes which contain an average volatile organic (VO) concentration ≥ 500 ppm. Section 265.1083 establishes general applicability of the standard, and includes exemptions for certain waste treatment processes. To determine if a waste contains 500 ppm, §265.1084(a) establishes a waste determination procedure. Wastes should always be evaluated at the point of origin. Generators may use either knowledge of a waste, or direct measurement to determine the VO concentration. §265.1084 provides detailed information concerning how to collect samples, the number of samples required, frequency of evaluation, etc. The specified analytical method for determining VO concentrations is Method 25D in 40 CFR Part 60, Appendix A.

The organic air emissions standards apply to containers (excluding satellite accumulation containers) which are larger than 26 gallons and which hold hazardous wastes with an average VO concentration ≥ 500 ppm. The container standards can be found in 40 CFR 265.1087.

Hazardous Waste Tank Storage Requirements

This section provides a description of the requirements applicable to generators who store wastes in tanks. These requirements apply in addition to the general requirements described above. A tank is defined as a stationary device designed to contain an accumulation of hazardous waste which is constructed primarily of non-earthen materials (i.e., wood, concrete, steel, plastic, etc.) and which provides structural support.

Tank Labeling

Regarding the accumulation start date:

- For PCB waste (≥ 50 ppm), the date waste was first put into the tank must be recorded on the tank. A record that includes, for each batch of PCBs, the quantity of the batch and the date the batch was added to the tank, as well as the date, quantity and disposition of any batch of PCBs removed from the tank must also be maintained. It is recommended that a log be maintained for this purpose.
- For wastes containing no PCBs, record the date when the tank first receives waste.

Containers that store materials with a PCB content of ≥ 50 ppm shall also be marked with a PCB mark.

Tank Management
Tanks holding hazardous wastes are subject to the requirements outlined below.

- In general, hazardous wastes may not be placed in a tank system if they would cause the tank system to rupture, leak, corrode or otherwise fail.
- Appropriate controls and practices must be used to prevent spills and overfills (i.e., check valves, high level alarms, automatic feed cutoffs, etc.) and to provide sufficient freeboard in uncovered tanks.
- Tanks must be in good condition and compatible with the waste stored in them.
- Tanks holding ignitable wastes are subject to applicable fire codes regarding location. Also see 373-3.10(i) for New York requirements.
- Tanks storing liquid hazardous wastes must have secondary containment.
- Tanks must be inspected daily.

Tank Secondary Containment Requirements (See Regulations for Full Requirements)
Secondary containment systems must be:

- Designed, installed, and operated so that no waste is released to the surrounding soil, groundwater, or surface water.
- Construction material or liner must be compatible with the waste to be stored and must be capable of containing accumulated material until it is promptly removed.
- Accumulations should be removed within 24 hours, or when such removal cannot be accomplished in a 24-hour period, within another time frame specified by the EPA Regional Administrator.
- Must have sufficient structural strength to prevent failure, and the foundation must be designed to resist failure due to normal movement of the surrounding soils.

- Must be equipped with a leak detection system capable of detecting failure in either the primary or secondary containment structures. Daily visual inspections provide acceptable leak detection, except for double wall tanks.
- Include daily visual inspections where tanks and tank components are physically accessible.

Tank Inspections
Daily inspections of hazardous waste tanks shall include:

- Overfill and spill control equipment to ensure that it is in good working order;
- Aboveground portions of the tank system to detect corrosion or releases of waste;
- Data gathered from any monitoring and leak detection equipment to ensure that the tank system is being operated according to its design; and,
- Construction materials and area surrounding the externally accessible portion of the tank system; including secondary containment structures to detect erosion or signs of releases of hazardous wastes.
- Cathodic protection systems must be inspected, if present, according to the following schedule:
- Proper operation of the cathodic protection system must be confirmed within six months after the initial installation and annually thereafter.
- All sources of impressed current must be inspected and/or tested as appropriate, but at least bimonthly.

All inspections must be documented in an inspection log. For PCB waste ($\geq$ 50 ppm), a record that includes for each batch of PCBs the quantity of the batch and the date the batch was added to the tank, as well as the date, quantity and disposition of any batch of PCBs removed from the tank must also be maintained. It is recommended that a log be maintained for this purpose.

3.4 Hazardous Waste Shipping

This section provides guidance for shipping hazardous waste. This includes preparing the shipment; offering the shipment to others for transport; and actual transport over the road.

When a regulated hazardous waste is offered for transportation, the material may also be regulated as hazardous by the DOT if the material being offered for shipment exhibits a DOT Hazard Class characteristic (i.e., Flammable Liquid, Corrosive Material, etc.). Hazardous waste is also regulated by the DOT if the material is regulated as hazardous by the federal EPA

even if the material does not exhibit a DOT Hazard Class characteristic. This is due to an interagency agreement between the DOT and the EPA. It should be noted that many state regulated hazardous wastes are not regulated as hazardous by the DOT. However, all state and federal wastes regulated as hazardous are managed under a shipping paper called a hazardous waste manifest when being offered for transportation. The process for shipping a hazardous waste includes the following steps:

- **Step 1:** Determine the proper DOT Hazard Class,
- **Step 2:** Select the best shipping description,
- **Step 3:** Select the proper shipping package,
- **Step 4:** Apply the proper marking & labeling to the container,
- **Step 5:** Prepare the shipping paper (Hazardous Waste Manifest),
- **Step 6:** If applicable, affix Placards to the vehicle.

When shipping hazardous wastes from a National Grid facility, a fax may be sent to the hazardous waste vendor providing details regarding the pickup. Please refer to the Environmental Department's Infonet web page to obtain a copy of a hazardous waste pick-up form which can be used to fax this information to the vendor.

3.4.1 DOT Hazard Class

According to the DOT, a hazardous waste is one which meets the federal EPA definition of a hazardous waste, which includes materials carrying EPA waste codes "D", "F", "K", "U", or "P". If a state regulated hazardous waste does not carry an EPA waste code or meet one of the 9 DOT Hazard Classes, it is not regulated as hazardous by the DOT and should not be assigned a Hazard Class.

To determine if a hazardous waste meets a DOT Hazard Class characteristic, refer to 49 CFR Part 173. Tables 3.2 and 3.3 provide descriptions of the DOT Hazard Classes and Placards, with applicable regulatory references. Figures 3.1 and 3.2 provide pictures of the DOT Hazard Class Labels and Placards.

3.4.2 DOT Shipping Description

For Hazardous Wastes which exhibit a DOT Hazard Class or are DOT regulated via interagency agreement with the EPA, a proper DOT shipping description must be used. Proper DOT shipping descriptions are selected from the DOT Hazardous Materials Table (49 CFR 172.101). If the material exhibits a DOT Hazard Class, a shipping description must be selected which matches the Hazard Class and best describes the material. However, if the material is an EPA regulated hazardous waste without a DOT Hazard Class, DOT makes it a Class 9 material with the generic description of "Hazardous Waste Liquid NOS" or "Hazardous Waste Solid NOS." The shipping name is then followed by: the DOT Class Number; the DOT Identification Number; and the Packing Group (PG) Number as found on the Hazardous Materials Tables. Lastly, if a constituent makes the material hazardous, that constituent should be identified in brackets following the basic DOT description.

3.4.3 DOT Shipping Packages

Shipping packages are defined by DOT as either bulk or non-bulk. Bulk packages have a capacity ≥ 119 gallons, such as tank trailers. Non-bulk packages have a capacity under 119 gallons such as a metal 55 gallon drum. DOT package requirements are found in 49 CFR Parts 173, 178, and 179. DOT requires that all packages used to contain a hazardous material be a United Nations (UN) performance package. The most common package used by National Grid to contain hazardous waste are steel 55 gallon drums. These drums must be marked on the bottom as either UN 1A1 or UN 1A2 for closed head and open head drums, respectively. In addition, drums used by National Grid shall at a minimum be marked with a "Y" rating for PG II and III performance standards. However, if a PG I hazardous waste is being shipped, a UN 1A1 or 1A2 drum with an "X" rating must be used. Shippers must check Column 8 of the proper DOT description in DOT's Hazardous Material Table (49 CFR 172.101) to select a proper shipping package. For further guidance on DOT package requirements, refer to the DOT packaging regulations at 49 CFR 173. Containers that provide environmentally equivalent protection and meet DOT requirements can also be used.

For shipping state regulated hazardous wastes which are not DOT regulated hazardous materials, National Grid generators shall at a minimum use UN 1A1 or 1A2 steel drums with a "Y" rating.

3.4.4 DOT Marking Requirements

Non-bulk packagings must be marked in accordance with 49 CFR 172.301 and associated regulations. These regulations require that non-bulk packagings holding either waste or virgin hazardous materials be marked with the following information prior to being shipped:

1. Shipper's name and address;

2. Proper DOT shipping name, including technical names and hazardous substance information, if required; and,

3. DOT ID number (including the letters "UN" or "NA" as appropriate).

The information for Items 2 and 3 above can be found in 49 CFR 172.101 (Hazardous Material Tables) on Columns (2), (4) and (6).

In addition, if the material being shipped is a hazardous waste, it must be marked with all of the following additional information prior to transport:

1. The words "HAZARDOUS WASTE" - Federal law prohibits improper disposal. If found, contact the nearest police or public safety authority or contact the U.S. EPA;

2. Generator's name and address; and,

3. Manifest Tracking Number.

Labels such as those shown in Figure 3.1 may be used to comply with the marking requirements for hazardous waste.

Bulk packagings must be marked with the proper DOT ID Number (UN/NA). The DOT ID Number can be found on Column (4) in 49 CFR 172.101 (Hazardous Material Table). The identification number must be marked on the bulk packaging as follows:

1. On each side and each end, if the packaging has a capacity of ≥ 3,785 L (1,000 gallons);

2. On two opposing sides if the packaging has a capacity of less than 3,785 L (1,000 gallons).

A bulk packaging must remain marked when emptied unless it is sufficiently cleaned of residue and purged of vapors to remove any potential hazard or it has been refilled. Once refilled, it must be marked in accordance with the above requirements.

3.4.5 DOT Labeling Requirements

DOT regulations require that hazardous materials be labeled with small square-on-point (diamond-shaped) labels which warn of the hazard of the material being shipped. Labeling requirements can be found in 49 CFR 172 Subpart E. Labels are required to be provided on the following:

1. Non-bulk packagings;

2. Bulk packagings other than cargo tanks, or tank cars with volumetric capacities of less than 18 cubic meters (640 cubic feet), unless placarded in accordance with 49 CFR 172 Subpart F;

3. Portable tanks of less than 3,785 L (1,000 gallons) capacity, DOT Specification 106 or 110 multi-unit tank cars, and overpacks, freight containers or unit load devices of less than 18 cubic meters (640 cubic feet) unless placarded in accordance with 49 CFR 172 Subpart F.

Labels can only be placed on packages that contain a hazardous material exhibiting the hazard identified on the label.

To choose the correct label for a material being shipped, you must determine the correct shipping name and hazard class in accordance with the Hazardous Materials Tables. The proper label is listed in Column 6 of the Hazardous Materials Table. If more than

one label is listed, the first is called the primary label and the second is called the subsidiary label. Primary hazard labels must have the hazard class number indicated in the bottom point of the label. Subsidiary hazard labels **cannot** have the hazard class number indicated on the label.

Figure 3.1 shows examples of labels commonly used for materials carried or transported by National Grid.

3.4.6 DOT Placarding Requirements

Placards are similar to DOT labels. They are used to warn of the hazards of materials being transported. Shippers of hazardous materials are responsible for either placarding vehicles or offering the initial carrier the appropriate placards. In general, placards must be provided on each end and each side of a transport vehicle.

To determine which placard to use for a material, the appropriate DOT hazard class or division of your material must be known. It is the Shipper/Generator's responsibility to determine the proper hazard class. A Placard Table is provided in Table 3.3. Pictures of DOT Placards are provided in Figure 3.2.

Find the hazard class in the left column of Table 3.3. The appropriate placard is listed in the right column.

Placarding requirements do not apply to the following situations:

1. Non-bulk packages containing less than 1,000 pounds aggregate gross weight of hazardous materials covered by Part B of Table 3.3;

(**NOTE:** Any quantity of hazardous material identified in Part A of Table 3.3 must be placarded.)

2. Any Hazard Class 9 material being shipped domestically;

3. Combustible liquids in non-bulk packagings;

4. Infectious substances;

5. Consumer Commodities;

6. Materials authorized to be offered as limited quantities in accordance with 49 CFR 172.203;

7. Hazardous materials packaged as small quantities under 49 CFR 173.4;

8. Empty non-bulk packages containing only the residues of hazardous materials in Table 3.2;

9. Subsidiary hazards.

Placards are required when a vehicle is transporting 55-gallon drums totaling more than 1,000 pounds of hazardous materials other than exclusively Class 9 materials. In Massachusetts, flammable and combustible placards are required for all flammable and combustible materials when ≥ 21 gallons are transported. This is a requirement of the Massachusetts Fire Marshall.

DANGEROUS placards may be used for shipments containing more than one hazard class. If the shipment contains non-bulk packages of hazard classes listed in Table 5.2 and there are no more than 2205 pounds of any of the hazard classes, a DANGEROUS placard may be used instead of individual placards. If any of the above qualifications is not true, individual placards must be used.

Figure 3.2 provides sample placards for hazardous materials commonly shipped by the Company.

3.4.7 Transporting PCB Contaminated MODF and PCB Transformers

In addition to DOT requirements, PCB regulations state that each vehicle transporting PCB containers that contain more than 45 kg (approximately 13 gallons) of liquid PCBs at concentrations of 50 ppm and greater or with one or more PCB transformers (500 ppm+), must be marked with the yellow and black M_L mark. Note that the total weight of PCB contaminated liquid must be calculated (not the PCB weight only) when determining if the mark is needed.

3.4.8 Hazardous Waste Manifest

The uniform hazardous waste manifest is a document which is used to track hazardous waste shipments from the generator to the treatment, storage or disposal facility (TSDF). Small and large quantity generators are required to comply with the manifest regulations. The manifest is also the shipping paper used for hazardous waste shipments, so in addition to the hazardous waste regulations governing manifests, DOT regulations governing shipping papers also apply. These can be found in 49 CFR 172 Subpart C.

A hazardous waste manifest is required for the transport of any Company-generated hazardous wastes from a Company generator facility to a non-Company treatment, storage or disposal facility (TSDF). This requirement includes state-regulated hazardous wastes as well as EPA hazardous wastes. A manifest is also required if the waste generated is not a hazardous waste in the generator state, but is a state-regulated hazardous waste in the destination state. Generally, hazardous waste manifests are not used when shipping wastes that are not regulated as hazardous.

The following rules apply to transporting and manifesting company hazardous wastes:

1. Transportation of hazardous wastes from one company generator facility to another Company generator facility is prohibited.

2. Equipment, debris, and other materials being transported from release locations or from VSQGs may be transported without a manifest to the nearest company generator for classification as a waste or for reuse.

3. Large volumes of wastes generated from non-generator facilities as a result of planned maintenance activities shall be manifested directly to a TSDF. A temporary EPA ID Number must be obtained in Rhode Island, New York, and New Hampshire and may be obtained in Massachusetts and Vermont. In Massachusetts and Vermont, the ID Number of the nearest company facility may also be used.

4. When hazardous spill cleanup-generated wastes are transported by a spill response vendor to a TSDF from a spill response in the territory, a hazardous waste manifest is required. A temporary EPA ID Number must be obtained in Rhode Island, New York and New Hampshire and may be obtained in Vermont. In Vermont, the ID Number of the nearest company facility may also be used. In Massachusetts, the field operating company EPA ID Numbers obtained for this reason from MADEP must be used.

5. Small volumes of spill cleanup debris and soil generated by National Grid cleanup activities may be transported in National Grid vehicles without a manifest to the nearest National Grid facility possessing an EPA ID Number. In Rhode Island up to 55 gallons of PCB contaminated waste may be transported.

3.4.9 Transporting PCB Wastes

In addition to TSCA PCB requirements, PCB wastes are subject to the DOT regulations if PCBs are in high enough concentrations and quantities to be considered hazardous substances. In order to be a DOT hazardous substance, there must be at least one pound of PCBs in each container. A hazardous waste manifest must be used to track the shipment of the waste, with the appropriate DOT shipping information included on the manifest.

The formula below may be used to determine the pounds of PCBs in a waste container:

PCB conc. (ppm) x S.G. of oil x 8.34 lb/gal x volume (gal) in container/ 1,000,000 = pounds of PCBs

The PCB concentration can be determined from lab analysis or from Clor-N-Oil test kits. If a test kit is used to determine the concentration, use the upper bound of the test kit as the concentration. In other words, if the test kit shows that the concentration of PCBs is between 50 and 500 ppm, use 500 ppm in the calculation. The S.G. of oil means the specific gravity of the oil, which can be found on a material safety data sheet for the oil. The specific gravity of MODF is typically approximately 0.9.

When shipping PCB wastes utilizing an independent transporter (40 CFR 761.208(a)(3)(ii)), the generator must confirm that the waste was received by the commercial storing or disposal facility. Confirmation of waste receipt must be completed within 1 day of receiving copy 3 of the hazardous waste manifest. Documentation of this confirmation should be maintained with the copies of the hazardous waste manifest.

3.4.10 Vendor Generated Hazardous Waste

Wastes generated by vendors at company locations are subject to regulatory requirements for transporting waste.

Projects Generating Large Quantities of Waste

For large projects which will generate significant quantities of waste, contractual language should be developed which specifically addresses the responsibility for management of hazardous wastes generated during the project.

Projects Generating Small Quantities of Waste

If a National Grid facility has an EPA ID Number, the vendor must either:

- Leave the waste on-site for management by National Grid personnel, or
- Ship the waste off-site under a hazardous waste manifest. National Grid must be named as the generator, the waste must be shipped to a National Grid-approved disposal facility, and National Grid personnel must sign the manifest (1).

Note: (1) - In Massachusetts and New York, National Grid may provide written authorization to vendor personnel to sign hazardous waste manifests on behalf of National Grid. The authorized vendor must have hazardous waste training.

3.4.11 Manifest Completion Responsibility

The generator is responsible for completing the hazardous waste manifest. Because the Company is the generator of the hazardous waste covered in this manual, the manifest shall be initiated by a Designated Supervisor or authorized company agent. The Designated Supervisor or authorized company agent shall sign the manifest as generator. Personnel authorized to sign manifests must have received adequate training. National Grid Service Company personnel may sign hazardous waste manifests for the various operating companies except as noted below regarding RI.

Usually, the transport vendor will provide the manifest form and assist in its completion. At present, several company approved waste brokers provide pre-printed manifests for shipment of company wastes.

It is the responsibility of the company to ensure that the manifest is properly, completely and legibly filled out and signed by all parties including the Designated Supervisor or authorized company agent. Wastes shall not be released to the transport vendor until all signatures are completed.

In Rhode Island, a list of company employees authorized to sign hazardous waste manifests as generators must be submitted annually to the Rhode Island Department of Environmental Management. Only these people may sign manifests in Rhode Island.

In New Hampshire, the generator must initial any changes made to a hazardous waste manifest.

3.4.12 Hazardous Waste Manifest Forms

The Hazardous Waste Manifest System is a set of forms, reports, and procedures designed to seamlessly track hazardous waste from the time it leaves the generator facility where it was produced, until it reaches the off-site waste management facility that will store, treat, or dispose of the hazardous waste. The system allows the waste generator to verify that its waste has been properly delivered, and that no waste has been lost or unaccounted for in the process.

The key component of this system is the Uniform Hazardous Waste Manifest which is a form prepared by all generators who transport, or offer for transport, hazardous waste for off-site treatment, recycling, storage, or disposal. Currently, the manifest is a paper document containing multiple copies of a single form. When completed, it contains information on the type and quantity of the waste being transported, instructions for handling the waste, and signature lines for all parties involved in the disposal process. The manifest is required by both Department of Transportation and EPA. Each party that handles the waste signs the manifest and retains a copy for themselves. This ensures critical accountability in the transportation and disposal processes. Once the waste reaches its destination, the receiving facility returns a signed copy of the manifest to the generator, confirming that the waste has been received by the designated facility.

3.4.13 Hazardous Waste Manifest Preparation

An example of a uniform Hazardous Waste Manifest is presented in Figure 3.3. Additional information on the federal hazardous waste manifest system as well as instructions for completion of the manifest are located at http://www.epa.gov/epaoswer/hazwaste/gener/manifest/.

3.4.14 DOT Emergency Response Information

Generators are also subject to some additional DOT regulations that must be complied with and completed by the generator prior to shipment. Specifically, the generator must provide the following emergency response information for each waste being shipped:

1. **A 24-hour emergency response telephone number for use in an emergency involving the hazardous waste**. The telephone number must be monitored at all times when the hazardous material is being shipped, and must be entered on the shipping paper either immediately following the shipping description or on a hazardous waste manifest in Item 3. It may only be entered in a separate location if the same telephone number applies to all of the materials represented by the shipping paper and if it is indicated that the number is for emergency response. In New England, Clean Harbors and Onyx both provide 24-hour emergency response information for the hazardous wastes and universal wastes being shipped by National Grid. The number for Clean Harbors is: 1-800-645-8265. In New York, the emergency contact number is provided by CHEMTREC at 1-800-424-9300.

2. **DOT Emergency Response Guide Number.** The guide number may be included in Item 9b of the hazardous waste manifest, after the DOT shipping description, or may be included in Item 14 of the manifest.

3.4.15 Distribution of the Hazardous Waste Manifest

As the manifest is forwarded along with the waste shipment, each party (generator, transporter, and TSDF) completes its applicable section. Please refer to EG-102 for details hazardous waste manifest distribution and management.

3.4.16 Incomplete Hazardous Waste Shipments

It is the responsibility of the generator to verify that the transported wastes actually arrive at the TSDF. If the generator does not receive a manifest copy from the TSDF within 35 days of the date of shipment, the generator representative responsible for hazardous waste manifest management shall contact the Environmental Engineer who will trace the shipment. In the event that the original copy cannot be located, a faxed copy of the signed manifest from the TSDF may be utilized to confirm receipt of the waste. The Environmental Engineer will submit an exception report to the hazardous waste authority of the state in which the shipment originated if the copy (or fax) is not received from the TSDF within 45 days of the date of shipment. Exception reports shall be written in conjunction with the appropriate Environmental engineer/staff. See EP 15.

If notified of a discrepancy in a waste shipment by the transporter or TSDF, contact the Environmental Engineer. The Environmental Engineer shall consult with the appropriate Environmental engineer/staff and attempt to rectify the situation or arrange for disposal at an alternate location.

3.4.17 Hazardous Waste Shipping from a Very Small Quantity Generator (VSQG) Facility (Massachusetts)

A VSQG may transport hazardous waste in a vehicle without a hazardous waste transporters license and without a manifest under the conditions listed below:

- The waste is generated by the VSQG or collected from another company VSQG;
- The waste is transported to another company SQG or LQG. New York must ship wastes generated by a CESQG to a TSDF;
- The weight of the waste does not exceed, in aggregate, more than 200 kg;
- The containers are tightly sealed and secured to the vehicle and properly labeled;
- The generator's DEP registration is located in the vehicle and easily accessible;
- Spills from the vehicle are reported to the local fire and police departments, the DEP, and NRC; and,
- A receipt for the waste is provided from facility accepting the waste with copy retained by the person delivering the waste and the person receiving the waste. The receipts must be maintained for three years.

3.4.18 National Grid Hazardous Waste Profiles

Most waste profiles for hazardous wastes shipped by National Grid are listed on the Environmental Department's web page on the company's Infonet. Please refer to this web site for an up-to-date listing of waste profiles.

3.5 Land Disposal Restrictions

40 CFR Part 268 identifies hazardous wastes that are restricted from land disposal and the treatment standards that will allow land disposal. It is important to note that the Land Disposal Restrictions (LDR) regulations apply to hazardous wastes being incinerated or otherwise treated, not just to hazardous wastes initially being land disposed. This is because the ash or sludge generated by the destruction or treatment of restricted wastes may ultimately be land disposed and still carries the restricted hazardous waste code designation.

The D.C. Court of Appeals in the case Association of Battery Recyclers, Inc. et. al. v. U.S. Environmental Protection Agency (decided August 21, 2000) vacated the use of the Toxicity Characteristic Leaching Procedure (TCLP) for evaluating whether manufactured gas plant (MGP) wastes (MGP-contaminated soil) are a hazardous waste. However, individual states may regulate MGP wastes that fail TCLP.

In New York, DEC allows a conditional exemption for MGP coal tar waste, soils and sediments exceeding TCLP for benzene (D018) destined for permanent thermal treatment.

Purifier waste containing greater than 3.5 percent sulfur by weight is excluded. The DEC Policy is stated in TAGM-4061.

In Massachusetts, the DEP Bureau of Waste Prevention has reviewed the court decision and concluded that the decision does not impact the regulation of MGP waste in Massachusetts under the Massachusetts Hazardous Waste Regulations, 310 CMR 30.000. Therefore, MGP remediation wastes generated at 21E sites that exhibit the toxicity characteristic when transported from a disposal site must be managed in Massachusetts as a hazardous waste, including the use of a hazardous waste transporter, hazardous waste manifest, and the applicable hazardous waste code. However, such wastes may be shipped to a non-hazardous waste facility in another state, provided that the receiving facility is legally authorized to accept MGP remediation wastes and complies with the requirements of the receiving state. In addition, the remediation wastes must comply with the management requirements for remediation waste under the MCP, including the transport of the waste to the receiving state on a hazardous waste manifest.

In Rhode Island, the DEM has indicated that the EPA decision does not impact the regulation of MGP waste in Rhode Island under DEM's "Rules and Regulation for Hazardous Waste Management" (Hazardous Waste Regulations), Regulation #DEM OWM-HW01-07. As such, MGP remediation wastes generated at a site which fail TCLP testing must be managed when transported from a disposal site as a Rhode Island hazardous waste, including the use of a hazardous waste transporter, hazardous waste manifest, and the applicable Rhode Island hazardous waste code. Additionally, MGP wastes which fail TCLP testing cannot be disposed of at an instate facility as the receiving requirements of such facilities are governed by DEM Hazardous Waste Regulations. However, similar to Massachusetts, such wastes may be shipped to a non-hazardous waste facility in another state, provided that the receiving facility is legally authorized to accept MGP remediation wastes and complies with the requirements of the receiving state.

As of this date, only a one-time notification is required. The one-time notification would apply to shipments of all restricted hazardous waste, and so would include lab packs. No new notification would be required unless there was a change in the waste, process, or receiving facility.

This chapter will provide general guidance on complying with these regulations. Contact the Environmental department for details or with questions.

3.5.1 Applicability of LDR

State regulated (non-RCRA) wastes are not subject to the LDR regulations nor are wastes generated by RCRA very small quantity generators. Newly identified wastes for which EPA has not promulgated land disposal restriction or treatment standards are also not subject to LDR. Lastly, de minimus losses of characteristic wastes to wastewaters are not prohibited wastes. See §268.41 for additional details on the applicability of the LDR.

New York State: PCB wastes are subject to LDR. [Ref. 6 NYCRR Part 376]

3.5.2 Generator Requirements

Generators of hazardous waste are required to determine if their wastes are subject to the land disposal restrictions. Restricted wastes cannot be land disposed unless all concentration limits are met or the specified treatment has been conducted.

Step 1: Determine all the applicable waste codes for a specific waste stream. This determination can be made in either of two ways: testing the waste or using knowledge of the waste. If the waste displays a hazardous characteristic of ignitability, corrosivity, reactivity or toxicity, comply with the special requirements of 40 CFR §268.9, in addition to any other applicable requirements.

Step 2: Determine whether the waste is a wastewater or non-wastewater. This is called the treatability group. Wastewaters are wastes that contain less than 1% by weight total organic carbon (TOC) and less than 1% by weight total suspended solids (TSS), with some exceptions. All other wastes are non-wastewaters. Most hazardous wastes will be non-wastewaters.

Step 3: Determine if the hazardous waste meets the treatment standards listed in 40 CFR §268.40 (treatment standards for hazardous waste or hazardous soil), §268.45 (alternative treatment standards for hazardous debris), and §268.48 (universal treatment standards). Standards are listed as total concentration, concentration of hazardous constituents in an extract of the waste, or waste treatment technologies. Technology treatment standards found in §268.40 are described in detail in Table 1 of §268.42. All hazardous constituents in the waste or in the waste residue must be at or below the values found in the tables for that waste.

3.5.3 Notification Requirements

The requirements for notices vary and are found at 40 CFR §268.7. The Company's licensed hazardous waste transporter/disposal vendors provide fill-in-the-blank notifications for use when shipping restricted wastes. Other facilities may also provide notifications which can be used if the notifications provide all the required information.

There are no specific or standard forms identified in the regulations. It is the generator's responsibility to prepare the forms and to ensure that the forms comply with the regulations.

There are four types of notices as described below:

- Notices for restricted wastes not meeting the treatment standards (these cannot be land disposed prior to treatment);

- Notices for restricted wastes meeting the treatment standards at the original point of generation (these can be land disposed without further treatment);

- Notices for wastes subject to exemptions from the requirement that hazardous wastes meet treatment standards before they can be land disposed, such as MGP wastes under certain circumstances. This also includes, but is not limited to, case-by-case extensions under §268.5, disposal in a no migration unit under §268.6, or a national capacity variance or case-by-case capacity variance under Subpart C of §268; and,

- Notices if a generator is managing a lab pack containing hazardous wastes and wishes to use the alternative treatment standard for lab packs found at §268.42(c).

The majority of National Grid RCRA wastes do not meet the land disposal restriction treatment standards and, therefore, cannot be land disposed without prior treatment. The notification requirements for several types of wastes are summarized below. Refer to §268.7 for notification requirements for other types of wastes and for specific details. It is important to remember that for characteristic wastes, the notification must include all underlying hazardous constituents that exceed their respective Universal Treatment Standards.

3.5.4 Waste Not Meeting Treatment Standards

If the waste or contaminated soil does not meet the treatment standard, the generator must send a one-time written notice, with the initial shipment of waste, to each treatment or storage facility receiving the waste, and place a copy in the file. The notice must include the information in column §268.7(a)(2) of the Generator Paperwork Requirements Table, provided as Table 3.4. No further notification is necessary until such time that the waste or facility changes, in which case a new notification must be sent and a copy placed in the generator's file.

3.5.5 Waste Meeting Treatment Standards

If the waste or contaminated soil does meet the treatment standard, the generator must send a one-time written notice, with the initial shipment of waste, to each treatment or storage facility receiving the waste, and place a copy in the file. The notice must include the information in column §268.7(a)(3) of the Generator Paperwork Requirements Table, provided as Table 3.4, and the following certification statement, signed by an authorized representative:

> *I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Subpart D. I believe that the information I submit is true, accurate, and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.*

If the waste changes, the generator must send a new notice and certification to the receiving facility, and place a copy in their file.

3.5.6 Waste Exempt from Treatment Standards

The notice for waste that is exempt from LDR must include the information in column §268.7(a)(4) of the Generator Paperwork Requirements Table, provided as Table 3.4. If the waste changes, the generator must send a new notice and certification to the receiving facility, and place a copy in their file.

3.5.7 Lab Packs

The notice required when a generator is managing a lab pack containing hazardous wastes and wishes to use the alternative treatment standard for lab packs found at §268.42(c), must include the information in column §268.7(a)(9) of the Generator Paperwork Requirements Table, provided as Table 3.4, and the following certification statement, signed by an authorized representative:

> *I certify under penalty of law that I personally have examined and am familiar with the waste and that the lab pack contains only wastes that have not been excluded under appendix IV to 40 CFR 268 and that this lab pack will be sent to a combustion facility in compliance with the alternative treatment standards for lab packs at 40 CFR 268.42(c). I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.*

If the lab pack contains characteristic hazardous wastes, the underlying hazardous constituents need not be identified.

This option is available to generators when the small containers of hazardous wastes in over packed drums (lab pack) are packaged as specified in 40 CFR §264.316 and §265.316, or if the lab pack does not contain any of the wastes listed in Appendix IV of §268 (includes D009, mercury), or if the lab packs are incinerated in accordance with the requirements for hazardous waste incinerators and certain incinerator residues are treated in compliance with the treatment standards specified for such wastes. Refer to §268.42(c) for the specific details.

3.5.8 On-site Treatment of Restricted Wastes in Tanks, Containers, or Containment Buildings

These activities are not normally conducted by National Grid generators. All activities which may involve treatment of hazardous waste must be reviewed with the Environmental department prior to initiating these activities.

3.5.9 Restricted Waste Exempt from Subtitle C

There are additional record keeping requirements for hazardous waste generators that treat waste on-site in systems that are excluded from subtitle C regulations, such as wastewater treatment systems subject to the Clean Water Act (CWA). These activities are not normally conducted by National Grid generators. All activities which may involve treatment of hazardous waste must be reviewed with the Environmental department prior to initiating these activities.

3.5.10 Special Requirements for Characteristic Wastes

Special rules regarding waste that exhibit a characteristic are found at 40 CFR §268.9. There are special requirements for listed hazardous wastes that also exhibit a hazardous characteristic. In most cases, the treatment standard for the listed waste operates in lieu of the treatment standard for the characteristic waste, provided the treatment standard for the listed waste includes a treatment standard for the constituent that causes the waste to exhibit the characteristic. Otherwise, the waste must meet the treatment standards for all applicable listed and characteristic waste codes.

For wastes that have been decharacterized, the generator must complete a one-time notice and certification which must be placed in the generator's or treater's file and sent to the EPA Region.

3.5.11 Records Requirements

Generators must retain a copy of all notices, certifications, waste analysis data, and other documentation produced pursuant to 40 CFR §268 for at least three years from the date the waste that is the subject of such documentation was last sent to the on-site or off-site treatment, storage or disposal facility.

3.6 Hazardous Waste Disposal

3.6.1 Importance of Ensuring Proper Disposal of Wastes

It is extremely important that hazardous wastes are disposed of in full compliance with federal and state laws and regulations. Failure to comply with these laws and regulations can result in improper disposal of hazardous wastes.

3.6.2 Treatment of Hazardous Waste

Generators are only allowed to treat hazardous waste on-site under specific conditions such as the case for VSQG's in Massachusetts. All treatment not performed in accordance with regulations is considered to be improper disposal of a hazardous waste. An example of allowable treatment is treatment of wastewater in a wastewater treatment unit provided the activity complies with all applicable permits and requirements.

Under federal regulations, characteristic wastes may be treated in 90-day tanks, containers, or containment buildings covered by 40 CFR Section 262.34(a), without a permit. If the waste thereafter no longer exhibits a hazardous characteristic, any further management of the waste is no longer subject to Subtitle C of RCRA. However, unless

the waste was decharacterized within an agency-approved Area of Contamination, LDRs will still apply.

The following activities are generally not considered "treatment":

- Neutralization of caustic or corrosive wastes that are hazardous due to characteristic only;
- Gravity separation of oil from water, that is not a hazardous waste, including the addition of acid or base to bring about a better separation of an oil/water emulsion;
- Filtering of solids from an oily sludge or other non-hazardous component of an oil mixture; and,
- Addition of an absorbent (e.g., sawdust, speedi-dry, $CaCO_3$) in which a chemical reaction does not occur and the use of a gelation process or similar technique in which a chemical reaction does not occur, if such processes are done at the site of generation and are done solely for the purpose of making the waste more amenable to disposal at a hazardous waste facility.

A generator may think they are minimizing hazardous waste, but may actually be treating the waste. For example, although evaporation may minimize the amount of hazardous waste a generator is shipping off-site, it is actually considered to be treatment of a hazardous waste and would be improper disposal.

3.6.3 Approved Hazardous Waste Disposal Facilities

Hazardous wastes generated by the National Grid shall be disposed of at disposal facilities which have been approved by the National Grid Waste Disposal Vendor Advisory Group. A list of Company-approved disposal facilities is shown on the Environmental Department's Web site on the Company's Infonet.

3.6.4 Disposal of PCB Wastes

PCB wastes are regulated for disposal by the EPA through the TSCA Regulations. The TSCA regulations require PCBs to be disposed of only at chemical waste landfills (solids) and incinerators (solids and liquids) permitted by EPA for the disposal of PCBs.

3.6.5 Disposal of On-Site Vendor Generated Wastes

Vendor-generated wastes may be managed in various manners depending upon the classification of the facility and the quantity of wastes being generated. In all cases, the following conditions apply:

- The vendor shall provide to the Environmental Engineer a list of the anticipated chemicals to be used during the project. The vendor is responsible for providing MSDSs for each chemical product to be used on site.

- All wastes generated by a vendor at a company site shall be owned, managed and disposed by the vendor.

- All unused chemicals (non-waste) and/or products originally brought to the company location by the outside vendor will remain the responsibility of the vendor and be removed by the vendor from the company location at the conclusion of the vendor's on-site activities.

- All wastes must be disposed of at a National Grid approved hazardous waste disposal facility. Refer to the Environmental Department's web site on the company's Infonet for a listing of approved disposal facilities.

3.6.6 Recycling of Scrap Metal

Because of the potential for National Grid scrap metal to contain oils, PCBs or lead, the company has developed a list of vendors approved to recycle National Grid scrap metal. Refer to the Environmental Department's web site on the company's Infonet for a listing of approved scrap metal facilities.

All junk oil-filled electrical equipment shall be disposed or recycled at a National Grid approved hazardous waste disposal facility. Oil-filled equipment shall not be sent to scrap metal recyclers, even if the equipment has been drained.

In an effort to limit potential liability associated with the unrestricted shipment and ultimate processing of lead-sheathed copper cable, only those facilities indicated as approved for lead cable may receive National Grid non-PCB lead cable.

Table 3.1: Generator Classification Criteria

Large Quantity Generator[1]					
Criteria	**MA[1]**	**NH[2]**	**VT[3]**	**RI[4]**	**NY[5]**
Generate Hazardous Waste Per Month	>1000 kg	≥100 kg	≥1000 kg	>1000 kg	>1000 kg
Generate Acute Hazardous Waste Per Month	>1 kg	≥1 kg	≥1 kg	>1 kg	>1 kg
Generate Residue from Cleanup of Acutely Hazardous Waste Spill	>100 kg	≥100 kg	≥100 kg	>100 kg	N/A
Accumulate Hazardous Waste	>2000 kg in containers >6000 kg in tanks >6000 kg total	≥1000 kg	≥6000 kg	>6000 kg	>6000 kg
Accumulate Acute Hazardous Waste	>1 kg	≥1 kg	≥1 kg	>1 kg	>1 kg
Accumulate Residue from Cleanup of Acutely Hazardous Waste Spill	N/A	≥100 kg	≥100 kg	N/A	N/A

Small Quantity Generator				
Criteria	**MA[1]**	**NH[2]**	**VT[3]**	**NY[5]**
Generate Hazardous Waste Per Month	<1000 kg	<100 kg	100 - 999 kg	>100 - <1000 kg
Generate Acute Hazardous Waste Per Month	<1 kg	<1 kg	<1 kg	<1 kg
Generate Residue from Cleanup of Acutely Hazardous Waste Spill	<100 kg	<100 kg	<100 kg	N/A
Accumulate Hazardous Waste	<2000 kg in containers <6000 kg in tanks <6000 kg total	<100 kg (if >1000 kg)	< 6000 kg	< 6000 kg
Accumulate Acute Hazardous Waste	<1 kg	<1 kg	<1 kg	<1 kg
Accumulate Residue from Cleanup of Acutely Hazardous Waste Spill	<100 kg	<100 kg	<100 kg	N/A

Table 3.1 (continued): Generator Classification Criteria

Very Small Quantity Generator			
Criteria	**MA[1]**	**VT[3]**	**NY[5]**
Generate Hazardous Waste Per Month	<100 kg	<100 kg	<100 kg
Generate Acute Hazardous Waste Per Month	0 kg	<1 kg	<1 kg
Generate Residue from Cleanup of Acutely Hazardous Waste Spill	0 kg	<100 kg	<100 kg
Accumulate Hazardous Waste	<600 kg	<1000 kg	<1000 kg
Accumulate Acute Hazardous Waste	0 kg	<1 kg	<1 kg
Accumulate Residue from Cleanup of Acutely Hazardous Waste Spill	NA	<100 kg	<100 kg

1. Massachusetts
   - Generators in Massachusetts may maintain dual status: one for waste oil and PCBs and another for RCRA hazardous waste. The advantage of maintaining dual status is that waste oil generators are subject to fewer regulations than RCRA hazardous waste generators. When determining a facility's MA generator status, the total amount of the following waste must be calculated: Waste Oil and Debris (MA01), PCB Waste Oil and Debris (MA02), Paint-Related Waste (MA04), Specification Used Oil Fuel (MA97), and Off Specification Used Oil Fuel (MA98) Waste.
   - MA VSQGs may self-transport limited quantities of waste without a license to a Company LQG/SQG.
   - MA VSQGs may treat hazardous waste or recycle regulated recyclable materials without a permit provided:
     - Only its own wastes are treated;
     - Treatment occurs at the site of generation;
     - Waste is treated only to render it less hazardous or nonhazardous;
     - Compliance with VSQG limits is always maintained.
   - MA SQGs that generate ≥ 1,000 kg of hazardous waste in a month are required to notify MADEP immediately after the one-time exceedance occurs. If possible, notify MADEP prior to generation of waste, such as for a planned clean-out. The facility is then required to have the large volume of waste removed as soon as possible, and no later than 90 days from the date of generation. Additionally, a biennial report must be prepared for the year that exceedance occurred.
2. New Hampshire
   - Used oil which is to be recycled by being burned for energy recovery or re-refinement does not need to be included when adding up the amount of waste generated on site.
   - NH SQGs may self-transport no greater than 20 gallons of nonacutely hazardous waste to an authorized facility. See Env-Wm 508.02 for additional details.
   - In New Hampshire, a large quantity generator is called a full quantity generator

- NH SQGs that generate ≥ 100 kg of hazardous waste in a month are required to notify NHDES immediately after the one-time exceedance occurs. If possible, notify NHDES prior to generation of waste, such as for a planned clean-out. The facility is then required to have the large volume of waste removed as soon as possible, and no later than 90 days from the date of generation. Additionally, a biennial report must be prepared for the year that exceedance occurred.

3. Vermont
   - In Vermont, a large quantity generator is called a Generator and a VSQG is called a Conditionally Exempt Generator.
   - Used oil recycled for energy recovery or re-refining does not need to be included when totaling the amount of waste generated or accumulated on site.
4. Rhode Island
   - All generators are regulated as LQGs with regard to the applicability of most parts of the state hazardous waste regulations (such as the need for a contingency plan and storage time limits). However, other requirements of the regulations (such as the need for a biennial report), as well as the potential for regulatory inspections, are based on actual generator status. RI SQGs that generate ≥ 1,000 kg of hazardous waste in a month are required to notify RI DEM immediately after the one-time exceedance occurs. If possible, notify RI DEM prior to generation of waste, such as for a planned clean-out. Additionally, a biennial report must be prepared for the year that exceedance occurred.
5. New York
   - In New York, a VSQG is called a Conditionally Exempt Small Quantity Generator.

Table 3.2: DOT Hazard Classes

Class No.	Division No. (If Any)	Name of Class or Division	49 CFR Reference for Definitions
None		Forbidden Materials	173.21
None		Forbidden Explosives	173.54
1	1.1	Explosives (with a mass explosion hazard)	173.50
1	1.2	Explosives (with a projection hazard)	173.50
1	1.3	Explosives (with predominately a fire hazard)	173.50
1	1.4	Explosives (with no significant blast hazard)	173.50
1	1.5	Very insensitive explosives; blasting agents	173.50
1	1.6	Extremely insensitive detonating substances	173.50
2	2.1	Flammable gas	173.115
2	2.2	Non-flammable compressed gas	173.115
2	2.3	Poisonous gas	173.115
3		Flammable and combustible liquid	173.120
4	4.1	Flammable solid	173.124
4	4.2	Spontaneously combustible material	173.124
4	4.3	Dangerous when wet material	173.124
5	5.1	Oxidizer	173.127
5	5.2	Organic peroxide	173.128
6	6.1	Poisonous materials	173.132
6	6.2	Infectious substance (etiologic agent)	173.134
7		Radioactive material	173.403
8		Corrosive material	173.136
9		Miscellaneous hazardous material	173.140
None		Other regulated materials: ORM-D	173.144

Table 3.3: DOT Placard Tables

Vehicles carrying hazardous materials must display warning placards identifying the hazard class of the contents. Vehicles carrying any amount of hazard-class material shown in Part A must always display the specific placard. Vehicles carrying more than 1,000 lbs. of hazard-class materials shown in Part B must display appropriate placards.

Part A		
Category of Material (Hazard Class or Division Number and Additional Description, as Appropriate)	**Placard Name**	**49 CFR Placard Design Section Reference**
1.1	Explosives 1.1	172.522
1.2	Explosives 1.2	172.522
1.3	Explosives 1.3	172.522
2.3	Poison Gas	172.540
4.3	Dangerous when wet	172.548
6.1 (PG I, inhalation hazard)	Poison	172.554
7 (Radioactive Yellow III label only)	Radioactive 1	172.556
Part B		
Category of Material (Hazard Class or Division Number and Additional Description, as Appropriate)	**Placard Name**	**49 CFR Placard Design Section Reference**
1.4	Explosives 1.4	172.523
1.5	Explosives 1.5	172.524
1.6	Explosives 1.6	172.525
2.1	Flammable Gas	172.532
2.2	Nonflammable Gas	172.528
3	Flammable	172.542
Combustible liquid	Combustible	172.544
4.1	Flammable Solid	172.546
4.2	Spontaneously Combustible	172.547
5.1	Oxidizer	172.550
5.2	Organic Peroxide	172.552
6.1 (PG I or II, other than PG I inhalation hazard)	Poison	172.554
6.1 (PG III)	Keep Away From Food	172.553
6.2	(None)	
8	Corrosive	172.558
9	Class 9	172.560
ORM-D	(None)	

Table 3.4: Generator Paperwork Requirements Table

Required Information	§268.7 (a)(2)	§268.7 (a)(3)	§268.7 (a)(4)	§268.7 (a)(9)
1. EPA Hazardous Waste and Manifest numbers	✓	✓	✓	✓
2. Statement that this waste is not prohibited from land disposal.			✓	
3. The waste is subject to the LDRs. The constituents of concern for F001-F005, and F039, and underlying hazardous constituents (for wastes that are not managed in a Clean Water Act (CWA) or CWA-equivalent facility), unless the waste will be treated and monitored for all constituents. If all constituents will be treated and monitored, there is no need to put them all on the LDR notice.	✓	✓		
4. The notice must include the applicable wastewater/ non-wastewater category (see §268.2(d) and (f)) and subdivisions made within a waste code based on waste-specific criteria (such as D003 *reactive* cyanide).	✓	✓		
5. Waste analysis data (when available).	✓	✓	✓	
6. Date the waste is subject to the prohibition.			✓	
7. For hazardous debris, when treating with the alternative treatment technologies provided by §268.45: the contaminants subject to treatment, as described in §268.45(b); and an indication that these contaminants are being treated to comply with §268.45.	✓		✓	
8. For contaminated soil subject to LDRs as provided in §268.49(a), the constituents subject to treatment as described in §268.49(d), and the following statement: This contaminated soil [does/does not] contain listed hazardous waste and [does/does not] exhibit a characteristics of hazardous waste and [is subject to/complies with] the soil treatment standards as provided by §268.49(c) or the universal treatment standards.	✓	✓		
9. A certification is needed (see applicable section for exact wording).		✓		✓

Figure 3.1: DOT Labels

By means of their color, shape and design, DOT Hazard Class labels communicate the hazards of the material contained in the package. The label needed for each hazardous material is described in Column 6 of the DOT Table. A separate label exists for each of nine classes of hazardous material (some with subdivisions).

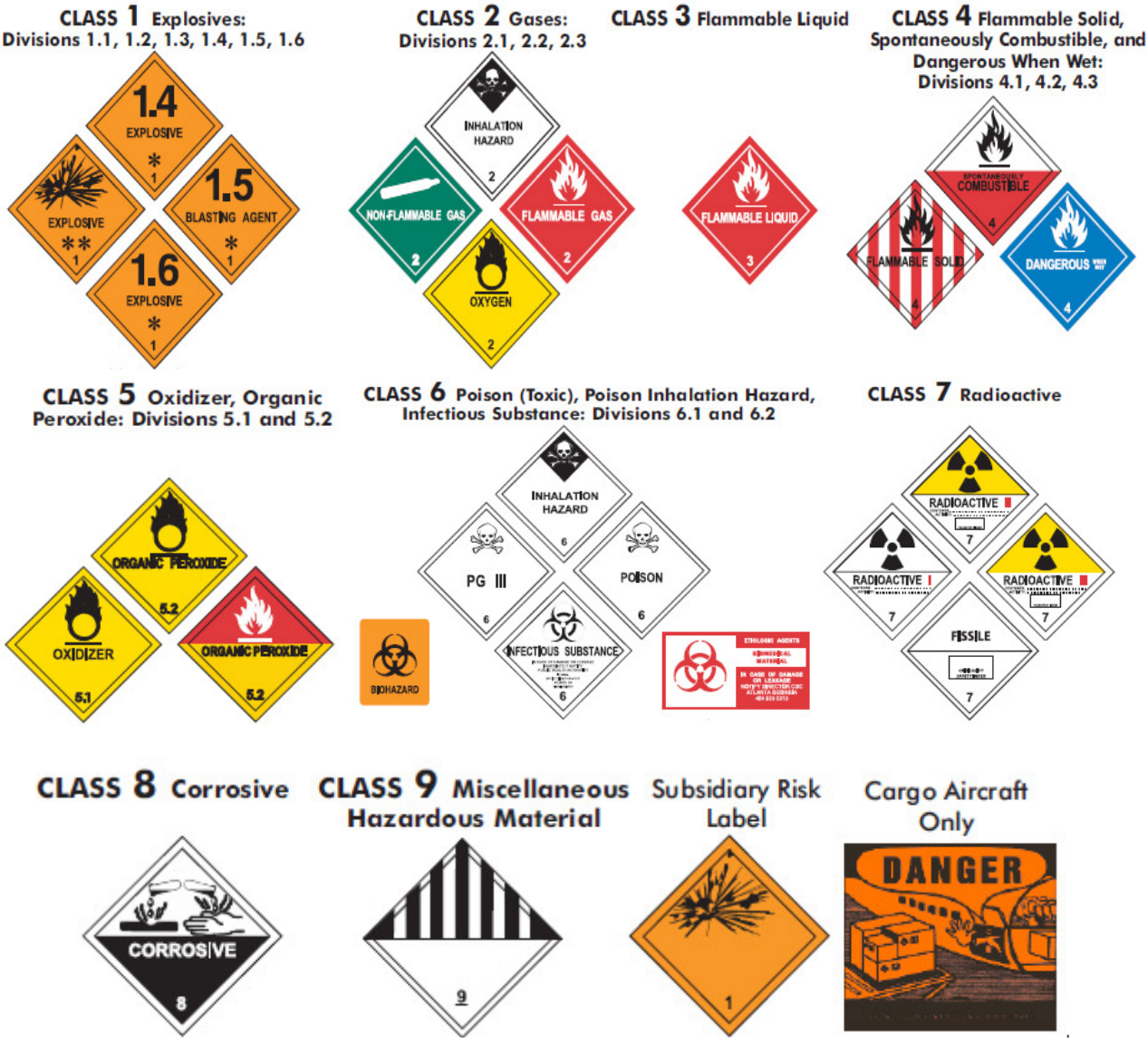
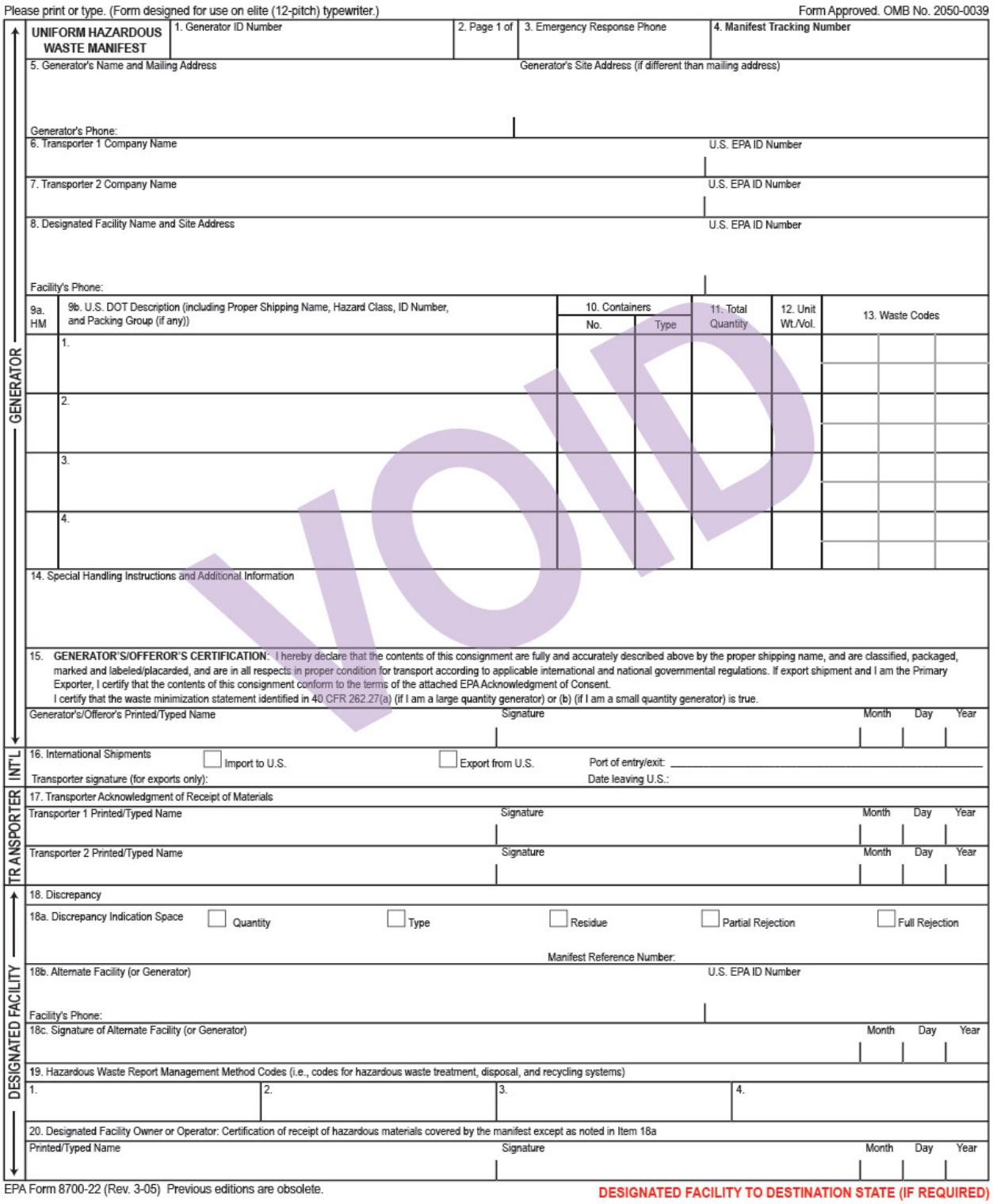


Figure 3.2: DOT Placards

Placards are designed for display on the outside of vehicles and are intended to provide emergency responders with warnings of the risks associated with vehicle contents. Placards may not be required for small quantities of hazardous materials.



Figure 3.3: Uniform Hazardous Waste Manifest Example



Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number | 2. Page 1 of | 3. Emergency Response Phone | 4. Manifest Tracking Number

GENERATOR

5. Generator's Name and Mailing Address — Generator's Site Address (if different than mailing address)

Generator's Phone:

6. Transporter 1 Company Name — U.S. EPA ID Number

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address — U.S. EPA ID Number

Facility's Phone:

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1.					
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information

15. **GENERATOR'S/OFFEROR'S CERTIFICATION**: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name — Signature — Month Day Year

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name — Signature — Month Day Year

Transporter 2 Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1. | 2. | 3. | 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name — Signature — Month Day Year

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

VOID

Figure 3.4: TSCA Manifest Continuation Form Example

Figure 5.4: TSCA Manifest Continuation Form Example

TSCA MANIFEST CONTINUATION FORM EXAMPLE

MANIFEST NUMBER: _____ GENERATOR NAME: _____

ADDRESS: _____

_____

EPA ID NUMBER: _____

ITEM	NUMBER	Type/ Description	Serial No. or Other ID No.	Date of Removal From Service For Disposal	Volume (gallons) or Weight (kilograms)

Information Purposes

NOTES

1. **Type/Description:** Brief description of the unit such as:
   (i) **Transformer** (> 500 ppm or < 500 ppm) **(ii) Capacitor** **(iii) Bulk Liquid/Solid** (tanker or roll-off)
   (iv) **PCB Container** - A container in direct contact w/ PCBs, such as a drum containing PCB spill debris
   (v) **PCB Article Container** - A container not in direct contact w/ PCBs, such as a drum containing one or more non-leaking motors, light ballasts, etc.
2. **Serial No. or Other ID No.:** Serial Number must be reported if one is present; if not, assign a unique number.
3. **Date Removed From Service For Disposal:** The date when the item was taken out of service for disposal. If more than one item (batch) is present in the container (tank), the reported date for the entire container (tank) must be the first (i.e., the earliest) date.

4.0 PCB WASTE MANAGEMENT

The following chapter outlines requirements for the management of waste PCB electrical equipment, MODF, and PCB waste. Please refer to EP No. 14 for information on the management of oil-filled equipment and waste oil.

The use, storage and disposal of PCB items is regulated by 40 CFR 761 -- Polychlorinated Biphenyls (PCBs), Manufacturing, Processing, Distribution in Commerce and Use Prohibitions which is administered by the Federal Environmental Protection Agency (EPA). In New York, Rhode Island, Massachusetts and Vermont, PCBs are also regulated as hazardous waste by state regulations.

EPA regulations allow for assumptions to be made regarding the PCB concentration in unlabeled oil-filled electrical equipment which is in use. However, testing for PCBs through laboratory analysis must be performed when classifying equipment or other materials for disposal. If the equipment does not have a manufacturer's label stating that the equipment is non-PCB, laboratory analysis must be performed prior to placing the equipment into storage for re-use. The analysis must be conducted by a certified laboratory using an EPA-approved method (gas chromatography). Screening kits may not be used for the determination of PCB content for disposal purposes.

Generally, wastes must be managed as a PCB hazardous waste if the PCB concentration $\geq$ 50 ppm. However, if utilizing the PCB Spill Cleanup Policy, it is important to note that spill cleanup wastes must be shipped as a PCB waste regardless of their actual PCB concentrations.

PCB-Contaminated fluid-filled electrical equipment, MODF and other wastes designated for disposal may only be accumulated as hazardous waste at a generator site in a main hazardous waste accumulation area for up to 30 days from the date the equipment was declared a waste. If drained, equipment may be accumulated without restriction. However, PCB-contaminated fluid-filled electrical equipment may be stored up to 90 days if stored in an area that complies with 40 CFR 761.65. Only Dewey Ave., Seventh North and North Albany Service Centers have such facilities.

> *Please note that the date the equipment was removed from service for disposal is the date the equipment was declared to be waste. This date may be different than the date the equipment was removed from use in the field.*

PCB fluid-filled electrical equipment designated for disposal may be accumulated as PCB hazardous waste at a generator site for up to 30 days from the date the equipment was removed from service for disposal. If drained, the empty carcass **and** MODF must be accumulated as a PCB hazardous waste at the generator site for up to 30 days of the date the equipment was declared a waste.

In order to demonstrate compliance with 40 CFR 761.215(d)(2) and 761.218, a Certificate of Disposal must be obtained for each PCB article shipped for disposal. Waste tracking reports are not an acceptable substitute. "Certificates of Disposal must be received from the disposal facility within 1 year of the date of shipment for disposal." Wastes not disposed of within 1 year of their "Out-of-Service" date must be included on an Exception Report.

5.0 UNIVERSAL WASTE & LIGHTING WASTE

This chapter details the National Grid management of universal wastes, including lighting waste. Section 5.1 of the chapter discusses the management of the various types of lighting wastes. Some types of lighting wastes may be managed as universal wastes if the generator so chooses and other types must be managed as hazardous waste, depending on the waste type and the generator state. Section 5.2 details the management of waste batteries. Section 5.3 details the management of mercury. Section 5.4 details the federal universal waste rule. Sections 5.5, 5.6, 5.7, 5.9 and 5.10 detail general universal waste rules applicable to all National Grid facilities, Massachusetts universal waste standards, New Hampshire universal waste program, and New York universal waste rule, respectively. As detailed in Section 5.8, Vermont has adopted the universal waste program for certain batteries, pesticides, thermostats, fluorescent light ballasts and mercury-containing lamps which would otherwise have to be managed as hazardous waste.

5.1 Management of Lighting Wastes

National Grid lighting wastes include a variety of items associated with indoor and outdoor lighting such as streetlights, floodlights, incandescent, vehicle and fluorescent lights. Streetlights and floodlights contain mercury vapor or sodium vapor High Intensity Discharge (HID) lamps, both of which contain quantities of mercury. Depending on the type and wattage of the light, it may contain ballasts and/or capacitors. In Massachusetts, New York, Rhode Island and New Hampshire, waste lamps are covered under the state Universal Waste programs. Refer to Table 5.1, 'Lighting Types and Wastes Generated from Each Lighting Type', for a summary of the various components of lights utilized by National Grid. Refer to Table 5.2, National Grid Management of Spent Lighting Materials, for state-specific information regarding the accumulation, storage, labeling, and shipping of lighting wastes. Refer to Chapter 1 for procedures to arrange for pickup of waste.

5.1.1 HID/Fluorescent Lamps: In order to minimize the quantities of hazardous waste lamps sent to non-hazardous waste landfills, EPA added hazardous waste lamps to the federal Universal Waste program, which is further discussed in Sections 5.4 and 5.5. The final rule was promulgated on July 6, 1999. This addition streamlines the management requirements for hazardous waste lamps, and supports energy and conservation efforts. Many states, including Massachusetts, Rhode Island and New Hampshire, had previously regulated hazardous waste lamps as universal wastes under their state-authorized hazardous waste programs.

5.1.2 Streetlight Capacitors: Intact PCB and non-PCB streetlight capacitors are removed from streetlight heads prior to sending the heads to a repair or scrap metal vendor. As defined in 40 CFR 761.3, small capacitor means a capacitor which contains less than 1.36 kg (3 lbs.) of dielectric fluid, while large capacitor (high/low voltage) means a capacitor which contains 1.36 kg (3 lbs) or more of

dielectric fluid. All streetlight capacitors collected by the company from lighting can be defined as small capacitors. PCB capacitors are managed as state-regulated hazardous waste in Massachusetts, New Hampshire, New York, Vermont and Rhode Island, and must be accumulated in a main or satellite hazardous waste accumulation area. Since 40 CFR 761.60(b)(7) provides exception to the storage requirements of 40 CFR 761.65 for PCB small capacitors, the company has no TSCA storage limits for intact PCB small capacitors. PCB and non-PCB capacitors may be accumulated in the same container, and disposed as PCB waste. Intact, small PCB capacitors are exempt from the federal Toxic Substances Control Act (TSCA) regulations; thus the PCB accumulation limits and PCB marking do not apply. PCB large capacitors and leaking PCB and non-PCB capacitors are TSCA regulated waste and must be managed and disposed in accordance with TSCA requirements (i.e., the waste must be marked with the PCB mark and transported within 30 days from when the first leaking capacitor was placed in the container.) (Note: Small, non-leaking capacitors [< 1.36 lb. PCB] are not hazardous waste in New York).

5.1.3 Fluorescent Light Ballasts: Intact PCB fluorescent light ballasts are devices that electrically control fluorescent light fixtures and that include a capacitor containing 0.1 kg or less of dielectric fluid. Such items are TSCA regulated wastes that fall under the definition of PCB Bulk Product Waste in the TSCA regulations. According to EPA, most fluorescent lamp ballasts manufactured before 1979 contain PCBs, but were not labeled as such. Only ballasts manufactured after 1979 are labeled to indicate that they do not contain PCBs.

Intact waste fluorescent light ballasts generated at National Grid facilities may be managed as either hazardous waste or non-hazardous wastes in New York and New Hampshire. In Vermont they may be managed as Universal Waste. Intact fluorescent light ballasts containing PCBs only in intact and non-leaking PCB small capacitors may be managed as non-hazardous waste in New York. If managed as non-hazardous, PCB and non-PCB lamp ballasts may be accumulated in the same container in an area outside the facility hazardous waste area. They should be labeled as Non-Hazardous Waste with the accumulation start date. They must also have the PCB mark as they are still TSCA regulated (not required in NY). Because ballasts are defined as a bulk product waste, they may be stored for 180 days in a storage area that meets the criteria found in 40 CFR 761.65(c)(9). Since the composition of the liner is not specified in the regulation, other than it prevents migration and is strong enough and designed to prevent failure, a floor of a building may be adequate to meet the definition. Therefore, if the storage for these ballasts is located indoors, away from floor drains or other areas where an uncontrolled release would allow for migration to the subsurface, and the surface of the storage area is in good condition, without cracks or other apertures that may lead to migration of waste to the subsurface, then ballasts could be stored for 180 days. Otherwise, ballasts may only be stored for 30 days. When PCB ballasts are transported from a

National Grid facility, they must be shipped on a TSCA manifest if required by applicable State regulations. The National Grid contact who schedules a pickup of PCB ballasts should remind the transporter that a TSCA manifest is required. If the generator chooses to manage the ballasts as hazardous waste, the ballasts must be accumulated in a Hazardous Waste Accumulation Area and must be shipped off-site within 90 days (providing the storage areas meets the 'liner' requirements discussed above; otherwise the time limit is 30 days) on a state hazardous waste manifest. PCBs can only be stored for 30 days in New York, unless in a TSCA-qualified containment.

In Rhode Island, Massachusetts, Vermont and New York (for large capacitors only), intact PCB ballasts are classified as hazardous waste (Waste Codes R007, MA02, VT01 and B004/B005, respectively), and must be managed accordingly. They must be accumulated in a Hazardous Waste Accumulation Area with a Hazardous Waste label and PCB mark, and have an accumulation time limit of 90 days (30 days for New York unless in a TSCA-qualified containment area). A federal hazardous waste manifest is not required for shipments of PCB ballasts in Rhode Island.

5.1.4 Streetlight Ballasts: Older mercury vapor streetlight systems utilized large cylindrical tank-style ballasts that contained the capacitor and electrical workings for the streetlight, while the streetlight head housed only the lamp. These old ballasts contain a PCB capacitor. Although they are quite different in appearance, these tank-style streetlight ballasts may be accumulated with fluorescent light ballasts. In Massachusetts, Vermont and New Hampshire, these streetlight ballasts should be accumulated and managed as TSCA regulated non-hazardous waste, and in Rhode Island the ballasts must be managed as TSCA regulated hazardous waste.

5.2 Management of Batteries

In an effort to facilitate the recycling of certain types of batteries, specifically nickel-cadmium and small-sealed lead acid batteries, Congress passed the "Mercury Containing and Rechargeable Battery Management Act" (Battery Act) on May 13, 1996. This act made the Universal Waste Rule effective immediately in all 50 states for the collection, storage, and transportation of batteries covered by the Act, providing national uniformity in the management of these batteries. National Grid manages intact, non-leaking batteries as Universal Waste. Non-intact or leaking batteries must still be managed as hazardous waste.

The National Grid battery recycling program incorporates elements of both the Universal Waste Rule and Battery Act for all non-leaking and non-cracked batteries. The battery recycling program has been established with National Grid approved vendors listed on the Environmental Department's web site on the company's Infonet. Table 5.4, National Grid Battery Recycling Program, summarizes the labeling, storage,

and shipping requirements for the various types of batteries. Details about the various types of batteries are provided below.

5.2.1 Substation/Recloser, Vehicle and Other Large Lead Acid Batteries

Spent large substation, vehicle and other large lead acid batteries are not required to be managed as hazardous or universal waste as long as they are intact and not leaking. 40 CFR 266.80 specifically exempts spent lead acid batteries that are to be reclaimed from regulation under the hazardous waste and universal waste regulations.

Because these batteries are exempt from regulation as a hazardous or universal waste, there is no accumulation, storage, or labeling requirements. However, for ease of storage and shipping, spent substation batteries and other large lead acid batteries such as those from vehicles or reclosers should be accumulated on pallets with short-circuit protection and strapping and/or shrink wrap. Recycling vendors should be informed as to what materials they will need to transport the pallets safely when the pickup is arranged.

A complete Bill of Lading (BOL) is required for each shipment of batteries. The BOL must contain: the name and address of the National Grid facility shipping the batteries; the destination facility; the quantity of each type of battery; the proper DOT shipping description; and the date the shipment left the facility. If a Recycling Certificate is provided by the vendor, it should be attached to the BOL and retained for 3 years.

Cracked or leaking batteries must be shipped on a hazardous waste manifest by an approved hazardous waste disposal vendor.

5.2.2 Small Sealed Lead Acid/Gel Cell Batteries

Spent small sealed lead-acid (SSLA) and gel cell batteries are covered by the Battery Act and are considered Universal Wastes in all states. These batteries may be returned to vendors when purchasing new batteries and the return of spent batteries may be a condition of the battery purchase contract. When the exchange of batteries is not possible, spent lead-acid batteries should be returned to a National Grid-approved facility for recycling or recovery.

Intact SSLA and gel cell batteries may be recycled at ENERSYS (formerly YUASA, Inc.) in Nashua, New Hampshire or Onyx Special Services (formerly Superior Special Services or Global Recycling Technologies) in Stoughton, Massachusetts. ENERSYS and Onyx accept intact SSLA and gel cell batteries of all types provided the conditions in Table 5.4 are met. ENERSYS does not accept nickel-cadmium or alkaline batteries.

Do not place leaking lead acid batteries into metal drums for disposal due to the possibility of the battery shorting out against the metal drum and causing the battery to explode.

Spent intact lead acid and gel cell batteries should be managed as Universal Waste when they are in storage prior to shipment from a National Grid facility. Universal Waste Batteries must be labeled or marked with the following:

- "Universal Waste-Battery(ies)"; or
- "Waste Battery(ies)"; or
- "Used Battery(ies)".

You may accumulate the batteries at the facility for up to one year. The accumulation start date must be known.

Refer to Table 5.4 for the labeling, storage, and shipping requirements for the lead batteries. Refer to the Environmental Department's web site on the company's Infonet for the names, addresses, and telephone numbers of the battery recycling vendors.

Because of potential environmental cleanup liability, spent lead batteries may not be disposed via scrap yards or junk dealers.

5.2.3 Nickel Cadmium and Lithium Batteries

Used, non-cracked, nickel-cadmium (Ni-Cd) and lithium batteries are considered universal wastes in all states under the Battery Act. Spent Ni-Cd or lithium batteries should be managed as universal waste when they are in storage prior to shipment from a National Grid facility. Universal waste batteries must be labeled or marked with the following:

- "Universal Waste-Battery(ies)"; or
- "Waste Battery(ies)"; or
- "Used Battery(ies)".

You may accumulate the batteries at the facility for up to one year. The accumulation start date must be known.

Refer to Table 5.4 for the labeling, storage, and shipping requirements for Ni-Cd batteries. Refer to the Environmental Department's web site on the company's Infonet for the names, addresses, and telephone numbers of the battery recycling vendors.

5.2.4 Alkaline Batteries

Alkaline batteries can be disposed as non-hazardous waste in the regular trash or recycled.

5.2.5 Nickel Metal Hydride (NiMH) Batteries

NiMH batteries are often used instead of NiCd batteries due to their lower price and better performance. NiMH batteries are not regulated as a Universal Waste or a Hazardous Waste. However, due to their Ni content, NiMH batteries should be recycled.

5.3 Mercury Management

Mercury and its compounds are severe cumulative poisons; mercury is also corrosive. Only National Grid personnel who have received training in the handling of mercury should conduct any activities related to the physical management of mercury waste streams. Material Safety Data Sheets may be referenced for specific health and spill response information.

Mercury may be contained in various instruments used in pressure and flow instrumentation such as gas pressure regulators, manometers, thermometers, barometers, electrical switches, pumps, batteries, fluorescent light bulbs, and mercury and sodium vapor high intensity discharge (HID) lamps. Mercury should be left in any mercury-containing device to be disposed. Attempting to remove the mercury may increase the chance of an accidental release.

Notes: Refer to Chapter 3 for disposal of mercury debris.

5.3.1 Mercury Disposal

Most mercury-containing lamps, thermometers, and devices are covered under the Universal Waste programs in Massachusetts, Vermont, New York, Rhode Island and New Hampshire. Hazardous waste mercury which fails the TCLP test is subject to Land Disposal Restrictions (LDRs). Refer to Chapter 3 for information regarding LDRs.

Refer to the Environmental Department's web site on the company's Infonet for a description of recycling/disposal shipping information for mercury-containing wastes at National Grid-approved vendors.

Refer to Sections 5.5, 5.6, 5.7, 5.8, 5.9 and 5.10 for a complete description of universal waste mercury management requirements applicable to all National Grid facilities and to those in individual states.

5.4 Federal Universal Waste Rule

On February 11, 1993, EPA proposed streamlining hazardous waste management requirements for collecting and managing certain widely generated hazardous wastes. On May 11, 1995, EPA finalized the Universal Waste Rule (the Rule), as an

amendment to the Resource Conservation and Recovery Act (RCRA). The intent of the Rule is to:

- Reduce the amount of hazardous wastes entering the municipal solid waste stream;
- Encourage the recycling and proper disposal of certain common hazardous wastes; and,
- Reduce the regulatory burden on businesses that generate these wastes and make the applicable regulations easier to comply with.

Specifically, the Rule streamlines the requirements related to notification, labeling, marking, prohibitions, accumulation time limits, employee training, response to releases, off-site shipments, tracking, exports, and transportation.

The federal Universal Waste Rule does not automatically apply in each state. In states authorized to implement the federal hazardous waste requirements (RCRA-authorized states), the Rule is not applicable until those states adopt the Rule in a separate state and receive authorization from EPA.

5.5 Universal Waste – All National Grid Facilities

5.5.1 Universal Waste Handler Categories

There are two categories of Universal Waste handlers:

- A small quantity handler of Universal Waste (SQHUW) is defined as a Universal Waste handler who accumulates less than 5,000 kilograms (11,000 pounds) total of universal waste at any time; and,
- A large quantity handler of Universal Waste (LQHUW) is defined as Universal Waste handler who accumulates 5,000 kilograms (11,000 pounds) or more total of universal waste at any time. A LQHUW must send written notification to the applicable state environmental regulatory agency and obtain an EPA Identification Number before meeting or exceeding the 5,000 kilogram accumulation limit. A facility that already has an EPA ID Number does not need to obtain another EPA ID Number, but does need to notify DEP of its universal waste activity, excluding batteries. Facilities that already have an EPA ID Number are not required to notify DEP of universal waste battery activity.

The National Grid facilities that accumulate universal waste do not accumulate 5,000 kilograms or more of universal waste at any time. As such, these facilities are covered under the standards for small quantity handlers of universal waste.

5.5.2 Standards for Small Quantity Handlers of Universal Waste-Universal Waste Management and Labeling

Universal wastes are subject to less stringent requirements than fully regulated hazardous wastes. National Grid facilities should have designated areas for the collection and storage of universal wastes.

5.5.3 Universal Waste Lamps

Universal Waste – Mercury-Containing Lamps

As stated in Section 5.1, Management of Lighting Wastes, mercury-containing lamps are a commonly generated waste at National Grid facilities. Examples of mercury-containing lamps include fluorescent, mercury vapor and sodium vapor high intensity discharge (HID), incandescent, and neon lamps. National Grid facilities use fluorescent lamps in offices, indoor substations, and other company buildings. HID lamps are found in streetlights.

a. Lamp Management: The types of fluorescent tubes at National Grid facilities include U-tubes, 4-foot linear, and 8-foot linear tubes. Spent fluorescent tubes from National Grid buildings should be accumulated in a designated area, preferably in cardboard boxes in which new fluorescent tubes are shipped. Boxes may also be obtained from the lighting waste vendor.

Spent mercury vapor and sodium vapor HID lamps should be accumulated in a designated area in a common container. HID lamps may be accumulated in drums or fiber containers that may be obtained from the lighting waste vendor.

Handlers are prohibited from dismantling, crushing, or treating mercury-containing lamps under the policy.

b. Lamp Labeling: Each mercury-containing lamp, or the container in which the mercury-containing lamps are contained, should be labeled or clearly marked with one of the following:

- "Universal Waste- Lamp(s)"; or
- "Waste Lamp(s)"; or
- "Used Lamp(s)".

5.5.4 Universal Waste Batteries

The company battery management program is discussed in Section 5.2 of this chapter. A battery must qualify as a hazardous waste before it can be classified as a universal waste. Batteries that do not qualify as hazardous waste such as alkaline batteries may instead continue to be managed as non-hazardous solid

wastes. Universal waste batteries that may be generated by National Grid include lead acid, lead gel cell, nickel cadmium, and lithium batteries.

a. Battery Management: Under the Universal Waste standards, batteries may be mixed together in a container. However, because reclamation processes often differ depending on the battery type, the various types should be accumulated separately.

b. Battery Labeling: Each battery or the container in which the batteries are contained should be labeled or clearly marked with one of the following:

- "Universal Waste-Battery(ies)" or
- "Waste Battery(ies)" or
- "Used Battery(ies)"

You may accumulate the batteries at the facility for up to one year. The accumulation start date must be known.

5.5.5 Universal Waste Mercury-Containing Equipment (MCE)

Universal waste mercury-containing equipment is defined as a device or part of a device that contains elemental mercury. Examples of some mercury-containing equipment are thermometers, thermostats, manometers, barometers, electrical switches and relays, gas pressure regulators and certain flow regulators. The universal waste standards allow for the joint collection, management, labeling, and recycling of mercury thermostats and mercury-containing equipment.

a. Mercury-Containing Equipment Management: Different types of mercury-containing equipment should be accumulated in the same container. Any broken mercury-containing device should be placed in a closed vapor-tight container, and any mercury residue must be cleaned up by a trained individual using a mercury spill kit (referenced in EP No. 5).

b. Mercury-Containing Device Labeling: Each mercury-containing piece of equipment or the container in which the mercury-containing equipment is contained should be labeled or clearly marked with the following:

- "Universal Waste- Mercury-Containing Equipment"; or
- "Waste Mercury-Containing Equipment"; or
- "Used Mercury-Containing Equipment".

You may accumulate mercury-containing equipment at the facility for up to one year. The accumulation start date must be known.

5.5.6 Universal Waste Accumulation Standards

A SQHUW may accumulate universal waste for no longer than one year from the date the universal waste is generated. A SQHUW must be able to demonstrate the length of time the universal waste has been accumulated from the date it becomes a waste. This may be accomplished in one of the following ways:

1. Placing the universal waste in a container and marking or labeling the container with the earliest date that any universal waste in the container became a waste; or

2. Marking or labeling each individual item of universal waste which is not in a container with the date it became a waste; or

3. Maintaining an inventory system on-site that identifies the date each universal waste became a waste; or

4. Maintaining an inventory system on-site that identifies the earliest date that any universal waste in a group of universal waste items or a group of containers of universal waste became a waste; or

5. Placing the universal waste in a specific accumulation area and identifying the earliest date any universal waste in the area became a waste; or

6. Any other method that clearly demonstrates the length of time that the universal waste has been accumulated from the date it became a waste.

5.5.7 Employee Training

Handlers of universal waste must receive training in proper handling and emergency procedures for the universal waste(s) handled. Universal Waste training is incorporated into the National Grid employees annual Environmental and Chemical Safety training program.

5.5.8 Response to Releases

All releases of universal waste and other residues from universal wastes must be immediately contained. Any mercury residue must be cleaned up by a trained individual using a mercury spill kit. Only personnel who have received appropriate training for mercury spills may participate in mercury cleanup.

5.5.9 Off-Site Shipments

A SQHUW is prohibited from sending or taking universal waste to a place other than another universal waste handler, destination facility, or foreign destination. If the SQHUW self-transports, they then become a universal waste transporter and must comply with the transporter requirements.

A National Grid SQHUW may self-transport universal waste to another National Grid SQHUW, without triggering Department of Transportation requirements, providing the following conditions are met:

- The SQHUW shipping the waste must ensure that the receiving SQHUW agrees to accept the waste;
- The transporter must not dispose, recycle, dilute or treat the waste except if responding to a release;
- Properly respond to releases;
- Do not hold the waste for more than 10 days during transport;
- If more than 1 pound of mercury is transported DOT requirements would apply. Since each fluorescent bulb contains ~ 30 mg of mercury, 1,000 bulbs would result in 30 grams of mercury which is well below 1 pound (454 grams); and,
- The receiving facility shall maintain documentation for at least three years for each shipment received of Universal waste. The documentation shall include:
  - The name and address of the waste shipper
  - The quantity of waste received
  - The date of receipt of the shipment

Any National Grid facility that is a LQHUW may not self-transport wastes.

The Environmental Department's web site on the company's Infonet contains a listing of the approved hazardous waste disposal and recycling facilities for company waste. This listing includes outlets for universal waste, specifically for batteries, fluorescent lamps, and mercury-containing items. Any of these vendors may be used for the specific type of universal waste.

Table 5.3 is an example of a spent lighting materials inventory sheet for shipments to a recycler in New England. The sheet should be completed for each company facility shipment of lighting materials. Depending on the lighting material, it may be classified as universal waste, hazardous waste, or non hazardous waste. After the inventory is completed, it should be faxed to the recycler and they will arrange for pick-up. Although universal waste batteries are not listed on the inventory sheet, the recycler may arrange for pickup of these items as well.

5.5.10 Tracking

A SQHUW is not required to keep records of shipments of universal waste.

5.6 Universal Waste in Massachusetts

The DEP adopted the federal Universal Waste Rule on October 17, 1997. The Standards for Universal Waste Management in Massachusetts are incorporated into the

state Hazardous Waste Regulations (310 CMR 30.00) at 310 CMR 30.1000. The Standards for Universal Waste Management provide an alternative set of management standards in lieu of regulation under the more stringent Hazardous Waste regulations. Table 5.5, "Summary of Massachusetts Universal Waste Regulations," provides a summary of the Massachusetts Universal Waste Regulations, including the regulatory citations.

5.6.1 Applicability

The provisions of the Massachusetts Standards for Universal Waste Management apply to the following wastes:

- Batteries
- Mercury-Containing Equipment
- Mercury-Containing Lamps
- Pesticides (Not a National Grid-generated waste so not discussed further.)

5.6.2 Universal Waste Thermostats/Mercury-Containing Devices

The standards for the management of universal waste thermostats and mercury-containing devices are found in separate sections of 310 CMR 30.1000.

5.6.3 Universal Waste – Mercury-Containing Lamps

Mercury-Containing Lamp Labeling: Each mercury-containing lamp, or the container in which the mercury-containing lamps are contained, should be labeled or clearly marked with one of the following:

- "Universal Waste-Mercury-Containing Lamp(s)"; or
- "Waste Mercury-Containing Lamp(s)"; or
- "Used Mercury-Containing Lamp(s)".

5.7 Universal Waste in New Hampshire

The NHDES adopted the federal Universal Waste Rule effective on October 14, 1998. Although New Hampshire has not as yet adopted the rule into codified regulations, New Hampshire has adopted a federal enforcement discretion policy that allows the state to manage certain hazardous wastes under Universal Waste standards.

5.7.1 Applicability

The provisions for the New Hampshire policy for Universal Waste Management apply to the following wastes:

- Antifreeze
- Batteries
- Mercury Lamps
- Mercury-Containing Devices

- Cathode Ray Tubes
- Pesticides (Not a National Grid-generated waste, so not discussed further.)

5.7.2 Universal Waste Antifreeze

The management requirements for waste antifreeze are found in NHDES Technical Bulletin HW-4. Antifreeze, which commonly consists of ethylene glycol or polypropylene glycol, may become contaminated with benzene, lead, and other hazardous constituents which may cause used antifreeze to be characterized as hazardous waste. HW-4 allows the management of waste antifreeze as a universal waste as an alternative to managing antifreeze as hazardous waste.

a. Antifreeze Management: Generators may recycle their own antifreeze on site through distillation or filtration; hire a contractor to come in with a mobile antifreeze recycling unit; or ship the antifreeze to a recycling facility.

b. Antifreeze Labeling: Each container or tank of waste antifreeze should be labeled or clearly marked with one of the following:

- "Universal Waste-Antifreeze", or
- "Waste Antifreeze", or
- "Used Antifreeze".

5.7.3 Universal Waste Mercury-Containing Lamps

The management requirements for waste mercury-containing lamps are found in NHDES Technical Bulletin HW-7. As stated in Section 5.1, Management of Lighting Wastes, mercury-containing lamps are a commonly generated waste at National Grid facilities. Examples of mercury-containing lamps include fluorescent, mercury vapor and sodium vapor high intensity discharge (HID), incandescent, and neon lamps. National Grid facilities use fluorescent lamps in offices, indoor substations, and other company buildings. HID lamps are found in streetlights.

Mercury-Containing Lamp Labeling: Each mercury-containing lamp, or the container in which the mercury-containing lamps are contained, should be labeled or clearly marked with one of the following:

- "Universal Waste - Lamp(s)"; or
- "Waste Lamp(s)"; or
- "Used Lamp(s)".

5.7.3 Universal Waste Cathode Ray Tube

The management requirements for waste cathode ray tubes are found in NHDES Technical Bulletin HW-25. As stated in Section 5.1, Management of Lighting Wastes, mercury-containing lamps are a commonly generated waste at National

Grid facilities. Examples of mercury-containing lamps include fluorescent, mercury vapor and sodium vapor high intensity discharge (HID), incandescent, and neon lamps. National Grid facilities use fluorescent lamps in offices, indoor substations, and other company buildings. HID lamps are found in streetlights.

Cathode Ray Tube Labeling: Each cathode ray tube, or the container in which the cathode ray tube are contained, should be labeled or clearly marked with one of the following:

- "Universal Waste – Cathode Ray Tube(s)"; or
- "Waste Cathode Ray Tube(s)"; or
- "Used Cathode Ray Tube(s)".

5.7.4 Accumulation Quantity Limits

Universal waste antifreeze and batteries do not have limits to the quantity of the wastes that may be accumulated on-site at any time. However the following quantity limits apply to mercury-containing lamps and mercury-containing devices:

- **Mercury-Containing Lamps:** No more than a combined total of 20,000 kilograms (44,000 pounds) of waste-mercury-containing lamps and other universal wastes.

- **Mercury-Containing Devices:** No more than a combined total of 5,000 kilograms (11,000 pounds) of waste-mercury-containing devices and other universal wastes.

5.8 Universal Waste in Vermont

Subchapter 9 of the Vermont Hazardous Waste Management Regulations details the universal waste program in Vermont.

5.8.1 Applicability

Universal waste management standards have been established in Vermont for the following wastes:

- Certain Batteries
- Thermostats
- Fluorescent Light Ballasts
- Mercury-Containing Lamps
- Pesticides (Not a National Grid-generated waste, so not discussed further.)

5.8.2 Universal Waste Batteries

The company battery management program is discussed in Section 5.2 of this chapter. The management requirements for universal waste batteries in Vermont are found in sections 7-902 and 7-204(f) of the Vermont Hazardous Waste Management Regulations.

5.8.3 Universal Waste Mercury-Containing Lamps

The management requirements for waste mercury-containing lamps are found in the Vermont Hazardous Waste management Regulations 7-912(5).

Mercury-Containing Lamp Labeling: Each mercury-containing lamp, or the container in which the mercury-containing lamps are contained, should be labeled or clearly marked with one of the following:

- "Universal Waste-Mercury-Containing Lamp(s)"; or
- "Waste Mercury-Containing Lamp(s)"; or
- "Used Mercury-Containing Lamp(s)".

In addition, a sign must be placed in the area of accumulation. The sign must be visible for at least 25 feet and include the following words; "Waste Mercury-Containing Lamps."

5.8.4 Universal Waste Thermostats

The management requirements for thermostats are found in 7-912(3) of the Vermont Hazardous Waste Management Regulations.

5.8.5 Universal Waste Fluorescent Light Ballasts

The management requirements for fluorescent light ballasts are found in 7-912(4) of the Vermont Hazardous Waste Management Regulations.

Each container into which ballasts have been placed must be labeled or clearly marked with one of the following:

- "Universal Waste- PCB Ballasts"; or
- "Waste PCB Ballasts"; or
- "Used PCB Ballasts"

5.9 Universal Waste in New York

6 NYCRR 374-3 of the New York Hazardous Waste Management Regulations details the universal waste program in New York.

5.9.1 Applicability

Universal waste management standards have been established in New York for the following wastes:

- Certain Batteries
- Mercury-containing equipment, including thermostats
- Lamps
- Pesticides

5.9.2 Off-Site Shipments

(1) (i) A small quantity handler of universal waste is prohibited from sending or taking universal waste to a place other than another universal waste handler, a destination facility, or a foreign destination; and,

(ii) When universal waste is being transported off-site, the requirements of Part 364 of this Title must be met.

(2) If a small quantity handler of universal waste self-transports universal waste off-site, the handler becomes a universal waste transporter for those self-transportation activities and must comply with the transporter requirements of Section 374-3.4 of this Subpart and Part 364 of this Title while transporting the universal waste.

(3) If a universal waste being offered for off-site transportation meets the definition of hazardous materials under CFR 49 Parts 171 - 180, incorporated by reference in subdivision 370.1(e) of this Title, a small quantity handler of universal waste must package, label, mark and placard the shipment, and prepare the proper shipping papers in accordance with the applicable Department of Transportation regulations under 49 CFR Parts 172 - 180 as incorporated by reference in subdivision 370.1(e) of this Title.

(4) Prior to sending a shipment of universal waste to another universal waste handler, the originating handler must ensure that the receiving handler agrees to receive the shipment.

(5) If a small quantity handler of universal waste sends a shipment of universal waste to another handler or to a destination facility and the shipment is rejected by the receiving handler or destination facility, the originating handler must either:

(i) Receive the waste back when notified that the shipment has been rejected, or

(ii) Agree with the receiving handler on a destination facility to which the shipment will be sent.

(6) A small quantity handler of universal waste may reject a shipment containing universal waste, or a portion of a shipment containing universal

waste that the small quantity handler has received from another handler. If a handler rejects a shipment or a portion of a shipment, the handler must contact the originating handler to notify them of the rejection and to discuss reshipment of the load. The handler must:

(i) Send the shipment back to the originating handler, or

(ii) If agreed to by both the originating and receiving handler, send the shipment to a destination facility.

(7) If a small quantity handler of universal waste receives a shipment containing hazardous waste that is not a universal waste, the handler must immediately notify the appropriate Department Regional Director of the illegal shipment, and provide the name, address, and phone number of the originating shipper. The Department Regional Director will provide instructions for managing the hazardous waste.

(8) If a small quantity handler of universal waste receives a shipment of non-hazardous, non-universal waste, the handler may manage the waste in any way that is in compliance with applicable federal, state or local solid waste regulations, including Part 360 of this Title.

5.10 Universal Waste in Rhode Island

The RI DEM adopted the federal Universal Waste Rule on November 13, 2001. The Standards for Universal Waste Management in Rhode Island are incorporated into the state Hazardous Waste Regulations (Regulation #DEM OWM-HW09-01). The Standards for Universal Waste Management provide an alternative set of management standards in lieu of regulation under the more stringent Hazardous Waste regulations. Table 5.6, "Summary of Rhode Island Universal Waste Regulations," provides a summary of the Rhode Island Universal Waste Regulations, including the regulatory citations.

5.10.1 Applicability

The provisions of the Rhode Island Standards for Universal Waste Management apply to the following wastes:

- Batteries
- Mercury-Containing Devices
- Mercury-Containing Lamps
- Used Electronic Devices not containing CRTs
- Cathode Ray Tube(s)
- Silver-containing photo fixing solutions (Not a National Grid-generated waste so not discussed further.)
- Pesticides (Not a National Grid-generated waste so not discussed further.)

5.10.2 Universal Waste Batteries

The standards for the management of universal waste batteries are found in Rules 13.5(B) of the Hazardous Waste Regulations. Waste nickel-cadmium, mercury oxide and lead acid dry cell batteries must be managed as a universal waste or hazardous waste; whether or not they exhibit a hazardous characteristic. In addition Lithium or Silver based batteries must be managed as a universal or hazardous waste.

5.10.3 Universal Waste Mercury Containing Devices

The standards for the management of universal waste mercury-containing devices are found in Rules 13.5(C) of the Hazardous Waste Regulations. Waste mercury containing devices must be managed as a universal waste or hazardous waste; whether or not they exhibit a hazardous characteristic.

5.10.4 Universal Waste Lamps

The standards for the management of universal waste Lamps are found in Rules 13.5(D) of the Hazardous waste Regulations. Waste lamps must be managed as a universal waste or hazardous waste; whether or not they exhibit a hazardous characteristic.

5.10.2 Universal Used Electronics not containing CRTs

The standards for the management of universal waste Used Electronic Devices not containing CRTs are found in Rules 13.5(H) of the Hazardous waste Regulations. Used Electronics as defined in Rule 3 must be managed as a universal waste or hazardous waste; whether or not they exhibit a hazardous characteristic.

5.10.2 Universal Cathode Ray Tubes

The standards for the management of universal waste Cathode Ray Tubes are found in Rules 13.5(H) of the Hazardous waste Regulations. Cathode Ray Tubes as defined in Rule 3 must be managed as a universal waste or hazardous waste; whether or not they exhibit a hazardous characteristic.

Table 5.1: Lighting Type and Waste Generated From Each Lighting Type

Light Type	Size (Watts)	Ballast	Lamp	Capacitor
Mercury Vapor Street Light	≤175	No	Yes	No
	>175	No	Yes	Yes

Sodium Vapor Street Light	<250	No	Yes	No
	≥250	No	Yes	Yes
Mercury Vapor Flood Light	≤400	No	Yes	Yes
	1000	No	Yes	Yes
Sodium Vapor Flood Light	250	No	Yes	Yes
	≥400	No	Yes	Yes
Fluorescent Lights (located in buildings)	Various	Most	Yes	Included within the ballast

Table 5.2: National Grid Management of Spent Lighting Materials

Description of Waste	Source	Waste Code	EPA Hazard	Mark	Storage Location	Accumulation Time Limit	Shipping Paper	DOT Shipping Description	Licensed Transporter
Fluorescent Lamps	MA NH VT NY RI VT	None	None	"Universal Waste Mercury Containing Lamps" & Date	Designated location not in high traffic areas; not in HW area[6].	1 year	BOL	Used Mercury-Containing Lamps, Non-DOT Regulated	No _____ NY
High-Intensity Discharge Lamps	MA NH NY RI VT	None	None	"Universal Waste - Mercury Containing Lamps" & Date	Designated location not in high traffic areas; not in HW area[6].	1 year	BOL	Used Mercury-Containing Lamps, Non-DOT Regulated	No _____ NY
Leaking PCB Capacitors and Ballasts*	MA NH RI VT NY	MA-MA02; NH-None; RI-R007; VT-VT01	Toxic	HW PCB RI only - Mark Class 9	HW	30 days	HW Manifest	Polychlorinated, Biphenyls, NON-DOT Regulated	Yes
Intact, Non-leaking PCB Capacitors (from Street Lights)	MA NH RI VT NY	MA-MA02; NH-None; RI-R007; VT-01; NY-None	Toxic	HW (Exempt from TSCA - no PCB mark required) RI only – Mark Class 9	HW	90 days (once in Main Accumulation Area)	HW Manifest	Polychlorinated, Biphenyls, NON-DOT Regulated	Yes
Intact PCB Ballasts* from Fluorescent Lighting[4]	NH NY	NH-None[5] NY-None	None[5]	Non-Hazardous Waste[5] PCB Mark HW Class 9	Not in HW area[5, 6]. Put in DOT containers. Secondary containment	180 days[5] None	Federal HW Manifest[5] BOL	Polychlorinated Biphenyls, NON-DOT Regulated	Yes Yes
	RI MA	RI-R007 MA-MA02	Toxic	Hazardous Waste PCB Mark Class 9 Hazardous Waste	HW	90 days	HW Manifest	Polychlorinated, Biphenyls, NON-DOT Regulated	Yes
	VT	VT-VT01	None	Universal Waste	Not in HW Area	One year	BOL	Used PCB Ballasts, Non-DOT Regulated	No

Notes:
1. When possible, place spent lamps in boxes originally shipped in.
2. Fiber drums are recommended storage containers for small bulbs (minimizes breakage).
3. Items marked with asterisk (*) must be included on the PCB Annual Log (PCB Report), and are considered to be "PCB Bulk Product Waste."
4. When shipped to a consolidation or processing facility and not directly for disposal.
5. If managed as a hazardous waste, the ballasts must be accumulated within a hazardous waste area for less than 90 days and shipped on a state hazardous waste manifest using the state's waste code (e.g., Massachusetts – MA02; New Hampshire – NH01).
6. Universal waste may be stored in hazardous waste storage areas in NY.

Table 5.3: National Grid New England Spent Lighting Materials Inventory Sheet

Date: _____

Company: _____ GSE _____ MECo _____ Nantucket _____ Narragansett

Facility:_____ Contact Person: _____

Address:_____ Telephone Number: _____

_____ Department: _____

Summary of Spent Lighting Materials for Shipment

State Requirements	Material	Number and size of Containers	Labels Needed? *Yes or No*	Containers Needed? Specify Type
NH, RI, MA: Universal Waste	Spent HID Lamps	____ 30 Gallon ____ 55 Gallon ____ Other Specify Type		
NH, RI, MA: Universal Waste	Spent Fluorescent Tubes	____ U-Tubes ____ 4 ft. linear ____ 8 ft. linear ____ Other - Specify Type ____ Other - Specify Type		
NH, MA, RI ; Not TSCA-Regulated	Small Intact PCB Capacitors	____ 30-gallon ____ 55-gallon ____ Other - Specify Type		
NH: TSCA-Regulated; Not Hazardous Waste MA, RI: Hazardous Waste	Intact PCB Ballasts	____ 5-gallon ____ Other - Specify Type		
NH, MA, RI: Hazardous Waste	Leaking PCB Capacitors and/or Ballast	____ 5-gallon ____ 30-gallon ____ 55-gallon ____ Other - Specify Type		

Table 5.4: National Grid Battery Recycling Program

Battery Type	Disposal/Recycling Options	Restrictions
1a. **Large Lead Acid Batteries** (Spent, *Non-Leaking*, Large Lead Acid Batteries - Substations, Reclosers, vehicles)	Return or Exchange at place of purchase or EnerSysy (formerly YUASA) or Veolia	• Do not mix lead acid batteries with other types of batteries. • Large batteries must be intact and placed in a single layer on pallet. Cover terminals with tape to prevent short circuits. Shrink wrap and strap to pallet using non-metallic strap. • Use BOL.
1b. **Small Sealed Lead Acid/Gel Cell Batteries** (Spent, sealed; *Non-Leaking, Non-Cracked*)	EnerSys (formerly YUASA) or Veolia	• Contact vendor for special packaging for shipping requirements. • Label batteries in accordance with Universal Waste requirements. • Ship within 1 year of generating the waste. • Use BOL.
1c. **Lead Acid Batteries** (*Leaking and/or Cracked)*	Clean Harbors Env. Services Inc. will transport to NovaPb	• All leaking or cracked batteries must be shipped on a hazardous waste manifest.
2a. **Nickel-Cadmium Batteries** (Large Ni-Cd batteries generated by substation operations and telecommunications dept's; *Non-Leaking, Non-Cracked*)	INMETCO or Veolia	• Place in single layer on pallet. • Strap with non-metallic strapping. • Label batteries in accordance with Universal Waste requirements. • Ship within 1 year of generating the waste. • Cover terminals. • Use a BOL.
2b. **Nickel - Cadmium Batteries** (Small Ni-Cd batteries generated by radios, laptop computers, and small hand tools; *Non-Leaking; Non-Cracked*)	Return or exchange at place of purchase or INMETCO or	• Contact vendor for special packaging for shipping requirements. • Label batteries in accordance with Universal Waste requirements. • Ship within 1 year of generating the waste. • Cover terminals. • Use BOL.

Table 5.4: National Grid Battery Recycling Program

Battery Type	Disposal/Recycling Options	Restrictions
	Veolia	
3. **Lithium Batteries** (Small Lithium batteries generated by metering equipment; *Non-Leaking; Non-Cracked)*	INMETCO or Veolia	• Contact vendor for special packaging for shipping requirements. • Label batteries in accordance with Universal Waste requirements. • Ship within 1 year of generating the waste. • Cover terminals. • Use BOL.
4. **Alkaline Batteries**	Veolia or INMETCO	• Cover terminals.
5. **Nickel Metal Hydride (NiMH) Batteries**	Return or exchange at place of purchase or Veolia	• Cover terminals.

Table 5.5: Summary of Massachusetts Universal Waste Management Regulations	
Regulatory Citation	**Summary**
310 CMR 30.1020	**Applicability -Types of Wastes Covered**: • Batteries - primarily NiCd's and button batteries • Pesticides • Mercury Thermostats • Mercury-Containing Devices • Mercury-Containing Lamps
310 CMR 30.1030 Standards for Small Quantity Handlers of Universal Waste**:** (SQHUW)	**Standards for Small Quantity Handlers of Universal Waste** • SQHUW can accumulate less than 5,000 kg total universal waste in one year. No notification or recordkeeping required. • Prohibitions: - Disposal is not permitted; - No dilution, treatment or recycling of universal waste unless responding to releases, or as described in 30.1034. • Must manage wastes according to (30.1034). • Marking and Labeling: - Must label wastes appropriately (30.1034). • Notification: - Notification is not required for SQHUW. • Mercury Containing Lamps: - Must not be managed by crushing without a recycling permit; - Lamps must be handled whole; incidental unintentional broken lamps may be shipped as universal waste. • Accumulation Time Limits: - No longer than one year from the date the universal waste is generated, or received from another handler. • Training: - Inform all employees who handle or manage universal waste of proper handling and emergency procedures appropriate to types of waste handled. • Shipment Tracking: - No tracking of shipments is required. • Off-site Shipments: - Must ship only to another universal waste handler, a destination facility, or a foreign destination. Must package, label, mark and placard shipment according with HAZMAT regulations; - Use shipping papers (BOLs) not manifests.

Table 5.5: Summary of Massachusetts Universal Waste Management Regulations	
Regulatory Citation	**Summary**
310 CMR 30.1040 Standards for Large Quantity Handlers of Universal Waste	**Standards for Large Quantity Handlers of Universal Waste** (LQHUW): • LQHUW handles more than 5,000 kg of universal waste in one year. • Notification: - Must notify MA DEP of universal waste handling activity. If a site has a valid EPA Identification Number, then facility must notify DEP of universal waste activity, except batteries. Facilities with valid EPA ID numbers are <u>not</u> required to notify DEP of universal waste battery activity. • Applicability • Accumulation Time Limits • Labeling and Marking • Off-Site Shipping • Response to Releases • Training: - Requirements in these areas for LQHUW are the same as for SQHUW. • Tracking: - LQHUW must keep records of all shipments of universal waste received (30.1048). • Records must be kept for three (3) years.
310 CMR 30.1050	Standards for Universal Waste Transporters
310 CMR 30.1060	Standards for Destination Facilities
310 CMR 30.1070	Import Requirements

Table 5.6: Summary of Rhode Island Universal Waste Management Regulations

Regulatory Citation	Summary
Hazardous waste Regulations	**Applicability -Types of Wastes Covered**: • Batteries • Pesticides • Mercury Thermostats • Mercury-Containing Devices • Mercury-Containing Lamps • Cathode ray Tubes (CRTs)
Hazardous Waste Regulations Rule 13.00	**Standards for Small Quantity Handlers of Universal Waste** (SQHUW): • SQHUW can accumulate less than 20,000 kilograms of CRTs and less than 5,000 kg total of all other universal waste in one year. No notification or recordkeeping required. • Prohibitions: - Disposal of universal waste in regular waste stream is not permitted; - No dilution, treatment or recycling of universal waste unless responding to releases • Must not intentionally break or crush universal waste. • Marking and Labeling: - Must label wastes with the words "Universal Waste" and the identity of the waste. - Must note the Accumulation Start Date • Notification: - Notification is not required for SQHUW. • Accumulation Time Limits: - No longer than one year from the date the universal waste is generated, or received from another handler. • Management: - Must manage unintentional breakage of significant numbers of Universal waste items as hazardous waste. - Must respond to spills/breakage and manage the released material as hazardous waste as applicable - Must take steps to prevent releases to the environment • Training: - Inform all employees who handle or manage universal waste of proper handling and emergency procedures appropriate to types of waste handled. • Shipment Tracking: - No tracking of shipments is required. • Off-site Shipments: - Must ship only to another universal waste handler, a destination facility, or a foreign destination. Must package, label, mark and placard shipment according with HAZMAT regulations; - Use shipping papers (BOLs) not manifests.

6.0 WASTE MINIMIZATION AND RECYCLING

This chapter provides information on waste minimization/recycling regulations and provides an overview of current National Grid waste minimization and recycling programs. Waste minimization and recycling are practices which reduce or eliminate the creation of waste at the source and prevent its release into the environment. Both practices are emphasized in state and federal hazardous waste programs. National Grid promotes a policy to "Reduce, Reuse, and Recycle" all hazardous wastes, materials and by-products, as appropriate.

6.1 Overview of Waste Minimization and Recycling Regulations

The following information summarizes pertinent regulations governing waste minimization and recycling:

6.1.1 Waste Minimization National Plan

The Waste Minimization National Plan is a long-term national effort to reduce the quantity and toxicity of hazardous waste. The goals of the national plan are to:

- Reduce by 50% the most persistent, bio-accumulative and toxic (PBT) chemicals in the nation by the year 2005;
- Emphasize source reduction and environmentally sound recycling over waste treatment and disposal; and,
- Prevent transfers of chemical releases from one medium (air, water, land) to another.

6.1.2 Pollution Prevention Act

The Federal Pollution Prevention Act of 1990 (PPA) sets pollution prevention as a national objective. The PPA required EPA to implement a strategy to promote source reduction. In the PPA, the Congress stated that pollution prevention is the highest goal and that if pollution cannot be prevented or reduced at the source, then it should be recycled; if it is not feasible to prevent or recycle, then pollution should be treated, and only disposed of as a last resort.

6.1.3 Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA), was designed to provide "cradle-to-grave" controls on wastes by imposing management requirements on generators, transporters, and treatment, storage and disposal facilities. Subtitle A of RCRA states that as a matter of national policy, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible and that land disposal should be the least favored method for managing hazardous wastes.

Generators of hazardous waste must comply with the set of standards in Section 3002 of RCRA. Section 3002(b) of RCRA states that the generator of the hazardous waste must certify on the hazardous waste manifests that:

1. The generator has a waste minimization program in place to reduce the volume or quantity and toxicity of hazardous waste generated to the degree determined by the generator to be economically practicable; and,

2. The proposed method of treatment, storage, or disposal is the practicable method currently available to the generator which minimizes the present and future threat to human health and the environment.

6.1.4 Universal Waste Rule

On May 11, 1995, the EPA finalized the Federal Universal Waste Rule. The purpose of the rule is to streamline regulatory requirements for certain widely generated hazardous wastes. It was designed to encourage recycling and to reduce the amount of hazardous waste from entering municipal solid waste facilities. Refer to Chapter 5 for additional information on the EPA's Universal Waste Rule.

6.1.5 Rhode Island OSCAR Program

Under Rhode Island's Ocean State Cleanup and Recycling (OSCAR) Program, source reduction and recycling are set as the top priorities for Rhode Island's solid waste management.

This Rhode Island state law requires that businesses recycle numerous solid wastes, including:

- Corrugated cardboard
- Office paper
- Newspaper
- Wood waste
- Used lubricating oil
- Vehicle batteries

Rhode Island's Rules and Regulations for Reduction and Recycling of Commercial and Non-Municipal Residential Solid Waste requires businesses with 50 or more employees to segregate and recycle solid wastes. The Rhode Island Resource Recovery Corporation (RIRRC) assumed responsibility for administering statewide recycling in 2001, when the Ocean State Cleanup and Recycling Program (OSCAR) was suspended. Annual reporting requirements to RI DEM have also been permanently suspended; however, the inventory and tracking of recycled materials is still recommended.

6.1.6 Vermont Hazardous Waste Reduction Plans

Under Vermont regulations Title 10 VSA Chapter 159 and Act 100, facilities are required to prepare Hazardous Waste Reduction (HWR) Plans and HWR Plan

Summaries. This program has been implemented as the state version of EPCRA. The goals of this program include:

- The elimination or reduction of the use of hazardous, toxic, materials;
- A reduction in the generation of hazardous waste;
- A reduction in the number of releases of contaminants that have adverse or serious health effects into the environment;
- Documented efforts towards hazardous waste and toxic use reduction, and the availability of this information to the public, as well as state and local government;
- Plans must be revised every 3 years; only the Plan Summaries are submitted to the Vermont Department of Environmental Conservation. Updated Plans and Plan summaries are due on or before July 1 of every third year. As a part of each Plan, the generator must establish specific performance goals for the reduction of toxins and hazardous waste for specific categories. The Plan Summaries must include a written statement articulating upper management's corporate policy with respect to a toxic use reduction and hazardous waste reduction plan, and a commitment to implement the plan goals.

6.1.7 Massachusetts

310 CMR 19.017(3) restricts the disposal or transfer for disposal of specific materials, such as wood, paper, cardboard and metal. Refer to Table 3 in the regulations for a complete list of materials. Since the MA DEP has actively enforced this regulation, it is important to ensure that restricted wastes are separated from the general trash or that the disposal contractor is bringing the waste to a facility where it will be segregated.

6.1.8 New Hampshire

Env-Wm 800 lists wastes which are exempted from Hazardous Waste regulation providing that they are being recycled. Other than this citation, there are no other specific regulations governing recycling.

6.2 National Grid Waste Minimization and Recycling Programs

The following information summarizes current National Grid waste minimization and recycling programs. The Company strives to **reduce** the quantities of hazardous waste generated by reducing or eliminating as many hazardous chemicals as possible in the work place, by consolidating the chemicals used, by **reusing** materials as much as possible, and by **recycling** increasing quantities of wastes. The following sections provide summaries of National Grid's current waste minimization and recycling programs.

6.2.1 Waste Minimization Program

National Grid Waste Minimization Program supports the national plan for reducing the volume and toxicity of all waste generated. National Grid efforts in this arena include reduction of solid waste through maximum reuse and recycling of materials and changing work practices to reduce or eliminate generation of hazardous waste. These waste minimization efforts allow National Grid to simultaneously improve environmental results and reduce costs.

A variety of initiatives instituted at National Grid as a result of waste minimization assessments include:

- The replacement of chlorinated based cleaners with non-chlorinated;
- Recycling of used oil filters and oily rags;
- Recycling of lighting waste;
- Recycling of corrugated board;
- Recycling of rechargeable batteries;
- Increasing the amount of oily soil recycled via asphalt batching;
- Applying in-situ remediation technologies to contaminated sites, when feasible and appropriate;
- Evaluating a plan to eliminate lead cable in new underground installations; and,
- Burning of waste automotive oil for energy recovery.

Refer to Attachment A for a copy of the National Grid Waste Minimization Program.

6.2.2 Battery Recycling Program

The Universal Waste Rule addresses most waste batteries. Refer to Chapter 5 of this EP for a complete description.

6.2.3 Empty Drum and Can Recycling Program

EPA's definition of an RCRA empty container is slightly different from the DOT definition. Under the EPA definition, a container is empty if all wastes have been removed that can be removed using the practices commonly employed to remove materials from that type of container; *e.g.*, pouring, pumping, and aspirating; *and* there is no more than 2.5 centimeters (one inch) of residue remaining on the bottom of the container or inner liner. A container that has held a hazardous material or hazardous waste that is a compressed gas is empty when the pressure in the container is substantially at atmospheric pressure. Refer to 40 CFR 261.7 and state-specific regulations for additional requirements for managing empty containers of acutely hazardous wastes.

Under DOT rules, a package/container is considered "empty" when it has been cleaned of residue and purged of vapors to remove any potential hazard (49 CFR 173.29). Residues removed from containers of hazardous wastes and hazardous materials must

be collected and managed as hazardous wastes as appropriate. Under no circumstances should residues be allowed to escape from a container, dumped on the ground or otherwise introduced into the environment.

- **Empty Drums:** Empty drums once used to store hazardous materials or wastes, shall be disposed of at an approved Hazardous Waste Disposal and Recycling Facility and shall not be disposed of in the trash or at a scrap dealer. Whenever possible, these empty drums and containers should be returned to the manufacturer.

  Empty drums which were not used to store hazardous materials or wastes should be recycled for scrap metal when possible and as a last choice, disposed of as a solid waste. In all cases, labels should be removed from the drums (or painted over with opaque black paint) prior to disposal.

- **Cans:** In order to minimize the generation of hazardous wastes, the full contents of a container of hazardous materials, such as paint cans and aerosol cans, should be used. Whenever possible, consolidate similar product items from several containers into a single container.

  When empty, these containers may be recycled for scrap metal, or discarded as solid waste. Empty aerosol cans should not be recycled as scrap metal unless the cans have been depressurized and the residues have been collected and appropriately managed.

6.2.4 Fluorescent Lamp and Lighting Waste Recycling Program

The Universal Waste Rule addresses most lighting wastes such as HID and fluorescent lamps, intact fluorescent light ballasts (PCB and non-PCB) and intact capacitors (PCB and non-PCB). Refer to Chapter 5 of this EP for additional information.

6.2.5 Oil Contaminated Soil Recycling

Soil contaminated with oils, including MODF, may be recycled at an approved asphalt batch facility, if the waste meets the criteria outlined in the facility's permit. These facilities cannot accept soils with concentrations of PCBs greater than or equal to 2, nor can they accept soils that contain listed or characteristic RCRA wastes over certain concentrations. The Infonet provides a listing of approved soil recycling facilities including location, permit number and mix type.

6.2.6 Oil Filter Recycling

National Grid recycles oil filters. The following criteria apply to recycling oil filters:

- Gasoline filters are not accepted for recycling.
- Oil filters destined for recycling are not hazardous wastes and can not be stored in the hazardous waste storage areas. The oil filter recycling drums should be labeled with the contents and the words "recyclable material."

- Oil filters should be shipped using a Bill of Lading.

Massachusetts Only

In order for the filters to be considered empty and therefore able to be managed as a recyclable material, the oil filters must be either:

- Drained and crushed to a point where no free flowing liquid remains in the crushed filter, or
- The anti-drain valve or dome end of the filter must be punctured and the filter hot drained for at least 12 hours.

6.2.7 Oily Rag Recycling

Non-saturated oily rags may be handled as non-hazardous waste when the following conditions are met:

- Rags must not have any quantity of oil such that if the rag is twisted oil will flow or drip from the rag;
- State regulations and guidance documents must be followed. See Table 6.1 for a summary of the requirements;
- Oils absorbed on the rags must not contain MODF or PCBs;
- The laundry facility, resource recovery facility, or recycling facility must hold all applicable permits;
- Rags which are non-hazardous should not be stored in a hazardous waste storage area and should not be labeled with any hazardous waste labels. Non-hazardous rags should be labeled with the contents to be in compliance with HazCom requirements.

Except in New York and New Hampshire (if associated with spill cleanup), oily rags must be handled as hazardous wastes if they are **saturated** with oil, chlorinated solvents, or contain PCBs or MODF. In New York, oily rags that originally contained ≥ 50 ppm PCB's must also be treated as hazardous waste.

6.2.8 Scrap Metals Recycling

The Institute of Scrap Recycling Industries, Inc. (ISRI) divides scrap metals into three types: Home Scrap, generated by steel mills and foundries; Industrial Scrap, generated by the metal working/fabrication industries; and Obsolete Scrap, composed of metal that has outlived its original intended use (such as an empty aerosol can). National Grid generates industrial and obsolete scrap metals, such as lead cable, steel structures, copper wire, aluminum wire and miscellaneous metal parts.

Scrap metals which contain no hazardous wastes are regulated as solid wastes. Metals should be recycled whenever possible through a National Grid approved scrap metal dealer. Refer to the Infonet for a list of approved facilities.

When recycling metals, consider the following:

- Except as provided below, no transformers or other electrical equipment such as circuit breakers, regulators, etc., can be sent to scrap metal dealers.
- Different types of metals such as steel, copper wire, and lead cable should be segregated for higher cost recovery.
- All free liquids should be removed from scrap metal containers prior to stockpiling or placing into a dumpster.

Non-PCB substation electrical equipment may either be recycled through a transformer recycling vendor or, providing certain criteria are met, empty units may be shipped to an approved scrap metal dealer. Investment Recovery will designate a scrap metal dealer in each geographic area to accept units. Unit may only be sent to such designated dealer. Additionally, the following criteria must be adhered to:

- All equipment must be thoroughly drained prior to shipment from the substation. The unit should be inspected several days to a week after draining to determine if a second draining to remove any residual oil is necessary. It should be anticipated that some oil may accumulate as internal walls and components drain over time.
- For states where used oil is treated as hazardous waste, the container must meet the RCRA definition of empty. All oil shall be removed that can be removed using practices commonly employed to remove oil from electrical equipment. In addition, no more than 2.5 cm of residue can remain on the container bottom or no more than 3% by weight of the container oil capacity remains if the capacity is <110 gallons or no more than 0.3% by weight of the container oil capacity remains if the capacity is >110 gallons.
- Stations personnel will attest to the condition of the equipment with a statement such as "I have visually inspected this piece of equipment and there exists no free-flowing or standing oil."
- Only units that contained non-PCB oil may be sold to a scrap dealer. Non-PCB oil is considered to be 49 ppm PCBs or less.
- All units must be sampled and analyzed via gas chromatography. Field testing; e.g., a Clor-N-Oil® test, is not acceptable for use. Analysis is not required if the unit is manufacturer-certified as non-PCB.
- All PCB analyses must be <1 year old. If analytical data is greater than 1 year old, the oil must be re-sampled and analyzed.
- If a unit had been previously drained such that no oil is available for analysis, analytical data >1 year old may be used for evaluating shipment to a scrap dealer.
- If units have more than one compartment with oil, each compartment must be sampled and analyzed separately. If any individual compartment is 50 ppm PCBs or greater, the unit may not be sent to a scrap dealer.

6.2.9 Certificates of Recycling

When shipping oily soil, used oil filters, oily rags and batteries using a shipping paper that does not provide confirmation of receipt of the material by the receiving facility (e.g., a hazardous waste manifest), a Certificate of Recycling should be obtained in order to assure that the material was properly managed. Often Certificates of Recycling are attached to invoices.

6.2.10 Personal Computers, Cellular Telephones, and Monitors

Personal Computers (PCs), cellular telephones, and monitors (CRTs) no longer in service are sold to secondary vendors through the company's Investment Recovery Group. Personal computers (PCs) and monitors (CRTs) do not present either a physical or health hazard during normal use. In the unlikely rare circumstance of a broken CRT, hazardous waste could be generated due to lead and/or mercury. For assistance in cleanup, contact the company's Industrial Hygienist for consultation. A HEPA vac and air sampling may be required due to volatilized lead and/or mercury from the non-intact CRT."

6.2.11 Cardboard and Office Paper

In accordance with state-specific regulatory requirements as well as National Grid's Environmental Policy, cardboard and office paper should be separated from general waste streams whenever feasible in order to ensure it is recycled. Separation is not required if that the disposal contractor is bringing the waste to a facility where it will be segregated.

6.3 Waste Oil Recycling

This section describes the appropriate methods for managing used oils prior to burning or recycling, the registrations, permits and record keeping required by facilities which burn, recycle or market waste oils, and the off-site shipment requirements. The regulations for storing, labeling, and recycling waste oils vary from state to state. Waste oils not destined for recycling may need to be managed as hazardous waste in accordance with state-specific requirements.

Generally, either recycling permits or "permit by rule" govern a Generator wishing to burn waste oils on-site. When shipping waste oils directly to a Burner, the generator likely is considered a "Marketer" of waste oils.

Regulations concerning the management of waste oils differ for specification (spec) and off-specification (off-spec) used oils. In general, spec used oils may be burned at facilities with fewer regulatory burdens. Each state, however, defines spec used oil in a slightly different manner. The following sections define spec and off-spec used oils and details the regulations in each state for both types of oils.

6.3.1 Waste Transformer Oil

Waste transformer oil may not be sent to a facility that processes and then sells the oil as fuel to other entities. An example of this type of facility is Murphy's Waste Oil

(Clean Harbors Environmental Services' facility), located in Woburn, Massachusetts. All waste transformer oil must be disposed at a National Grid-approved incinerator or thermal recovery facility. See the Infonet for a listing of such facilities. In some cases, non-PCB MODF may qualify as MA98, off-specification used oil fuel, and may be manifested as an MA98 waste oil to a National Grid-approved incinerator or thermal recovery facility. However, it is important to ensure that the transporter's permit allows it to act as the marketer. See EP No. 6 for details.

6.3.2 Massachusetts

Waste oil recycling in Massachusetts is regulated by 310 CMR 30.0000. Recycling of waste oil through burning on-site in a space heater for energy recovery is covered as a "permit by rule" activity and no actual permit is issued by the state. Burning of waste transformer oil, with or without PCBs, or chlorinated solvents is prohibited. Requirements for this activity are contained in EG-125MA and summarized below:

- Records must be maintained demonstrating that no speculative accumulative of waste oil has occurred. The records must include: the amount of material being accumulated or stored at the beginning of each calendar year; records showing the amount of material received or generated during the calendar year; and records showing the amount of materials being accumulated or stored at the end of the calendar year.
- Each waste oil tank or container must be labeled with the following: The words "Regulated Recyclable Material"; the identity of the substance; the type of hazard associated with the materials; the date upon which each period of accumulation or storage begins (dating is not required for tanks or containers that are hard piped to space heaters).
- Training must be provided for personnel who are involved in the recycling activities. The training topics must include the conditions of the permit and how to conduct activities to ensure protection of human health and the environment.

When shipping off-specification used oil fuel to a burner, the transporter must have a permit allowing them to act as a "Marketer." Otherwise, the oil must be shipped as a hazardous waste or the generator must obtain a Class B-3 recycling permit.

Waste oil may be shipped as MA01 – hazardous waste, MA97 – specification oil, and MA98 – off-specification oil. Shipments of waste oil utilizing the MA97 and MA98 waste codes are not subject to the Massachusetts hazardous waste transporter fee.
Massachusetts spec oil parameters are described in Table 6.2. Each batch of spec oil must be analyzed to ensure it meets these criteria. Used oil fuel which exceeds the allowable level of any constituent or property, is not transformer oil, and has not been mixed with a hazardous waste (e.g., F001 halogenated solvent), is considered to be off-spec oil. Off-spec oil need only be analyzed to ensure it has not been mixed with hazardous waste. Therefore, generators of waste motor oils or other off-spec oils should utilize the waste code MA98, as the waste oil need only be screened for total halogens to confirm it is not a hazardous waste. The results of the test are recorded on

the manifest. Analytical results from a representative sample of off-spec oil are on file with the Environmental Engineer.

6.3.3 New Hampshire

Generators in New Hampshire that recycle used oils must comply with the regulations set forth in Part Env-Wm 807, Requirements for Management of Used Oil Being Recycled, of the New Hampshire Hazardous Waste Rules. Standards for generators of used oil being recycled are found at Env-Wm 807.06. Table 6.3 summarizes generator, burner and other requirements applicable to used oils being recycled.

As outlined in Table 6.3, direct shipment of used oil to a burner qualifies the generator as a "Marketer." Standards which the Marketer must follow are outlined in Table 6.3 and include:

- Analysis of each load of oil for parameters listed in the regulations (Tables 8.1 and 8.2).
- Assignment of a unique ID number to each batch of oil.

6.3.4 Rhode Island

Generators in Rhode Island which burn used oils are subject to Rhode Island Air Pollution Control Regulation 20 and the requirements of 40 CFR 266, Subpart E, where more stringent. Table 6.4 summarizes the applicable requirements for recycling used oils in Rhode Island.

Rhode Island has a Policy (1991) on the management of waste oils, although DEM personnel do not appear to interpret the Policy consistently. However, if the generator, through repeated analysis, can show that the waste oil does not meet the criteria to be determined hazardous, the generator may manage the waste oil as a non-hazardous waste. The generator should ship the waste utilizing a regular BOL and must maintain analytical data and shipping papers. Additionally, oil that is being managed as a non-hazardous waste must not be stored in the generator's hazardous waste area. Also, the waste oil must not be shipped on a RI hazardous waste manifest form. If the waste oil is shipped out of state and a manifest is required by the destination state, copies must not be sent to RIDEM.

As outlined in Table 6.4, direct shipment of Used Oil to a burner qualifies the generator as a "Marketer". Marketer Standards which must be followed are also listed in Table 6.4

6.3.5 Vermont

Generators in Vermont that burn oils in space heaters on site must comply with the requirements of Section 7-610 of the Vermont Hazardous Waste Management Regulations and all applicable provisions of the Vermont Air Pollution Control Regulations. Table 6.5 summarizes the requirements applicable to used oil recycling.

Generators that recycle waste crank case and motor vehicle oils are exempt from managing these oils as a hazardous waste as long as the oils do not exhibit a hazardous waste characteristic, and are stored in a manner such that no disposal occurs and are transported by a licensed hazardous waste transporter to a facility, such that the waste oil is ultimately burned for energy recovery [VT 7-203(14)(b)]. However, it is National Grid Policy that containers and tanks storing waste oils are managed in accordance with the Generator requirements specified in Chapter 3.

As outlined in Table 6.5, direct shipment of Used Oil to a burner qualifies the generator as a "Marketer." Marketer Standards which must be followed are also listed in Table 6.5.

6.3.6 New York

In New York, used oil is managed according to 6 NYCRR Part 360 (Solid Waste Management Facilities), Subpart 360-14 Used Oil and Part 374-2. On specification, Used Oil is handled as a solid waste. All tanks storing used oil must be registered under the Bulk Petroleum Storage Regulations (6 NYCRR 612) whether or not the minimum threshold volume of 1,100 gallons on site storage is met.

Used oil burned for energy recovery is also subject to Subpart 374-2 and Part 225 of 6 NYCRR. Table 6.6 summarizes the requirements applicable to used oil recycling.

Table 6.1: State-Specific Summary of Regulatory Status of Used Rags and Wipers

Requirement	Massachusetts	New Hampshire	Rhode Island	Vermont	New York
Items Covered	Shop towels, rags and disposable wipers.	Rags, shop towels and wipers.	Towels and sorbents.	Rags, shop towels and reusable absorbents.	Rags, shop towels, reusable absorbents and soiled clothing contaminated with oil or solvents.
No Free Liquids Allowed	"One drop" rule.	Paint filter test.	No free liquids.	"One drop" rule.	No free liquids.
Acceptable Contaminants	Oils and Solvents.	Oils and solvents.	Oils and trace amounts of hazardous wastes.	Oils and trace amounts of hazardous wastes.	Oil and incidental amounts of solvents.
On-Site Management Requirements	Management requirements not specified in DEP policies. May be managed as solid waste.	Material must be placed in containers with lidded drums or sealed laundry bags. Containers are to be kept closed, etc. Containers must be stored away from sources of ignition. Container must be labeled "Contaminated Wipers for Laundering." Containers must be managed and transported in accordance with DOT requirements.	Material must be stored in containers away from any source of heat. No other wastes may be mixed with sorbents.	Must meet all of the VT OSHA requirements regarding the storage of ignitable/flammable materials between the time the solvent-contaminated rags are generated and the time they are picked up.	Must be managed as non-exempt hazardous waste until they are loaded onto a vehicle for transportation Storage must be in fire proof or fire resistant containers Notification is made in accordance with 6 NYCRR Part 376.1(g)(1)(vii) of the LDRs.
Reuse Options	Recycling by laundering rags or by energy recovery at an incinerator.	May be laundered at a commercial off-site laundry or laundered on-site.	May be laundered at a facility which meets the appropriate state and local criteria to handle such material.	Solvent-contaminated rags must be cleaned by a dry-cleaning service. Oil-contaminated rags may be laundered by a commercial service.	Recycling by laundering

Notes: 1. Any contaminated rags, etc., which would allow the release of free liquids determined to be hazardous wastes must be managed and disposed of as a hazardous waste.
2. Solvents should not be poured onto rags, etc.

3. All laundering facilities shall have the appropriate state and local permits, including facilities which will launder on-site. Contact the appropriate Environmental group for information concerning approved commercial laundry facilities.
4. It is National Grid Policy that all facilities managing containers of oil/solvent contaminated rags, shall indicate the contents of the containers, shall keep the containers away from sources of ignition and shall manage and transport the containers in accordance with DOT requirements.

Table 6.2: Summary of Waste Oil Requirements in Massachusetts

Requirement	Description
Recycling Definition	Use, reuse or reclamation of a material
Specification Oil Parameters (Total concentrations)	Halogens 4,000 ppm[1] Lead 100 ppm PCB 2 ppm Flashpoint 100° F Arsenic 5 ppm Cadmium 2 ppm Chromium 10 ppm
Spec Oil Permits/Notifications	Class A
Off-spec Oil Permits/Notifications[2, 3]	Class B(3)
Generator Standards	• Weekly inspections • Training • Ship only to facility with recycling permit, TSDF or other authorized facility • Secondary containment • Security • Floor marking • Satellite accumulation • Container condition • Container management • Posting "Waste Oil" sign • Special requirements for tanks (310 CMR 30.253)
Labeling	• "Regulated Recyclable Material" or "Hazardous Waste" • Name of waste (e.g., used oil fuel, waste oil) • EPA Hazard (e.g., toxic, ignitable, if applicable) • Accumulation start date
Shipping Papers	• Manifest or log • MA97 for spec oil • MA98 for off-spec oil
Recordkeeping	• Show 75% recycled per year
Reporting	• Annual reports
Marketer Definition	A person who transfers used oil fuel to other persons who burn the fuel or a person who operates a facility where used oil fuel is blended to prepare specification used oil fuel
Marketer Standards	• Notification • Analysis of oil • B(3) permit for off-spec used oil • Records - notification - analysis - permit - burner certification - shipping documents - keep as specified in Table 3.4

Table 6.2: Summary of Waste Oil Requirements in Massachusetts	
Requirement	**Description**
Burner Standards	• Notification • Analysis of oil • B(3) permit for off-spec used oil • Burn off-spec oil only in industrial or utility boilers, industrial furnaces, approved space heaters • Records - notification - analysis - permit - marketer certification - shipping documents - keep as specified in Table 3.4

Notes: 1. Used oil containing >1,000 ppm total halogens are presumed to be hazardous wastes unless the generator can prove otherwise.

2. Off-specification used oils are those which do not meet the limitations listed for specification used oil, are not transformer oils, and have not been mixed with hazardous wastes.

3. Generators of spec and off-spec oils are not required to obtain a recycling permit if the oil is being sent to a Marketer, not a burner, and has been authorized to receive that material in compliance with 310 CMR 30.200. National Grid Generators, if not burning waste oil on-site or at another Company location, shall have the oil transported by and to Murphy's utilizing the waste code MA98. Other vendors may be able to provide similar services on a case-by-case basis.

Table 6.3: Summary of Waste Oil Requirements in New Hampshire

Requirement	Description
Recycling Definition	Use, reuse or reclamation of a material
Specification Oil Parameters[1] (Total concentrations) (807.02)	Halogens ≤1,000[1] ppm Lead ≤100 ppm PCB ≤ 2 ppm Flashpoint ≥100° F Arsenic ≤5 ppm Cadmium ≤2 ppm Chromium ≤10 ppm
Spec Oil Permits/Notifications	None for generators
Off-spec Oil Parameters (807.03)	Arsenic 18 ppm max Cadmium 10 ppm max Chromium 35 ppm max Lead 1,000 ppm max Flashpoint 100° F min PCBs 2 ppm, no upper limit specified
Off-spec Oil Permits/Notifications	None for generators
Generator Standards (807.06)	• Must be stored in DOT containers or structurally sound tank • Containers must be kept closed unless adding waste • Prevent releases • Analysis required if other than used automotive oil • May self-transport up to 110 gallons and must use Bill of Lading (BOL)
Labeling (807.06)	"Used Oil for Recycle"
Shipping Papers (807.06)	3-copy BOL or manifest form when required by the destination state. Special language required if using BOL [see 807.06(9)(f)]. If using manifest indicate in Line J. "To be recycled."
Recordkeeping (807.06)	• BOL/Manifest • Analysis • Keep as specified in Table 3.4
Reporting	None for generators
Used Oil Marketer Definition (807.08)	Someone engaged in the act of marketing; e.g., the transfer of oil from one party to another. Does not include used oil generators or transporters who transport used oil received only from generators.

Table 6.3: Summary of Waste Oil Requirements in New Hampshire	
Requirement	**Description**
Marketer Standards (807.09)	• Notification • Analysis of oil • Records - notification - analysis - burner certification - shipping documents - operating logs - keep as specified in Table 3.4
Burner Standards (807.10)	• Notify Waste Management Division and Air Resources Division • Burn off-spec only in industrial furnaces, boilers >10 million Btu/hr at mfg. site, utility boilers, space heaters where the oil was generated on site • Burn spec oil only in oil furnaces and boilers, space heaters <0.5 million Btu/hr which are vented outdoors • Analysis unless only automotive oil or was tested by generator • Records - notifications - analysis - certifications - shipping documents - keep as specified in Table 3.4
Transporters (807.07)	For >110-gallons, use NH permitted hazardous waste transporter.

Note: 1. Used oil containing >1,000 ppm total halogens are presumed to be hazardous wastes unless the generator can prove otherwise.

Table 6.4: Summary of Waste Oil Requirements in Rhode Island

Requirement	Description
Recycling Definition	Use, reuse or reclamation of a material
Alternative Fuel Parameters (20.4) (Total concentrations)	Halogens ≤0.1% (weight); Sulfur ≤1.0% (weight) Lead ≤100 ppm (weight); PCB ≤50 ppm volume Cadmium ≤2 ppm volume; Flashpoint ≥100° F Chromium ≤10 ppm volume; Arsenic ≤5 ppm volume Heating Value ≥8,000 BTU
Alternative Fuel Permits/Notifications	Written authority from RIDEM Air Division
Generator Standards	Comply with all Chapter 3 requirements if oil is a hazardous waste, including used oil voluntarily managed as hazardous waste. If oil is not being managed as a hazardous waste, generator should still perform weekly inspections of containers, clearly label contents of containers, etc., but must not accumulate the containers in the hazardous waste accumulation area.
Labeling	Per Chapter 3 if applicable. Otherwise label as "Waste oil for recycling" or comparable wording.
Shipping Papers	• Bill of lading • Manifest • Automotive oil manifest
Recordkeeping	Per Chapter 3, if applicable.
Reporting	None for generators.
Marketer Definition	A person who used oil fuel to other persons who burn the fuel or a person who operates a facility where used oil fuel is blended to prepare specification used oil fuel.
Marketer Standards	• Notification • Analysis of oil • Records - notification - analysis - burner certification - shipping documents - operating logs - keep as specified in Table 3.4
Burner Standards (20.4)	• Notify Waste Management Division and Air Division • Analysis (20.6) • Records (20.9) - notifications - analysis - shipping documents - keep as specified in Table 3.4
Transporters	Permitted transporter for hazardous waste or waste oil being voluntarily managed as hazardous.

Table 6.5: Summary of Waste Oil Requirements in Vermont

Requirement	Description
Recycling Definition	Use, reuse or reclamation of a material
Specification Oil Parameters (7-606) (Total concentrations)	Halogens ≤4,000 ppm[1] Arsenic ≤5 ppm Lead ≤100 ppm Cadmium ≤ 2 ppm PCB ≤2 ppm Chromium ≤10 ppm Flashpoint ≥100° F
Spec Oil Permits/Notifications	None for generators
Off-spec Oil Permits/Notifications[2]	None for generators
Generator Standards (7-608)	See Section 10.3.5 and Chapter 3 requirements.
Labeling	Per Chapter 3 unless the waste oil is exempt from hazardous waste management and then containers should be labeled as "Waste oil for recycling" or comparable wording.
Shipping Papers	• Bill of lading or manifest if shipped out-of-state • Invoice
Recordkeeping	Per Chapter 3
Reporting	None for generators
Marketer Definition	A person who transfers used oil fuel to other persons who burn the fuel or a person who operates a facility where used oil fuel is blended to prepare specification used oil fuel.
Marketer Standards (7-609)	• Notification • Analysis of oil • Records - notification - analysis - burner certification - shipping documents - keep as specified in Table 3.4
Burner Standards (7-610)	• Notify Waste Management Division • Analysis • Records - notifications - analysis - shipping documents - keep as specified in Table 3.4

Notes: 1. Used oil containing >1,000 ppm total halogens are presumed to be hazardous wastes unless the generator can prove otherwise.
2. Off-specification used oils are those which don't meet the limitations listed for specification used oil.

Table 6.6: Summary of Waste Oil Requirements in New York

Requirement	Description
Recycling Definition	Use, reuse or reclamation of a material
Specification Oil Parameters (360-14) (Total concentrations)	Halogens ≤4,000 ppm[1] Lead ≤100 ppm PCB ≤2 ppm Flashpoint ≥100° F Arsenic ≤5 ppm Cadmium ≤ 2 ppm Chromium ≤10 ppm
Spec Oil Permits/Notifications	Registration of used oil tanks
Off-spec Oil Permits/Notifications	Registration of used oil tanks
Labeling	"Used Oil"
Shipping Papers	Bill of lading or manifest if required by receiving state
Recordkeeping	BOL, Tank Inspections per 613
Reporting	None for generators
Marketer Definition	A person who transfers used oil fuel to other persons who burn the fuel or a person who operates a facility where used oil fuel is blended to prepare specification used oil fuel.
Marketer Standards	• Notification • Analysis of oil • Records - notification - analysis - burner certification - shipping documents - keep as specified in Part 374-2.5
Burner Standards	• Notification • Analysis • Records - notifications - analysis - shipping documents - keep as specified in Part 374-2.4
Transporters	Permitted Part 364 Transporter

Notes: 1. Used oil containing >1,000 ppm total halogens are presumed to be hazardous wastes unless the generator can demonstrate otherwise.

ATTACHMENT A

National Grid
Waste Minimization Program

This policy describes the current National Grid Waste Minimization Program for reducing the volume and toxicity of all wastes generated. Past efforts have focused on reducing the amount of hazardous waste generated. Current efforts include reduction of solid wastes through maximum reuse and recycling of materials, and changing work practices to reduce or eliminate the generation of hazardous waste (HW). Waste minimization efforts allow National Grid to simultaneously improve environmental results and reduce costs.

The six elements of the National Grid Waste Minimization Program (modeled using the U.S. EPA interim final guidance published in 58 Federal Register 31114) are:

1. Top Management Support

Management support for waste minimization is demonstrated in both long-term planning documents and the National Grid Environmental Policy and Principles. Specifically, Principle 4 states:

> "We will work to prevent pollution at the source, minimize waste generation, recycle materials when economically feasible, and dispose of remaining wastes only through safe and environmentally sound methods."

2. Characterization of Waste Generation and Waste Management Costs

In 1993, National Grid recognized a need to improve waste tracking data and standardize the way environmental costs were tracked within the company. Initially, Corporate Conservation, Inc. summarized National Grid's 1993 waste generation data, and associated management costs as part of the Green Accounting project. Improved waste tracking was identified as a need, and National Grid responded by modifying contracts such that solid waste and HW disposal vendors provide waste generation data. This information is tracked internally to monitor ongoing performance.

3. Periodic Waste Minimization Assessments

Annual cost and waste disposal summaries are used to assess waste minimization opportunities and evaluate progress. Projects implemented as a result of these assessments include:

- Replacement of chlorinated solvent-based cleaners with non-chlorinated cleaners;
- Recycling of used oil filters (both automotive and process equipment);
- Burning waste automotive oil for energy recovery, and recycling used oily rags;
- Recycling spent rechargeable batteries (instead of disposal as hazardous waste);
- Recycling of lighting wastes (both relamping projects and routine maintenance);

- Centralizing corrugated board recycling (making maximum use of the Worcester baler);
- Increasing the amount of oily soil recycled via asphalt batching;
- Applying in-situ remediation technologies for contaminated sites (where appropriate);
- Developing a plan to eliminate the use of lead cable in new underground installations.

4. Appropriate Cost Allocation

Departments which generate waste are responsible for associated environmental management costs including:

- environmental and emergency response training costs
- contingency plan costs
- recycling program costs
- solid and hazardous waste disposal costs
- site assessment costs, and spill response activities

A National Grid environmental activity and project code-based cost accounting system is in place to simplify ongoing environmental cost tracking.

5. Technology Transfer is Encouraged

National Grid is actively involved with the Electric Power Research Institute (EPRI), State recycling organizations, and State regulatory waste site cleanup committees.

Monthly staff meetings of National Grid environmental personnel provide an opportunity to share information, and obtain feedback regarding current waste reduction and recycling efforts.

6. Program Implementation and Evaluation

National Grid's Environmental Department will lead efforts to eliminate, reduce, reuse, or recycle wastes. Projects and new programs are rolled out to other National Grid facilities as appropriate, and best management practices are shared within the environmental group.

We evaluate progress each December, and set environmental and safety goals which support National Grid's business strategy. Key accomplishments are periodically shared with National Grid employees via National Grid paper articles and memos.

SUMMARY

National Grid's waste minimization program is successful by applying the following three waste minimization principles:

- **Reduce**
  - Changing maintenance practices to reduce the use of hazardous materials;

- Changing operating practices to eliminate/reduce hazardous waste generation;
- Working with vendors to reduce packaging and use recycled packaging when possible;
- Developing partnerships with vendors to reduce National Grid inventory, and thus reduce waste.

- **Reuse**
  - Striving to maximize reuse of National Grid's supplies issued and not used for the original job;
  - Repairing and reusing transformers, relays, and other equipment (when possible);
  - Selling unused/surplus electrical equipment to other utilities for reuse.

- **Recycle**
  - Recycling oily soil via asphalt batching processes;
  - Recycling used treated wood by-products (poles, pallets, boxes) as fuel for utility boilers;
  - Recycling tree-trimming wastes by chipping for use as wood boiler fuel or as mulch;
  - Recycling used oil filters, used oily rags/wipers, and used automotive oil;
  - Recycling corrugated cardboard.

7.0 SOLID WASTE MANAGEMENT

This chapter discusses the proper management of solid wastes that may be generated from National Grid activities and provides a summary of the federal and state regulations governing the management of solid wastes.

7.1 Federal Regulations Pertaining to Solid Wastes

The Resource Conservation and Recovery Act (RCRA) of 1976, as amended in 1980 and 1984, provides federal guidelines and standards for the environmentally sound reuse, handling and disposal of solid waste. The act requires that states incorporate these guidelines into their solid waste management programs.

The primary goals of RCRA are to:

- Protect human health and the environment from potential hazards of waste disposal;
- Conserve energy and national resources;
- Reduce the amount of waste generated;
- Ensure that wastes are managed in an environmentally sound manner.

Solid waste management on the federal level is the responsibility of the United States Environmental Protection Agency (EPA). The Code of Federal Regulations, Title 40, is entitled Protection of the Environment, which includes Subchapter I Solid Wastes (CFR Parts 240 through 280). Direct implementation of solid waste programs is strictly delegated to state and local governments.

7.2 State Regulations Pertaining to Solid Wastes

7.2.1 Massachusetts

Regulation
Two sets of regulations govern solid waste in Massachusetts: 310 CMR 19.00 and 310 CMR 16.00.

- The "Solid Waste Management Regulations" (310 CMR 19.000) pertain to protecting public health, safety and the environment by regulating the storage, transfer, processing or disposal of solid waste in Massachusetts.

- The "Site Assignment Regulations for Solid Waste Facilities" (310 CMR 16.00) are designed to provide information related to the process of determining if a parcel of land is suitable for being a solid waste management facility.

Massachusetts solid waste management regulations, 310 CMR 19.000, are summarized in Table 7.1.

Definition
Massachusetts defines solid waste as: Useless, unwanted or discarded solid, liquid or contained gaseous material resulting from industrial, commercial, mining, agricultural, municipal or household activities that is abandoned by being disposed or incinerated, or is stored, treated or transferred pending such disposal, incineration or other treatment. As defined in 310 CMR 19.00, solid waste *does not include*:

- Ash produced from the combustion of coal when reused as prescribed pursuant to M.G.L.c.111, Subchapter 150A; or

- Those materials and by-products generated from and reused within an original manufacturing process and other items listed in 310 CMR 19.006.

7.2.2 New Hampshire

Regulation
The New Hampshire solid waste regulations are contained in the *Solid Waste Rules* (Chapter Env-Wm 100 to 2800). Table 7.2 provides a brief outline of the New Hampshire waste management regulations.

Definition
New Hampshire defines solid waste as: Any matter consisting of putrescible material, refuse, residue from an air pollution control facility and other discarded or abandoned material. It includes solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining and agricultural operations and from community activities. As defined by RSA 149-M:1, XIX and Env-Wm 101.01, solid waste ***does not include***:

- Hazardous wastes as defined in RSA 147-A:2;
- Solid or dissolved materials in irrigation return flows;
- Cut or uprooted tree stumps incident to clearing of land depicted on a site plan showing burial locations and mailed to the Director, provided that such burial locations are not located within 75 feet of any well as defined in RSA 485:37;
- Municipal and industrial discharges which are point sources subject to permits under Section 402 of the Federal Water Pollution Control Act;
- Special nuclear or by-product material as defined by the Atomic Energy Act of 1954;
- Septage or sludge as defined in RSA 285-A.IX-a and XI-a; or
- Deceased persons.

7.2.3 Rhode Island

Regulation

The Rhode Island Recycling Act and The Solid Waste Act (Chapters 23-18, 23-19, 37-15 and 42-1) established a coordinated solid waste system with three state-built resource recovery facilities along with a flow control over municipal solid waste, and a policy of reducing, reusing, recycling or recovering energy from solid waste, in preference to disposal of waste in landfills. Rhode Island Department of Environmental Management (RIDEM) coordinates the statewide recycling efforts, prepared regulations controlling solid waste management in Rhode Island and has set goals for recycling.

Rhode Island's Rules and Regulations for Reduction and Recycling of Commercial and Non-Municipal Residential Solid Waste requires businesses with 50 or more employees to segregate and recycle solid wastes. Annual recycling reports are due March 1 of each year to RI DEM. Table 7.3 provides a summary of Rhode Island's solid waste regulations.

Definition
Rhode Island defines solid waste as: Garbage, refuse and other discarded solid materials generated by residential, institutional, commercial, industrial and agricultural sources. Non-hazardous solid waste ***does not include***:

- Solids or dissolved material in domestic sewage or hazardous waste; or
- Hazardous waste as defined in the Rhode Island Hazardous Waste Management Act, Chapter 23-19.1.

7.2.4 Vermont

Regulation
The Vermont Solid Waste Management Rules (6-100 to 6-1100) provide the procedures and standards for properly managing solid wastes in Vermont. The Rules are regulated by the Vermont Agency of Natural Resources (VANR), Solid Waste Management Division. Table 11.4 summarizes the sections pertinent to National Grid's solid waste activities.

Definition
Vermont defines solid waste as: Any discarded garbage, refuse, septage, or sludge from a waste treatment plant, water supply plant or pollution control facility; and other discarded material, including solid, liquid, semi-solid or contained gaseous materials resulting from industrial, commercial, mining or agricultural operations and from community activities. As defined in Vermont's Solid Waste Management Rules, solid waste ***does not include***:

- Animal manure and absorbent bedding used for soil enrichment; or
- Solid dissolved materials in industrial discharges which are point sources subject to permits under the Water Pollution Control Act, Chapter 47.

7.2.5 New York

Regulation

The New York State Solid Waste Management Regulations, 6 NYCRR Part 360, is the authority by which the state sets standards and criteria for all solid waste management facilities. The purpose is to regulate solid waste management facilities, other than hazardous waste management facilities and facilities managing radioactive materials. All solid waste must be transferred, processed, recovered, stored, reclaimed or disposed of in a manner consistent with the regulation.

Definition

New York defines solid waste as: any garbage, refuse, sludge from a wastewater treatment plant, water supply treatment plant, or a pollution control facility and other discarded materials including solid, liquid, semi-solid, or contained gaseous material, resulting from industrial, commercial, mining and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges that are point sources subject to permitting, or source special nuclear or by-product material.

7.3 Solid Waste Management Practices

The following section provides guidance on the proper management of solid wastes that may be generated from National Grid activities. It also provides information regarding the storage and disposal for asbestos waste. Topics include the management of:

- Demolition/Construction Debris, including Asphalt, Brick and Concrete (ABC) Rubble;
- Woodchips;
- Non-Hazardous Paint Waste;

Personal Computers (PCs) and monitors (CRTs) no longer in-service are sold to secondary vendors through the company's Investment Recovery Group. Personal computers (PCs) and monitors (CRTs) do not present either a physical or health hazard during normal use. In the unlikely rare circumstance of a broken CRT, hazardous waste could be generated due to lead and/or mercury. Please refer to Chapter 3 of this EP for further guidance.

7.3.1 Demolition/Construction Debris, including Asphalt, Brick and Concrete (ABC) Rubble

Waste-building materials and rubble resulting from the construction, remodeling, repair or demolition of structures or roads (i.e., “construction and demolition debris” or “C&D waste”) are regulated as a solid waste under the provisions of various state Solid Waste Rules. The term “C&D waste” includes, but is not limited to, asphalt, brick, concrete (ABC) rubble and other masonry materials, wood, wall coverings, plaster, dry wall,

plumbing, fixtures, insulation, roofing shingles, asphalt pavement, glass, plastics and electrical wiring/related components. Construction/demolition debris should be disposed at a state-approved solid waste/demolition landfill. In Massachusetts, asphalt, brick, concrete, metal and wood are banned for disposal or incineration or transfer for disposal at solid waste facilities. In New York, because of the significant volume of C&D debris generated it is acceptable to place fill on Company and third-party properties. Please refer to EG-119NY – C&D Debris Fill Policy for Guidance. Refer to the National Grid Infonet Site for the Approved Hazardous Waste Vendors. Also, please follow the identified internet links identifying state approved landfills by appropriate state:

MA: Web site: http://www.mass.gov/dep/recycle/

NH: Contact the New Hampshire Department of Environmental Services, Waste Management Division.
Phone: (603) 271-2900
Web site: http://des.nh.gov/index.htm

RI: Contact the Department of Environmental Management, Waste Management Division.
Phone: (401) 222-2797
Web site: http://www.dem.ri.gov/index.htm

VT: Contact the Department of Environmental Conservation, Waste Management Division.
Phone: (802) 241-3888
Web site: http://www.anr.state.vt.us/dec/dec.htm

NY: Contact the New York State Department of Environmental Conservation.
Phone: (518) 357-2234
Web site: http://www.dec.ny.gov

Exceptions are noted below:

- Materials which may be recycled, such as steel rebar, should be collected and sent to an approved recycling vendor (refer to Chapter 10);
- Materials which contain hazardous components, such as roofing materials or floor tiles that contain asbestos, must be properly removed and disposed before demolition;
- Some types of solid waste may be reused in accordance with solid waste regulatory requirements (refer to the sections below).

Beneficial Use Determination - Massachusetts

Some types of solid waste, including waste generated from the demolition of a building, may be reused if approved by the DEP. To obtain approval for "beneficial use" of a solid waste, an application must be submitted to the DEP in accordance with 310 CMR 19.060.

Refer to EG-119MA, Massachusetts Building Demolition Regulatory Requirements for more information regarding Beneficial Use Determination Application Requirements, notification requirements for crushing ABC rubble, and notification requirements for building construction/demolition.

7.3.2 Woodchip Storage

Woodchips are generally generated from tree trimming activities that are necessary for the maintenance of the overhead line rights-of-way. The vegetation is chipped at the site of trimming and then brought to designated areas in the company. The areas are managed by the company arborists. Since wood processing activities do not occur at the storage site, it has been determined that the storage is not subject to solid waste regulations. However, if practices change, compliance with applicable regulations should be evaluated.

Because the woodchips are a combustible material, notification to the local Fire Department might be required before storage. The Vegetation Management Department will submit notification forms with location maps to the appropriate fire departments as required. Copies of the documents are maintained by the company arborists.

Management of the Woodchip Piles

The storage of woodchips requires certain fire protection measures in order to minimize risk of a fire. Woodchip piles have the potential to heat internally and spontaneously combust if not managed correctly. Experience and tests indicate that two different types of fires may occur in storage piles: surface fires and internal fires. Fire prevention activities and fire protection facilities should, therefore, be prepared to cope with both situations. Fire protection measures include:

a. Avoid all refuse and old chips in the chip pile base.
b. The storage site should be reasonably level, solid ground or should be paved with blacktop, concrete or other hard-surface material that has been thoroughly cleaned before starting a new pile.
c. Operating plans (where required) for the buildup and reclaiming of the pile should be based upon a maximum turnover time of one year under ideal conditions. Piles containing other than screened chips made from cleaned and barked logs (for example, whole-tree chip piles containing bark or leaves) may be subject to greater degrees of spontaneous heating and thermal degradation and should be reclaimed more frequently.
d. Pile size should be limited. Pile heights should be kept low, particularly for piles that are subject to greater compaction.
e. Wetting the pile regularly will help keep chips from drying out and help maintain the moisture content of the surface layer of the pile.
f. Vehicles used on all piles should be of a type that minimizes compaction.
g. Smoking must be prohibited in chip pile areas.
h. Ground surface around piles should be kept free of combustible materials.

i. In Rhode Island, storage of greater than 3 cubic yards may require a permit.

7.3.3 Paint Wastes

Paint wastes are typically generated during paint removal operations, during lead abatement activities and during routine maintenance activities. These wastes may include the following:

- Paint chips and sandblast grit;
- Brushes, rollers, rags;
- Waste paint, paint cans;
- Personal protective equipment (PPE).

In some instances, paint waste may be hazardous due to the constituents in the paint, such as lead, chromium, or other metals, or because the paint has been mixed with solvents. A hazardous waste determination must be made through generator knowledge or through testing. Refer to Chapter 3, Hazardous Waste, for more information on handling hazardous waste.

Solid, non-hazardous paint waste, such as latex paint debris, may be disposed at a solid waste landfill. To minimize the generation of paint wastes, the following practices should be followed:

- Reduce waste volumes by segregating hazardous paint wastes from non-hazardous paint wastes.
- Segregate paint chips from other painting debris and other paint removal waste streams. The chips will tend to be more hazardous than the PPE or other wastes.
- Reuse blasting sand or sponges more than once, if possible.
- Liquid paint wastes must not be sent to a solid waste landfill. Although this practice is permitted in some states with specific approval of regulatory agencies, it is not the best management practice. Non-hazardous liquid paints may be incinerated by trash-to-energy incinerators. Solidified/dried paint wastes may be land filled.
- Empty cans by pouring excess liquid paint into a disposal container. ("RCRA empty;" i.e., cans that have had all paint scraped, poured or pumped from original container, and there is less than one (1) inch remaining in the bottom) may be disposed in the trash as non-hazardous waste.
- Solidified paint in cans that are classified as RCRA "empty" may be disposed of in the trash as non-hazardous waste. Ensure all painting wastes (rags, rollers, and brushes) are dry prior to disposal.

- Use all paint in the container and reduce volume of wastes by consolidating paints into as few containers as possible.
- Reduce variety of types/colors of paints in order to minimize the amount of waste paints discarded.
- Minimize solvent use. Buy only small containers of solvents and substitute cleaning solvents that contain non-RCRA constituents.

Table 7.1: Summary of Massachusetts Solid Waste Management Regulations, 310 CMR 19.000	
Regulatory Citation	**Summary**
310 CMR 19.001	**Authority:** M.G.L. c.21A, Subparts 2 and 8; and Chapter 111, Subpart 150A.
310 CMR 19.002	**Purpose:** To protect public health, safety and the environment by regulating the storage, transfer, processing, treatment, disposal, use and reuse of solid waste in Massachusetts.
310 CMR 19.003	**Applicability:** To all solid waste management activities and facilities, including landfills, dumping grounds, transfer stations, solid waste processing facilities, recycling and other waste management areas.
310 CMR 19.006 - Definitions	Solid Waste does NOT include: •Ash produced from combustion of coal when reused as described in M.G.L. c.111, 150A; •Compostable or recyclable materials when composted or recycled in an operation not required to be assigned (in 310 CMR 16.00).
310 CMR 19.017	Restricted materials: •*Lead batteries* (banned from landfills and incinerators). •*Leaves* (banned from landfills and incinerators). •*Tires* (tires must be shredded before disposal in landfills). •*White Goods* (banned from landfills and incinerators). •*Aluminum containers* (banned from landfills and incinerators). •*Metal or glass containers* (banned from landfills and incinerators). •*Single polymer plastics* (banned from landfills and incinerators). •*Recyclable paper* (banned from landfills and incinerators). •*Asphalt Pavement, Brick and Concrete* (banned from landfills and incinerators). •*Metal* (banned from landfills and incinerators). •*Wood* (banned from landfills and incinerators).
310 CMR 19.100 - 19.151	Landfill design and operation requirements.
310 CMR 19.200 - 19.221	Regulations on Transfer Stations.

Table 7.2: Summary of New Hampshire Solid Waste Management Regulations, Solid Waste Rules (Chapter Env-Wm 100-2800)

Regulatory Citation	Summary
Chapter Env-Wm 101	**Applicability**: Statutory Authority: RSA 149-M:8 These regulations apply to the disposal and management of solid waste in New Hampshire, including: • Collection, storage and transfer facilities• Composting facilities and landfills • Recycling centers • Incinerators
Env-Wm 101.02	**Purpose of these rules**: • Prescribe requirements, limitations and procedures for storing, transferring, processing, treating and disposing of solid waste in New Hampshire. • Promote solid waste management practices that minimize risks to public health and the environment. • Encourage regional cooperation and management practices consistent with New Hampshire Solid Waste Management Plan. • Encourage conservation and recovery of natural resources.
Env-Wm 200	Procedural rules.
Env-Wm 202	Waivers. This section describes the procedures and criteria to accommodate situations where strict adherence to the Rules would not be in the best interest of the public.
Env-Wm 300	Permitting.
Env-Wm 301.03	Permit-by-Rule (exemptions from needing permits) Types of facilities deemed to have a valid Permit-By-Rule (as long as the facility complies with Env-Wm 308, the Universal Environmental Performance Standards): • *Stump burial* locations incident to land clearing (as long as locations are shown on a map and are >75 feet away from any well, and the map is submitted to DES). • *Composting* facilities, for yard waste generated at the same location. • *Chipping brush* in the same area that it was generated. • Screening of *sand blast materials.* • *Storage containers* for recyclable materials. • Other facilities listed in 301.03.
Env-Wm 2100	Collection, storage and transfer facility standards.
Env-Wm 2200	Processing or treatment facilities.
Env-Wm 2300	Composting facility standards.
Env-Wm 2400	Incineration facility standards.
Env-Wm 2500	Landfill requirements.
Env-Wm 2600	Management of certain wastes. • Asbestos (Env-Wm 2601) • Ash (Env-Wm 2602) • Batteries (Env-Wm 2603) • Infectious waste (Env-Wm 2604) • Motor oil (Env-Wm 2605) • Stumps (Env-Wm 2606) • Tires (Env-Wm 2607)
Env-Wm 2700	Solid Waste Management Districts.
Env-Wm 2800	Inspection and enforcement.

Table 7.3: Summary of Rhode Island Solid Waste Management Regulations

Regulatory Citation	Summary
Rules and Regulations for Reduction and Recycling of Commercial and Non-Municipal Residential Solid Waste	**Rule 1: Purpose** • To define what are the recyclable parts of commercial and non-municipal residential solid waste.
	Rule 5: Recyclable Materials • Aluminum • Cars • Cardboard • Glass containers • Laser toner cartridges • Leaves and yard waste • Newspaper • Plastic soft drink containers • Steel and tin coated steel cans • Telephone directories • Used lubricating oil • White goods • Wood waste These items must be segregated and kept in a condition to meet recycling standards.
	Rule 6: All commercial solid waste must be segregated, a record must be kept of the total waste generated and amounts and types of recyclable materials segregated.
Rules and Regulations for Reduction and Recycling of Commercial and Non-Municipal Residential Solid Waste	**Rule 7:** All companies with 50 or more employees, who generate solid waste, must submit a Source Reduction and Recycling Plan to RI DEM. Annual reports are due to RI DEM by March 1 of each year.
Rules and Regulations for Solid Waste Management Facilities, April 1992, Regulation DEM-DAHM-SW03-92	These regulations cover the proper management of solid wastes by landfills, incinerators, transfer stations, etc. In general, Rhode Island facilities must have their wastes segregated and recycled as appropriate. Recyclable waste haulers employed by National Grid in Rhode Island provide a summary of recyclable materials transported off-site for recycling.

Table 7.4: Summary of Vermont Solid Waste Management Rules

Regulatory Citation	Summary
Solid Waste Management Rules, 6-101	**Purpose:** To establish procedures and standards to protect the public health and environment by ensuring safe, proper and sustainable management of solid waste in Vermont.
Solid Waste Management Rules, 6-301	Applicability. These rules apply to: • Storage of solid wastes; • Transfer stations; • Transportation; • Incineration; • Landfills; • Recycling operations; • Composting; or • Other solid waste disposal.
Solid Waste Management Rules, 6-301	Exemptions. The following are exempt from Solid Waste Management Rules: • Earth materials from extractions operations • Small volumes (<1 cubic yard) of: - Wastes that are composted - Wastes that pass prequalifying tests in 6-702(a)(10) - Wastes that do not contain chemical contaminants above applicable standards listed in 6-702(a)(10) • Recyclable materials • Insignificant Waste Disposal Event (IWDE) that will not result in a threat to public health and safety, the environment or create a nuisance; written approval needed for IWDE
6-302	Prohibitions.
6-801	Special wastes: • Asbestos waste • Infectious waste
6-1100	Composting and composting certifications.

Table 7.5: Summary of New York Solid Waste Management Regulations, 6 NYCRR Part 360	
Regulatory Citation	**Summary**
6 NYCRR Part 360	**Authority:** Statutory authority: Environmental Conservation Law, Sections 1-0101, 3-0301, 8-0113, 19-0301, 19-0306, 23-2305, 23-2307, 27-0101, 27-0106, 27-0107, 27-0109, 27-0305, 27-0703, 27-0704, 27-0705, 27-0911, 27-1317, 27-1515, 52-0107, 52-0505, and 70-0107
6 NYCRR Part 360-1.1(a)	**Purpose:** The purpose of this Part is to regulate solid waste management facilities.
6 NYCRR Part 360-1.1(b)	**Applicability:** All solid waste other than low-level radioactive waste and NARM waste as defined in Part 382 of this Title which is required to be disposed of at a land disposal facility subject to regulation under Parts 382 and 383 of this Title and other than hazardous waste as defined in Part 371 which is required to be managed at a facility subject to regulation under Part 373 or 374 of this Title must be transferred, processed, recovered, stored, reclaimed or disposed of in a manner consistent with this Part. However, the management of nonhazardous solid waste in a portion of a facility that also handles hazardous waste is subject to the requirements of Part 373 of this Title unless exempted under that Part. Any facility authorized under Part 373, 374, 382 or 383 of this Title is not regulated under this Part. Regulations governing collection and transportation of industrial-commercial waste, waste tires, regulated medical waste, septage, sludges, and used oil are set forth in Part 364 of this Title; however, disposal activities involving those wastes are regulated under this Part and Parts 373 and 374 of this Title.
6 NYCRR Part 360-1.2 - Definitions	Solid waste means, except as described in paragraph (4) of this subdivision, any garbage, refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded materials including solid, liquid, semi-solid, or contained gaseous material, resulting from industrial, commercial, mining and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges that are point sources subject to permit under 33 USC 1342, as amended (86 Stat. 880), or source, special nuclear or by-product material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923) except as may be provided by existing agreements between the State of New York and the government of the United States (see section 360-1.3 of this Part).
6 NYCRR Part 360-1.5	Prohibited disposal.
6 NYCRR Part 360-1.7	Permit requirements, exemptions and variances.

8.0 MEDICAL AND INFECTIOUS WASTE

Special regulatory requirements apply to the management of medical and infectious wastes because of the potential of the waste to contain contagious agents, such as viruses. The risk of an individual being infected by medical waste can be reduced to a very low level if safe work practices are followed, exposures are promptly reported, and medical care and counseling is obtained if exposure does occur. This chapter provides information regarding management of medical and infectious waste for disposal. Contact a safety representative for information regarding safe work practices and notification procedures should an exposure occur.

8.1 Definitions

Medical and infectious wastes are defined as wastes which may cause or significantly contribute to an increase in mortality or a serious irreversible or incapacitating reversible illness, and pose a hazard to human health or the environment when improperly treated, stored, transported or disposed.

Medical and infectious wastes include:

1. **Human Blood, Body Fluids, and Blood Products**
   - Liquid waste human blood or body fluids;
   - Products of blood;
   - Items saturated and/or dripping with blood;
   - Waste materials that were at one time saturated/dripping with blood but are now caked with dried blood (i.e., gauze, bandages, etc.).

2. **Sharps**
   Discarded medical articles that may cause puncture or cuts, including needles, syringes, scalpels, etc.

3. **Other Medical and Infectious Wastes**
   Wastes from human patient care that were in contact with infectious agents or bodily fluids, including soiled dressings, sponges, surgical gloves, etc.

8.2 Massachusetts

Regulatory Overview

The Massachusetts Department of Public Health (DPH) regulations 105 CMR 480.00 establish requirements for the handling and disposal of medical and biological waste in Massachusetts.

Packaging and Storage

1. Waste generators must contain and store medical waste at all times in leakproof, rodent-proof, flytight containers which ensure that no discharge or release of such waste occurs and that no odor or other nuisance is created.

2. All on-site storage containers shall be held in an area away from general traffic, preferably in a room identified for this purpose. The manner of storage must restrict access or contact with the waste to authorized persons only.

3. Sharps must be segregated from other medical wastes in a leakproof, rigid, puncture-resistant, shatterproof container.

4. All other medical wastes must be placed in a non-permeable, three millimeter or thicker, polyethylene bag which is securely sealed to eliminate leaks.

5. Waste must not be compacted or ground up.

Labeling

1. Every container or bag of waste must be distinctively marked with the international biohazard symbol and colored red to indicate that it contains waste and, in the case of sharps, be distinctively labeled to indicate that it contains sharp waste capable of inflicting punctures or cuts.

2. Every container or bag of waste to be transported off the premises for disposal must be rigid, leak resistant, impervious to moisture, sealed to prevent leakage, and of sufficient strength to prevent tearing or bursting under normal conditions of use and handling.

3. Every container or bag of waste to be transported off the premises for disposal must have a label which states the name, address and telephone number of the generator. The label must be affixed securely.

Transportation/Disposal

1. Generators must prepare manifests prior to shipping waste. The manifest must include the following information:

   a. Description of waste to be shipped;
   b. Total quantity of waste;
   c. Type of container in which waste is transported.

2. The generator must designate on the manifest the address of the site to which the waste is to be delivered and sign it. The transporter must sign the manifest to indicate that the transporter has received the waste and will comply with the generator's transportation instructions. When the waste arrives at the approved off-site disposal facility, and has been disposed of, the disposal facility owner must sign the manifest and return the original to the generator.

3. If the generator does not receive the manifest from the disposal facility within 30 days after shipment of the waste by the generator, the generator must report this fact to the DPH.

4. The generator must maintain a copy of the manifest, both as initially sent out and as returned by the disposal facility, for a period of 3 years.

8.3 Rhode Island

Regulatory Overview

The Rules and Regulations Governing the Management and Disposal of Regulated Medical Waste in Rhode Island are promulgated pursuant to the authority conferred under Chapter 23-19.12 of the General Laws of Rhode Island, as amended, and are established for the purpose of adopting standards for the handling, transportation, treatment, and disposal of medical wastes.

Packaging and Storage

1. Medical wastes must be segregated from the general waste stream into two groups: "Sharps" and "Other regulated medical wastes."

2. All medical wastes must be stored in containers that are rigid, leak-resistant, impervious to moisture, of a strength sufficient to prevent tearing or bursting under normal conditions, and sealed to prevent leakage.

3. In addition, sharps must also be stored in containers that are puncture-resistant. The sharps must be placed directly into the container without recapping, clipping bending or breaking.

4. Sharps containers must be sealable in a manner that prevents spillage of contents during transport.

5. For "other regulated medical wastes," including materials saturated with blood, waste must be packaged in either rigid containers that are designed to be tightly sealable or in plastic bags that are:

   a. Impervious to moisture and tear-resistant;

   b. Colored a distinctive red or orange; or clear/transparent (if the bag is transparent, then the universal biohazard symbol shall be appropriately displayed on the bag);

   c. If the bag is less than 3 millimeters thick, then double-bagging is required.

6. Wastes must be stored in a predesignated location, and protected from rain, snow wind, etc.

7. On-site storage areas must be restricted to authorized personnel only. Outdoor storage areas (dumpsters, trailers, etc.) must be locked.

8. Waste must be stored in a manner that makes it rodent-proof and insect-proof.

9. The storage area must be clearly identified as containing regulated medical waste through the posting of a universal biohazard sign or a sign containing the following wording: "Medical Waste or Regulated Medical Waste."

10. Waste must be maintained in a non-putrescent state. Total storage of regulated medical waste must not exceed 50 pounds or the average quantity of regulated medical waste generated over 5 consecutive calendar days, whichever condition allows for storage for the longer period of time.

11. Medical waste must not be compacted or ground up.

Labeling

1. All packages or containers of medical waste must be provided with a water-resistant label affixed or printed on the outside of the container. The label must include the words "Medical Waste", or display the universal biohazard symbol.

2. The outermost surface of each package or container must be marked before shipment with indelible lettering on a water-resistant ID tag of sufficient dimension and contain the following:

   a. Generator's name and address;
   b. Transporter's name and Permit Number;
   c. Date of shipment;
   d. Identification of contents as medical waste.

3. If the generator has used inner containers, including sharps containers, each inner container must also be provided with the aforementioned information (excluding transporter info).

Transportation/Disposal

1. Generators must use a transporter who has been issued a Rhode Island Regulated Medical Waste Transporter Permit number by the Rhode Island DEM.

2. Generators do not need to use a permitted transporter when transporting waste from the original generation point to a central collection point, or between satellite facilities, provided they meet all of the following conditions:

   a. Waste is transported by the generator in a company-owned vehicle;

   b. The central collection point is owned by the generator;

   c. A variance is applied for with the RIDEM, as per Section 18.00;

   d. The generation point and collection point are located in RI;

e. A shipment log is compiled and maintained at each generation point (if possible) and central collection point.

3. Generators must prepare tracking forms, available through RIDEM, unless an exemption is applied for as noted in Section 13.02(b). With tracking forms, the generator shall:

   a. Provide one copy to each transporter, one copy to each intermediate handler, two copies to the destination facility, and one copy for file;

   b. Sign the certification statement on the tracking form;

   c. Obtain the handwritten signature of the initial transporter and include the date of acceptance on the form; and,

   d. Retain one copy.

4. Generators must retain both copy #4 and the completed generator copy #1 of each signed tracking form for at least 3 years from the date the waste was accepted for disposal.

5. If a Small Quantity Generator exemption from the tracking forms is applied for and granted, generators must comply with the recordkeeping requirements in 13.05(b), 13.05(c), and 13.07.

6. If signed copies of the tracking forms are not returned to the generator within 35 days, the generator must contact the transporter and destination facility to determine the status of the waste.

7. The generator must submit an Exception Report to the Director if a completed copy of the tracking form is not received within 45 days of shipment of the waste. See 13.06(b) for details.

8.4 New Hampshire

Regulatory Overview

Infectious waste is a subcategory of the broader medical waste stream. In New Hampshire, it is defined as any waste which, because of its infectious nature, may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness, or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed or otherwise managed. It is regulated as a solid waste under New Hampshire RSA Chapter 149-M and the New Hampshire "Solid Waste Rules" (reference Part Env-WM 2604), with special treatment and disposal standards.

Packaging and Storage

1. The waste must be stored in a pre-designated location, protected from water, rain and wind.

2. Waste must be maintained in a non-putrescent state, using refrigeration when necessary.

3. Waste must not be stored at room temperatures in excess of 72 hours.

4. Outdoor storage areas containing the waste, such as dumpsters, sheds, trailers, etc, must be locked to prevent unauthorized access.

5. Access to on-site storage areas must be limited to authorized persons.

6. Waste must be stored in rodent-proof, insect-proof containers.

7. Storage containers and packaging must be of sufficient structural integrity to ensure that the waste is not released to the environment during storage.

8. Storage containers and packaging must be labeled conspicuously in a legible manner with the words “infectious waste” or “biohazard waste” or with the universal biohazard symbol.

9. The contents of damaged or ruptured containers must be repackaged.

10. Waste must not be compacted or ground up.

11. Facilities which receive infectious waste from off-site generators must not store the waste in excess of 7 days from the date of receipt.

12. Sharps transported for disposal must be segregated and encased inside rigid, puncture-resistant containers.

13. Medical waste and sharps containers must be placed in a sealed nonpermeable 3 millimeter polyethylene bag or equivalent, which is then placed in a second 3 mil bag and sealed.

Labeling

1. Bags must be labeled with the following:

    a. Clear markings indicating the contents including the words “Infectious Waste,” or “Biohazard Waste,” or the universal biohazard symbol;

    b. The name, address and telephone number of the generator and transporter.

Transportation/Disposal

1. Infectious waste must not be landfilled in New Hampshire unless treated to achieve the standard specified in Env-WM 2604.03(a).

2. The generator must assure that the waste is treated at an authorized facility to achieve high-level disinfection plus the required reduction of Bacillus subtilis or Bacillus stearothermophilus.

8.5 New York

Regulatory Overview

The New York State Department of Environmental Conservation (NYSDEC) regulates medical waste as a solid waste. The standards for the tracking and management of medical waste are provided in 6 NYCRR Part 364.9.

Packaging and Storage

1. Medical waste must be segregated by type: sharps, fluids, and other regulated medical waste.

2. If other types of solid waste are mixed with medical waste, the entire mixture must be treated as a medical waste and handled in accordance with the regulations.

3. Medical waste, other than sharps, must be contained in red bags which are impervious to moisture and will not rip, tear or burst under normal conditions of usage and handling. The bags shall be secure so as to prevent leakage during storage, handling or transport.

4. Sharps must be contained in leak-proof, rigid, puncture-resistant containers which are secured to prevent the loss of the contents. The containers must be red and conspicuously labeled with the word(s) "infectious" or "regulated medical waste."

5. Before medical waste is transported from a facility for disposal, the waste should be placed in disposable or reusable containers such as pails, cartons, drums or portable bins. The containers must be leak-proof, have tight fitting covers, and be kept clean and in good repair. If a container has visible signs of contamination, it should be decontaminated. If decontamination is not possible, the container must be labeled, marked and disposed of as a medical waste as well. In addition, all non-rigid packaging and inner liners must be treated as medical waste.

6. Medical waste must be stored in a location that is protected from the environment and limits exposure to the public. Access to the storage area should be limited to authorized employees only. Medical waste should be stored in a manner that would not cause decomposition, using refrigeration when necessary. Outdoor storage areas must be locked to prevent unauthorized access.

Labeling

1. When preparing medical waste to be shipped for disposal, the outermost container must be marked with a water-resistant identification tag containing the following information: generator's name and address; transporter's name; transporter's State permit or identification number, or if not applicable, then transporter's address; date of shipment; and, identification of the contents as medical waste.

2. Inner containers (red bags, sharps containers, fluid containers, etc.) must be marked with indelible ink or imprinted with water-resistant tags containing the following information:

generator's name and address. In addition, sharps containers must be labeled as "infectious" or "regulated medical waste."

Transportation/Disposal

1. The requirement to use a permitted transporter is waived in the event that medical waste is transported for consolidation to central company locations. For example, if a company nurse generates regulated medical waste at a service center, the medical waste can be transported to a central collection facility (i.e., Syracuse, Buffalo, or Albany offices) by the Company nurse. Two pages of the New York State Medical Waste Tracking Form (available from the NYSDEC) must be prepared and carried with each load. The Medical Waste Tracking Form must be kept for a minimum of three (3) years as a record of the shipment.

2. The generator is responsible for determining the quantity of medical waste generated in a calendar month and the quantity of medical waste transported or offered for transport for disposal in a calendar month.

3. When medical waste is transported for disposal, the following requirements apply;

   - A transporter authorized by the New York State Department of Environmental Conservation to transport medical waste must be used. Company personnel should ensure that the transporter has a current and valid permit to haul medical waste prior to transporting the waste.

   - The generator must prepare a Medical Waste Tracking Form and sign the certification statement on the form by hand. The form must be completed by the initial transporter with a handwritten signature and date of acceptance. One copy of the form is retained by the generator, one copy is provided to the transporter, one copy to each intermediate transporter, if applicable, and two copies are provided to the disposal facility.

4. The disposal facility is responsible for signing and dating the Medical Waste Tracking form to certify that the medical waste listed on the form was received. A signed copy of the form must be returned to the generator within 15 days of the delivery. If there is a discrepancy (such as number of containers, packaging that is broken, etc.), the disposal facility must attempt to resolve the discrepancy with the generator. If the discrepancy is not resolved, the disposal facility must submit a letter to the New York State Department of Environmental Conservation within 15 days of the delivery describing the discrepancy and attempts to reconcile it.

5. If the generator does not receive a Medical Waste Tracking Form that is signed by the owner or operator of the disposal facility within 35 days of the date the shipment was accepted by the initial transporter, the generator is responsible for determining the status of the waste. The generator should contact the disposal facility, initial transporter, and intermediate transporters, as appropriate, to determine the location of the waste.

6. If the generator does not receive a Medical Waste Tracking Form that is signed by the owner or operator of the disposal facility within 45 days of the date the shipment was accepted by the initial transporter, the generator must submit an exception report to the New York State Department of Environmental Conservation. The exception report must be postmarked on or before the 46th day and must include the following information:

   - Copy of the original tracking form for which the generator does not have confirmation of delivery.

   - Cover letter signed by the generator explaining the efforts taken to locate the medical waste and the results of those efforts.

7. The regulations specify that the generator maintain Medical Waste Tracking Forms for a minimum of three (3) years from the date the waste was accepted by the initial transporter. The generator must also maintain exception reports submitted to the New York State Department of Environmental Conservation, as described in the previous section, for a period of at least three (3) years from the due date of the exception report.

9.0 MANHOLE, VAULT AND SECONDARY CONTAINMENT SLUDGE/SEDIMENT WASTE MANAGEMENT

This section describes how the sludge and debris removed from underground structures (e.g., manholes, underground vaults, and secondary containment areas) shall be managed to maintain compliance with hazardous waste management requirements. For information on management of water accumulated in manholes, vaults and secondary containment structures, refer to EP No. 7.

In addition to the possible presence of lead as discussed below, other possible contaminants associated with electrical operations which may be present in the sludge/sediments include asbestos, PCBs, oil. Subsurface structures located in the vicinity of 3rd Party contaminated sites may also contain contaminates which migrated into the structure.

9.1 Asbestos

If the presence of asbestos is of concern due to historical information or visual observations, a sample of the sludge/sediment should be collected for laboratory analysis. If the concentration is greater than 1%, the waste must be managed as an asbestos waste and the removal of the sludge/sediment may need to be performed as an asbestos abatement. Refer to Chapter 11 of this procedure.

9.2 PCBs/Oil

Structures which contain or previously contained oil-filled equipment could potentially be impacted from spills of oil which may contain PCBs. A sample should be collected and analyzed for PCBs. If the source of the PCBs is not known, then sample results greater than 1 ppm PCB should be managed in accordance with state-specific hazardous waste and federal TSCA regulations. PCB wastes, B-series wastes in New York, are restricted from land disposal and require a land disposal restriction form along with the usual hazardous waste manifest. Additionally, the structure may need to be managed in accordance with "Continued Use of Porous Surfaces" requirements contained in 40 CFR 761.30(p). For samples with results < 1 ppm PCB or < 50 ppm PCB where the source PCB concentration is known to be < 50 ppm PCB, the sludge/sediment should be managed as oily debris. Refer to Environmental Procedure No. 5 for additional information on spill response requirements.

9.3 3rd Party Contaminated Site Impacts

Subsurface structures located in the vicinity of 3rd party contaminated sites have the potential to be impacted by contaminant migration from these sites. Contaminant migration could occur either through groundwater flow of surface erosion. If such a condition is believed to exist, it is recommended that a file review be conducted with the appropriate regulatory agency to determine site conditions.

9.4 Lead

Structures which contain (or contained) lead covered cable have the potential to have lead contamination in the sludge/sediment. This section does not apply to more recently constructed underground structures that contain only plastic- or rubber-covered cable, and never contained lead-covered cable. Structures containing primarily demolition type debris (e.g., bricks, concrete, and wood) the debris - **but NOT the sludge** - may be managed as non-hazardous solid waste.

Analysis of sludge samples taken from manholes in districts with older underground systems has shown that some of these samples may fail the *Toxicity Characteristic Leaching Procedure* (TCLP) metals test for lead (e.g., exceeding the 5.0 ppm regulatory limit). Note that in New York, historical analysis of sludge samples from manholes in urban underground systems has shown that the majority of these samples do not exceed the TCLP threshold.

When classifying the sludge for disposal, the following management options exist:

Option 1:
Assume all the sludge is lead contaminated and manage it as hazardous waste. Note that either a temporary EPA ID Number must be obtained or the EPA ID Number from a company service center used. Refer to Chapter 3 of this procedure for information regarding the use of EPA ID Numbers.

Option 2:
Collect a composite sample of the sludge and arrange for a TCLP lead analysis. (The cost of a TCLP lead analysis is about $100.)

Based on the quantity of material to be removed, a roll-off container, drum or vactor truck may be used. Generally it is more cost effective to use a roll-off container when more than 2.5 yards (~ 10 drums) of material requires management.

If the waste is either assumed to be a lead hazardous waste or the laboratory results exceed the TCLP threshold, be aware that lead wastes (D008), B-series wastes in New York, are restricted from land disposal, and require a land disposal restriction form along with the usual hazardous waste manifest. Any other debris in the underground structure that is contaminated with sludge (including pieces of wood, tyvek suits, tyvek boot covers, rubbish, etc.) should be placed in the drums along with the sludge.

10.0 INVESTIGATION AND REMEDIATION WASTE MANAGEMENT

This chapter provides guidance regarding the management of waste generated as the result of environmental investigation and remediation activities. Investigation-derived waste (IDW) refers to waste generated during investigation activities, such as during drilling of soil borings and installation of monitoring wells. Remediation waste refers to waste that is generated during remediation activities, such as excavation of contaminated soils for reuse on-site or disposal, and removal of contaminated ground water or non-aqueous phase liquid (NAPL). The two terms are also used interchangeably in some circumstances. For example, IDW can be characterized as remediation waste for disposal purposes.

10.1 General Requirements For On-site Management of All Wastes

The following general requirements should be implemented for purposes of storing wastes:

- Wastes must be stored within a secure area. Storage of wastes in non-secure areas may be considered as a last resort and evaluated on a case-by-case basis.
- Wastes should be stored in a manner that protects the environment from contamination. In certain instances, storage of wastes directly upon the ground may be appropriate for wastes stored within an Area of Contamination. This may involve the use of drums, roll-off containers or poly sheeting beneath and covering soil piles. The poly sheeting must have a minimum thickness of 6 millimeters (10 ml in Rhode Island). In all cases, the sheeting should be of sufficient strength and weighted on top to prevent tearing by the wind).
- To the extent practicable, wastes should not be stored near wetlands, surface water, water supply wells, playgrounds or other sensitive receptors.
- The amount of time that wastes are stored on-site prior to off-ship shipment should be minimized to the extent feasible. Most states have time limits on storage.
- The wastes must be labeled in accordance with applicable regulatory requirements.
- Whenever possible, movement or aeration of waste should be limited to those activities necessary to manage the stockpiles.

10.2 Investigation-derived Wastes

IDW typically includes groundwater monitoring well development and purge water, soil boring cuttings, and used personal protection equipment (PPE). These wastes are typically placed in 55-gallon drums for management. In addition to the general requirements listed above, the following should also be followed for investigation-derived wastes:

- The contents of each container (e.g., drill cuttings, well purge water, used PPE) should be written on it at the time the container is filled. This information may be needed for waste characterization purposes.
- When feasible, the drums should be stored together in a single location on a site instead of being left separately at each waste drum's point of generation.

- It may be appropriate to consider on-site re-use of investigation-derived wastes such as drill cuttings, well purge water, and test pit excavate, if allowed by State and/or Federal regulations. Follow these guidelines in re-using:

    - Do not re-use the soil in such a way that a stockpile is created.
    - Compact re-used soils properly to prevent settlement and erosion.
    - Do not make soil contamination conditions worse in reusing the soil. For example, dispose of waste at the source area, and do not place contaminated soil from the subsurface near ground surface.
    - If soil is reused on site under a capped/paved surface, restore the surface.
    - Do not reuse contaminated soils in clean areas of the site; re-use the soil in a similarly contaminated area.
    - For test pits, return the soil to the pit in generally the same order it came out.
    - Reuse well development/purge water at the point of withdrawal or upgradient of the point of withdrawal.

Refer to state-specific guidance to determine specific requirements for managing IDW. It should be noted that IDW requirements in NY are contained in the NYSDEC-approved work plans.

10.3 Remediation Waste/IDW Management

Federal

Handling of hazardous waste at sites subject to remediation may be subject to less stringent standards. At the federal level, the management of waste at Superfund sites is discussed in OSWER Directive No. 9347.1-02 (April 17, 1989). Further clarification was provided in an October 14, 1998 memo from the Acting Assistant Administrator for Solid Waste and Emergency Response and Assistant Administrator for Enforcement and Compliance Assurance to RCRA/CERCLA Senior Policy Managers Regional Counsels. This memo states, "In what is typically referred to as the area of contamination (AOC) policy, EPA interprets RCRA to allow certain discrete areas of generally dispersed contamination to be considered RCRA units (usually landfills). Because an AOC is equated to a RCRA land-based unit, consolidation and *in situ* treatment of hazardous waste within the AOC do not create a new point of hazardous waste generation for purposes of RCRA."

Management of waste generated during waste site investigation and remediation is specifically addressed in the site work plan. Work plans are reviewed and approved by regulators in NY and RI.

New York

NYSDEC TAGM #4032 contains specific guidance on the management of IDW. The guidance provides the options for the management of drill cuttings and spoil, and allows for on-site disposal provided that site conditions are not exacerbated by the on-site disposal activity.

Rhode Island

The Rhode Island Department of Environmental Management's (RI DEM) Policy Memo 95-01 *Guidelines for the Management of Investigation Derived Wastes* provides guidance on management of wastes from investigations and interim remedial activities. Items of note in the Policy memo are as follows:

- While solids generated during investigations may be placed back into their excavation, while they out of the excavation they must be placed on poly sheeting (> 10 mil) if less than 48 hours or into containers if a longer period of time.
- Non-decontamination liquids may be returned to the site if < 250 gallons and laboratory analysis demonstrates that groundwater quality standards are met.
- Wastes should be stored in accordance with RI DEM's Hazardous Waste Regulations if the waste is deemed to be hazardous or in accordance with this policy if non-hazardous.
- Wastes associated with PPE and decontamination must be sent for off-site disposal.

Massachusetts

Remediation waste generated in Massachusetts is regulated under the Massachusetts Contingency Plan at 310 CMR 40.0030. The MCP requires that remediation waste is managed in a manner that provides equivalent protection to the requirements contained in the Massachusetts hazardous waste regulations. Site-specific conditions will dictate the level of protection that is feasible. For wastes generated at company-owned operating facilities such as a Service Center, the wastes should be stored indoors, if feasible, preferably in a hazardous waste storage area.

Pursuant to 310 CMR 40.0033, remediation waste may be stored for longer than the 90-day time limit specified in the state hazardous waste regulations (310 CMR 30.000), provided that the storage complies with the management requirements of 310 CMR 30.000 and the following information is provided in the next required MCP response action submittal: the type, quantity and generation rate of the waste; justification for storage for longer than 90 days, and a projected timeline for storage of the waste.

New Hampshire

New Hampshire hazardous waste regulations provide an exemption for oily debris associated with spill cleanup activities as well as for oil which will be burned for energy recovery. Use of these two exemptions will result in most investigation derived wastes being exempted from management as a hazardous waste. Env-Ws 412.17 discusses the requirements for soil storage on-site.

11.0 ASBESTOS WASTE MANAGEMENT

Existing federal and state environmental and safety regulations govern the removal and disposal of asbestos and asbestos containing materials. The regulations are administered by the U.S. Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), the Massachusetts Department of Environmental Protection (MADEP), the Massachusetts Department of Labor and Workforce Development (MADLWD), the Rhode Island Department of Health (RIDOH), the New Hampshire Department of Environmental Services (NHDES), the New Hampshire Department of Health and Human Services (NHDHH), New York Department of Labor (NYDOL) and Vermont Department of Health (VTDOH).

This procedure addresses the regulatory notifications and waste management associated with asbestos abatement projects.

11.1 Definitions

Asbestos - The term asbestos describes six naturally occurring fibrous minerals found in certain types of rock formations. The asbestos minerals chrysolite, amosite, and crocidolite have been the most commonly used in building products because of fire resistant and insulating properties. Asbestos minerals separate into microscopic fibers when present in the air and it has been determined that there are adverse health effects associated with exposures to these fibers.

Asbestos Containing Material (ACM) - Any material containing more than one (1) percent asbestos. Asbestos or asbestos containing material may include thermal insulation, transite pipes, transite panels, floor tiles, ceiling tiles, gaskets, cables, wires, siding, cement panels, roofing materials and surfacing materials (decorative or acoustical plaster or other materials on ceilings, concrete slabs, or decking and fireproofing materials on structures).

11.2 Training

Training is required for all employees who conduct asbestos related activities. No employee may conduct asbestos related activities without the appropriate level of training regardless of whether or not it is an emergency.

11.3 Notifications

All emergency work that may involve activities that may disturb ACM must be communicated to the Company Environmental Engineer by the next working day (not required in NY). Information provided must include: the type of work; the type and quantity of material; and the group who will perform (or performed) the work (i.e., outside contractor or appropriate underground department).

Copies of any asbestos notification forms that have been submitted to outside agencies shall be submitted to the Company Environmental Engineer within 3 working days of the submission.

Asbestos Blanket Plan Notifications (Massachusetts Only)
Each year an application must be submitted to the MADEP for each district for DEP approval of planned demolition/renovation operations during a twelve-month period. Only small-scale asbestos abatement projects (< 10 linear ft./< 25 sq. ft.) qualify under the Blanket Plan. Refer to each District Asbestos Removal Blanket Notification approval document for specific details.

Contractor Notification

Contractors must be notified prior to working near asbestos containing material in accordance with the Company O & M Program.

Regulatory Agency Notifications
Notifications to regulatory agencies shall be submitted by the supervisor in charge of the project according to the requirements identified in Attachment 1. In the event a contractor is hired for the project and he or she completes the required notification(s), the supervisor must obtain copies of the notifications before the job begins and ensure that the proper notification forms have been submitted. Additionally, he/she must ensure that one copy of the notification form is submitted to the Company Environmental Engineer.

11.4 Storage

Asbestos waste may be either collected from the site of generation or temporarily stored at a company facility until transported to an approved facility. Before asbestos is placed into storage, it must be adequately wetted, double bagged (6 millimeter poly) and sealed. The bags should be placed into metal or fiberglass drums or into a locked, roll off container. The bags and containers must be labeled. The labels must state:

Danger
Contains Asbestos Fiber
Avoid Creating Dust
Cancer and Lung Disease Hazard

Asbestos is considered a "Special Waste" and must be stored in an area separate from the hazardous waste area. There are no time limits for accumulation.

11.5 Transportation & Disposal

A completed company Asbestos Removal & Disposal Report or Bill of Lading must accompany the waste when transported from the site of generation to a company facility. It serves as the Bill of Lading and assists in tracking the waste and the company asbestos worker's hours on the

job. If a transporter collects the waste at the site of generation, the transporter's manifest or bill of lading may be used.

For all shipments to asbestos waste to a disposal location, a Waste Shipment Record (WSR) or similar form must be used. Please refer to Attachment 1 for a copy of the WSR as well as instructions on its completion. For wastes shipped under a hazardous waste manifest, a Waste Shipment Record or similar form must also be completed. The disposal facility is required to send a copy of the WRS or similar form to the Operator upon receipt at the disposal location. This copy is reviewed to determine if any waste discrepancies exist.

When the asbestos is prepared for transport to the disposal facility, two labels must be added: A Class 9 Hazardous Material Shipping Label and a shipping label stating the company name and address and the DOT shipping name, "RQ Asbestos 9 NA2212 III."

11.6 Regulatory Requirements

Refer to Tables 11.1 thru 11.5 for state-specific notification requirements.

11.7 Records

All notifications, disposal records, monitoring records, training records, etc., as identified in the applicable regulations, shall be retained for a minimum of 30 years.

11.8 Disposal

Refer to the Approved Vendor Listing on the Infonet (under the Supply Chain Management Department's web site) for a current list of National Grid-approved vendors who may receive asbestos for disposal.

11.9 Asbestos Fiber Release

In the event of an emergency release of asbestos containing material, procedures outlined in EP No. 5, Release Response and in the Company O&M Program must be followed, including the immediate notification of the Company Environmental Engineer.

11.10 References

Regulations and standards governing disturbance of asbestos exist on the Federal, State and Local level. The three primary regulations on the Federal level are:

- Environmental Protection Agency's (EPA) National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR 61, Subpart M)
- Occupational Health and Safety Administration's (OSHA) Occupational Exposures to Asbestos (29 CFR 1910.1001)
- OSHA, Exposure to Asbestos in Construction Work (29 CFR 1926.1101)

On the State and Local level various asbestos regulations exist, primarily regarding the removal of asbestos materials.

- New York State Parts 56 of Title 12 and 73 of Title 10 of the Official Compilation of Codes, Rules, and Regulations and Applicable Variances
- Massachusetts State Parts 310and 453 of the CMR
- New Hampshire Chapter ENV-A 1800, et. al.
- Rhode Island, Rules and Regulations for Asbestos Control [R23-24.5-ASB]
- Vermont V.S.A Title 18, Chapter 26; Vermont Regulations for Asbestos Control

Local law or regulation as applicable including but not limited to New York City, Boston and other as applicable to the location.

Table 11.1
Massachusetts Requirements

Agency	Notification Quantity Thresholds	Deadline	Form	Fee Required
MADEP	Non-Blanket Jobs Any amount of ACM	10 Days Before Start of Job	ANF-001	$85 decal
MADEP	Blanket Plan Notifications <10 linear ft./25 sq. ft.	Report as required on Blanket: Submit form and decal to Boston and Regional DEP offices w/in 24 hours for each job conducted under Blanket. (E-mail or fax with follow-up paper submittal.)	ANF-001	$35 decal
MADEP	Emergency Jobs	Within 1 working day prior to the beginning of an emergency job, unless a waiver is granted by the DEP, or if <1 working day, make telephone notification with written follow-up.	ANF-001	If qualifies under Blanket Plan Notification use $35 decal: if not use $85 decal
MADEP	Additional Notifications Req'd	• when work is scheduled for widely-spaced geographical locations on the same facility; • when work is scheduled for a single facility but separated by > 1 week; and • when work is postponed by > 30 days from the date on the initial notification.	ANF-001	$85 decal
MADLWD	≥ 3 linear feet or ≥ 3 square feet	10 Days Before Start of Job	ANF-001	DEP Notification and Fees below apply to DLWD per 453 CMR 6.12 for jobs meeting DLWD threshold.

Table 11.2
Rhode Island Requirements

Agency	Notification Quantity Thresholds	Deadline	Specific Notif. Form	Fee Required
RIDOH	Spot Jobs <10 linear ft./25 sq. ft.	None Required	N/A	N/A
RIDOH	Non-Spot Jobs >10 linear ft./ >25 sq. ft.	Must first obtain RIDOH approval of Asbestos Abatement Plan: then submit 10 day start notification (No FAX allowed.) Telephone notice required when on-site preparation begins. Notification to local fire fighting authorities required in writing prior to initiating any activity. Written notice required when amount of asbestos changes by ≥ 20% or when original start date changes. (See B.2.1(e) for details.)	ASB-22	Yes
RI DOH	NA	10 days following shipment of waste – Must submit certification from disposal location or status report on why certification of disposal has not been received.	NA	No
RIDOH	Emergency Non-Spot Jobs	Obtain permission from RIDOH prior to initiating abatement. If not possible, proceed with abatement and notify RIDOH w/in 1 working day from beginning of emergency and follow-up within 10 working days with written report. (See A.4.2(b) for additional requirement.)	ASB-22	
EPA[1]	Only projects in RI ≥160 sq. ft./ ≥ 260 linear ft.	10 days and meet other RI notification requirements.	No – See RI	No – See RI

1 EPA no longer requires that a notification of NESHAPs asbestos abatement projects be submitted for projects in the States of MA, NH, CT and ME as of 1997, as long as a proper notification is submitted to the state regulatory agency.

Table 11.3
New Hampshire Requirements

Agency	Notification Quantity Thresholds	Deadline	Specific Notif. Form	Fee Required
NHDES and local Health Office	Projects > 10 linear feet or 25 square feet	10 days prior to project Must re-notify if the date of the project changes to a time outside of the start/finish dates provided in the original notice		Yes
None	Projects < 10 linear feet or 25 square feet			
NHDES	Emergency projects	Verbal notice within 24 hours; written follow-up within 48 hours		

Table 11.4
Vermont Requirements

Agency	Notification Quantity Thresholds	Deadline	Specific Notif. Form	Fee Required
VTDOH	> 10 linear ft./ > 10 sq. ft.	10 days. Amended notif./fee required w/in 24 hours if permit category increases.	Yes	Sliding fee scale. See 7.2 for details.
VTDOH	Small Scale, Short Duration ≤ 10 linear ft/ ≤ 10 sq. ft.	Within 48 hours of the activity must submit on Department form small scale short duration notification.	Yes	No fees.
VTDOH	Emergency	Within 24 hours of emergency must verbally notify VTDOH and follow-up in writing w/in 48 hours following the beginning of the emergency.	Yes	Sliding fee scale. See 7.2 for details.

Table 11.5
New York Requirements

Agency	Notification Quantity Thresholds	Deadline	Specific Notif. Form	Fee Required
NYSDOL	Minor <10 sq. ft./25 lineal ft.	None Required	N/A	N/A
NYSDOL	Large >200 lineal ft./>160 sq. ft.	10 days prior to commencement of project.		N/A
NYSDOL	Emergency Major Jobs	Notify Program Managers Office – Asbestos Control Bureau Albany NY ASAP prior to abatement. Provide written notification within 48 hrs. after the beginning of the emergency abatement.		N/A
	Asbestos wrapped coal tar pipe	Under DOL waiver File# 54-94, cases 1-14 Employees need one time awareness training	Not required	None

Attachment 1

1. Work site name and mailing address	Owner's Name	Owner's Telephone No.
2. Operator's name and address		Operator's Telephone No.
3. Waste disposal site (WDS) name, mailing address, and physical site location		WDS phone No.
4. Name and address of responsible agency		
5. Description of materials	6. Containers No. Type	7. Total Quantity; m^3 (yd^3)
8. Special handling instructions and additional information		
9. Operator's Certification: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations.		
Printed/typed name and title	Signature	Month Day Year
10. Transporter 1 (Acknowledgment of receipt of materials)		
Printed/typed name and title Address and Telephone No.	Signature	Month Day Year
11. Transporter 2 (Acknowledgment of receipt of materials)		
Printed/typed name and title Address and Telephone No.	Signature	Month Day Year
12. Discrepancy indication space		
13. Waste disposal site owner or operator: Certification of receipt of asbestos materials covered by this manifest except as noted in item 12.		
Printed/typed name and title	Signature	Month Day Year

WASTE SHIPMENT RECORD INSTRUCTIONS

(Attachment to Fact Sheet WMD-ASB-14)
Waste Generator Section (Items 1-9)

1. Enter the name of the facility at which asbestos waste is generated and the address where the facility is located. In the appropriate spaces, also enter the name of the owner of the facility and the owner's phone number.
2. If a demolition or renovation, enter the name and address of the company and authorized agent responsible for performing the asbestos removal. In the appropriate spaces, also enter the phone number of the operator.
3. Enter the name, address, and physical site location of the waste disposal site (WDS) that will be receiving the asbestos materials. In the appropriate spaces, also enter the phone number of the WDS. Enter "on-site" if the waste will be disposed of on the generator's property.
4. Provide the name and address of the Local, State, or EPA Regional Office responsible for administering the asbestos NESHAP program.
5. Indicate the types of asbestos waste materials generated. If from a demolition or renovation, indicate the amount of asbestos that is:
   - Friable asbestos material
   - Nonfriable asbestos material
6. Enter the number of containers used to transport the asbestos materials listed in item 5. Also enter one of the following container codes used in transporting each type of asbestos material (specify any other type of container used if not listed below):
   DM - Metal drums, barrels
   DP - Plastic drums, barrels
   BA - 6 mil plastic bags or wrapping
7. Enter the quantities of each type of asbestos material removed in units of cubic meters (cubic yards).
8. Use this space to indicate special transportation, treatment, storage or disposal or Bill of Lading information. If an alternate waste disposal site is designated, note it here. Emergency response telephone numbers or similar information may be included here.
   NOTE: The waste generator must retain a copy of this form.
9. The authorized agent of the waste generator must read and then sign and date this certification. The date is the date of receipt by transporter.

Transporter Section (Items 10 and 11)

10. Enter name, address and telephone number of each transporter used, if applicable. Print or type the full name and title of person accepting responsibility and acknowledging receipt of materials as listed on this waste shipment record for transport. Enter the date of receipt and signature.
11. Same as above.
    NOTE: The transporter must retain a copy of this form.

Disposal Site Section (Items 12 and 13)

12. The authorized representative of the WDS must note in this space any discrepancy between waste described on this manifest and waste actually received as well as any improperly enclosed or contained waste. Any rejected materials should be listed and the destination of those materials provided. A site that converts asbestos-containing waste material to non-asbestos material is considered a WDS.
13. The signature (by hand) of the authorized WDS agent indicates acceptance and agreement with statements on this manifest except as noted in item 12. The date is the date of signature and receipt of shipment.

    NOTE: The WDS must retain a completed copy of this form. The WDS must also send a completed copy to the operator listed in item 2.

Appendix O: Citizens Participation Plan (CPP)

To Be Provided by National Grid

CITIZEN PARTICIPATION PLAN

FOR THE

FORMER MANUFACTURED GAS PLANT AT PATCHOGUE, SUFFOLK COUNTY, NY

Prepared by

National Grid

January 2011

TABLE OF CONTENTS

Section	Title	Page
1.0	**INTRODUCTION**	1
2.0	**BASIC SITE INFORMATION**	2
3.0	**REMEDIAL PROGRAM OVERVIEW**	4
3.1	New York State Remedial Program Overview	4
3.2	Project Area Investigation History	4
4.0	**CITIZEN PARTICIPATION ACTIVITIES**	6
4.1	Goals and Objectives	6
4.2	Tools and Methods	8
4.2.1	Document Repository	8
4.2.2	Fact Sheets, Public Meetings and Comment Period	9
4.2.3	Responsiveness Summary	10
4.2.4	Information Newsletters	10
4.2.5	Telephone Hotline	10
4.3	Roles and Responsibilities	10
4.4	Schedule for Implementing Elements of the CPP	11
5.0	**SUMMARY**	11

List of Figures

1	Site Location Map	3

List of Appendices

Glossary of Key Citizen Participation Terms and Major Program Elements ..... A

Identification of Document Repositories ..... B

Identification of Affected and/or Interested Parties C

Identification of Project Management Contacts ..... D

1.0 INTRODUCTION

Citizen participation is an integral component of remedial programs in New York State. Input from affected or interested individuals and organizations on the remedial program helps ensure outcomes that account for both technical and human concerns for protecting public health and the environment. A project-specific plan is needed to inform and involve community residents, public and private leaders, and other stakeholders. This Citizen Participation Plan (CPP) documents the planned project-specific public outreach activities and resources organized for the remedial program associated with the former Manufactured Gas Plant (MGP) site.

The primary purpose of this CPP plan is to outline a variety of communication methods that, based on applicable New York State law and New York State Department of Environmental Conservation (NYSDEC) regulations and guidance, provide for constructive communication of program activities between the stakeholders and other interested parties. This CPP includes methods intended to inform interested parties of program developments, elicit responses and public involvement, and provide a central point of contact for inquiries regarding the remedial program for the former Patchogue MGP Project. Given this context, this CPP presents the planned communication and outreach activities, describes how interested individuals and groups can participate in the remedial program, and provides a variety of reference materials to facilitate gaining access to project-specific information and management personnel.

Both the NYSDEC and National Grid are committed to the implementation of this CPP as required by Title 6 of the New York Code of Rules and Regulations (NYCRR) Part 375, applicable NYSDEC guidance (e.g., DER-23/Citizen Participation Handbook for Remedial Programs (January 2010), the Administrative Order on Consent (Index # A2-0552-0606) and the statewide Inactive Hazardous Waste Site Citizen Participation Plan (NYSDEC, 1988). As required by 6 NYCRR Part 375-1.10, NYSDEC and National Grid will review and update this CPP to account for significant changes in the Patchogue Project's remedial program.

2.0 BASIC SITE INFORMATION

In February 2007, National Grid signed an Administrative Order on Consent (Index # A2-0552-0606) with the NYSDEC to investigate and remediate hazardous substances believed to exist at the Patchogue site. The Patchogue former MGP site, currently vacant, is located at 234 West Main Street on a parcel south of Main Street, east of River Avenue, and adjacent to Patchogue River in the Village of Patchogue, Town of Brookhaven, Suffolk County, New York. The site is approximately 3.6 acres. The site is located along the Patchogue River, just south of where the River exits Patchogue Lake. (See Site Location Map).

The site is owned by National Grid.

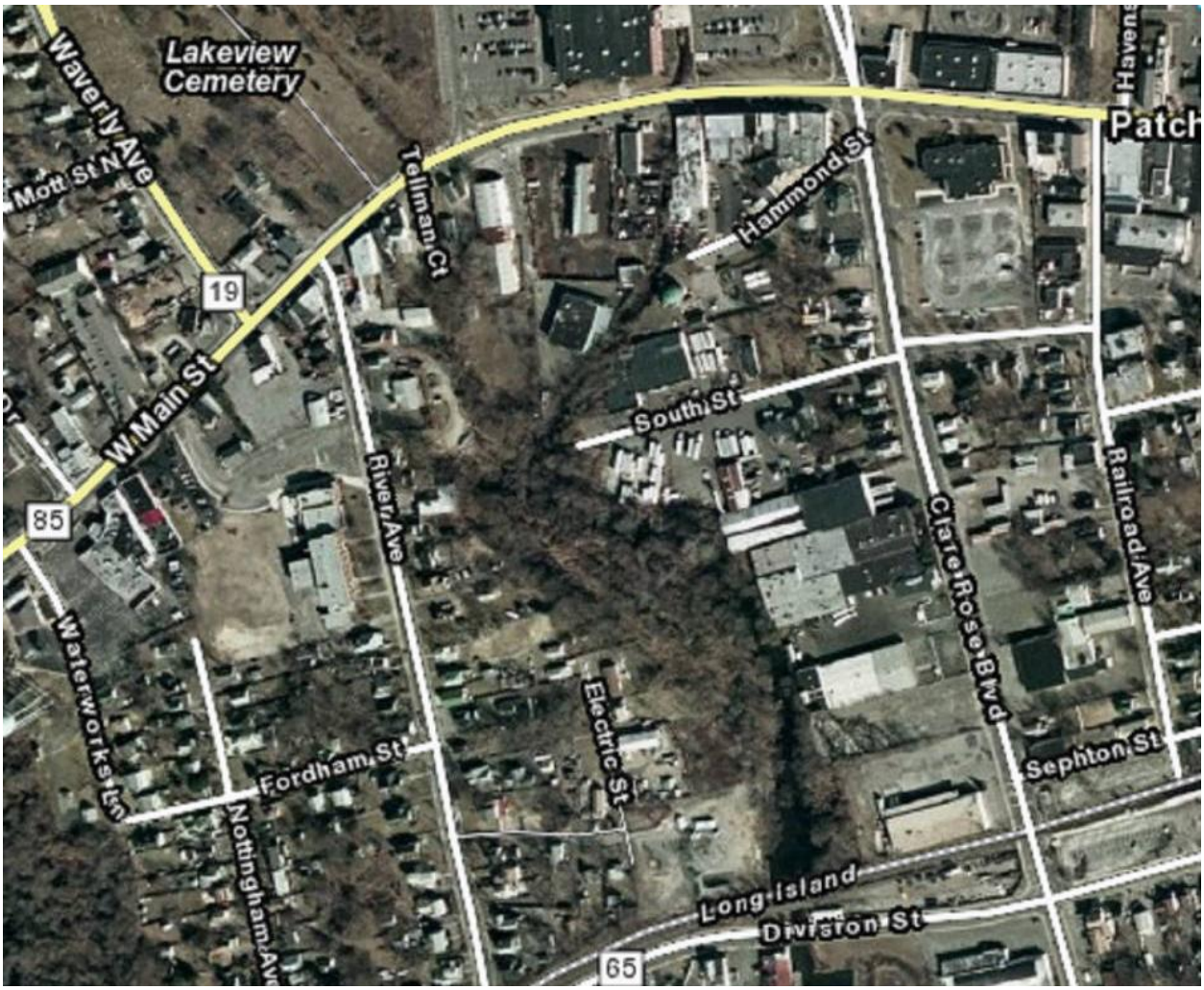
History and Operations

The Manufactured Gas Plant was constructed by the Patchogue Gas Company approximately in 1906 and produced gas through 1917 as a continuing facility and through 1925 in emergencies. After 1925, the site was modified to a gas distribution facility, which it remained until the 1970's, when LILCO sold the site to third parties. From the mid-1970s through early 2005 the site was used as a refrigeration equipment and scrap storage yard, before National Grid acquired it in May 2005 for purposes of remediation. The manufacture of gas, in general terms, consisted of heating coal and recovering the vapors to produce raw gas. Byproducts, such as coal tar, sludge, oils, ashes, contaminated wood chips used for gas purification and other chemicals, were produced from the scrubbing systems used to clean impurities from the raw gas, and these were either recycled for energy recovery and chemical feedstocks, or disposed.

The land use is currently vacant.

Figure 1

Site Location Map



Current Site Description

The Site is on an irregularly shaped tract of land covering approximately 2 acres, on West Main Street in Patchogue. Neither National Grid nor its predecessor companies owned the land between the mid-1970's and May 2005, when it was re-acquired by National Grid. The land is presently vacant.

3.0 REMEDIAL PROGRAM OVERVIEW

3.1 New York State Remedial Program Overview

National Grid entered into an Administrative Order on Consent covering the Patchogue site in February 2007. The Order requires a Remedial Investigation of the Site, followed by a Feasibility Study of remedial options, a Remedial Action Plan, a Remedial Design and then construction and operation of a remedy to eliminate, to the extent possible, environmental hazards detected at the site The Consent Order also permits National Grid to perform one or more partial Interim Remedial Measures to more quickly remediate contamination prior to adoption of a Remedial Action Plan. Once the Remedial Design is approved by NYSDEC, National Grid will commence construction. Finally, National Grid will submit to NYSDEC a detailed Post-Remedial Operations and Maintenance Plan (O&M Plan). The O&M Plan provides the means to track the effectiveness of the completed remedial work.

For more information on the remedial program and process in New York State, interested parties can contact any of the state representatives listed in Appendix D.

3.2 Project Area Investigation History

A U.S. Environmental Protection Agency Preliminary Assessment was conducted in 1986. EPA concluded that no further action on the site was required. An Administrative Consent Order for a Preliminary Site Assessment of the site was issued in September 1999. The final PSA was Report was accepted by the NYSDEC in March 2002. The PSA found that additional investigative work would be required, which is the subject of the current ACO.

A Preliminary Site Assessment accepted by the NYSDEC in 2002 found materials expected on a former MGP site as well as other wastes associated with industrial use. Possible MGP contaminants were detected in soil, groundwater, surface water and sediment samples. Based on the PSA, the residues include volatile aromatic hydrocarbons such as benzene, toluene, ethylbenzene and xylenes (BTEX) and Polycyclic Aromatic Hydrocarbons (PAHs). There are also indications of subsurface structures that may have been associated with past MGP operations.

A Final Remedial Investigation Report was accepted by the NYSDEC in Fall 2009. The Key Findings are:

- There are no imminent hazards to human health. There are potential pathways through which people can be exposed to the potentially harmful materials. These pathways may require additional study or remedial action. The results of the Qualitative Exposure Assessment conducted as part of the Remedial Investigation will be used to support future site remediation decision-making.
- The site exhibits the characteristics of a former MGP site, including the presence of contaminants usually associated with such use. The main contaminant onsite is MGP tar, a dark viscous material that is denser than water and very persistent in the environment. The MGP tar acts as a source for soil and groundwater contamination. The MGP tar is made of several common chemicals, classified into two groups. The first is BTEX, which stands for the four chemicals found in the group (Benzene, Toluene, Ethylbenzene, and Xylene), These are volatile organic carbons which tend to dissolve more in water and are found in most petroleum based products (e.g. gasoline, diesel fuel, solvents, and adhesives). The second group is known as Polycyclic Aromatic Hydrocarbons (PAHs). These are semi-volatile organic carbons and are less likely to dissolve in water, as they are the by-products of incomplete combustion. They can be found in car exhaust and grilled meats.
- The Remedial Investigation developed sufficient information to identify and delineate impacts to surface soils, groundwater, sediments, surface water and soil gas, and to complete a Fish and Wildlife Resources Impact Analysis. The MGP tar is found in areas of the site associated with historic structures. There is an additional location of petroleum impacts that is likely site related, to the southeast of the main site, closer to the Patchogue River. The groundwater at the site flows from the northwest to the southeast. Groundwater which moves through the tar becomes contaminated. The contaminated groundwater is then discharged into the river where dilution and degradation quickly act on the contaminants.
- The Remedial Investigation determined that the presence of contaminants in the soils, groundwater, sediments and surface water do not present a risk to the transient fish and wildlife present in the environment on or near the site.

4.0 CITIZEN PARTICIPATION ACTIVITIES

This section presents the specific citizen participation and outreach activities planned for implementation during the remedial program and to be implemented in accordance with 6 NYCRR Part 375. Operating under project-specific citizen participation goals, clearly defined objectives will be achieved by implementing a range of communication tools and methods. The planned activities are geared toward making project-specific information (e.g., work plans, technical reports, information sheet summaries) available to the public; facilitating communication among stakeholders including the creation of contact lists; scheduling and conducting public meetings; establishing comment periods; and notifying the public of document availability, public meetings, comment periods and major program milestones.

4.1 Goals and Objectives

The central goal of this CPP is to achieve effective, open communication among stakeholders and interested parties, National Grid and the NYSDEC. Common goals include:

- Communicate program goals and major milestones, actions and outcomes;
- Inform citizens and others of ongoing project activities, status and progress;
- Provide citizens (and all stakeholders) a forum for input and comment; and
- Engender a public understanding of constituents of interest, their potential effects on human health and the environment, and appropriate responses to mitigate those effects.

In order to accomplish these goals, the following specific objectives will be pursued through the implementation of this CPP:

- Consistently communicate goals, accomplishments and status of the project to the contact list (including community leaders, public officials and the wider community, as necessary) through appropriate means;

- Establish, maintain, update and utilize the contact lists;

- Educate the community, in lay terms, about the nature and magnitude of potential site risks, including instructions for mitigating risk (if appropriate) and assurances that the environment and worker/public health and safety are protected;

- Provide interested parties the opportunity to review and comment on technical reports generated through the remedial program (e.g., public comment periods and document repository as required by 6 NYCRR Part 375);

- Provide interested parties the opportunity to present opinions and ideas during the remedial program (e.g., conduct public meeting/comment period and availability session as required by 6 NYCRR Part 375);

- Provide responses to public review and comment (e.g., prepare a responsiveness summary as required by 6 NYCRR Part 375);

- Provide the news media with interviews or press releases of National Grid authorized spokespersons, as available, to ensure accurate coverage of remedial program activities;

- Provide a designated project spokesperson as point of contact through which community inquiries regarding the project can be addressed consistently and effectively; and

- Periodically review the effectiveness of the citizen participation and outreach activities during the remedial program and make adjustments in this CPP's methods and/or activities, if necessary.

The community contact list is provided in Appendix C and the Patchogue former MGP Site Project management contacts (NYSDEC, NYSDOH and National Grid representatives) are provided in Appendix D.

4.2 Tools and Methods

There are many ways to reach and communicate with the community and other interested parties as this CPP is implemented over the course of the remedial program. A variety of outreach tools and methods will be used to ensure proper communication with the interested parties that include various organizations, public and business leaders, and a diverse assemblage of individuals of all ages, education backgrounds and cultures.

Interested parties will be informed and invited to participate in the planned citizen participation activities through appropriate means such as mailings to the contact list, legal notice in newspapers, press releases, information sheets and other documents made available in the document repository.

The following specific public participation activities will be implemented as required by 6 NYCRR Part 375 and current NYSDEC guidance.

4.2.1 Document Repository

A Document Repository has been established at the local public library which has agreed to maintain in one file all of the relevant documents related to the Site. The Document Repository is located at:

Patchogue Medford Library
54-60 East Main Street, Patchogue, NY 11772
T: 631-654-4700
W: www.pmlib.org http://www.pmlib.org›

The following documents, as available, will be placed in the Repository:

- Administrative Order on Consent
- Citizen Participation Plan
- Fact Sheet Announcing the Start of the Remedial Investigation
- Remedial Investigation Work Plan
- Remedial Investigation Report

- Reports of any Interim Remedial Measures
- Feasibility Study Report;
- Proposed Remedial Action Plan;
- Record of Decision (ROD);
- Remedial Design;
- Post-Remedial O&M Plan; and
- Other Materials (e.g., Information Sheets, Notices, etc.).

4.2.2 Meetings, Meeting Fact Sheets and Comment Period

After completion of the RI Report a Public Meeting was held to discuss its findings. After the Feasibility Study Report is completed, the preferred remedy for the site will be presented in a Proposed Remedial Action Program (PRAP) and will be subject to public review and comment at a Public meeting. Legal notice of the Meetings will be published in the local newspaper, and Fact Sheets announcing the meetings and summarizing the documents will be prepared and disseminated to interested parties and the community. During the RI Public Meeting, NYSDEC, NYSDOH and National Grid project managers summarized the findings of the RI Report and of IRMs completed, and answered questions regarding project area characterization, data and activities. At the PRAP Public Meeting, remedial alternatives presented in the Feasibility Study, the preferred remedy presented in the Proposed Remedial Action Program, costs, implementation schedules and criteria used in evaluating the preferred remedy will be discussed. After the PRAP comment period ends, NYSDEC and NYSDOH will review all public comments from the Public Meeting and submitted during the comment period and, where applicable, incorporate the comments into the Remedial Action Program.

Fact Sheets were distributed to the interested parties and proximate community at the time of the beginning of the Remedial Investigation, the acceptance of the RI Report (including announcement of Public Meeting) and the announcement of the PRAP (also including announcement of the Public Meeting).

4.2.3 Information Newsletters/Handouts

Information newsletters/Handouts will be prepared and distributed to the contact list in order to announce activities that may impact normal community activities, or at major project milestones and accomplishments throughout the remedial program (e.g., start of construction, major report completion, etc.). Written in lay terms, information newsletters will describe and summarize the upcoming work, the project area's history, review the goals of the project, update the status of project plans and/or results, list opportunities for citizen involvement, list key contacts and list the location of the document repositories.

4.2.4. Telephone Hotline

National Grid has established a Telephone Hotline for neighbors of the Patchogue MGP site. The phone number is 631 348 6100. There will be occasional news updates about the investigation, and the Hotline can be used at any time to leave questions about the investigation.

4.2.5 Responsiveness Summary

Public questions, comments and concerns voiced during the public meeting and collected during the comment period after the PRAP meeting will be addressed by the NYSDEC and published in the Remedial Action Program's Responsiveness Summary. Agency responses are to address both the broad general concerns and the significant questions communicated by the interested parties.

4.3 Roles and Responsibilities

The specific roles and associated responsibilities for implementing this CPP are:

- NYSDEC Remedial Project Manager - The NYSDEC Project Manager is responsible for enforcement, oversight and management of the overall remedial program. Typical citizen participation-related activities include making presentations at public meetings, reviewing project documents such as information sheets and providing technical assistance in preparing the responsiveness summary or answering public inquiries.

- NYSDEC Citizen Participation Specialist - The Citizen Participation Specialist assists the project managers in implementing the CPP. Typical activities include preparation and/or review of information sheets and the responsiveness summary and coordination of public meetings and availability sessions.

- National Grid Project Manager - The National Grid Project Manager, in cooperation with the NYSDEC Project Manager, is responsible for implementing the overall remedial program at the site. Typical citizen participation-related activities include management of CPP implementation, presentations at public meetings and technical assistance to the NYSDEC Project Manager and Citizen Participation Specialist.

4.4 Schedule for Implementing Elements of the CPP

Implementing elements of this CPP will depend upon completion by National Grid and final approval by the NYSDEC of various plans and reports required by the Consent Order governing the Patchogue Site, such as the RI Work Plan, RI Report, FS Report, Remedial Design, etc. National Grid will establish the Document Repository as soon as the RI Work Plan is approved and will place all completed documents in the Repository for public review. Public comments and hearings will be scheduled on NYSDEC acceptance of the Remedial Investigation Report and NYSDEC completion of the Proposed Remedial Action Program. The Responsiveness Summary will be completed shortly after close of the public comment period. Distribution of Fact Sheets or information sheets will also occur after completion of significant remedial or IRM construction activities at the Patchogue Site.

5.0 SUMMARY

Guided by the goals and objectives of this CPP, implementation of the planned public outreach and citizen participation activities will ensure the timely communication of important program information of interest to the local community. Citizen involvement and interaction in the remedial program will be facilitated through specific opportunities such as public meetings, public comment periods, availability sessions and use of the Document Repository. Throughout the remedial program, this CPP and its specific outreach tools and methods will be monitored and, as required and agreed by the NYSDEC and National Grid will be adjusted to improve its effectiveness in responding to community needs.

Appendix A

GLOSSARY OF KEY CITIZEN PARTICIPATION TERMS AND MAJOR PROGRAM ELEMENTS

Citizen Participation Plan (CPP) - A document that describes the project-specific citizen participation and outreach activities that will take place alongside the technical components of the remedial program. The CPP also provides project information, citizen participation goals and objectives, and lists of contact persons and document repositories.

Citizen Participation Specialist - An NYSDEC staff member whose duty it is to provide guidance and assistance in carrying out the CPP. The Citizen Participation Specialist is the key contact for public inquiries about the project and the remedial activities.

Contact List - A list in the CPP (Appendix B) containing names and addresses of individuals, groups, organizations, news media and public representatives interested and/or affected by the project. The contact list is used to distribute important information and notices about the project and the remedial program.

Document Repository - Project documents and other information are placed in the Document Repository to facilitate convenient public access to these materials. Documents are available for public reference and review at the offices of Medford Public Library 4 in Patchogue. Refer to Appendix B for more information about the Document Repository location and hours of operation.

Feasibility Study (FS) - Based on information gathered during the Remedial Investigation (RI), the FS is a process for developing, evaluating and selecting appropriate Remedial Action (RAs) for limiting or eliminating the potential human and environmental hazards of a site. The FS sets out the goals of the remedial actions to be taken, evaluates the most appropriate alternatives and selects the best alternative based on several criteria. The selected remedy is then recommended for implementation in the Proposed Remedial Design Plan, which is subject to public review and comment.

Interim Remedial Measure (IRM) - A discrete action which can be conducted at a site relatively quickly to reduce the risk to people's health and the environment from a well defined waste problem. An IRM can involve cutting and plugging waste conduits, removing contaminated soil and securing a site.

Polycyclic Aromatic Hydrocarbons (PAHs) - Contaminants typically found at MGP sites and associated with coal tar residues.

Remedial Design (RD) - This report will include a detailed description of the remedial objectives and the means by which each essential element of the selected remedial alternative will be implemented to achieve those objectives. It incorporates the findings of the FS Report to provide a remedial design which will be implemented during the performance of the cleanup activities at the site.

Remedial Investigation (RI) - A process to determine the nature and extent of contamination at a site by analyzing data collected from sampling (e.g., water, soil, air, etc.) at a site. Information gathered throughout the RI is then used to conduct a Focussed Feasibility Study (FFS), which proposes and evaluates various remedial alternatives for the site.

Responsiveness Summary - The Responsiveness Summary is prepared by the NYSDEC to address public comments, questions and concerns regarding the proposed remedial action to be taken at a site. The Responsiveness Summary is issues as part of the Remedial Action Program.

Volatile Aromatic Hydrocarbons - Benzene, Toluene, Ethylbenzene, Xylene (BTEXs) - Volatile aromatic hydrocarbons and are typical contaminants found at MGP sites and other sites where coal, oil, refined products and other hydrocarbons were burned or used.

Appendix B

IDENTIFICATION OF DOCUMENT REPOSITORY

Patchogue Medford Library
54-60 East Main Street
Patchogue, NY 11772
T: 631-654-4700

NYSDEC Region 1 Office
SUNY-Stonybrook
Stony Brook, NY 11790
Contact: Mr. Walter Parish
(631) 444-0241
Hours: M-F: 9-5 (by appointment)

Appendix C

IDENTIFICATION OF AFFECTED AND/OR INTERESTED PARTIES

Site Owners:

National Grid Corporation — 175 East Old Country Road, Hicksville NY 11801

Government Officials

Village Mayor	Paul V. Pontieri, Jr. 14 Baker Street P.O. Box 719 Patchogue, NY 11772 PPontieri@patchoguevillage.org (631) 475-4300
Brookhaven Supervisor	Mark Lesko One Independence Hill Farmingville, NY 11738 Phone (631) 451-6955 Fax (631) 451-6677
Suffolk County Legislator	Jack Eddington 90 W. Main St -Suite 2N Patchogue, NY 11772 Phone (631) 854-1400 Fax: (631) 854-1403
State Assembly Member	Dean Murray 1735 North Ocean Avenue, Suite A Medford, New York 11763 Phone: (631 207-0073
State Senator	Lee Zeldin 250 Veteran's Memorial Highway, Suite 2A-1 Hauppauge, New York 11788 Phone: (631) 360-3356 Fax: (631) 360-3269

Community Groups

Greater Patchogue Chamber of Commerce
Charlie Baker, President
15 North Ocean Avenue
Patchogue, New York 11772
(631) 207-1000
info@patchoguechamber.com

Long Island Neighborhood Network
Neil Lewis, Executive Director
7180 Republic Airport
East Farmingdale, NY 11735
Phone: (631) 963-5454
Fax: (631) 963-5466
Email:**linnet@neighborhood-network.org**

Long Island Mid-Suffolk Business Action
Chairman**:** Ernest Fazio, Energy Demonstration Center
PO Box 135
Centerport NY 11721
PH: (631) 757-1698
www.limba.net

Local Newspapers Covering Area

Long Island Advance
20 Medford Ave.
P.O. Box 780
Patchogue, NY 11772
Phone: (631)475-1000
Fax: (631) 475-1565

La Tribuna Hispana
P. O. Box 186
Hempstead, NY 11550
888-900-2811 ext 3

Appendix D

IDENTIFICATION OF PROJECT MANAGEMENT CONTACTS

New York State Department of Environmental Conservation
Elizabeth Lukowski
Environmental Engineer
Remedial Bureau C
Division of Environmental Remediation
Albany, NY 12233-7014
(518) 402-9564

New York State Department of Health
Jacquelyn Nealon, Project Manager
NYSDOH, BEEI
547 River St., Room 300
Troy, NY 12180-2216
(800) 458-1158 ext. 27880

National Grid
James Christman
Community Relations Representative
175 East Old Country Road
Hicksville NY 11801

Patchogue Project Hotline Telephone – 631 348 6100

Please leave a message on the Hotline and your call will be promptly returned by the end of the next business day.