Site Management Plan

The DeLaval Property
202-204 Rinaldi Boulevard
City of Poughkeepsie,
Dutchess County, New York
ERP Site No. B00190-3

CHA Project Number: 030114.000



Prepared for:

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Revisions to Final Site Management Plan:

Revision No.	Submitted Date	Summary of Revision	DEC Approval Date
01	01/22/2014	Replaced metes & bounds map in Appendix A	01/22/2014
02		Revised groundwater sampling program requirements based on NYSDEC-approved reduction described in Section 3.0. Also includes miscellaneous name/address revisions.	

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CERTIFICATION

I, the undersigned, certify that I am currently a New York State registered professional engineer and that this Site Management Plan (SMP) was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation (DER) *DER-10 Technical Guidance for Site Investigation and Remediation*, dated May 2010.

For CHA Consulting, Inc.:

(Professional Seal)

Scott M. Smith
Printed Name of Certifying Engineer

Signature of Certifying Engineer

September 22, 2022
Date of Certification

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Registration Number

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Registration State

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LIST OF ACRONYMS & ABBREVIATIONS

ACM	Asbestos-Containing Material
AKA	Also Known As
AMSL	Above Mean Sea Level
AOC	Area of Concern
AOS	Apparent Opening Size
ASP	Analytical Services Protocol
ASTM	American Society of Testing & Materials
BASE	Building Assessment and Survey Evaluation
BFB	Bromofluorobenzene
BUD	Beneficial Use Determination
C	Celsius
C&D	Construction & Demolition
CAB	Concrete Anchor Block
CAMP	Community Air Monitoring Plan
CATV	Cable Television
CD	Compact Disk
CFR	Code of Federal Regulations
CHA	Clough Harbour & Associates LLP
CHMM	Certified Hazardous Materials Manager
CIH	Certified Industrial Hygienist
CIP	Cast-in-Place
COC	Certificate of Completion
Conc.	Concrete
CRZ	Contamination Reduction Zone
CSP	Certified Safety Professional
CVOC	Chlorinated Volatile Organic Compound
CY	Cubic Yard
DEC	Department of Environmental Conservation
DER	Division of Environmental Remediation
DFTPP	Decafluorotriphenylphosphine
DNAPL	Dense Non-Aqueous Phase Liquid
DOH	Department of Health
DOL	Department of Labor
DOT	Department of Transportation
DQO	Data Quality Objective
DUSR	Data Usability Summary Report
DVD	Digital Video Disk (or Digital Versatile Disk)
E	East
EAP	Emergency Action Plan
EC	Engineering Control
ECB	Erosion Control Blanket
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program

Elev.	Elevation
EPA	Environmental Protection Agency
ERP	Environmental Restoration Program
ESA	Environmental Site Assessment
ESC	Erosion and Sediment Control
EWP	Excavation Work Plan
Exist.	Existing
EZ	Exclusion Zone
FBE	Fusion Bonded Epoxy
FPS	Feet per Second
ft.	Foot
GC	Gas Chromatography
GIS	Geographic Information System
HASP	Health & Safety Plan
HAZWOPER	Hazardous Waste Operations & Emergency Response
HDPE	High Density Polyethylene
HEPA	High Efficiency Particle Arrestor
HSC	Health & Safety Coordinator
HST	Health & Safety Technician
HVAC	Heating, Ventilation & Air Conditioning
Hyd.	Hydrant
IC	Institutional Control
ICP	Inductively Controlled Plasma
IDLH	Immediately Dangerous to Life or Health
in.	Inch
Inv.	Invert
KSI	Kips per Square Inch
lb.	Pound
LEP	Licensed Environmental Professional
LNAPL	Light Non-Aqueous Phase Liquid
LSP	Licensed Site Professional
MC	Medical Consultant
mg/Kg	Milligrams per Kilogram
mg/m^3	Milligrams per Cubic Meter
mmd	Mass Median Diameter
max.	Maximum
MH	Manhole
MHW	Mean High Water
min.	Minimum
MLW	Mean Low Water
MOSF	Major Oil Storage Facility
MPH	Miles per Hour
MS	Mass Spectrometry
MS	Matrix Spike
MSD	Matrix Spike Duplicate

MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
MTA	Metropolitan Transportation Authority (of New York City)
MW	Monitoring Well
MUC	Maximum Use Concentration
N	North
NAPL	Non-Aqueous Phase Liquid
NiCd	Nickel-Cadmium
NIOSH	National Institute for Occupational Safety and Health
NOI	Notice of Intent
NRC	National Response Center
NTU	Nephelometric Turbidity Unit
NYCRR	New York Code, Rules & Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
O&M	Operation & Maintenance
OGS	Office of General Services
ORP	Oxidation Reduction Potential
OSHA	Occupational Safety & Health Administration
oz.	Ounce
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
PCS	Petroleum-Contaminated Soil
PDF	Portable Document Format
PE	Professional Engineer
PEL	Permissible Exposure Limit
PFE	Pressure Field Extension
PG	Professional Geologist
PID	Photoionization Detector
PM	Particulate Matter
POB	Point of Beginning
POTW	Publicly Owned Treatment Works
PPE	Personal Protective Equipment
PPM	Parts Per Million
PR	Periodic Review
PRAP	Proposed Remedial Action Plan
PRR	Periodic Review Report
PSI	Pounds per Square Inch
PVC	Polyvinyl Chloride
QA	Quality Assurance
QAO	Quality Assurance Objective
QAPP	Quality Assurance Project Plan

QC	Quality Control
QEP	Qualified Environmental Professional
RA	Remedial Action
RAR	Remedial Alternatives Report
RAW	Regulated Asbestos Waste
RCP	Reinforced Concrete Pipe
RCRA	Resource Conservation and Recovery Act
RDWP	Remedial Design Work Plan
REC	Recognized Environmental Condition
REL	Recommended Exposure Limit
RFI	Request for Information
RI	Remedial Investigation
ROD	Record of Decision
ROW	Right-of-Way
RPD	Relative Percent Difference
RRT	Relative Retention Time
S	South
SAC	State Assistance Contract
SAE	Society of Automotive Engineers
SCBA	Self-Contained Breath Apparatus
SCG	Standard, Criteria, and Guidance
SCO	Soil Cleanup Objective
SCS	Soil Conservation Survey
sec.	Second
SMP	Site Management Plan
SO	Safety Officer
SOP	Standard Operating Procedure
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SSDS	Sub-slab Depressurization System
SSP	Steel Sheet Pile
STEL	Short-Term Exposure Limit
STP	Sewage Treatment Plant
SVI	Soil Vapor Intrusion
SVOC	Semivolatile Organic Compound
SWPPP	Stormwater Pollution Prevention Plan
SZ	Support Zone
TAGM	Technical & Administrative Guidance Memorandum
TAL	Target Analyte List
TCC	The Chazen Companies
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
Tel.	Telephone
TF	Top of Frame

TMP	Tax Map Parcel
TOGS	Technical & Operational Guidance Series
TWA	Time-Weighted Average
µg/Kg	Micrograms per Kilogram
$\mu g/m^3$	Micrograms per Cubic Meter
µm	Micrometers or microns
US	United States
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
UV	Ultraviolet
VOC	Volatile Organic Compound
VTSR	Validated Time of Sample Receipt
W	West
WC	Water Column
WCD	Work Change Directive
WV	Water Valve
yd.	Yard

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1.0 INTRODUCTION & DESCRIPTION OF REMEDIAL PROGRAM

1.1 INTRODUCTION

This document is required as an element of the remedial program for the Hudson River Waterfront - DeLaval Property located in the City of Poughkeepsie, Dutchess County, New York (hereinafter referred to as the "Site") under the New York State (NYS) Environmental Restoration Program (ERP) administered by New York State Department of Environmental Conservation (NYSDEC). The Site was remediated in accordance with the NYSDEC's Record of Decision (ROD) issued in March 2005 for Site No. B00190-3 and the November 2005 Remedial Design Work Plan (RDWP).

The City of Poughkeepsie entered into State Assistance Contract (SAC) No. C302762, which was executed on November 11, 2005 and last amended on June 11, 2010 to allow the City to seek reimbursement for a portion of the costs (up to 90 percent of eligible items) required to perform additional investigation, complete a remedial alternative analysis and coordinate the remedy selection with the NYSDEC through the ERP program. The State added the City's eligibility for reimbursement for portion of incurred costs for remedial design and remedial action to the SAC through Amendment No. 1.

This Site Management Plan (SMP) was prepared to address activities at the DeLaval Property following the completion of the remedial construction completed in March 2008 through January 2012. This plan will be updated on an as-needed basis and all changes will be submitted to NYSDEC for approval.

It is important to note that this Site Management Plan should replace the SMP developed for the Site in July 2007 that provided requirements for the remedial construction. The July 2007 SMP does not apply to any activities at the Site following the remedial construction, does not meet the current requirements of the NYSDEC, and therefore, should no longer be utilized.

1.1.1 SMP Organization

This SMP has been divided into seven (7) major sections, including:

Section 1: Summarizes the purpose of the SMP, provides the Site background, and summarizes the investigations and remedial actions completed at the Site.

Section 2: Engineering Control/Institutional Control Plan

Section 3: Site Monitoring Plan (including groundwater monitoring and Site-Wide Inspection requirements)

Section 4: Operation & Maintenance Plan (primarily for sub-slab depressurization systems)

Section 5: Provides requirements for inspections of the Site and reporting & certification requirements to the NYSDEC.

Section 6: Excavation Work Plan (for all intrusive Site activities)

Section 7: Health and Safety Plan Requirements (minimum requirements)

1.1.2 General

The City of Poughkeepsie entered into a SAC with the NYSDEC to remediate an approximately 14.04-acre property located in the City of Poughkeepsie, Dutchess County, New York. This SAC required the Remedial Party, the City of Poughkeepsie, to investigate and remediate contaminated media at the Site. The address for the Site is 202-204 Rinaldi Boulevard, Poughkeepsie, New York, 12601 and is accessed at the intersection of Pine Street and Rinaldi Boulevard. The approximate centroid of the Site is located at 41º 41' 40" N and 73º 56' 20" W and the property is identified as Tax Map Parcel (TMP) No. 131300-6061-43-752749-0000 on the City of Poughkeepsie Tax Map.

A vicinity location map of the Site is included as Figure 1. A figure showing the location and boundaries of this 14.04-acre host property, which includes an 11.46-acre area for redevelopment and a 2.58-acre area that is dedicated parkland along the waterfront, is provided in Figure 2. CHA notes that the Site was originally a 13.95-acre parcel; however, due to some design modifications during the course of construction that resulted in the need to shift the bulkheads along the shoreline slightly further west into the Hudson River, the City was required to obtain an additional approximately 0.09-acres of land from the State of New York Office of General Services (OGS) under a submerged land acquisition application process.

Additionally, due to accessibility issues during construction, the soil cover system could not be practically placed across the entire property, and thus, a portion of the property was left in its original state and is not included as part of the Site. Specifically, the "Site" includes the 14.04-acre parcel less 0.40-acres near the northeastern corner of the parcel as shown on Figure 2, or a total of 13.64-acres. This exclusion area has been separated from the Site by a chain link fence to serve as a physical boundary. The boundaries of the Site are more fully described in the metes and bounds Site description that is part of the Environmental Easement, and has been included in Appendix A of this document.

After completion of the remedial work described in the Remedial Design Work Plan (RDWP), some contamination was left in the subsurface at this Site, which is hereafter referred to as 'remaining contamination." This SMP was prepared to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with Environmental Conservation Law (ECL) Article 71, Title 36. All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State.

This SMP was prepared by Clough Harbour & Associates LLP (CHA), on behalf of the City of Poughkeepsie, in accordance with the requirements in NYSDEC's *DER-10 Technical Guidance for Site Investigation and Remediation*, dated May 3, 2010, and the guidelines provided by NYSDEC. This SMP addresses the means for implementing the Institutional Controls (ICs) and Engineering Controls (ECs) that are required by the Environmental Easement for the Site.

1.1.3 Purpose

The Site contains contamination left after completion of the remedial action. ECs have been incorporated into the Site remedy to control migration of and exposure to remaining contamination during the use of the Site to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Dutchess County Clerk, will require compliance with this SMP and all ECs and ICs placed on the Site. The ICs place restrictions on Site use, and mandate operation, maintenance, monitoring and reporting measures

for all ECs and ICs. This SMP specifies the methods necessary to ensure compliance with all ECs and ICs required by the Environmental Easement for contamination that remains at the Site. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

This SMP provides a detailed description of all procedures required to manage remaining contamination at the Site after completion of the Remedial Action, including: (1) implementation and management of all Engineering and Institutional Controls; (2) media monitoring; (3) operation and maintenance of all treatment, collection, containment, or recovery systems; (4) performance of periodic inspections, certification of results, and submittal of Periodic Review Reports (PRRs); and (5) defining criteria for termination of treatment system operations.

To address these needs, this SMP includes three plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual for complex systems).

This plan also includes a description of Periodic Review Reports for the periodic submittal of data, information, recommendations, and certifications to NYSDEC.

It is important to note that:

- This SMP details the Site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the environmental easement, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, Title 6 of New York Code, Rules & Regulations (NYCRR) Part 375 and SAC No. C302762, Site No. B00190-3 for the Site, and thereby subject to applicable penalties.

1.1.4 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. In accordance with the Environmental Easement for the Site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files. Any approved revisions to this SMP must be denoted on the cover page of the plan.

Proposed changes to the allowable Site uses in the Environmental Easement should only be considered under extraordinary circumstances due the fact that the cleanup levels achieved at the Site were specific to the proposed use of the Site, and therefore, limit other types of uses, particularly lighter type uses, such as residential use. However, any such proposed changes would require the explicit, written authorization by the NYSDEC as well as significant modifications to both this SMP and the Environmental Easement for the Site, at a minimum.

1.2 SITE BACKGROUND

1.2.1 Site Location and Description

The Site is located in the City of Poughkeepsie, County of Dutchess, New York and is identified as Tax Map Parcel (TMP) No. 131300-6061-43-752749-0000 on the City of Poughkeepsie Tax Map. The "Site" is approximately 13.64 acres in size and is situated on a host property which is an approximately 14.04-acre parcel of land, as described in Appendix A and as shown on Figure 2. The Site consists of the following two primary areas:

- Eastern Redevelopment Area: The eastern area of the parcel leased for redevelopment and approximately 11.46-acres in size. However, as indicated in Appendix A - Site Metes and Bounds, only 11.06-acres of this parcel constitutes the "Site." During the remedial construction, it was determined that the northeastern corner of the overall property was not solid bedrock, and thus, was required to be isolated with a soil cover system. However, due to the limited equipment access to this area and impracticability of covering this area, it was determined that a portion would not be capped. While this approximately 0.40-acre area is still part of the legal parcel boundary, is not part of the Site, and thus, the Owner does not have the same liability protections for this areas as the remainder of the Site, as defined in § 56-0509 of the Environmental Conservation Law.

- Western Waterfront Area: The western side of parcel consisting of an approximately 50 to 60-foot wide strip of land along the Hudson River waterfront that is owned and maintained by the City of Poughkeepsie, approximately 2.58-acres in size.

CHA again notes that the Site was originally a 13.95-acre parcel; however, due to some design modifications during the course of construction that resulted in the need to shift the bulkheads along the shoreline slightly further west into the Hudson River, the City was required to obtain an additional approximately 0.09-acres of land from the State of New York OGS under a submerged land acquisition application process, resulting in a new parcel size of 14.04-acres.

The Site is bounded by the Shadows on the Hudson restaurant/catering facility and The Grandview banquet facility (formerly the City Sewage Treatment Plant (STP) site) to the north, Love/Effron, a major oil storage facility (MOSF) to the south, a MTA Metro-North Railroad (an agency of the Metropolitan Transportation Authority (MTA) of New York City)-owned concrete wall with an elevated railroad corridor utilized by Metro North, Amtrak and Conrail to the east, and the Hudson River to the west (see Figure 2). The boundaries of the Site are more fully described in Appendix A – Site Metes and Bounds.

1.2.2 Site History

1.2.2.1 Past Uses & Ownership

The Site has a long history of former industrial use based upon review of available Sanborn Mapping and other historical documents. Early Sanborn maps indicated that much of the DeLaval Site was under water and part of the Hudson River in the late 1800s, but also indicate the industrial development had begun on the Site by that time (at least as early as 1887). The DeLaval Separator Company reportedly started operations on the Site in 1890 with the opening of the Lavalco factory (*Reflections – A History of DeLaval, 2005)* and it appears that operations expanded through the 1950s, at which point DeLaval occupied most of the Site.

A review of aerial photographs indicated that operations likely ceased in the early 1960s, followed by the razing of the majority of the Site structures sometime between 1962 and 1967. In a 1970

aerial photograph of the Site, there were two structures remaining on the Site, including a structure south of the former machine shop and adjacent to the waterfront, and a small structure near the intersection of Pine Street and Rinaldi Boulevard that may have been the former "employment office" shown on the Sanborn maps. There were no visible structures on the Site by 1980 based upon review of the available aerial photography maintained by the Dutchess County Geographic Information System (GIS) Department, although some vegetation was visible by 1980. A 1995 aerial photograph, as well as site assessment work that began in 1999, indicates that the Site remained vacant between the 1960s and 2007, with the exception of some parking lots further described in subsequent paragraphs. The Site remained vacant until 2007 (with the exception of construction of various paved and unpaved parking lots) when a pump station was installed along the eastern boundary of the Site, and a parking lot was constructed at the north end of the Site.

Historical Industrial Activities at the Site

Several types of industrial operations and processes were conducted on the Site prior to 1970, including, but not limited to:

- Manufacturing of milking machinery/cream separators used in the dairy industry, including the following types of operations:
    - Pickling
    - Tinning operations
    - Annealing, machining, and forge shops
    - Clarifying operations (i.e. surface finishing)
    - Tooling and machining
    - Casting operations
- Storage of lime, cement and coal
- Operation of a coal-fired power/steam plant and later oil-fired power plant
- Storage of hides and operation of a tannery at the north end of the Site.

The specific waste disposal practices related to the aforementioned industrial operations on the Site are not definitively known. However, Site investigations have revealed a landfill area on the

southern portion of the property shown as Area of Concern (AOC) No. 1 (AOC-1) on Figure 2. This area is also located in the area that was historically identified as a DeLaval storage area between 1913 and 1950. Additionally, evidence of minor convenience dumping was observed at various locations on Site during the investigation phase of the project. Most of the dumping appeared to be the result of recent trespassers; however, this material was removed during the remedial action phase of the project as later described in this SMP.

Detail Site History

The following detailed summary of the Site history was prepared based upon review of available Sanborn Mapping, historical railroad mapping provided by the MTA, and review of historical documents on DeLaval, Inc.'s website (http://www.delaval-us.com):

1887 Sanborn Map: Development of the Site had already commenced and it was occupied by a tannery, carpentry shop, two coal sheds, and a pair of homes at that time. Much of the current Site was underwater by the Hudson River at that time, particularly towards the southern end of the Site. Rinaldi Boulevard was known as South Water Street at that time.

1890 – DeLaval Website: According to DeLaval's website, they began operations in Poughkeepsie, New York in 1890.

1895 Sanborn Map: The approximately northern half of the Site was occupied by E.B. Taylor. E.B. Taylor had several structures on the Site that were utilized for the storage of lumber, lime, cement and coal. There was also one coal shed occupied by J.G. Martin and two coal sheds occupied by A. Doughty's located at the north end of the Site (north of the intersection between Pine Street and Rinaldi Boulevard). In addition, there was a small office building, a "hides" structure associated with the former tannery, and a hay storage shed located near the northern boundary of the Site. Approximately 250 north of the existing tunnel beneath the MTA railroad tracks and adjacent to the railroad tracks, there was a "switchman's tower."

Moving southward, there were three structures present that appeared to be associated with the DeLaval Separator Company, which was identified as a manufacturer of cream separators used in the dairy industry. The northernmost structure was labeled as "packaging, assembly and shipping" and was located east of the existing tunnel beneath the MTA railroad tracks. Further south was another structure labeled "Iron Works & Offices." A coal-fired power/steam plant with two engines was situated between the main two structures and immediately adjacent to the MTA tracks. Additionally, one small ice house was present east of the iron works and offices building and additional ice houses were located at the south end of the Site.

The areas surrounding the DeLaval Site were also largely developed. To the north of the Site were several structures associated with Adriance, Platt and Co., also known as Buckeye Works. This facility was an apparent foundry that specialized in the production of harvesting machinery. The railroad tracks operated by the New York City and Hudson River Railroad were already present along the eastern side of the Site; however, it appeared that there were only three primary sets of tracks at that time. Several residential dwellings were present further east along Lansing Avenue and Prospect Street. Two foundries (D.H. Burrell & Co., a manufacturer of boiler engines and creamery machines, and Lane Bros. Hardware Specialties) were located south of Lansing Avenue and east of the structures associated with the DeLaval Separator Company.

1907 Railroad Map: This map indicated that the northern half of the Site was still occupied by lumber sheds, store houses, and a barn. The DeLaval Separator Company had expanded, adding a store house between the shipping building and the railroad tracks, and a paint shop between the iron works building and the railroad tracks. A rail spur running northward across most of the length of the DeLaval Site from the south end was present at that time and was labeled as being operated by the "Standard Oil Company." The southern end of the DeLaval property was occupied by the Poughkeepsie Yacht Club.

1913 Sanborn Map: The DeLaval Separator Company had expanded its operations significantly, and occupied most of the Site. In fact, based upon the map, it appeared that DeLaval had constructed bulkheads along the riverfront and had encroached further westward into the Hudson River. The DeLaval Separator Company manufactured milking machines, centrifuges to separate milk and cream, and other stainless steel farming equipment by this timeframe.

The railroad spur near the center of the Site split into two spurs near the north end of the Site and extended to near the intersection of South Water Street (Rinaldi Boulevard) and Pine Street. Structures located between the railroad spur and the Hudson River included a pressed steel room, a pickling room, a tinning room, an annealing room, a relatively large engine and dyno room (an "independent electric plant") with what appears to possibly be three horizontal oil storage tanks, a large smoke stack, a clarifying room, a bowl department, a tool room, an inspecting room, a finished stock room, an assembly room, a machine shop, castings storage, metal storage, and a scrap metal building. The engine room was situated near the center of Area of Concern (AOC)-2/3 (see Section 1.3.1 for a description of each AOC at the Site). Releases from the engine room and associated fuel supply are suspected to have contributed to the contamination initially encountered at the Site.

An acetylene gas house, house/fire house, a forge shop, storage buildings, a packing/shipping/box building room, offices (including drafting areas and a blueprint room), a bicycle room, and an oil storage structured were present between the railroad spur and the existing railroad tracks along the east side of the Site. The oil storage structure was located approximately 450 feet south of the tunnel going beneath the MTA railroad tracks.

While the coal sheds at the north end of the Site (north of the Site entrance) changed little, these structures were now owned by DeLaval Separator Company was well. DeLaval also owned structures northeast of the intersection of Pine Street and Rinaldi Boulevard and east of the railroad

tracks. A large dwelling was visible on top of the rock outcropping present near the northeast corner of the Site.

The south end of the DeLaval Site was undeveloped and much of it was still under water from part of the Hudson River. However, the far south end of the Site was labeled as the "DeLaval Separator Co. Storage Yard."

The surrounding areas remained relatively unchanged; however, a total of six sets of tracks were visible along the east side of the Site.

1917 Railroad Map: The map indicates that the Site was occupied by several structures and the Site was labeled as the DeLaval Separator Company. The map shows the presence of the rail spur on the Site and the presence of a gasoline tank located immediately west of the spur, approximately 200 feet north of the southern Site boundary. There are no other visible structures shown at the south end of the Site, so the purpose of this tank is unclear. The parcel of land north of the DeLaval Site was labeled Moline Plow Company.

1913 to 1950 Sanborn Maps: The Site continued to be controlled by the DeLaval Separator Company as well as the former D.H. Burrell & Co. and the Lane Bros. Co. foundries located east of the railroad tracks and west of Prospect Street (now partially occupied by US Route 9 corridor). However, the eastern expansion beyond the railroad tracks is not part of the Site.

One of the coal storage sheds located near the entrance to the Site had been removed and replaced with an "auto parking" area. Towards the south end of the Site, the machine shop had been significantly expanded. A note indicates this addition was constructed in 1918. Additionally, a steam shop had been added to the southern end of the oil storage structure adjacent to the railroad retaining wall and an "oil research laboratory" was located approximately 750 feet south of the tunnel beneath the railroad track retaining wall.

1952 Sanborn Map: The map revealed that DeLaval continued to occupy the majority of the Site and had expanded to the east side of the railroad tracks (an area that is not part of the ERP Site). Also the presence of two underground storage tanks and oil storage building in AOC-2/3which are suspected to have contributed to the Site contamination.

Site Ownership

According to a title at the Dutchess County Real Property Tax Office, the DeLaval Separator Company sold the Site to the Roger H. Corbetta Corporation in December of 1965, who in turn sold the land to the City of Poughkeepsie in 1968. It appears based on review of historical aerial photographs that the Roger H. Corbetta Corporation may have razed some of the Site buildings during their ownership, but there is no indication that the Site was actively utilized during their relatively brief ownership. The City has owned the Site since 1968 and the Site has remained

undeveloped since that time. However, a gravel parking lot and partially paved entrance/driveway to the parking areas were installed at the north end of the Site prior to CHA's involvement with the project in 2001. The exact year in which the parking lot areas and driveways were installed is unknown, but occurred sometime after the City took possession of the Site in 1968. The parking lot was utilized for both City events such as festivals and non-City related events, such as access to the Hudson River for fishing.

Recent Site Activities

Numerous environmental assessments and investigations were conducted at the Site between 1999 and 2005. The City executed a Contract for the Site remediation with a Contractor in December 2007. By the time this Contract was executed, the Developer of the DeLaval Site had already reached an agreement with the City to install a new gravel parking lot with a demarcation barrier, a stormwater drainage system, and lighting at the north end of the Site (north of the Site entrance) to provide additional parking for events at the facility adjacent to the north end of the Site as well as parking for nearby hospital workers. This parking area was later paved with asphalt in 2010, prior to the completion of the remedial and Site preparation construction at the Site. Curbing and landscaped islands were also installed as part of the completion of redevelopment of the north end of the Site in 2010. Additionally, The City installed a concrete sidewalk along the Hudson River waterfront as part of the redevelopment of this portion of the Site.

In addition to the new parking lot, Ginsburg Development was responsible for installing a sanitary sewer pump station on the DeLaval Property adjacent to the railroad retaining wall and just north of the tunnel going under the tracks in January of 2007. This pump station was installed to serve both the redevelopment on the Site and the residential development constructed east of the railroad tracks, known as Hudson Pointe.

The remedial action at the Site commenced in March of 2008 and was completed in January of 2012. Since the City of Poughkeepsie had already negotiated the redevelopment of the Site with a Developer by this time, some redevelopment activities also occurred within this timeframe (specifically, June 2010 through January 2012. Specifically, the Developer (and/or the

Developer's contractor) completed grading activities and installed a number of underground utilities prior to the completion of the final step of the remedial action, which was the installation of a soil cover system across the Site. Due to issues that arose during the course of the Site construction, the Developer also completed the installation of the soil cover system(s) at the Site.

1.2.2.2 Previous Reports & Investigations

A number of investigations have been performed to assess the environmental condition of the DeLaval Property. The investigation of the DeLaval property began by the City of Poughkeepsie retaining a consultant, The Chazen Companies (TCC), to prepare the *Phase I Environmental Site Assessment (ESA) Report for the Procida Waterfront Property*, dated December 28, 1999. This assessment was completed prior to the City entering the ERP program and included the assessment of three other parcels of land in the vicinity of the DeLaval Property.

Based upon the recognized environmental conditions (RECs) associated with the historical use of the Site identified in the Phase I ESA, the City retained TCC to characterize the soil and groundwater quality associated with the DeLaval property to define the potential environmental liability associated with the property. In May of 2001, TCC submitted a *Phase II Subsurface Investigation Report of the DeLaval Property* to the City that identified four AOCs, based upon the results of the subsurface investigation.

In 2004, the City entered the NYSDEC's ERP and submitted a Remedial Alternatives Report (RAR) Work Plan that identified the measures to be taken to evaluate potential remedies for the DeLaval property. The draft RAR report was submitted to the NYSDEC for review in July of 2004 based upon the Phase I and II environmental assessments of the property completed by TCC. However, during the course of preparing the initial RAR, a series of data gaps were identified that resulted in the need for additional investigation. A supplemental investigation was conducted at the Site in the summer of 2004 to fill some of the data gaps and provide a better understanding of the nature and extent of contamination present at the DeLaval property and CHA's final *Supplemental Investigation Summary Report* was submitted to the NYSDEC in January 2005.

CHA's Final RAR that thoroughly evaluated potential remedies for the Site was also submitted to the NYSDEC for review and approval in January 2005.

After that work was completed in January 2005, the NYSDEC issued the Proposed Remedial Action Plan (PRAP) for the Site in February 2005 and a Record of Decision ROD) describing the Site remedy was issued in March of 2005 following a public comment period. In June of 2005, the City submitted an application to amend the existing SAC to include the remedial design and construction portion of the project. The remedial design work plan (RDWP) was submitted in November 2005 and final design/bid documents for the remedial construction at the Site were approved on July 31, 2007. The bid documents were made available to contractors on August 13, 2007, and the contract for the remedial construction was fully executed on December 10, 2007.

1.2.2.3 Structures on the Site

All of the former buildings on the DeLaval Property were raised in the 1960s, with the exception of

two structures remaining on the Site, including a structure south of the former machine shop and adjacent to the waterfront, and a small structure near the intersection of Pine Street and Rinaldi Boulevard that may have been the former "employment office" shown on the Sanborn maps. There were no visible structures on the Site by 1980 based upon review of the available aerial photography maintained by the Dutchess County GIS Department, indicating that the final structures were demolished prior to 1980.

During the course of the investigations and remedial action at the Site, several remaining subsurface foundations and utility vaults were encountered. While several of the structures were removed during the implementation of the remedial action at the Site, some structures remain in the subsurface of the Site. The vaults encountered at the Site were hollow, and thus, it is expected that additional hollow vaults remain present at the Site following the remedial action and associated construction work between 2008 and 2012.

As previously indicated, a new City-owned pump station was installed along the eastern side of the Site in January 2007. During the implementation of the remedial action at the Site, several structures were also installed along the shoreline of Site, including two large steel sheet piling bulkheads and several concrete headwalls associated with existing outfalls and stormwater outfalls associated with the planned redevelopment of the Site. Redevelopment of the Site, including grading and the installation of underground utilities began in 2010. In addition to utility structures, the City has an agreement with a developer to construct several structures on the Site for mixture of commercial and passive recreational uses. The City will maintain a strip of land along the Hudson Riverfront that will be designated as parkland and made available for passive recreational uses.

1.2.3 Geologic Conditions

1.2.3.1 Site Geology

According to the *Dutchess County, New York Soil Conservation Survey (SCS)*, the soils occurring on the DeLaval Site consist of Udorthents. These soils are described as very deep, somewhat excessively drained to moderately well drained soils that have been altered by cutting and filling. Review of the *Surficial Geologic Map of New York, Lower-Hudson Sheet* (1989), indicated that the overburden on-Site consists of recent alluvial deposits. These soils generally consist of oxidized, non-calcareous, fine sand to gravel and are often overlain by silt in larger valleys. These soils vary in thickness from one to ten meters and are subject to frequent flooding. According to the *Geologic Map of New York, Lower-Hudson Sheet* (1970), the bedrock beneath the Site is mapped as the Trenton Group and Metamorphic equivalents. These rocks are described as the Taconic Melange, which is a chaotic mixture of Early Cambrian through Middle Ordovician pebble to block-size clasts in a pelitic matrix of Middle Ordovician (Barneveld) age.

The subsurface investigations previously conducted at the DeLaval Site were limited to less than twenty (20) feet below the ground surface, and therefore, the complete geologic profile beneath the Site was not ascertained. However, review of historical Sanborn maps for the Site revealed that much of the Site was once under the waters of the Hudson River, and that most of the Site

consists of man-made land. Evidence of the historical filling on Site was observed during the investigations and remedial action. Historical fill, consisting of silt, sands, cobbles, brick, concrete, scrap metal, metal lathe millings, glass, plastic, ceramic tile, wood, slag, tires, etc. was observed with the most significant amount of debris being encountered at the south end of the Site. During the remedial action at the Site, several parallel timber bulkheads were encountered along certain sections of the shoreline, suggesting that the encroachment onto the river occurred in phases. Finally, the depth to bedrock at the Site varies greatly. While bedrock is over twenty feet (20) beneath the ground surface across most of the Site, there are also two large bedrock outcroppings (one near the Site entrance at the intersection of Rinaldi Boulevard and another near the south end of the Site) present at the Site.

1.2.3.2 Site Hydrogeology

The average static depth to groundwater at the DeLaval property ranged from five to seven feet below the ground surface. While regional groundwater flow is to the west towards the Hudson River, a localized evaluation of the groundwater flow direction beneath the Site was not performed during the previous Site investigations due to the extreme variations in water levels observed over short periods of time that are a function of the tidal changes associated with the Hudson River. Generally, groundwater flow beneath the Site is to the west toward the River; however, when water levels rise during a high tide, a reverse gradient to the east is observable in areas adjacent to the Hudson River.

The Hudson River, which is adjacent to the Site, is tidally influenced and water levels also fluctuate due weather events (e.g. precipitation events) or changes in barometric pressure and wind. The mean high water (MHW) level at the Site is at elevation +1.8 feet above mean sea level (AMSL), while the mean low water (MLW) level is at an elevation of -1.4 feet AMSL. A typical high-high water elevation is typically a little above +4.3 feet AMSL while a low-low water elevation is typically around -1.7 feet AMSL.

The Hudson River, as with most tidal areas, experiences two high and two low tides per days (diurnal tides). The highest and lowest tides (extreme or spring tides) occur approximately twice

a month, typically around the new/full moon phase. Moderate tides, termed neap tides, occur around the first and last quarter moons.

1.3 SUMMARY OF REMEDIAL INVESTIGATION FINDINGS

A Remedial Investigation (RI) was performed to characterize the nature and extent of contamination at the Site. The results of the RI are described in detail in the following reports and analytical summary tables have been included in Appendix B:

- *Phase II Subsurface Investigation Report of the DeLaval Property*, prepared by The Chazen Companies, dated May 2001
- *Supplemental Investigation Summary Report*, prepared by Clough Harbour & Associates LLP, dated January 2005.

The following activities were conducted during the combined investigations:

- Research of historical information;
- A magnetometry survey to determine the presence of potentially buried underground structures;
- A soil gas survey to determine if a suspected landfill area was generating methane gas through degradation of wastes and assess possible vapor exposure pathways;
- Excavation of one hundred sixty-three (163) test pits to locate underground drainage/leach fields, determine the depth of wastes, determine the extent of buried structures such as underground storage tanks (USTs) and pipelines, and to collect subsurface soil and waste samples for chemical analysis;
- Collection of twenty-nine (29) discrete surface soil samples from the upper two inches of soil to evaluate the potential for direct exposure to surficial contamination;
- Installation of thirty-six (36) soil borings and twenty-three (23) temporary/permanent monitoring wells (MWs) for analysis of soils and groundwater, as well as physical properties of soil and hydrogeologic conditions, and;
- Collection of approximately twenty-three 23) discrete groundwater samples from monitoring wells.

To determine whether the soil and groundwater contain contamination at levels of concern, data from the investigation were compared to the following Standards, Criteria and Guidance values (SCGs):

- Groundwater, drinking water, and surface water SCGs are based on NYSDEC "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.

- Soil SCGs are based on the NYSDEC "Technical and Administrative Guidance Memorandum (TAGM) 4046; Determination of Soil Cleanup Objectives and Cleanup Levels".

1.3.1 Areas of Concern

Based upon the subsurface investigations previously completed at the Site by CHA and TCC as well as the construction associated with the implementation of the remedial action, the following five (5) AOCs associated with the Site as well as small areas of contamination encountered along the waterfront have been identified and are illustrated on Figure 3.

- **AOC-1:** An area of petroleum-impacted soil and groundwater near the southern end of the Site that parallels the Hudson River, approximately 0.8-acres in size. An industrial landfill/construction & demolition debris disposal area that extended eastward of the petroleum-impacted soils to a bedrock outcrop along the east side of the Site was located above the petroleum-impacted area.

- **AOC-2/3:** An area of petroleum-impacted soil and groundwater in the central portion of the Site that parallels the Hudson River, approximately 2.4-acres in size. An abandoned 14-inch oil pipeline and an approximately 400-gallon underground storage tank (UST) were also present in this AOC and likely contributed to the contamination in this area.

- **AOC-4:** An area adjacent to a former Paint Shop along the eastern border of the Site where solvent-like odors were observed during one of the investigations and several semivolatile organic compounds (SVOCs) were detected in the soil samples. This AOC was initially discovered during TCC's investigation. However, CHA was unable to find any evidence of solvent-like odors in this area during the supplemental investigation, and therefore, no remediation was planned for this area as part of the overall construction. However, the contamination found in AOC-4A (discussed below) may be related to the contamination previously observed by TCC.

- **AOC-4A:** An area measuring approximately 32-feet wide by 50-feet long of petroleum contamination that was encountered adjacent to the western side of AOC-4 while investigating for the potential presence of additional oil pipelines extending southward on the Site during the construction at the Site. Migration of the contamination in this area appeared to have been hindered by the presence of several subsurface concrete foundation walls.

- **AOC-5:** A small area of petroleum contamination encountered near the south end of the Site immediately adjacent to the eastern concrete retaining wall that runs parallel to the Site during the installation of Storm Manhole No. STMH-1. Sanborn mapping indicated the presence of a former "oil house" in this location which likely contributed to the contamination encountered in this area.

- **Revetment:** Two small areas of petroleum contamination were encountered during the subgrade excavation for the revetment in Zone 2. Similarly, two small areas of petroleum contamination were also encountered in Zone 4 during the revetment subgrade excavation. The limits of the petroleum contamination were reached as the excavations were advanced inland. However, based upon test excavations beyond the limit of the revetment stone, the contamination in Zone 2 extended further into the river. Delineation of the limit of impacted sediment within the Hudson River was not required as part of the construction requirements for this project.

A dilapidated relieving platform cantilevered over the river and a bulkhead system existed along most of the DeLaval property shoreline prior to the 2008 to 2012 construction, which included demolition and shoreline stabilization. The structure included a buried timber bulkhead or cutoff wall that had apparently impeded the migration of significant quantities of petroleum contaminants observed in the AOCs towards the Hudson River. However, the condition of the existing wall varied from adequately intact to significantly eroded and dilapidated. In some areas of the Site, multiple timber cutoff walls were observed, suggesting that historically the Site was enlarged via additional encroachments in to the Hudson River of several phases.

It should be noted that "grossly contaminated soils", referred to throughout the work plan, are defined as soil, fill or debris, sediment, surface water, or groundwater which contain free product or mobile contamination that is identifiable either visually, through strong odors, by elevated vapor

levels as indicated by field instrumentation, or is otherwise readily detectable without laboratory analysis.

1.3.1.1 AOC-1: Construction & Demolition Debris Disposal Area

AOC-1 was an area that is suspected of being used as an industrial landfill for the disposal of primarily construction and demolition debris. This area was located near the south end of the DeLaval property and was estimated to be approximately 0.8-acres (35,000 square feet) in size. The depth to the contamination in this area typically ranged from five to fifteen feet below the ground surface. A variety of materials were encountered in AOC-1 including silt, sands, cobbles, metal lathe millings, brick, fire brick, concrete, clay pipe, scrap metal, glass, ceramic tile, carpet, wood, slag, plastic, scrap metal, off-spec machinery and automobile parts, metal shavings covered with a white grease-like lubricant, and tires. In addition, CHA noted a petroleum odor and sheen on the groundwater observed in some of the test pits excavated along the west side of AOC-1 during the supplemental investigation.

1.3.1.2 AOC-2/AOC-3: Northwest Petroleum-Impacted Area

AOC-2 and AOC-3 were initially thought to be separate petroleum impacted areas located near the center of the DeLaval property. However, based up on the results of the supplemental investigation, it was determined that these areas were connected and contain similar contaminants. AOC-2/3 had an approximate area of 2.4-acres (105,000 square feet) and the petroleum impacted soils were typically encountered at a depth between two to five feet below the ground surface. The vertical extent of the contamination was not verified at several locations in AOC-2/3 due to the presence of concrete or brick structures, and the instability of the test trenches below the water table, especially where coarse slag material or cobbles were encountered. However, petroleum odors were noted at depths of up to fourteen feet below the ground surface.

An abandoned six-inch diameter pipeline and what was thought to be an approximately 4,000-gallon underground storage tank (UST) containing fuel oil, sludge, and/or groundwater were identified in addition to the petroleum impacted soils near the center of this AOC (in proximity of what was believed to be the former engine room associated with former DeLaval facility) during

the completion of the supplemental investigation. This tank was not removed during the investigation due to its poor condition, but was actually determined to be an approximately 400-gallon tank and was then removed during remedial construction activities. It appeared that historical releases from the pipeline and UST likely contributed to the observed petroleum contamination in AOC-2/3.

The fuel oil pipeline was located approximately four feet below grade and was apparently installed over a concrete slab. The pipe was found to be in relatively poor condition and the soils surrounding the pipe appeared saturated with fuel oil. While the slab was believed to have reduced the vertical migration of the petroleum contamination, the pad was noted to be in poor condition or absent in some locations. It was determined that the top two feet of fill material was relatively free of petroleum contamination, while approximately two feet of present immediately above the pipe was more contaminated. These soils were stained and had a strong petroleum odor. In locations where the concrete slab was broken up or missing, the petroleum contamination was identified to be deeper than four feet. While the 6-inch diameter pipeline containing weathered fuel oil was removed during the remedial construction activities, two parallel 14-inch diameter fuel oil pipelines were also discovered and removed from AOC-2/3 during the remedial construction activities.

The water table was typically encountered at a depth of five to seven feet below the ground surface depending upon the ground surface elevation and the tide in the Hudson River at the time that the test pits were installed. In several of the test pits excavated in AOC-2/AOC-3, the groundwater was black in color with a moderate to strong petroleum odor. It is unclear whether the black color observed in association with the groundwater was attributable to the petroleum contamination, the presence of slag and other fill materials in the subsurface or septic conditions associated with potential anaerobic breakdown of the contaminants. However, a petroleum odor did typically coincide with the presence of the sheen.

1.3.1.3 AOC-4: Former Paint Shop Area

AOC-4 was located adjacent to the location of a former paint shop along the east side of the DeLaval property. The impacted area was estimated to be approximately 0.45-acres (20,000 square feet) in size and the impacted soils were typically encountered at an interval of two to eight feet below the ground surface. Several fill materials were encountered in the test pits installed in AOC-4, including concrete, brick, slag, wood, and several cobbles. While no significant staining was observed on the soils in AOC-4, organic vapor readings ranging from 23 to 31 parts per million (ppm) and a solvent-like odor emanating from the test pits were noted.

Although solvent-like odors were noted while excavating the test pits in AOC-4 during previous investigations, the analytical results for the soil samples collected in this area did not indicate the presence of elevated concentrations of volatile organic compounds (VOCs) or chlorinated-VOCs (CVOCs). Several semivolatile organic compounds (SVOCs) were detected in the soil samples collected from AOC-4 at concentrations above NYSDEC Soil Cleanup Objectives identified in TAGM 4046. Other than a slight sheen on the groundwater table observed in test pit TP-41, there was no field evidence of groundwater contamination in the test pits excavated in AOC-4.

1.3.1.4 AOC-4A: Petroleum-Impacted Area Adjacent to AOC-4

During the course of the remedial action, a fourteen (14)-inch diameter oil pipeline was encountered in AOC-2/3. To investigate whether or not this pipeline extended further south beyond AOC-2/3 or not, several additional test pits were excavated attempting to locate the pipe. While no 14-inch oil pipeline was found to the south, an area of petroleum-impacted soils was discovered adjacent to the western edge of AOC-4. An area measuring approximately 32 feet wide by 50-feet long was excavated from AOC-4A to remove the limits of gross-contamination in this area. Numerous foundation walls were encountered in this excavation, which are expected to have limited the migration of the contamination in this area.

1.3.1.5 AOC-5: Petroleum-Impacted Area at Former Oil House

Similar to AOC-4A, a small area of petroleum-impacted soils was encountered immediately adjacent to the eastern retaining wall when excavating the Site for the installation of Storm

Manhole No.1 (ST MH-1) as part of the weep hole drainage system installation. Supplemental reviews of available Sanborn mapping by the NYSDEC and CHA (originally performed by TCC during the Phase I ESA of the Site and two other properties) revealed the presence of a former "oil house" in this location, which likely contributed to the contamination encountered in this area. The limits of the contamination were removed in all directions and confirmatory samples were collected to verify removal of this AOC. However, no confirmatory sample was collected along the eastern side of the excavation as all soil was removed to the concrete retaining wall leaving no material to sample in this direction.

1.3.2 Nature & Extent of Contamination

Many soil and groundwater samples were collected to characterize the nature and extent of contamination at the Site during the RI. The main categories of contaminants that exceed the NYSDEC SCG values are VOCs, SVOCs, polychlorinated biphenyls (PCBs), and metals.

Numerous SVOCs were detected in the soil samples collected at the Site. The SVOCs consisted primarily of a group of compounds known as polynuclear aromatic hydrocarbons (PAHs). PAHs are compounds that are part of the makeup of petroleum or asphalt products, roofing products, soot from open burning, exhaust emissions from internal combustion engines, among other sources. As could be expected at a former industrial property such as this, PAH compounds were found to be widespread across the Site in both surface and subsurface soils. The PAH compounds most commonly detected above SCGs include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene. PCBs were detected above SCGs in the southern area of the Site in surface and subsurface soils and in groundwater.

Metals were also detected in soil at the Site at concentrations above SCGs. Specifically, the metals most commonly detected at the DeLaval property included arsenic, cadmium, chromium, lead, silver, and mercury.

The extent of contamination and the media affected are detailed in the following subsections.

1.3.2.1 Waste Materials

As previously indicated, a number of waste materials were encountered in AOC-1. While fill materials, including soil, cobbles, and slag were encountered across the majority of the DeLaval Site, the subsurface investigations revealed that concrete, brick, scrap metal, and wood were also present in AOC-2/3.

1.3.2.2 Surface Soils

The analytical results for the surface soil samples were compared to the NYSDEC's Recommended Soil Cleanup Objective concentrations listed in TAGM No. 4046, which the NYSDEC had established as the surface soil SCG values for the DeLaval property.

A number of SVOCs, namely PAHs, were also detected in the surface soil samples collected across the DeLaval property. Phenanthrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and dibenzo(a,h)anthracene, were detected in excess of the NYSDEC recommended soil cleanup objective concentrations . It appears that the contamination is fairly widespread across much of the DeLaval property, rather than being limited to a few isolated areas. With the exception of five of the soil samples collected across the Site, at least one SVOC was detected in excess of the cleanup objective concentration in each of the other samples analyzed.

Aroclor-1260 was the only PCB congener detected in the surface soils on the DeLaval property. It was detected in 11 of the 30 surface soil samples collected from the DeLaval property, mainly along north side of AOC-1 and the northern one-third of the Site. However, Aroclor-1260 was only detected in three samples exceeding the TAGM 4046 guidance value of 1 part per million (PPM) along the north end of AOC-1, with concentrations up to 3.4 ppm.

Metals contamination was also identified in a majority of the surface soils collected from the DeLaval Site. With the exception of the background sample and a sample collected approximately three-hundred feet south of the background sample, there were at least three metals in excess of the background concentrations in all of the surface soil samples on the DeLaval property. Arsenic,

cadmium, chromium, lead, silver, and mercury were the most commonly occurring metals detected above the SCGs. Maximum concentrations detected during the supplemental investigation include arsenic at concentrations up to 24.8 ppm, cadmium at concentrations up to 8.7 ppm, chromium at concentrations up to 627 ppm, lead at concentrations up to 908 ppm, silver at concentrations up to 240 ppm, and mercury at concentrations up to 1.3 ppm.

1.3.2.3 Subsurface Soils

Contamination in the subsurface soils was mainly located within the three previously identified AOCs. Petroleum- related VOCs, PAHs, and metals contamination are widespread in AOC-1 and AOC-2/3. AOC-4 contained low-level PAH contamination and was observed to have solvent odors in test pits.

TAGM 4046 guidance values were exceeded in AOC-1 for VOCs, SVOCs, PCBs, and heavy metals. VOC compounds included benzene detected at one location at 2.3 ppm, xylenes at two locations up to 2.5 ppm, and 1,1,1-trichloroethane at one location at 2.3 ppm. SVOCs were more prevalent, consisting of PAHs at concentrations several times the TAGM 4046 guidance values. PCBs were detected in one subsurface sample at 11 ppm, slightly above the TAGM 4046 guidance value of 10 ppm. Heavy metals were detected above TAGM 4046 guidance values at eight locations and included arsenic, mercury, barium, cadmium, chromium, lead, and silver. Evidence of petroleum contamination was encountered along the western edge of AOC-1 as well as strong petroleum odors and heavy black staining of the soils.

SVOCs and heavy metals were detected in AOC-2/3 above TAGM 4046 guidance values. PAHs were found at most test pit locations at concentrations several times the guidance values. Heavy metals were detected at similar frequency and concentrations as found in AOC-1.

Most of the subsurface soil identified as requiring remediation in AOC-1 and AOC-2/3 was based on observations that met the criteria for grossly-contaminated soils during the supplemental investigation activities. No grossly-contaminated soils were identified in AOC-4.

1.3.2.4 Groundwater

Several groundwater samples were collected from on-Site monitoring wells during the subsurface investigations conducted at the DeLaval property. The groundwater results were evaluated by comparing the data to the NYSDEC's *Technical and Operational Guidance Series (TOGS) 1.1.1 of "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations" for fresh (Class GA) Groundwater (1998)*. The following paragraphs summarize the results of the groundwater investigations; however, the analytical results from these investigations indicate that the impact to the groundwater quality beneath the DeLaval property has been minimal.

As previously indicated, black groundwater with a moderate to strong petroleum odor and with sheen on the surface was encountered in a number of the test pits in AOC-2/3. Only minor petroleum odor was noted in the groundwater removed from the wells in AOC-1. During the remedial activities, it was confirmed that he black liquid observed was associated with the former release of petroleum-related products at the Site. In fact, significant amounts of "free product" were removed from both AOC-1 and AOC-2/3 during the implementation of the remedy, with the greater quantity being in AOC-2/3.

Based on analytical data from the investigations at the Site, chemical impacts to groundwater were minimal. The compound 1,2,4-trimethylbenzene was detected above SCGs in one sample, as was naphthalene, p-& m-xylene, and cis-1,2-dichloroethene. PCBs were detected above SCGs on two occasions from one well located in AOC-1 at a concentration of 4.7 ppb during the first sampling event and 0.31 ppb during a second sampling event. Lead was detected above the SCGs in one sample collected from monitoring wells.

1.3.2.5 Soil Gas

Based upon some of the putrescible wastes identified TCC in AOC-1, a soil gas survey was performed in this area to measure concentrations of combustible gas. Soil gas results from the survey conducted in AOC-1 indicated that there was no active methane gas generation in the vicinity of the landfill.

1.4 SUMMARY OF REMEDIAL ACTIONS

Throughout the remainder of this SMP, locations on the Site are often referred to as Zones 1 through 5. These Zones are briefly described as follows and are identified on Figure 3:

- Zone 1: The southern-most portion of the DeLaval property, extending approximately 381 lineal feet northward of the southern property boundary. This Zone includes the Zone 1 bulkhead and all of AOC-1.

- Zone 2: An approximately 848 lineal foot long sections of the DeLaval property located north of Zone 1 and south of Zone 3. Zone 2 is located between AOC-1 and AOC-2/3 and no significant remediation was planned for this area. However, a relatively small amount of petroleum-impacted soils were disposed offsite from the Zone 2 waterfront during the course of preparing the subgrade for riprap revetment installation.

- Zone 3: This zone is approximately 658 lineal feet long and includes the Zone 3 bulkhead and all of AOC-2/3.

- Zone 4: This zone is approximately 730 lineal feet long and includes the northernmost portion of the DeLaval Site along with a portion of the Grandview Development property to the north of the DeLaval property. Specifically, the southernmost 370 lineal feet of Zone 4 is part of the DeLaval Site and the northernmost 360 lineal feet is part of another City-owned waterfront strip of land adjacent to the Grandview/Shadows facility that was developed prior to the commencement of the DeLaval construction. While no active remedial work was anticipated for this area a relatively small amount of petroleum-impacted soils were disposed offsite from this area during the course of preparing the subgrade for riprap revetment installation. The primary activity conducted in this zone was the installation of riprap revetment along the shoreline and the extension of or replacement of existing outfalls.

- Zone 5: This zone is approximately 311 lineal feet in length and is completely off the DeLaval property. However, the installation of riprap revetment was conducted in this zone. This zone was similar to Zone 4; however, the primary difference is that a series of live stakes were installed in Zone 5 to attempt to soften the riprap hardscape with a green, more natural surface.

Figure 3 also provides the as-built locations of the bulkhead systems, revetment, underground utilities, and the actual limits of the AOC excavations described in this SMP.

1.4.1 Contract Documents

The Site was remediated in accordance with the NYSDEC-approved Remedial Design dated July 2007 and the Contract Documents (which included technical specifications and other contractual requirements) dated August 8, 2007. A total of six (6) addenda were issued during the bid phase of the project and are summarized as follows:

- Addendum No. 1, dated August 22, 2007
  - Extended the deadline for submittal of sealed bids
  - Changed the date of the pre-bid meeting
  - Added requirements for apprenticeship agreements
  - Added non-collusive bidding certification requirements
  - Added standard clauses for New York State contracts

- Addendum No. 2, dated September 14, 2007
  - Added soil boring logs to Information Available to Bidders
  - Added three line items to the Contract, including the installation of a sheet pile cut-off wall (was only required if the mud line in the river was too steep to facilitate proper installation of the riprap revetment or the toe protection stone on the waterward side of the bulkheads, but was ultimately not necessary), offsite disposal of construction and demolition (C&D) debris, and offsite disposal of solid waste
  - Extended Developer time to grade Site/ install utilities from 45 days to 90 days
  - Extended the completion date for the end of the project until the end of 2008
  - Revised the description of two payment line items in the contract
  - Modified the required overlaps for the demarcation barrier geotextile
  - Revised the specifications for the bulkhead waterstop material
  - Extended the length of the Zone 1 outfall such that it extended beyond the deadman
  - Added an alternate for the backflow preventers for the weep hole drainage system
  - Clarified requirements for retainage
  - Clarified requirements of contractors to apply for dispensation for overtime work
  - Clarified that welding of bulkhead interlocks was not permitted
  - Extended the question period for contractors bidding on project
  - Provided a revised bid form to reflect the new items added to the contract

- Addendum No. 3, dated September 21, 2007
  - Provided a revised bid form to reduce the number of steel sheet pile (SSP) toe pins
  - Added alternate anchor plate assemblies to the contract
  - Revised the description of two payment line items in contract
  - Revised the specification for the gradation of the riprap stone along shoreline
  - Revised the specification for the bulkhead waterstop and steel sheet piles

  - Permitted use of fabricated corner pieces for steel bulkheads
  - Provided clarifications for which bulkhead pieces required epoxy coating
  - Revised the concrete cap shear key detail note
  - Clarified the placement of toe pins
  - Clarified role of Contractor and Developer when Developer on-Site
  - Clarified that Contractor must also unload salvaged materials at City garage
  - Clarified permit requirements for the tank closure(s)
  - Again clarified no welding of interlocks was to be permitted
  - Clarified that burning holes through sheet piles for bolt holes was not permitted

- Addendum No. 4, dated September 26, 2007
  - Provided a revised bid form to add the potential need for a revetment cutoff wall
  - Divided the bulkhead work items into three separate payment items

- Addendum No. 5, dated September 27, 2007
  - Extended the deadline for submitting bids one additional week
  - Removed topsoil and seed alternate from base bid
  - Revised specifications for threadbars and nuts associated with the bulkheads

- Addendum No. 6, dated September 28, 2007
  - Revised specifications for threadbars and nuts associated with the bulkheads

During the course of the remedial construction, a number of contract modifications were made via executed change orders, as summarized in Table 1-1.

Table 1-1. Summary of Change Executed Orders

Change Order No.	Date Executed	Description/Reason for Change
1	03/10/08	Contractor required to obtain railroad insurance, but draft permit indicating requirements and costs associated with the insurance not issued until after signing of the construction contract.
2	05/16/08	Replacement of existing 54-inch combined sewer overflow outfall. Was not part of the remedy, but requested to be included in the contract by the City of Poughkeepsie following the opening of the bids.
3	05/16/08	Due to the changes in grade along the waterfront, the initially installed silt fence had to be removed and replaced. The replacement due to grade changes was beyond maintenance requirements specified in the Contract.
4	05/30/08	Four (4) drums were encountered in AOC-1 just beneath the Site surface and the removal of drums was not included in the original Contract.

Change Order No.	Date Executed	Description/Reason for Change
5	06/09/08	Installation of a temporary soil containment pad to temporarily stage contaminated river sediments encountered in Zone 2 on-Site. No remedial work was included in the construction contract in Zone 2 and no investigation of the river sediments was included as part of the initial investigations of the Site.
6	06/09/08	Hauling of contaminated river sediments encountered in Zone 2, as handling of river sediments was not included in the original contract. While excavation, handling & disposal of petroleum-contaminated material were included in the contract, additional handling was required to haul the material to the containment pad for drying. The loading and handling of the material multiple times was not required by the original construction contract.
7	06/10/08	Coarse aggregate (2 to 3-inch diameter stone) required to fill in large sink holes along the shoreline. During the course of clearing and grubbing the Site, several large sink holes were discovered beneath the root balls of the trees associated with scour from the river. The scour holes had to be backfilled to provide safe work area from which to install the bulkheads and riprap revetment. A larger volume of coarse aggregate was also used for backfill beneath the water table in AOC-1 and AOC-2/3. Since dewatering the AOCs was determined to be impractical during construction, a backfill material with no "fines" was required to avoid the entrapment of pore pressure during placement, particularly since compaction testing beneath the water table was not feasible and extensive dewatering was deemed impractical.
8	08/06/08	Screening of debris out of soil for AOC-1 was not part of the original contract, but the intent of this change order was to have the Contractor provide screening of the excavated material to minimize the amount of material requiring offsite disposal and also reduce the amount of material that needed to be imported back to the Site for restoration activities.
9	09/29/08	Additional investigation and demolition activities associated with the Zone 3 bulkhead due to the excessive subsurface obstructions encountered while driving sheet piles in this area. The work included probing the limits of a large subsurface obstruction as well as time to construct a large demolition probe/H-pile and use it to prepare a path for the sheet piles to be driven through the obstruction.

Change Order No.	Date Executed	Description/Reason for Change
10	09/29/08	Timber pile disposal. Several waste disposal line items were included in the Contract; however, there was no line item to specifically dispose of creosote-coated timber piles removed as part of the shoreline reconstruction work. As described later in the FER, the Contractor had difficulty in finding a construction and demolition (C&D) debris disposal facility in eastern New York to accept this waste without significant processing.
11	12/12/08	The Contractor utilized a number of absorbent materials to manage the petroleum-impacted sediments along the Zone 2 shoreline, but again, removal of impacted materials from Zone 2 was not a part of the original contract, so absorbents utilized in this Zone 2 were in addition to those required by the Contract.
12	12/12/08	Tire disposal. Given the number of buried tires encountered at the Site, a line item was required to address the specific disposal of a waste tire stream. Additionally, the tires were partially cleaned (e.g. removal of large soil clods and quick washing) and sorted in preparation of disposal.
13	12/23/08	The handling and removal of an unforeseen 14-inch oil pipeline in Zone 3 partially filled with oil.
14	02/16/09	Renewal of insurances for the project. Most of the premiums were paid on an annual basis. Since the change orders extended the completions dates beyond a one-year construction schedule, additional compensation was provided to the Contractor for renewal of the insurance.
15	02/05/09	Additional geotextile fabric was used in the AOC excavations to control fines migration between the coarse stone material placed beneath the water table and the finer-grained on-Site soils placed on-top of the stone. The fabric was the same as the demarcation barrier geotextile; however, this change order was prepared to compensate the Contractor for the additional material utilized in the AOCs.
16	03/12/09	Similar to CO-14, this change was associated with the costs to renew the railroad insurance in accordance with the extended schedule for the construction contract.
17	03/26/09	Excavation, loading, and disposal of materials contaminated by unforeseen asbestos-containing materials (ACM) encountered in Zone 1. Specifically, this material had already been screened and was stockpiled in Zone 2.
18	03/26/09	Setup and preparation for the ACM removal activities in CO-17.
19	04/07/09	The Developer of the DeLaval Site had previously installed a temporary fence along the north side of the Site. However, since the City's Contractor was still utilizing the fence and had damaged it, this change was provided to the Contractor so that the City could compensate the Developer for the fence that they were using for the construction work.

Change Order No.	Date Executed	Description/Reason for Change
20	04/07/09	Following the clearing of trees and vegetation along the southeast corner of the DeLaval Site, MetroNorth requested that the City have a temporary fence installed to control potential trespassers.
21	05/22/09	Disposal of soils impacted by both petroleum contamination and ACM in Zone 1, specifically the area between the bulkhead and the deadman where excavation was more difficult and production was slower.
22	05/22/09	Disposal of soils impacted by both petroleum contamination and ACM in Zone 1, specifically the area east of the bulkhead deadman. Also, included spot removals along shoreline in Zone 2 where some ACM-impacted material had been placed prior to discovery of the presence of ACM.
23	05/22/09	Setup and preparation for the ACM removal activities in Zone 1.
24	06/29/09	Setup and preparation for the ACM removal activities in Zone 2.
25	06/29/09	Modifications to the weep hole drainage system associated with the existing retaining wall along the east side of the DeLaval property. Specifically, this change order deals with the additional costs associated with design modifications associated with final grade changes established by the Developer, such as an increased pipe diameter, longer pipe runs, etc.
26	06/29/09	Based upon the Site grades established by the Developer in the southeast corner of the DeLaval property, erosion control blankets (ECBs) were required to provide slope stabilization for slopes of 33 percent and greater until vegetation could be established.
31	02/24/10	Modifications to the concrete anchor blocks (deadman) required to help support the southern end of the Zone 1 bulkhead. The modifications were prepared based upon actual field conditions encountered at the location of each block.

Change Order Nos. 27, 28, 29, 30, 32, and 33 were not included in the summary table above as these changer orders were never executed by SWC and returned to CHA, as required by the Contract Documents.

In addition to the executed change orders, a total of eight (8) Work Change Directives (WCDs) were issued during the course of the construction. WCDs were issued to provide a modification to the original Contract documents in writing or provide clarification to the Contractor in absence of a Request of Information (RFI). The WCDs are summarized in the following table:

Table 1-2. Summary of Work Change Directives

WCD No.	Date Issued	Associated Change Order(s)	Description/Reason for Change
01	05/23/08	None	Revised coordinates of AOC-2/3, specifically the corners of the future building pad, to accommodate changes made by the Developer of the Site.
02	09/12/08	31	Due to depth to bedrock at the south end of the Zone 1 bulkhead, a steel sheet pile deadman was not possible, and therefore, SWC was required to install an alternative concrete anchor block deadman in this area.
03	09/16/08	None	Revised coordinates of AOC-2/3, specifically the corners of the future building pad, to accommodate changes made by the Developer of the Site.
04	12/15/08	25	Revised weep hole drainage system along MTA retaining wall due to grading changes made by the Developer for the Site.
05	05/06/09	None	The inverts of the weep hole drainage system manholes was modified to accommodate the Contractor's use of Z-Lok rubber boots casted into the concrete.
06	05/18/09	22 & 24	The Contractor was directed as to which areas in Zone 2 required removal of the material potentially containing ACM.
07	06/23/09	21, 22, & 23	The Contractor was directed as to which areas in Zone 1 required removal of the material potentially containing ACM.
08	07/31/09	26	The Contractor was provided direction for grading and installing a geogrid demarcation barrier in the southeast corner of the Site due to steep slopes resulting from a collapse of an old brick retaining wall.

Finally, the Contractor submitted a number of written RFIs during the course of the project. The Engineers then provided written response to the RFIs, at which point the written clarifications became part of the contractual requirements for the project.

1.4.2 Summary of Remedial Activities

The following is a summary of the major Remedial Actions (RAs) performed at the Site:

1. The installation of two steel sheet pile bulkheads down-gradient of the AOCs. More specifically, an approximately 331-foot long, anchored bulkhead with a combination of

steel sheet pile and concrete block deadman was installed down-gradient of AOC-1 at the south end of the Site. An approximately 658-long cantilevered bulkhead was installed down-gradient of AOC-2/3. These bulkheads include hydrophilic (water swelling) water stops in the sheet pile interlocks. The bulkheads were installed prior to the excavation of contaminated soils to protection the Hudson River during the soil removal process, but also to serve as permanent barriers between the remaining contamination at the DeLaval Site and the Hudson River.

2. The excavation of grossly-contaminated soil/media within AOC-1 and AOC-2/3, and the off-site disposal of these materials. Most of the soil disposed from AOC-1 was disposed of petroleum-contaminated soil (PCS) containing regulated asbestos waste (RAW) while the soil from all other AOCs were disposed of as PCS only. In addition to the AOC excavations identified during the investigation phase of the project, petroleum-impacted soils and/or sediments were also removed from the following locations:

   - **AOC-4A:** An area measuring approximately 32-feet wide by 50-feet long of petroleum contamination that was encountered adjacent to the western side of AOC-4 while investigating for the potential presence of additional oil pipelines extending southward on the Site during the construction at the Site. Migration of the contamination in this area appeared to have been hindered by the presence of several subsurface concrete foundation walls.

   - **AOC-5:** A small area of petroleum contamination encountered near the south end of the Site immediately adjacent to the eastern concrete retaining wall that runs parallel to the Site during the installation of Storm Manhole No. STMH-1. Sanborn mapping indicated the presence of a former "oil house" in this location which likely contributed to the contamination encountered in this area.

   - **Revetment:** Two small areas of petroleum contamination were encountered during the subgrade excavation for the revetment in Zone 2. Similarly, two small areas of petroleum contamination were also encountered in Zone 4 during the revetment subgrade excavation. The limits of the petroleum contamination were reached as the excavations were advanced inland. However, based upon test excavations beyond the limit of the revetment stone, the contamination in Zone 2 extended further into the river. Delineation of the limit of impacted sediment within the Hudson River was not required as part of the construction requirements for this project.

   - **Spills:** In addition to the petroleum-impacted areas encountered in the AOCs and areas described above, the Contractor was also required to cleanup small spills that occurred as a result of their actions and/or equipment failures.

Confirmatory results were collected following the excavation area to verify the level of cleanup. However, since the material in these excavations was the responsibility of the Contractor to dispose of at his/her expense, the overall quantities of disposed material reported in this document exclude the material that was the responsibility of the contractor.

Grossly-contaminated media is defined by the NYSDEC as "soil, sediment, surface water or groundwater which contains sources of substantial quantities of mobile contamination in the form of NAPL that is identifiable either visually, though strong odor, by elevated contaminant vapor levels, or is otherwise readily detectable without laboratory analysis." Section 1.4.3 of the SMP summarizes the materials/items were disposed from the Site during the implementation of the Remedial Action.

3. The construction and maintenance of a soil cover system to prevent human exposure to remaining contaminated soil/fill remaining at the Site. The soil cover system consists of a 6-ounce non-woven geotextile and a one-foot layer of barrier protection soil. In areas where the subgrade slopes exceeded a 3:1 slope, a biaxial geogrid was utilized as the demarcation layer due to the desire to have more soil-to-soil contact between the soil cover layer material and the existing Site soils. This was required due to the low friction angle provided by the demarcation barrier material and concerns with the overall slope stability.

4. While not an element of the remedial action, riprap revetment was installed along the non-bulkhead areas of the Site shoreline to reduce the potential for erosion and scour of Site soils. Had the revetment not been installed, future scour could have potentially resulted in damage to or a loss of a portion of the soil cover system and the potential scouring of remaining contaminated soils behind the bulkheads. The following lists summarizes the length and location of each revetment section present at the Site:

   - Zone 1: 50 lineal feet (south of the Zone 1 bulkhead)
   - Zone 2: 848 lineal feet
   - Zone 4: 370 lineal feet (southernmost area of Zone 4)

5. Execution and recording of an Environmental Easement to restrict land use and prevent future exposure to any contamination remaining at the Site.

6. Development and implementation of a SMP for long term management of remaining contamination as required by the Environmental Easement, which plans for: (1) Institutional and Engineering Controls (ICs/ECs), (2) monitoring, (3) operation and maintenance, and (4) reporting.

Remedial activities were completed at the Site in January 2012 with the installation of the final cover system.

1.4.3 Removal of Contaminated Materials from the Site

The following table summarizes the types of materials removed from the Site as well as their origin (other than vegetation removed as part of clearing and grubbing activities):

Table 1-3. Summary of Materials Disposed From Site

Material	Origin	Quantity
Petroleum-Contaminated Soils (PCS)	AOC-1 AOC-2/3, 4A & 5, Revetment Areas	220.62 Tons 34,041.24 Tons
PCS with ACM	AOC-1	10,312.03 Tons
ACM-contaminated debris	AOC-1	7,668.38 Tons
Timber Piles	Waterfront	660.54 Tons
Petroleum-contaminated groundwater	AOC-2/3	29,602.4 Gallons
LNAPL/Free Product	AOC-2/3	1,443.6 Gallons
14-Inch Oil Pipeline	AOC-2/3	315 Lineal Feet
400-gallon UST	AOC-2/3	1 Each
Drums of waste hydraulic oil	AOC-1	2 Each
Drums of debris contaminated with oil	AOC-1	2 Each
Waste Tires	AOC-1 (Primarily)	942 Each
Scrap Steel	Site-wide	146.1 Tons[1]

Note: 1.This includes Site-derived scrap steel only with the exception of scrap steel that was included in specific Contract line items. It should be noted that an additional 8.31 tons of steel (Ticket No. 184083, dated June 26, 2009) was associated with the disposal of the UST and 14-inch oil pipeline from AOC-2/3 (e.g. lump sum Item Nos. 22 & 23 in the Contract), and therefore, was not included in the payment of 146.1 tons of disposal paid to the Contractor under Item 52 of the Contract. Additionally, scrap steel associated with the bulkhead construction was included in the bulkhead line items of the Contract, and therefore, the quantity was not tracked by the Engineer. The Contractor provided one ticket associated with the scrap generated from the bulkhead construction(Ticket No. 193697 dated September 23, 2009 for 15.9 tons), and while included with the FER, the weight associated with this ticket is not included in summary table, nor was it included in the payment to the Contractor.

Figure 4 has been included in the SMP to depict the actual limits of each AOC excavation. Per the ROD for the Site, the goal of the remedial construction was to excavate and dispose of grossly-contaminated soils. While confirmatory samples were collected following the excavation process (see Section 1.4.5), the limits of the AOC excavations was based upon field screening processes,

including use of visual, olfactory, and photoionic evidence of contamination. It should be noted that a small percentage of the PCS listed in Table 1-3 was actually removed from the waterfront between the AOCs during the installation of the revetment between the bulkheads. The limits of the PCS contamination in the Hudson River (western limits) were not reached; however, the limit of the PCS soils on the DeLaval Site were reached to the north, south, and east as the subgrade for the revetment was excavated.

In an effort to reduce the amount of material being disposed off-site and reduce the amount of fill imported to the Site, a decision was made during the remedial construction to screen some of the debris out of the soils in AOC-1 in the upper four to six feet of the AOC-1for eventual reuse as backfill. Since the upper soils appeared to contain debris only and had no evidence of significant petroleum contamination, a shaker-type screen was mobilized to undertake the screening operation. However, during the course of the screening process, small transite fragments, a suspected ACM, were discovered. Upon confirmation of the presence of ACM, the screening operation was immediately halted. As a result, most of the material separated out by the screen unit was disposed of off-site as ACM-contaminated debris and most of the grossly-contaminated, petroleum-impacted soils in AOC-1 were disposed of off-site as petroleum-contaminated soils containing regulated asbestos waste (RAW). Section 1.4.5.5 describes the area of potential remaining ACM on the Site.

Figure 4 also depicts the approximate depths of soil removal in each AOC. Specifically, a grid system was overlaid over each AOC, and the approximate depth excavated in each grid cell is identified. The depths were approximated utilizing a survey rod & level and/or wooden ruler, as the bottom of the excavation was beneath the water table and was not visible. Each AOC was backfilled following the PCS removal and collection of confirmatory samples. While attempts were made to restore the grades in AOC-2/3 to an approximate average elevation, the grades were not restored to original grades in AOC-1 in attempt to control project costs following the discovery of ACM and the unplanned capital expenditures associated with the off-site disposal of this material.

1.4.4 Site-Related Treatment Systems

No long-term treatment systems were installed as part of the Site remedy.

1.4.5 Remaining Contamination

Following the completion of the AOC excavations, confirmatory samples were collected from both the bottom and side walls of the excavations to document the remaining contamination levels at the Site. A total of twelve (12) confirmatory samples were collected from each AOC, as shown on Figure 5. Tables summarizing the analytical results (detected parameters only) of the confirmatory samples have been included in Appendix C, including:

- Table C-1: Confirmatory Results for AOC-1
- Table C-2: Confirmatory Results for AOC-2/3
- Table C-3: Confirmatory Results for AOC-4A
- Table C-4: Confirmatory Results for AOC-5
- Table C-5: Minimum and Maximum Concentrations for the Major AOCs

The subsections below summarize the data and provide a comparison to Part 375 Unrestricted SCOs.

1.4.5.1 AOC-1 Confirmatory Sample Summary

For AOC-1, four (4) of the confirmatory samples were collected from the bottom of the excavation while the remaining eight (8) samples were collected from the sidewalls of the excavation. The following characteristics for AOC-1 were noted from the confirmatory samples:

- No VOCs were detected in eleven (11) of the confirmatory samples. Naphthalene and sec-butylbenzene were detected at concentrations below the Part 375 unrestricted use SCO in Sample No. 11, collected along the southern sidewall of the excavation.

- No SVOCs were detected in seven (7) of the confirmatory samples. One (1) or more of eight (8) SVOCs, specifically PAHs, were detected in the remaining confirmatory samples collected; however, all of these PAHs were detected at concentrations below the unrestricted SCOs.

- No PCBs were detected in ten (10) of the twelve (12) confirmatory samples. However, two PCB congeners, Aroclor-1254 and Aroclor-1260, were detected in Sample Nos. 9 and 10 near the northern end of the excavation, at total PCB concentration of 0.827 milligrams per kilogram (mg/Kg) and 0.143 mg/Kg, respectively. These results are in excess of the unrestricted use SCO for PCBs, which is 0.1 mg/Kg or 0.1 parts per million (ppm), but is below the restricted commercial SCOs of 1 mg/Kg.

- No pesticides or herbicides were detected in any of the confirmatory samples.

- Metals were detected in all of the confirmatory samples and all but one (1) had at least one metal compound detected at a concentration in excess of the Part 375 unrestricted SCO. The metals detected in excess of the unrestricted SCOs include chromium, copper, lead, nickel, and zinc. With the exception of copper and nickel, all metal concentrations were below the commercial SCOs. However, the remedy for the project did not specifically target remediation for metals beyond encapsulation beneath a soil cover system, so the remaining metals at the Site are not unexpected.

- Sheens were observed periodically on the groundwater surface in AOC-1 during the course of the removal activities and after the excavation, indicating some level of residual product remaining. Long-term groundwater monitoring will be conducted to evaluate any impacts to groundwater, as described in the SMP.

1.4.5.2 AOC-2/3 Confirmatory Sample Summary

For AOC-2/3, nine (9) of the confirmatory samples were collected from the bottom of the excavation (most near the perimeter of the excavation) while the remaining three (3) samples were collected from the sidewalls of the excavation. The following characteristics for AOC-2/3 were noted from the confirmatory samples:

- No VOCs were detected in ten (10) of the confirmatory samples. Naphthalene was detected in Sample No. 13-Bottom and tetrachloroethene (PCE) was detected in Sample No. AOC-2/3-#19; however, both compounds were detected at concentrations below the Part 375 unrestricted SCOs.

- No SVOCs were detected in ten (10) of the twelve (12) confirmatory samples. A total of ten (10) SVOCs, specifically PAHs, were detected in the remaining confirmatory samples collected; however, only benzo(a)anthracene, benzo(a)pyrene, chrysene, and indeno(1,2,3-cd)pyrene were detected at levels in excess of the unrestricted SCOs, and exceedances were only detected in Sample No. 10 (side wall) near the south end of the excavation. There were no unrestricted SCO exceedances in Sample No. AOC-2/3-#4 also collected near the south end of the excavation. Only benzo(a)pyrene in Sample No. 10 was detected at a concentration in excess of the commercial SCO (concentration of 1.5 mg/Kg versus a SCO of 1 mg/Kg).

- The detected PCB congener results are summarized in the table below, as well as in Appendix C. Two PCBs congeners, Aroclor-1254 and Aroclor-1260, were detected in Sample AOC 2/3-2 at a combined concentration below the unrestricted SCO of 100 micrograms per kilogram (µg/Kg). Aroclor-1260 was also detected in Samples #13 Bottom, #10 Side, AOC 2/3 Grid 11, and AOC 2/3 Grid 4, but was only detected in excess of the unrestricted SCO in Samples #13 Bottom and #10 Side. However, the total PCB concentrations in #13 Bottom and #10 Side (which is only Aroclor-1260 in this case) is well below the restricted commercial use SCO of 1,000 µg/Kg for total PCBs.

Compound	Units	AOC 2/3 2	#13 Bottom	#10 Side	AOC 2/3 Grid 11	AOC 2/3 Grid 4
Aroclor-1254	µg/Kg	30	ND	ND	ND	ND
Aroclor-1260	µg/Kg	30	240	120	0.02	0.02

Note: ND = Not detected.

- No herbicides were detected in any of the confirmatory samples. A relatively low concentration of 4-4' DDT was the only pesticide detected in AOC-2/3, and was found in Sample #7 Bottom. The concentration of DDT exceeded the unrestricted use SCO; however, was well below the commercial use SCO and protection of groundwater SCO.

- Seven (7) metals were detected in excess of the unrestricted SCOs in one or more of the confirmatory samples. However, the remedy for the project did not specifically target remediation for metals, so again, it is not unexpected that somewhat elevated concentrations of some heavy metals remain at the Site.

- Sheens were observed periodically on the groundwater surface in AOC-2/3 during the course of the removal activities and after the excavation, indicating some level of residual product is remaining at the Site. Long-term groundwater monitoring will be conducted to evaluate any impacts to groundwater, as described in Section 3.2.1 of this SMP.

1.4.5.3 AOC-4A Confirmatory Sample Summary

Three (3) confirmatory soil samples were collected from AOC-4A, including one (1) bottom sample and one (1) sample from both the north and east side walls of the excavation. Confirmatory soil samples were not collected from the west or south side walls of the excavation as the excavation was advance to solid foundation walls. Test pits were excavated on the opposite side of the foundation walls in both directions to confirm that the limits of the grossly-impacted soils had been removed. The following characteristics for AOC-4A were noted from the confirmatory samples:

- No VOCs, pesticides, herbicides, or PCBs were detected in any of the confirmatory samples.
- Two (2) SVOCs, specifically PAHs fluoranthene and pyrene, were detected in the confirmatory sample collected from the bottom of the excavation only. However, both compounds were detected at a concentration of 210 µg/Kg, which is well beneath the unrestricted SCOs of 100,000 µg/Kg for each compound.

- Several heavy metals were detected in the confirmatory samples; however, only copper, lead & zinc were detected above the unrestricted SCOs. All three of these metals were detected at concentrations above the unrestricted SCOs in the sample collected on the north side of the excavation, while lead was detected above the unrestricted SCO in all three samples. All three metals were detected at concentration below the Restricted Use SCOs (including both residential and commercial SCOs) established in Table 375-6.8(b) of 6 NYCRR Part 375.

1.4.5.4 AOC-5 Confirmatory Sample Summary

Four (4) confirmatory soil samples were collected from AOC-5, including one (1) bottom sample and one (1) sample from the north, west and south side walls of the excavation. As previously indicated, no confirmatory samples were collected from the eastern side of the excavation as the soil removal extended to the concrete retaining wall leaving insufficient soil to sample. The following characteristics for AOC-5 were noted from the confirmatory samples:

- No VOCs, SVOCs, pesticides, herbicides, or PCBs were detected in any of the confirmatory samples.

- Several heavy metals were detected in the confirmatory at or above the Part 375 unrestricted SCOs.

1.4.5.5 ACM Remaining

Based upon the testing activities performed at the Site to date, there are two areas suspected of containing potential ACMs remaining on-Site, as shown on Figure 5. These include the eastern embankment along AOC-1 and an area along the waterfront north of the bulkhead associated with AOC-1. The eastern embankment represents a portion of the former AOC-1 landfill area that was not excavated as part of the remedy for the Site. While additional ACM-contaminated soils were removed based on the anticipated grading requirements of the future developer of the Site, soils beneath the demarcation barrier in this area may still contain ACM material. In addition to the

horizontal demarcation barrier used to establish a vertical limit between the Site soils and soil cover system, a vertical demarcation barrier geotextile was placed along the eastern face of the removal area in AOC-1 to delineate the horizontal limits of the area removed during the course of the remedial construction.

Prior to the discovery of ACM at the Site, a small amount of overburden material removed from AOC-1 (near the surface) was placed as fill along the waterfront north of AOC-1, specifically behind the concrete jersey barriers associated with the revetment stone material in Zone 2. Some of this placed material was removed to account for grading transitions and to accommodate future light pole bases as shown on Figure 5, but excavations in this area outside the removal zones may encounter ACM beneath the demarcation barrier.

1.5 NON-REMEDIAL ACTIVITIES

In addition to the remedial activities described in Section 1.4, a number of non-remedial activities were also performed during the 2008 to 2012 construction period. The major non-remedial activities included:

- The removal and salvaging of an existing monument near the Site entrance that was associated with the former DeLaval Separator Company (former Site occupant).

- The installation of riprap revetment in Zones 2, 4 and 5 to provide shoreline stabilization. The revetment generally included a woven geotextile placed upon the subgrade, a twelve (12) inch layer of bedding stone, and a four (4) foot-thick layer of armor stone. Large toe stones were placed at the bottom of the revetment section and precast concrete jersey barriers were installed at the top of the revetment section to separate the armor stone from the Site soils.

- The installation of a weep hole drainage system along the eastern side of the DeLaval property to collect any water discharge from the weeps in the existing concrete retaining wall along the east side of the Site that were anticipated to be buried by proposed grade changes by the future developer. The system consists of a total of five (5) precast manholes connected by a series of ten (10)-inch diameter high density polyethylene (HDPE) pipe. The discharge pipes were tied into an existing precast concrete manhole that is associated with the 36-inch diameter outfall that originates from the residential development east of railroad tracks.

- The installation of five (5), 24-inch diameter stormwater outfalls to be utilized by the future developer. The outfalls typically include a twenty (20) foot long section of pipe with a plug at the landward end for future extension by the developer; however, the outfall in Zone 1 was extended sixty (60) eastward to ensure that no future excavation would be required between the bulkhead and associated deadman. The Zone 1 and Zone 3 outfalls were encased in a concrete collar where they penetrated the newly installed steel bulkheads. The two (2) outfalls installed in Zone 2 and the one (1) in Zone 4 were installed with precast concrete headwalls in the revetment sections and were fitted with backflow preventer devices.

- The installation of a new manhole, new concrete headwall, and approximately 32 lineal feet of 54-inch diameter of reinforced concrete pipe (RCP) to replace the waterward end of the City of Poughkeepsie's existing combined sewer overflow outfall at the north end of the DeLaval property.

- The extension of existing, active outfalls in Zones 4 and 5.

- The abandonment/removal of existing, unused outfalls/intakes in Zones 4 and 5.

2.0 ENGINEERING & INSTITUTIONAL CONTROL PLAN

2.1 INTRODUCTION

2.1.1 General

Since remaining contaminated soil and groundwater, and potentially soil vapor, exists beneath the Site, Engineering Controls and Institutional Controls (EC/ICs) are required to protect human health and the environment. This Engineering and Institutional Control Plan describes the procedures for the implementation and management of all EC/ICs at the Site. The EC/IC Plan is one component of the SMP and is subject to revision by NYSDEC.

2.1.2 Purpose

This plan provides:

- A description of all EC/ICs on the Site;
- The basic implementation and intended role of each EC/IC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the features to be evaluated during each required inspection and periodic review (PR);
- A description of plans and procedures to be followed for implementation of EC/ICs, such as the implementation of the Excavation Work Plan for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site; and
- Any other provisions necessary to identify or establish methods for implementing the EC/ICs required by the Site remedy, as determined by the NYSDEC.

2.2 ENGINEERING CONTROLS

The NYSDEC has defined an engineering control as "any physical barrier or method employed to actively or passively contain, stabilize, or monitor contamination, restrict the movement of contamination to ensure the long-term effectiveness of a remedial program, or eliminate potential exposure pathways to contamination. Engineering controls include, but are not limited to, pavement, caps, covers, subsurface barriers, vapor barriers, slurry walls, building ventilation

systems, fences, access controls, provision of alternative water supplies via connection to an existing public water supply, adding treatment technologies to such water supplies, and installing filtration devices on private water supplies."

2.2.1 Engineering Control Systems

2.2.1.1 Soil Cover System

Exposure to remaining contamination in soil/fill at the Site is prevented by a soil cover system placed over the Site. This cover system is generally comprised of a minimum of 12 inches of clean imported soil. Other cover systems include soil, topped with run-of-crush stone and asphalt pavement, or concrete sidewalks. Figure 6 shows the location of each type of soil cover system at the Site. The Excavation Work Plan provided in Section 6 of this SMP outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection of the cover systems are provided in Section 3.4.1 of this SMP while procedures of maintaining the soil cover systems are described in Section 6.10.

A demarcation barrier has been installed beneath the soil cover to provide a visual barrier between the existing Site soils and the clean, imported soil cover layer materials. The demarcation barrier consists of a six (6) ounce, continuous filament, non-woven geotextile (e.g. Skaps GT-160 and Mirafi 160N). However, in areas where steep slopes (i.e. greater than 3 Horizontal:1 Vertical) are present along the eastern side of the Site, the demarcation barrier consists of a polypropylene, integrally formed biaxial geogrid (e.g. Tensar BX-1100, as manufactured by Tensar Corporation).

The demarcation barrier was installed a minimum of twelve (12) inches below the finished surface. Redevelopment activities, including activities such as paving, or other site construction activities may have resulted in the barrier being installed at a greater depth at the following locations:

- In AOC-2/3, a large stone subbase material (Item 4) pad was constructed in the area where future planned buildings intersected the AOC-2/3 excavation, as shown on Figure 6. Upon review of the as-built survey information provided by the Contractor, it was determined

that the pad was approximately 20-feet short of the designed limit on the north end; however, the Contractor was required to go back and re-excavate the area to install the required additional 20-feet of pad area. In the building pad area, the demarcation layer was installed at an approximate elevation of 0.5 feet NAVD88. While imported stone material ranging from two (2) to five (5) inches in diameter was placed beneath this layer (fill placement of on-Site materials beneath the water table was deemed impractical due to compaction requirements), excavation beneath the water table would also trigger the need to implement the Excavation Work Plan discussed in the SMP. A similar geotextile was installed at elevation 0.5 feet NAVD88 in areas outside the building pad to control fines migration between the coarse stone placed beneath the water table and the finer-grained on-Site soils used as backfill. The geotextile placed at elevation 0.5 feet NAVD88outside the building pad area was installed for geotechnical purposes only, and is not considered a demarcation barrier.

- In the areas of potential remaining ACM, a minimum of a 24-inch soil cover system was required by the NYSDOL, and thus, the demarcation is a minimum of 24-inches deep in these area (east side of AOC-1 and narrow strip of land along west side of Zone 2).

- Utility trenches at the Site have also been lined with non-woven geotextile and backfilled with clean, imported fill (e.g. pipe bedding materials and/or Item 4 crusher run material). Thus, the demarcation layer is present at a greater depth beneath the finish Site grades at the location of subsurface utilities. Although all trenches are lined with a demarcation barrier and backfilled with clean material, future modifications or repair to these utilities may still trigger the need to utilize the Excavation Work Plan as discussed in the SMP. Depending on the depth and width of the original trenches, it may not be possible to maintain the demarcation barrier in place during subsequent excavations of these utility trenches. Should the on-Site soils beneath/behind the demarcation barrier be exposed during maintenance or repair activities, the Excavation Work Plan described in this SMP must be implemented.

As previously indicated, the various final soil cover systems are depicted in Figure 6 and typical sections of the primary soil cover types are included on Figure 7. However, the top 12-inches of material utilized for the soil cover typically includes either silty loam topsoil or Item 4 material. Three exceptions include:

- The southeast slope that includes 6-inches of topsoil over 6-inches of Item 4 (with a geogrid demarcation barrier beneath)

- The northern parking lot area that is now finished with an asphalt surface

- The concrete sidewalk area along the west side of Zone 4.

Procedures for monitoring the soil cover system are included in the Monitoring Plan (Section 3 of this SMP). The Monitoring Plan also addresses severe condition inspections in the event that a severe condition, which may affect controls at the Site, occurs (see Section 3.4.1).

2.2.1.2 Steel Sheet Piling Bulkheads

Due to the remaining contamination in AOC-1 and AOC-2/3, steel sheet pile (SSP) bulkheads were installed along the waterfront down-gradient of each of these AOCs. While the bulkheads provided containment of the impacted soils and groundwater during the AOC excavations, they were also designed to serve as permanent down-gradient barriers for the remaining contamination in the AOCs. The location of the Zone 1 bulkhead (down-gradient of AOC-1) and Zone 3 bulkhead (down-gradient of AOC-2/3) are shown on Figures 2 through 6.

Record drawings for the bulkheads, as prepared by OCC, have been included in Appendix D and provide both the layout and design details for each bulkhead. The record drawings reflect the field modifications that were made during the construction. The following lists summarize the major components of each bulkhead:

Zone 1 Bulkhead:

- 330.89-foot long, anchored bulkhead consisting of 160 (or 80 doubles) AZ26 steel sheet piles. The shallow depth to bedrock at the southern end of the Site restricted driving depths for the sheet piles and necessitated the need for an anchored bulkhead system as opposed to a cantilevered wall installation. The steel sheet piles were epoxy coated on both sides along their entire length, although only the upper portion of the sheet piles was required to be coated per the Contract. Refer to the "Product Listing" below for additional information.

- Return Walls: The southern return wall is approximately 16.53-feet long and consists of 8 (or 4 doubles) AZ26 sheet piles. The south return wall is a cantilevered wall system with no deadman support. The northern return wall is approximately 33.07-feet long and consists of 16 (or 8 doubles) AZ26 sheet piles. The northern wall is an anchored wall. The steel sheet piles were epoxy coated on both sides along their entire length, although only the upper portion of the sheet piles was required to be coated per the Contract. Refer to the "Product Listing" below for additional information.

- Waterstop: Adeka Ultra Seal A-30, as manufactured by Adeka Ultra Seal / OCM, Inc. was installed in the bulkhead sheet pile interlocks to seal the interlocks. The material is a hydrophilic material that swells in the presence of water to fill/seal the joint. Additionally, Adeka Ultra Seal P-201 sealant waterstop was applied to seal penetrations in the sheet piles. As a Contractor-requested substitution, waterstop was omitted at interlocks between shop-threaded double piles. In lieu of waterstop at these interlocks, the Contractor proposed and was permitted to shop-weld the interlocks prior to application of the epoxy protective coating.

- Anchor Walls: An approximately 285.78-foot long anchor deadman constructed of AZ13 steel sheet piles is located approximately 47 feet behind the face sheet piles along the waterfront. The anchor wall behind the northern return wall located approximately 40 feet behind the face sheets consists of 12 (or 6 doubles) AZ13 steel sheet piles. The anchor wall steel sheet piles were uncoated. It should be noted that the southernmost three anchor rods on the face sheets are anchored to concrete block deadman rather than the steel sheet pile deadman. The concrete anchor blocks consist of 5-foot long by 5-foot wide by a minimum of 5-foot high concrete blocks pinned into bedrock via five (5) one-inch diameter threaded rod rock anchors grouted in-place. Anchor plate assemblies were anchor bolted to the concrete blocks to provide a means of connecting the anchor rods to the blocks.

- Wales: A steel wale consisting of two C15x40 channels bolted together with 1-inch diameter anchor bolts was connected to both the face sheet piles and the steel anchor wall/deadman with four 1-inch diameter ASTM F1554, 60 kips per square inch (KSI) yield strength bolts, at an approximate interval of every 4.1-feet on-center (connected at each "belly" in the sheet pile doubles). The steel wale channels were epoxy coated. Refer to the "Product Listing" below for additional information.

- Anchor Rods: 1-1/4-inch diameter DYWIDAG threadbar anchor rods were installed between the waterfront sheet piles and steel deadman to provide additional anchoring support to the face sheets along the waterfront. The rods were designed to be spaced at an interval of approximately 12' 4-3/4" on-center. While accepted by the Engineer, the as-built survey revealed that the spacing on the tie rods ranged from 10'-11" to 12'-10" on the face sheets and 8'-2" to 8'-3" on the northern return wall. The anchor rods were bedded in 1.5-feet below and 1-foot above of run-of-crush stone (Item 4) material. The anchor rods were epoxy coated. Refer to the "Product Listing" below for additional information.

- Toe Protection Stone: To reduce the potential for scour of sediment in front of the bulkheads, a 4-foot thick layer of toe protection stone was placed in front of the bulkhead at a slope of 1.5 H:1 V. The toe protection stone included armor stone (235 to 2,125 pounds per stone) and toe stone (1,100 to 4,400 pounds per stone) at the mud line. The toe protection stone was placed on a 12-inch thick layer of 1.5 to 3-inch diameter bedding stone. A Mirafi FW-700 woven geotextile was placed beneath the bedding stone to reduce the potential for scour of the on-Site fines in the subgrade material.

- Precast concrete caps: A 30-inch wide by 12-inch precast concrete cap was installed on top of the waterfront sheet piles and on the northern and southern return walls. The caps rest on a continuous steel angle (L6" x 4" x ½") that is welded to the sheet piles and anchor bolted to the caps. In cases where the Contractor drove the sheet piles too low or the top elevations were below the design elevation of 5.5 feet NAVD88, a 5-inch high precast concrete filler beam was placed between the steel angle and final precast caps.

- Stormwater outfall: A stormwater outfall was installed through the Zone 1 bulkhead and the steel deadman as part of the redevelopment infrastructure installation. The initial installation included 60 lineal feet of a 24-inch diameter corrugated HDPE pipe. While most outfalls were initially installed with only 20 lineal feet of pipe, the Zone 1 outfall was extended behind the steel deadman sheet piles so that future excavation between the deadman and the face sheet piles could be avoided, and thus, reduce the potential for damage to the anchor rods. A cast-in-place concrete collar was installed around the pipe outfall in the bulkhead to provide a seal between the steel sheet piles, structural steel wale assembly, and the outfall pipe.

- Concrete anchor blocks: The three southernmost anchor rods on the Zone 1 bulkhead (Anchor Nos. A5, A6 & A7) were connected to cast-in-place (CIP) concrete anchor blocks (CABs) rather than the steel sheet pile deadman. Each CAB consisted of a 5-foot long by 5-foot wide by a minimum of 5-foot high up to an approximately 7.3-foot high reinforced concrete block as identified on the record drawings. It should be noted that bedrock surface was not level at the time of the installation of the CABs, and therefore, the surface of the bottom of the blocks varied to follow the contour of the bedrock. The CABs were secured to the underlying bedrock using a series of five (5) rock anchors. While the anchor rods were initially designed for 5-feet of embedment in the rock, a debris layer (e.g. sand, gravel, etc.) washed beneath the Contractor's form work prior to the placement of the concrete. To address the layer of debris, OCC required 10-feet of embedment into the bedrock, with the exception of Anchor 4 on CAB No. 6, which had 6.25 feet of embedment, as shown on the record drawings. The anchor rods were connected to the CABs using specially fabricated anchor plate assemblies that were anchor bolted to the CABs.

Zone 3 Bulkhead:

- 661.23-foot long, cantilevered bulkhead consisting of 318 (or 159 doubles) AZ26 steel sheet piles. Unlike the Zone 1 bulkhead, the Zone 3 bulkhead was constructed as a cantilevered bulkhead structured and no anchor/deadman were required. The steel sheet piles were epoxy coated on both sides along their entire length, although only the upper portion of the sheet piles was required to be coated per the Contract. Refer to the "Product Listing" below for additional information.

- Return Walls: The southern return wall is approximately 33.07-feet long and consists of 16 (or 8 doubles) AZ26 sheet piles. The northern return wall is approximately 24.80-feet long and consists of 12 (or 6 doubles) AZ26 sheet piles. Both return walls on the Zone 3

bulkhead are cantilevered wall structures. The steel sheet piles were epoxy coated on both sides along their entire length, although only the upper portion of the sheet piles was required to be coated per the Contract. Refer to the "Product Listing" below for additional information.

- Waterstop: Adeka Ultra Seal A-30, as manufactured by Adeka Ultra Seal / OCM, Inc. was installed in the sheet pile interlocks to seal the interlocks. The material is a hydrophilic material that swells in the presence of water to fill/seal the joint. Additionally, Adeka Ultra Seal P-201 sealant waterstop was applied to penetrations in in the sheet piles. As a Contractor-requested substitution, waterstop was omitted at interlocks between shop-threaded double piles. In lieu of waterstop at these interlocks, the Contractor proposed and was permitted to shop-weld the interlocks prior to application of the epoxy protective coating.

- Toe Protection Stone: To reduce the potential for scour of sediment in front of the bulkheads, a 4-foot thick layer of toe protection stone was placed in front of the bulkhead at a slope of 1.5 H:1 V. The toe protection stone included armor stone (235 to 2,125 pounds per stone) and toe stone (1,100 to 4,400 pounds per stone) at the mud line. The toe protection stone was placed on a 12-inch thick layer of 1.5 to 3-inch diameter bedding stone. A Mirafi FW-700 woven geotextile was placed beneath the bedding stone to reduce the potential for scour of the on-Site fines in the subgrade material.

- Precast concrete caps: A 30-inch wide by 12-inch precast concrete cap was installed on top of the waterfront sheet piles and on the northern and southern return walls. The caps rest on a continuous steel angle (L6" x 4" x ½") that is welded to the sheet piles and anchor bolted to the caps. In cases where the Contractor drove the sheet piles too low or the top elevations were below the design elevation of 5.5 feet NAVD88, a 5-inch high precast concrete filler beam was placed between the steel angle and final precast caps.

- Stormwater outfall: A stormwater outfall was installed through the Zone 3 bulkhead as part of the redevelopment infrastructure installation. The initial installation included 20 lineal feet of a 24-inch diameter corrugated HDPE pipe. A cast-in-place concrete collar was installed around the pipe outfall in the bulkhead to provide a seal between the steel sheet piles and the outfall pipe.

The following protective coating products were applied to certain structural elements of the bulkheads, as described below:

Product Listing:

- **Macropoxy 646, as manufactured by Sherwin-Williams:** A black epoxy product that was applied to all AZ26 sheet piles installed along the waterfront. This epoxy was also

utilized to touchup/repair damaged areas of the coating on the landward face of the bulkhead and on the waterward face of the bulkheads from an elevation of +2.0 feet NAVD88 and above. This product was submitted as a substitute for the originally specified BAR-RUST 235 Multi-Purpose Epoxy Coating, as manufactured by Devoe Coatings.

- **FX-764 Hydro-Ester ® Splash-Zone & Underwater Paste, as manufactured by Fox Industries, Inc.:** A moisture-insensitive, two-component, 100 percent solids epoxy-resin material that was used for repairing the Macropoxy 646 coating on the waterward side of the sheet piles in the splash zone and below the waterline (elevations below +2.0 feet NAVD88). This material also used to repair a few leaking interlocks on the Zone 3 bulkhead.

- **Adeka Ultra Seal A-30, as manufactured by Adeka Ultra Seal / OCM, Inc.:** A chemical resistant hydrophilic waterstop material that swells by a factor of three (3) times its original volume when hydrated to seal the interlock sheet piles. This material was applied to all non-welded interlocks for their entire length.

- **Adeka KM String, as manufactured by Adeka Ultra Seal / OCM, Inc.:** A chemically modified natural rubber product with a chemically bonded hydrophilic agent that allows the material to expand by a factor of three (3) times its original volume when hydrated. This material was used in attempt to repair some of the leaking interlocks encountered at the Site.

- **Fusion Bonded Epoxy (FBE) Coating:** All anchor rods were factory coated with fusion bonded epoxy prior to delivery to the project Site.

- **Zinc Hot Dip Galvanizing (ASTM A153):** All bolts, anchor bolts, plate washers, and pipe spacers were hot dip galvanized for protection.

- **Tneme-Zinc 90-97, as manufactured by Tnemec, Inc.:** An advanced technology, two-component, moisture-cured, zinc-rich primer was utilized as a field touchup material for repairing cut or damage galvanized components.

- **Pro-poxy 300, as manufactured by Unitex:** A non-sag, injectable anchoring epoxy used to grout in the anchor bolts into the bottom side of the precast concrete caps.

- **Sikagrout 212, as manufactured by Sika Corporation:** A non-shrink, high strength, cementitious grout used to patch the lifting inserts location on the precast caps. This material was also dry-packed in the space between the precast concrete caps and the concrete filler beams where the top elevation of the sheet piles was too low.

- **Armatec 110 Epocem Bonding Agent, as manufactured by Sika Corporation:** A concrete bonding agent applied to the existing concrete surfaces prior to making repairs

with the Sikagrout 212. This material was also used for field touchup of the fusion bonded epoxy on the anchor rods.

- **Blendcrete™, as manufactured by ProSpec:** A single component, polymer-modified, cement-based concrete patching compound used to repair spalls and voids on the precast concrete caps.

- **Sika ® Boom Expanding Polyurethane Spray Foam, as manufactured by Sika Corporation:** A polyurethane-based fast curing expanding foam material that was used to fill joints in the precast caps where field-cut ends were present.

- **Sikaflex®-2c NS TG, as manufactured by Sika Corporation:** A two-component, traffic-grade, polyurethane elastomeric sealant was used to seal all joints between adjacent precast concrete cap sections due to the fact that the Contractor did not follow the specified joint spacing requirements when installing the caps. The color "Precast" was selected for this project. SOF®ROD backer rod as manufactured by Nomaco Inc. was installed in larger joints prior to application of the sealant.

- **Speed Crete® Blue Line, as manufactured by The Euclid Chemical Company:** A fast-setting underwater, cement-based patching material used to patch large voids in the concrete anchor blocks at the south end of the Zone 1 bulkhead that were discovered at removal of the formwork.

- **Duralprep AC, as manufactured by The Euclid Chemical Company:** A priming agent applied to exposed steel and concrete surfaces prior to patching the concrete anchor blocks with Speed Crete ®.

- **Sure-Grip High Performance Grout™, as manufactured by Dayton Superior:** A high performance grout utilized to tremie grout the rock anchors for the concrete anchor blocks.

- **Five Star® Grout, as manufactured by Five Star Products, Inc.:** A non-shrink grout pressure injected beneath the concrete anchor blocks to fill in void spaces in the debris layer that sloughed beneath the concrete blocks prior to the concrete pour.

Manufacturer data sheets for these products have been included in Appendix E.

Procedures for monitoring the steel bulkhead system are included in the Monitoring Plan (Section 3.4.2 of this SMP). The Monitoring Plan also addresses severe condition inspections in the event that a severe condition, which may affect controls at the Site, occurs. Procedures for operating and maintaining the steel bulkhead system are documented in the Operation and Maintenance Plan (Section 4 of this SMP).

2.2.1.3 Sub-slab Depressurization Systems & Sub-slab Ventilation

While most of the contaminants of concern at the DeLaval Site were associated with heavier petroleum products that do not volatize as readily as lighter petroleum products (e.g. gasoline) or chlorinated solvents, a potential for vapors to migrate into new structures and impact indoor air quality does exist, and therefore, must be addressed for all future structures constructed on the Site.

Soil vapor, if present, could potentially enter a building through cracks or penetrations in the building foundations and concrete slab flooring systems, particularly when the zone of impacted soil is in direct contact with the structures. The vapors typically rise into the building space due to the difference in interior and exterior air pressures. Since the pressure beneath the concrete slab is typically several times greater than the interior pressure in the building, the vapors tend to migrate into the building due to the pressure differential. While the specific design and layout of the sub-slab depressurization systems (SSDS) will be the responsibility of architects and/or engineer's designing any future structures for the Site, the following guidelines provide the minimum system requirements for such systems:

1. The installation of the sub-slab depressurization (SSD) system should be conducted under the direct supervision of a competent professional with specific experience in building vapor mitigation and environmental remediation practices. The system design should be submitted to NYSDEC and the New York State Department of Health (NYSDOH) for approval.

2. It should be verified that the foundation subgrade is a minimum of two (2) feet above the high water table.

3. After preparing the foundation subgrade, a minimum of a 6-ounce non-woven geotextile fabric will be installed over the subgrade. The geotextile may be omitted only in locations where the subgrade consists of clean, imported fill that has already been placed over an existing demarcation barrier (e.g. Zone 3). The geotextile should be extended beyond the footprint of the foundation sufficiently to allow the fabric to overlap the vertical edges of the stone fill beneath the building slabs and form a closed envelope with the building foundations.

4. A minimum of an 8-inch gas venting layer of crushed stone will be installed beneath the floor slabs of all structures. A crushed stone with little to no fines is recommended to facilitate air movement and good communication beneath the building slabs. While

alternative stone materials can be utilized with approval from NYSDEC, the following stone material is acceptable for the gas venting layer:

a. Crushed stone free of organic material, elongated particles or other deleterious materials, conforming to the requirements of the New York State Department of Transportation (NYSDOT) Section 703-2 and meeting the following gradation requirements (NYSDOT, Size 2):

Sieve	Percent Passing
1 ½"	100
1"	90-100
½"	0-15

b. Particle size analysis shall show no gap grading.

c. The permeability of the gas venting layer shall be greater than $1x10^{-3}$ centimeters per second when compacted to a minimum of 90 percent of standard Proctor maximum dry density.

d. All soil or stone particles shall be classified as rounded or sub-rounded ASTM D 2488).

5. A pipe network consisting of a minimum of four (4)-inch diameter Schedule 40 polyvinyl chloride (PVC) pipe shall be placed within the gas venting layer stone to serve as a collection conduit for any vapors beneath the building slabs. The piping network will typically consist of a number of parallel pipe runs connected to a header pipe, although the actual layout of the network will need to be designed based upon the specific configuration of each structure. The pipe network beneath the slab will consist of perforated piping while the above-grade and discharge piping will consist of solid wall piping. PVC piping was selected based upon the proven performance of the material and its smooth interior, although butt-fused HDPE or other pipe materials may also be considered. The use of corrugated HDPE pipe, such as that used for under drains, is discouraged due to the low strength of the pipe and the greater restriction of air flow in the pipe. The diameter of the pipe perforations should be selected by the designer; however perforations ranging from 1/4 to 3/8-inches in diameter, spaced six (6) inches on center, and located in rows no more than 120 degrees apart (i.e. minimum of 3 rows of perforations) is commonly used. It is recommended that all piping runs be connected to a pipe manifold and a system of ball valves that can be utilized for throttling and balancing of the pressure field.

6. At a minimum, a fifteen (15) mil Class A polyethylene resin vapor barrier meeting or exceeding all requirements of ASTM 1745-96, such as the Perminator™ 15-mil manufactured by W.R. Meadows, Inc. or the Stego-Wrap 15-mil manufactured by Stego Industries LLC, will be installed over the gas venting layer. All seams in the vapor barrier will be sealed using a polyethylene tape with pressure sensitive adhesive. Pipe boots constructed of the vapor barrier material and the pressure sensitive tape and/or vapor

proofing mastic will be used to seal around all pipe penetrations through the barrier. The vapor barrier will be sufficient in strength to resist tearing and puncturing during the placement of reinforcing steel and concrete for the concrete flooring systems. Using a 15-mil vapor barrier will eliminate the need to install a cushion layer of sand between the gas venting layer and the vapor barrier. While a cushion layer of sand is not required for the vapor barriers discussed above, nor is it recommended, a thin layer of sand could be placed over the top of the vapor barrier for added protection prior to the pouring of the concrete slab or if it is not desirable to have the vapor barrier in direct contact with the bottom of the concrete slab. Most vapor barriers, such as those described above, are resistant to tears and puncturing damage that would typically be associated with the installation of reinforcing steel and pouring concrete, but the manufacturer of the vapor barrier should be contacted for specific limitations of their product.

Additionally, gas vapor barrier systems such as Geo-Seal™ as manufactured by Land Science Technologies and Liquid Boot® as manufactured by CETCO® should be considered a good alternative barrier for SSD systems.

7. All floor slab construction joints, penetrations, and other openings will be sealed using two wraps of closed cell foam backer rod and/or an elastomeric polyurethane sealant applied to a minimum depth of one inch.

8. To provide active ventilation beneath the building slabs, the piping network will be connected to a blower system to achieve a negative pressure of at least -0.002 inches of water column (WC) beneath the entire slab. Smaller blower units (e.g. radon fans) will be installed on the outside of exterior walls, above the roofing system, or in the plenum space of the buildings to separate the unit from occupied space. Larger blower units (e.g. centrifugal or regenerative fans) will be installed either inside a mechanical room within the buildings or in a pad-mounted noise-attenuating, weather-resistant enclosure adjacent to the buildings. The blower discharge pipe will be extended a minimum of twelve inches above the structure roof line. Appropriate inline mufflers and discharge silencers will also be used as appropriate to minimize the noise associated with the blowers. All blower units will be designed for continuous operation and a minimum life expectancy of five (5) years.

9. For systems with larger blower units, a water knockout filter will be installed immediately downstream of the blower unit to remove any moisture from the vapor beneath the slab and keep condensation from reaching the unit. For smaller systems, all piping will be sloped such that any condensate will drain beneath the sub-slab.

10. To avoid entry of extracted subsurface vapors into the building, the exhaust/discharge pipe shall be:

    a. A minimum of 12 inches above the surface of the roof (preferably above the highest level of the roof).

    b. At least 10 feet above the ground level.

c. At least 10 feet away from any opening that is less than 2 feet below the exhaust point.

d. At least 10 feet from any adjoining or adjacent buildings, or heating, ventilation and air conditioning (HVAC) intakes or supply registers.

11. Sampling ports will be included on the discharge piping to facilitate future sampling of the discharged air stream, if necessary.

12. All equipment and pipe above the slab should be properly labeled. At least one label should be placed near the blower unit and one at the point of discharge that states "Caution: Sub-Slab Depressurization System – Do Not Tamper or Disturb". Flow direction arrows should also be placed on all pipes and a label stating the name of the system installer, date of the system installation, and a phone number for system service shall be affixed on or immediately adjacent to the blower unit. The label installed at the point of discharge shall be weather resistant as well as resistant to ultraviolet (UV) light.

13. A monitoring panel should be installed to monitor the real time differential pressure for each blower and associated system. A pressure/vacuum gauge (e.g. Sensocon® or Dwyer® real time Magnehelic® gauge) reading in inches of water column shall be installed to monitor the pressure for each fan unit. The post installation static differential pressure reading of each sub-system should be recorded on the pressure panel. Additionally, a visual/audible low pressure alarm that is activated when the system pressure falls below 0.25 inches of water column (may vary depending on fan size) shall be installed at the monitoring panel to provide an alert of a significant pressure drop.

The redevelopment includes the construction of a limited number of smaller structures that will be occupied only on a part-time basis and/or by transient persons. For the purposes of this SMP, transient persons are considered those that occupy the structures for less than eight (8) hours per day for less than five (5) days per week (i.e. less than forty (40) hours per week). Small structures that are anticipated to only be occupied for short periods of time will include structures such as public restrooms and food kiosks constructed to serve the public areas along the waterfront, storage sheds for grounds keepers, and other similar structures. For these examples, occupancy will be limited to the following:

- Public restrooms: Public restrooms will typically be occupied on a short-time basis by persons utilizing the public areas of the Site, including the parking lot areas, the waterfront walkway areas, the marina, the kayak launch area, etc. Additionally, maintenance

personnel will occupy the structures on a short-term basis for cleaning and other maintenance activities.

- Food Kiosks: Food kiosks will typically only be occupied by personnel using the structure for the sale of food and beverages. While employees may occupy such structures for longer periods of time, these types of structures will be fully open to the atmosphere when occupied to provide ventilation. Enclosed structures with indoor seating for customers (i.e. a restaurant) will not be permitted on the Site unless equipped with an active sub-slab depressurization system. Food kiosks will typically be used on a seasonal basis when use of the public areas of the Site is greatest.

- Grounds keepers' buildings/storage sheds: These types of structures will be utilized for the storage of maintenance equipment and materials only. While maintenance personnel will enter these structures periodically to add or remove items, occupancy will be on a short-term basis, typically less than one-hour.

Given the limited occupancy of these structures as well as the limited footprint of the structures (i.e. short distance from the center of the slab to the perimeter of the building), passive vapor systems will be installed beneath these structures. The passive systems will include a piping network, gas collection layer, and vapor barrier with the solid-wall piping that will be extend a minimum of twelve inches above the roofline; however, no blower systems will be required.

Blower systems can only be omitted in structures operated as open air buildings. For example, open-air food kiosks would include structures utilized for the sale of food and beverages from buildings equipped with sliding doors/windows or overhead roll-up doors on at least one side that would provide a continuous source of fresh air from the surrounding ambient air. In public restroom facilities and storage structures, louvered wall panels will be installed to provide fresh air ventilation into the building spaces. If restrooms or storage buildings are conditioned (i.e. heated and/or cooled), appropriate fresh return air returns and exhaust ventilation systems will be design to provide a continuous flow of fresh air into the structures.

This approach to addressing the potential for vapor intrusion into smaller structures on the DeLaval Site that are not intended for extended human occupancy was approved by the New York State Department of Health on November 3, 2005.

Procedures for monitoring the SSD system are included in the Monitoring Plan (Section 3 of this SMP). The Monitoring Plan also addresses severe condition inspections in the event that a severe condition, which may affect controls at the Site, occurs. Procedures for operating and maintaining the SSD system are documented in the Operation and Maintenance Plan (Section 4 of this SMP).

2.2.2 Criteria for Completion/Termination of Remedial Systems

Generally, remedial processes are considered completed when effectiveness monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in NYSDEC DER-10.

2.2.2.1 Soil Cover System

The soil cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in perpetuity.

2.2.2.2 Steel Sheet Piling Bulkheads

The steel sheet pile bulkheads are permanent controls and the quality and integrity of these bulkheads will be inspected at regular intervals in perpetuity.

2.2.2.3 Sub-slab Depressurization Systems

Any installed SSD system will not be discontinued unless prior written approval is granted by the NYSDEC. In the event that monitoring data indicates that the SSD system is no longer required, a proposal to discontinue the SSD system will be submitted by the Site owner to the NYSDEC and NYSDOH. The shutdown of the active SSD system will include the shutdown of the blower system only. The system will continue to be operated as a passive sub-slab ventilation system in perpetuity.

2.3 INSTITUTIONAL CONTROLS

The NYSDEC has defined an institutional control as “any non-physical means of enforcing a restriction on the use of real property that limits human and environmental exposure, restricts the use of groundwater, provides notice to potential owners, operators, or members of the public, or

prevents actions that would interfere with the effectiveness of a remedial program or with the effectiveness and/or integrity of operation, maintenance, or monitoring activities at or pertaining to a remedial Site."

A series of Institutional Controls (ICs) are required by the ROD to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination by controlling disturbances of the subsurface contamination; and, (3) limit the use and development of the Site to commercial uses, which includes passive recreational uses, only. Adherence to these Institutional Controls on the Site is required by the Environmental Easement and will be implemented under this Site Management Plan. These Institutional Controls are:

- Compliance with the Environmental Easement and this SMP by the Grantor and the Grantor's successors and assigns;
- All Engineering Controls must be operated and maintained as specified in this SMP;
- All Engineering Controls on the Controlled Property must be inspected at a frequency and in a manner defined in the SMP.
- Groundwater monitoring must be performed as defined in this SMP;
- Data and information pertinent to Site Management must be reported at the frequency and in a manner defined in this SMP;

Institutional Controls identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement.

The Site also has a series of Institutional Controls in the form of Site restrictions. Adherence to these Institutional Controls is required by the Environmental Easement. Site restrictions that apply to the Site include:

- The Site may only be used for commercial use, which includes passive recreation use, provided that the long-term Engineering and Institutional Controls included in this SMP are employed;

- The Site may not be used for a higher level of use, such as unrestricted or restricted residential, schools, or other use without additional remediation and amendment of the Environmental Easement, as approved by the NYSDEC;

- All future activities on the Site that will disturb remaining contaminated material must be conducted in accordance with this SMP;

- The use of the groundwater underlying the Site is prohibited without treatment rendering it safe for intended use (e.g. potable water, process water, irrigation, etc.) and written approval from the Dutchess County Department of Health (DOH);

- Given the potential for vapor intrusion to be present at the Site, an active sub-slab depressurization system will be constructed beneath all buildings constructed at the Site. Small structures that are only occupied on a part-time basis (e.g. public restrooms, food kiosks, and storage sheds) and are open to atmosphere when occupied will be equipped with passive sub-slab ventilation systems. A passive system will meet all of the requirements of Section 2.2.1.3 of this SMP; however, the installation of a blower system will not be required.

- Vegetable gardens and farming on the property are prohibited;

- The Site owner or remedial party will annually submit to NYSDEC a written statement that certifies, under penalty of perjury, that:

    1. Controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC.

    2. Nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP.

  NYSDEC retains the right to access the Site at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be made by an expert that the NYSDEC finds acceptable. Additional information regarding the requirements of the annual certification is included in Section 5 of this SMP.

2.3.1 Excavation Work Plan

The Site has been remediated for restricted commercial use only, which includes passive recreational uses. Any future intrusive work that will penetrate the soil cover, or encounter or disturb the remaining contamination, including any modifications or repairs to the existing cover system will be performed in compliance with the Excavation Work Plan (EWP) that is included as Section 6 of this SMP. Any work conducted pursuant to the EWP must also be conducted in

accordance with the procedures defined in a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) prepared for the Site.

Since a HASP should be task specific as well as Site specific, an activity specific HASP should be developed for each task or type of task that is in current compliance with DER-10, and 29 CFR 1910, 29 CFR 1926, and all other applicable Federal, State and local regulations. While much of the information in the Site-specific HASP will be the same each time, the hazard/task analysis will need to be specific for each intrusive task to be performed at the Site. Section 7 of this SMP provides a summary of the minimum requirements for all HASPs that are to be developed for the Site. Based on future changes to State and federal health and safety requirements, and specific methods employed by future contractors, the HASP and CAMP will be updated and re-submitted with the notification provided in Section 6.1 of the EWP. Any intrusive construction work will be performed in compliance with the EWP, HASP and CAMP, and will be included in the periodic inspection and certification reports submitted under the Site Management Reporting Plan (See Section 5).

The Site owner and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all intrusive work, the structural integrity of excavations, proper disposal of water derived or associated with excavations, control of runoff from open excavations into remaining contamination, and for structures that may be affected by excavations (such as building foundations and bridge footings). The Site owner will ensure that Site development activities will not interfere with, or otherwise impair or compromise, the engineering controls described in this SMP.

2.3.2 Soil Vapor Intrusion Evaluation

Based upon the March 31, 2005 ROD for the Site, active sub-slab depressurization systems are required for all newly constructed buildings at the Site as a component of the overall remedy. The only exception to this requirement is that small structures designed to be occupied only on a part-time basis and are open to atmosphere when occupied (e.g. public restrooms, food kiosks, storage

sheds, etc.) will be designed with passive ventilation systems. The passive ventilation will include all components of the mitigation system except for the blower units as further described in Section 2.2.1.3 of this SMP.

Since SSD systems are required for future buildings on the Site as part of the ROD, an initial soil vapor intrusion (SVI) evaluation is not necessary for this Site.

2.4 INSPECTIONS & NOTIFICATIONS

2.4.1 Inspections

Inspections of all remedial components installed at the Site will be conducted at the frequency specified in the SMP Monitoring Plan schedule. A comprehensive Site-wide inspection will be conducted annually, regardless of the frequency of the Periodic Review Report (PRR). The inspections will determine and document the following:

- Whether Engineering Controls continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria;
- Sampling and analysis of appropriate media during monitoring events;
- If Site records are complete and up to date; and
- Changes, or needed changes, to the remedial or monitoring system;

Inspections will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3). The reporting requirements are outlined in the Periodic Review Reporting section of this plan (Section 5).

If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs, an inspection of the Site will be conducted within 5 days of the event to verify the effectiveness of the EC/ICs implemented at the Site by a qualified environmental professional (QEP) as determined by NYSDEC.

As defined in NYSDEC's DER-10, finalized in May 2010, a QEP is defined as "a person, including a firm headed by such person, who possesses sufficient specific education, training, and experience necessary to exercise professional judgment to develop opinions and conclusions regarding the presence of releases or threatened releases to the surface or subsurface of a site or off-site areas, sufficient to meet the objectives and performance factors for the areas of practice identified by this guidance (DER-10). Such person must:

i. Hold a current professional engineer's (PE's) or professional geologist's (PG's) license or registration and have the equivalent of three (3) years of full-time relevant experience in the site investigation and remediation of the type detail in this guidance; or

ii. Be a site remediation professional licensed or certified by the federal government, a state or recognized accrediting agency, to perform investigation or remediation tasks identified by this guidance, and have the equivalent of three (3) yeas of full-time relevant experience. Examples of such license or certificate include the following titles:

(1) Licensed Site Professional (LSP) , by the State of Massachusetts;

(2) Licensed Environmental Professional (LEP), by the State of Connecticut;

(3) Qualified Environmental Professional (QEP), by the Institute of Professional Environmental Practice; or

(4) Certified Hazardous Materials Manager (CHMM), by the Institute of Hazardous Materials Management."

2.4.2 Notifications

Notifications will be submitted by the Site owner to the NYSDEC as needed for the following reasons:

- 60-day advance notice of any proposed changes in Site use that are required under the terms of the State Assistance Contract (SAC), 6 NYCRR Part 375, and/or Environmental Conservation Law.
- 15-day advance notice of any proposed ground-intrusive activities pursuant to the Excavation Work Plan, where the demarcation barrier or groundwater table will be encountered or potentially encountered (see Section 6 of this SMP for additional requirements).

- Notice within 48-hours of any damage or defect to any engineering control (e.g. bulkhead, cover system, sub-slab depressurization system) that reduces or has the potential to reduce the effectiveness of said control or other Engineering Controls and likewise any action to be taken to mitigate the damage or defect.

- Notice within 48-hours of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of Engineering Controls in place at the Site, including a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action shall be submitted to the NYSDEC within 45 days and shall describe and document actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser has been provided with a copy of the SAC, and all approved work plans and reports, including this SMP.

- Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing.

Written notifications to NYSDEC should be made to the following:

Project Manager, Site ID B00190
NYSDEC Remedial Bureau C
625 Broadway
Albany, NY 12233-7014

Additionally, written notification should be provided to the current Site owner and the Site owner's qualified environmental professional who is responsible for the completion of the period review reports as discussed in more detail in Section 6 of this SMP.

2.5 CONTINGENCY PLAN

Emergencies may include injury to personnel, fire or explosion, environmental release, serious weather conditions (e.g. flooding, hurricanes, tornadoes, significant periods of drought, etc.), or major structural failures (e.g. failure of a bulkhead or the retaining wall along the eastern side of the Site). While there are numerous other types of emergencies (e.g. terrorism threats, power

blackouts, pandemics, etc.), the most likely event to impact the engineering controls constructed at the Site would be severe weather, such as a flooding event that scours the soil cover system.

2.5.1 Emergency Telephone Numbers

In the event of any environmentally related situation or unplanned occurrence requiring assistance the Owner or Owner's representative(s) should contact the appropriate party from the contact list below. For emergencies, appropriate emergency response personnel should be contacted. Prompt contact should also be made to a qualified environmental professional. These emergency contact lists must be maintained in an easily accessible location at the Site.

Table 2-1. Emergency Contact Numbers

Medical, Fire & Police	**911**
NYSDEC Spills Hotline	(800) 457-7362
National Response Center (for Pollution Toxic Chemical Oil Spills)	(800) 424-8802
Poison Control Center	(800) 222-1222
EPS of Vermont - 24-Hour Emergency Spill Response	(800) 577-4557
Dig Safely New York – Utility Clearance (3-day notice required for utility mark out)	(800) 962-7962 or 811

Note: Contact numbers are subject to change and should be updated as necessary.

Table 2-2. Support Contact Numbers

City of Poughkeepsie Engineering Department	(845) 451-4074
CHA, Inc. – Environmental Consultant/Environmental Professional	(877) 215-0020
EPS of Vermont – Cleanup Contractor	(518) 465-4000
NYSDEC Division of Environmental Remediation (DER)	(518) 402-9662 (315) 426-7551(alternate)
New York State Department of Health	(800) 458-1158
Dutchess County Department of Health	(845) 486-2400

Note: Contact numbers are subject to change and should be updated as necessary.

2.5.2 Map and Directions to Nearest Health Facility

Site Location: Intersection of Rinaldi Boulevard and Pine Street
Poughkeepsie, New York 12601

Nearest Hospital Name: Vassar Brothers Medical Center
Hospital Location: 45 Reade Place
Poughkeepsie, New York 12601

Hospital Telephone: (845) 454-8500

Directions to the Hospital: (see Figure 8 for a map of directions to hospital)

1. Drive east on Pine Street, going under railroad overpass.
2. Turn right onto Pine Street Spur.
3. Turn left onto Columbia Street.
4. Cross over Route 9 and turn right onto Young Street
5. Turn right onto Reade Place
6. Hospital on left. Follow signs to Emergency entrance.

Total Estimated Distance: 0.5 miles
Total Estimated Time: 2 minutes

2.5.3 Response Procedures

As appropriate, the fire department and other emergency response groups will be notified immediately by telephone of the emergency. The emergency telephone number list is found at the beginning of this Contingency Plan (Table 2-1). The list will also be posted prominently at the Site (at least one list in each on-Site structure and one in each management and/or maintenance office) and made readily available to all personnel at all times. Finally, a copy of this list will be maintained by the Site owner(s).

2.5.3.1 Spill Response Procedures

Spill Response Equipment

Storage areas for spill containment equipment are located in the maintenance and grounds building. The minimum spill equipment to be maintained on-Site is summarized in the table below. The exact storage location of this equipment is to be determined, but will likely be stored in a grounds keeper's or maintenance storage shed.

Table 2-3. Spill Cleanup/Containment Equipment

Description	Quantity
18” x 18” Absorbents Pads	100 each
Oil Absorbent Booms	50 Linear Feet
20 lb. bags of Lite-Dri Absorbent	10 each
Plastic Trash Bags	20 each
Shovel	1 each
Broom	1 each

Spill Response Procedures

1. Immediately upon evidence that a spill or release has occurred, facility personnel shall call the City of Poughkeepsie Engineering Department at (845) 451-4074 and inform them of the pertinent facts related to the spill event (i.e., location, source of spill, immediate threats).

2. Secure the spill site.

3. Check for immediate threats or people in danger.

4. Evaluate exposures to response personnel, the public, and the environment.

5. Call environmental services contractor, as necessary, for assistance with spill containment and cleanup.

6. Begin to contain the spill using spill containment equipment. All cleanup personnel will utilize appropriate personal protective equipment (PPE), such as gloves, boots, coveralls, eye protection, etc.

7. Barricade the point of release and the point at which the discharge exits the building (if applicable) with oil absorbent materials.

8. Prevent the flow into storm drains or other points of concern using oil absorbent booms and other materials to the extent possible.

9. Call Emergency Response (Fire Department) for assistance if necessary or if the surrounding community is affected.

10. Call the State Spill Hotline at (800) 457-7362 within two hours of discovery of the spill.

11. Call the National Response Center at (800) 424-8802 if the spill has reached navigable water or adjoining shorelines.

In some situations, an accidental discharge can be discovered without knowing the source of the spill. An example of this would be someone reporting an oil sheen on a surface water body. In these cases, the following spill alert procedures will be implemented:

1. Call the City of Poughkeepsie Engineering Department at (845) 451-4074 and inform them of the pertinent facts related to the spill event (i.e., location, extent, immediate threats).

2. Contain the spill as much as possible. For example, if an oil discharge is discovered on a surface water body, use an oil absorbent boom to surround the affected area to the extent practical.

3. Trace the spill either upstream or up-gradient to locate the source. Look for culverts which may be conveying the oil or chemical, areas of sloped ground from which there may be a seep of oil or evidence of chemical staining, or storm sewer catch basins, grates, or pipes that may have evidence of oil or chemicals present.

4. If the release cannot be traced back to a definite source, a systematic check of all potential on-Site sources should be performed (see items 5 through 8 below), while some response team members stay at the site of the detected spill to begin cleanup and continue containment.

5. Begin checking vehicles or maintenance equipment closest to where the spill was detected. Examine the ground and tanks for staining, odors, or corrosion.

6. Check parking areas that have storm drainage that discharges to the affected area.

7. If the source of the release is found, implement the spill response procedures outlined above.

8. If cause of the release is not found and the discharge is continuing, response and containment should continue, and the fire department should be contacted. Appropriate authorities should also be contacted (state and National Response Center (NRC)).

Methods of Disposal of Recovered Materials

All materials recovered from spill response measures will be appropriately containerized and labeled as to contents, including the date and nature of the contamination. City officials or designated representatives will make a hazardous waste evaluation of the containerized waste in accordance with the requirements of 6 NYCRR Part 371. In the event that the material is determined to be a regulated hazardous waste, it will be managed and disposed of in accordance

with the appropriate requirements of 6 NYCRR Part 374 and 376, including manifesting of the hazardous waste. If the material is being disposed of by the City of Poughkeepsie, the facility's Environmental Protection Agency (EPA) ID No. is NYR000145292. However, this ID number is specific to the City of Poughkeepsie as the owner/generator, so any waste generated under a different owner will require application to the EPA for a another ID number.

In the event that the recovered material is determined to be non-hazardous, it will be managed and transported in accordance with the requirements of 6 NYCRR Part 364, as required. The City will retain appropriately trained and/or certified vendors and/or contractors to perform spill cleanup and disposal services.

Spill Incident Reporting

All spills must be reported to the NYSDEC Spill Hotline at (800) 457-7362 unless they meet all of the following criteria:

- The spill is known to be less than 5 gallons
- The spill is contained and under control
- The spill has not and will not reach the State's waterways
- The spill is cleaned up within 2 hours of discovery.

When reporting a spill, the following information should be documented and provided to the NYSDEC for each reportable spill:

- The facility address and phone number
- Date and time of the discharge
- Type of material discharged
- Estimated total quantity of material discharged
- Source and/or cause of the discharge
- A description of all affected media
- Any damages or injuries caused by the discharge
- Actions being used to stop, remove, and mitigate the effects of the discharge
- Whether an evacuation may be needed

- The names of the individuals and/or organizations who have also been contacted

2.5.3.2 Evacuation Procedures

It is not always necessary to evacuate the Site during an emergency. However, if there is a catastrophic failure of the Site engineering controls, a significant release that poses threat to the human health, or a significant weather event that poses a threat to the Site, evacuation may become necessary. It is important that occupants on the Site are prepared and plan for such evacuations in advance.

An emergency action plan (EAP) is a written document required by particular OSHA standards (29 CFR 1910.38(a)). The purpose of an EAP is to facilitate and organize employer and employee actions during workplace emergencies. Well-developed emergency plans and proper employee training (such that employees understand their roles and responsibilities within the plan) will result in fewer and less severe employee injuries and less structural damage to the facility during emergencies. A poorly prepared plan, likely will lead to a disorganized evacuation or emergency response, resulting in confusion, injury, and property damage. While employers will be responsible for preparing detailed EAP's for each site, some general guidelines include the following:

Building Evacuation

In the event that it becomes necessary to evacuate a building on the Site, the following procedures will be utilized:

1. Stay calm.
2. Safely stop work.
3. Gather personal belongings only if it is safe to do so (Reminder: take prescription medications with you if at all possible, as it may be hours before you are allowed back in the building).
4. If safe, close your office door and window, but do not lock them.
5. Use the nearest safe stairs and proceed to the nearest exit. Evacuation routes are provided at key locations through each building. Do NOT use elevators.

6. Evacuate persons with disabilities first if possible. Always ask someone with a disability how you can assist BEFORE attempting any rescue technique or giving assistance.

7. Proceed to the designated mustering point and report to the appropriate roll taker. All persons should stay a minimum of 100-feet from the evacuated building. Call 911 if emergency responders have not already been contacted.

8. Wait for instructions from emergency responders.

9. Do not re-enter the building or work area until emergency responders indicate it is safe to do so.

Site Evacuation

In the event it is necessary to evacuate the Site, emergency responders (e.g. police or fire departments) will coordinate such evacuations and determine when it is safe to return to the Site. If an evacuation is ordered, all persons on the Site should heed all safety personnel instructions relative to evacuation routes from the Site and/or follow the general flow of traffic. Site occupants will be prohibited to congregate at the Site limits or evacuation line during emergency events.

2.5.3.3 Contingency Plan Amendments

The Site owner will notify the NYSDEC of any amendments to the Contingency Plan a minimum of 60-days prior to implementing the proposed changes. The procedures noted in this SMP are general in nature given that the Site was vacant at the time the SMP was prepared. However, as the Site is developed, more detailed plans, particularly evacuation plans, will be prepared.

3.0 SITE MONITORING PLAN

3.1 INTRODUCTION

3.1.1 General

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the remedy to reduce or mitigate contamination at the Site, the soil cover system, and all affected Site media identified below. Monitoring of other Engineering Controls is described in Section 4, Operation & Maintenance Plan. This Monitoring Plan may only be revised with the approval of NYSDEC.

3.1.2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance, (SCGs) particularly ambient groundwater standards (Technical and Operational Guidance Series (TOGS) 1.1.1) and Part 375 Soil Cleanup Objectives (SCOs) for soil;
- Assessing achievement of the remedial performance criteria.
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment; and
- Preparing the necessary reports for the various monitoring activities.

To adequately address these issues, this Monitoring Plan provides information on:

- Sampling locations, protocol, and frequency;
- Information on all designed monitoring systems (e.g., well logs);
- Analytical sampling program requirements;
- Reporting requirements;
- Quality Assurance/Quality Control (QA/QC) requirements;

- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Annual monitoring of the performance of the remedy and overall reduction in contamination on-Site will be conducted for the first two years following the completion of the remedial construction. The frequency thereafter will be determined by NYSDEC. Trends in contaminant levels in air, soil, and/or groundwater in the affected areas, will be evaluated to determine if the remedy continues to be effective in achieving remedial goals. Monitoring programs are summarized in Table 3-1 and outlined in detail in Sections 3.2 and 3.3.

Table 3-1. Monitoring & Inspection Schedule

Monitoring Program	Frequency*	Matrix	Analysis
Groundwater Quality	~~Annually (1st due 18 months after COC issued)~~18-month rotating basis beginning October 2022	Water	~~8260~~/8270/8082/6010/7474 (all wells, except for MW-3, MW-7, MW-8 and MW-9 used for gauging purposes only)
Site-Wide Inspection – including soil cover system & above water portions of bulkheads	Annually	Not Applicable	Not Applicable
Ultrasonic Steel Thickness Checks for Bulkheads (see Section 3.4.2.1)	Once every 5 years following issuance of the COC	Not Applicable	Not Applicable
Underwater Inspection of Bulkheads (see Section 3.4.2.2)	10, 20 & 25 years following issuance of the COC. Every 3 years thereafter.	Not Applicable	Not Applicable
Sub-slab Soil Vapor	System startup for new structures & prior to termination of system. Additionally, systems will be inspected quarterly and completed forms will be include and discussed in annual monitoring reports	Gas	TO-15

** The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH.*

Since the sub-slab depressurization systems include mechanical sections, the operational and maintenance requirements for these systems in presented in Section 4 of this SMP.

3.2 MEDIA MONITORING PROGRAM

3.2.1 Groundwater Monitoring

Groundwater monitoring will be performed on a periodic basis to assess the long-term effectiveness and performance of the remedy. A network of nine (9) monitoring wells (MWs) has been installed to monitor both up-gradient and down-gradient conditions at the Site, as shown on Figure 6. The network of on-Site wells has been designed based upon the following criteria:

- One (1) monitoring well has been installed up-gradient of each of the primary AOCs to provide monitoring of groundwater quality up-gradient of these areas. Specifically, well MW-4 was installed up-gradient of AOC-1 and well MW-8 was installed up-gradient of AOC-2/3.

- Two (2) monitoring wells have been installed down-gradient of each of the primary AOCs, with one being installed at each end (north and south) of each bulkhead. Given that the bulkheads were installed as containment structures, the wells were placed near the bulkhead return walls where there is the greatest potential for groundwater migration around the bulkhead and into the Hudson River. Specifically, to monitor AOC-1, wells MW-1 and MW-2 were installed at the south and north ends of the Zone 1 bulkhead, respectively. To monitor AOC-2/3, wells MW-5 and MW-6 were installed at the south and north ends of the Zone 3 bulkhead, respectively.

- One (1) monitoring well has been installed near the center of each of the primary AOCs. Specifically, well MW-3 was installed near the center of AOC-1 and well MW-7 was installed near the center of AOC-2/3. These wells will be used for gauging purposes and monitoring for the presence or absence of LNAPLs only. These wells will not be sampled annually along with the other wells in the monitoring network.

- Well MW-9 was installed along the existing concrete retaining wall up-gradient of AOC-2/3. During construction, contaminated soils were encountered in this area in close proximity to the retaining wall; however, the extent of the soil removal was terminated approximately 10-feet west of the retaining wall to avoid disturbance to the wall and foundation system. During the remediation activities, field evidence suggesting a potential offsite extension and/or continuation of contamination found in AOC 2/3 was observed in this area. The NYSDEC agreed with CHA that further excavation to the east during the remediation phase of the project may have undermined the foundation of the retaining wall;

however, the State required that a well be installed at this location to monitor groundwater quality and to evaluate the need for future investigation and/or remediation up-gradient of this location. Additionally, the NYSDEC will evaluate the need to remove non-aqueous phase liquid (NAPL) from this monitoring well should free product be detected during future monitoring events.

Monitoring well construction logs and boring logs for each of the wells are included in Appendix F. Since all of the wells installed during the initial investigation phases of the project conflicted with soil excavation areas and/or future structures, they were abandoned and new wells were installed during the final stages of the remedial construction.

All of the new wells installed at the Site were installed in the uppermost water bearing unit, which is an unconfined aquifer encountered at an approximate elevation of 0 to 2 feet AMSL. Effort was made during the installation of these monitoring wells to straddle the water table, since most of the contamination encountered at the Site was located in the "smear" zone located between the low and high water levels. While the water levels beneath the Site are significantly influenced by the tide in the Hudson River, the groundwater flow direction beneath the Site is generally westward toward the Hudson River. Since the wells were installed at a depth where well screens would straddle the groundwater level, the wells are all screened in fill material. The wells were not installed at a depth sufficient to penetrate native soils and sediments. This finding is consistent with the historical Sanborn mapping for the Site (see Section 1.2.2.1) that indicates that a majority of the Site consists of manmade land that encroached into the Hudson River.

All wells were constructed of two-inch Schedule 40 polyvinyl chloride (PVC) riser pipe with a ten foot section of factory slotted, 0.010-inch (No. 10) well screen. All PVC monitoring well materials were new and remained covered until their installation. A sand filter pack was placed around the screen to a level of at least one to two feet above the top of the screen and a minimum of a two-foot layer of bentonite pellets was placed on top of the filter pack to provide a watertight seal on top of the sandpack and prevent grout from migrating into the sandpack. The remaining borehole annulus was completed as a one to two-foot thick concrete surface seal sloped to provide positive drainage away from the well. Flush-mounted steel protective casings were installed over the top of each well riser and a locking gripper-type plug was installed in each well.

Since the final cover system had not been placed around each monitoring well at the time of installation, a 4 or 6-inch PVC temporary casing was placed around each well riser and a locking gripper plug was installed at the top of each riser. Following the completion of this FER and installation of final Site surface treatments (e.g. asphalt paving, concrete sidewalks, etc.), the City will be responsible for the installation of the permanent, flush-mount casings and protective concrete pads. These casings were provided to the City at the time of the well installation, but CHA was requested not to install the casings at that time until the grading of the Site was finalized.

After the installation of the post-remediation groundwater monitoring wells, the wells were developed via several cycles of surging and pumping until the turbidity level of the water in was reduced to below 50 Nephelometric Turbidity Units (NTUs).

All monitoring wells, except for wells MW-3, MW-7, MW-8, and MW-9, used for gauging and monitoring of NAPLs only, will be sampled annually as indicated previously in Section 3.1.2. The sampling frequency may be modified with NYSDEC approval. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC. The groundwater samples will be analyzed for the parameters specified in Section 3.2.1.1 of this SMP. While wells MW-3, MW-7, MW-8, and MW-9 will not be sampled during the event, they will still be gauged and screened for the presence or absence of NAPLs using an interface probe during the routine sampling event. Should product be detected in any of the on-Site wells, the thickness will be measured and the product will be collected for characterization and disposal a described in this SMP.

3.2.1.1 Sampling Protocol

All monitoring well sampling activities will be recorded in a field book and on a groundwater-sampling log presented in Appendix G. Other observations (e.g., well integrity, accessibility, etc.) will be noted on the well sampling log. The well sampling log will serve as an inspection form for the groundwater monitoring well network. Sampling and handling protocols are presented in the following sub-sections.

Well Gauging

The headspace in each well riser must be screened for the presence of organic vapors using a photoionization detector (PID) immediately upon removal of the rubber gripper plug from the wells. Where feasible, the plug will only be partially removed a sufficient distance to facilitate the insertion of the PID sampling probe, to minimize ventilation of the headspace. All PID readings will be recorded on the well sampling logs.

Water level measurements will then be taken in each well prior to monitoring well purging and sampling. All wells should be gauged within a one hour period of time and prior to commencement of the purging and sampling activities. Given the tidal influence of the Hudson River, the tide level/water elevation of the Hudson River must be documented during each sampling event. For this Site, the gauging station located in Poughkeepsie, New York (41.70º N, 73.95º W) may be utilized for determining tide levels. One possible source of this information is located at the following website:

http://tbone.biol.sc.edu/tide/tideshow.cgi?site=Poughkeepsie%2C+Hudson+River%2C+New+York&units=f.

For reporting purposes, the tide elevation will be compared to the groundwater elevations to help evaluate the effect of the tide on groundwater data.

The water levels will be obtained by measuring the distance from the marked location of the top of the well riser to the top of the water column using an electronic oil-water interface probe, such as the Solinst Model 122 Interface Meter. The interface probe instrument should be utilized to measure the thickness of any non-aqueous phase liquids (NAPLs) (either light non-aqueous phase liquids (LNAPLs or dense (sinking) non-aqueous phase liquids (DNAPLs)), if any, at the time of the gauging. All measurements will be obtained to nearest one-hundredth foot accuracy.
Should NAPLs be encountered in any of the monitoring wells, the thickness of the product layer will be recorded on the well sampling logs. The product will then be evacuated using disposable polyethylene bailers and placed into a 55-gallon drum until no additional product is visible in the

bailer (i.e. negligible product level present). At a minimum, five (5) gallons of liquid will be initially purged from any well containing product. Alternatively, the purge volume can be calculated as the thickness of the product layer in inches times 4.41 gallons per inch of product (assuming an immediate radius of influence of three (3) feet). Since recovery methods usually results in some groundwater removal, the volume of product and groundwater removed should be recorded separately on the well sampling log.

The well should then be allowed to stabilize for a minimum of one (1) hour and screened for the presence of product again. If a detectable layer of product is encountered, it will be evacuated again. If product repeatedly accumulates in the well, additional remedial measures may be required by NYSDEC, such as routine manual evacuation of product, the use of oleophilic and hydrophobic absorbent tubes or socks, passive specific gravity collectors, or automated skimmers.

The need for additional measures to manage free product will based upon the product recharge rate as well as other Site-specific characteristics of the Site. To measure the rate of recharge of the NAPL, if present, the well should be allowed to recharge for a period of at least one additional hour. The product thickness should be measured on an hourly basis for up to four (4) hours and at least one additional time approximately twenty-four (24) hours following the initial detection. Dividing the change in product thickness by the elapsed time for the product to accumulate will provide an estimated recharge rate in inches per hour. Alternatively, the volume of product can also be estimated based upon the product thickness and well diameter to estimate a volume versus elapsed time.

Any drummed liquids will be temporarily staged on-Site for characterization purposes. Any such liquid will be characterized and properly disposed of off-site within a maximum period of ninety (90) days. Given the historical contaminants of concern at the Site and the recent remedial work completed at the Site, any NAPLs, if present, are most likely to be LNAPLs

To minimize the potential for cross-contamination between each monitoring well, all personnel involved in well gauging will don a new pair of disposable latex gloves at each well. Additionally, all water level measuring equipment that comes in contact with well water will be cleaned in

accordance with "Decontamination" subsection below to ensure that cross-contamination does not occur. Monitoring wells containing free product will not be sampled during the routine sampling event due to the obvious elevated levels of contamination present in the well.

Well Purging

Prior to sample collection, monitoring wells will be purged in accordance with the following protocol:

1. All personnel involved in well purging will wear a new pair of disposable latex gloves for each well.

2. Purging will be conducted until a minimum of three well volumes are removed from the well or until the well is purges to dryness. Field parameters, including a minimum of turbidity, pH, temperature, and conductivity will be measured at a maximum rate of one time for each well volume purged to evaluate well stabilization. It is highly recommended that a multi-parameter water quality instrument with a flow-through cell, such as the Horiba U-22 or the YSI 600XL, be utilized for the purging operation to maintain lower turbidity levels for the samples. Calibration of all field instruments will be conducted in accordance with the manufacturer's instructions.

3. Purging will be considered complete when three consecutive consistent readings of temperature, pH and conductivity are obtained and the turbidity is less than 50 NTUs, if possible. Readings will be considered consistent if all of the readings are within 10 percent of the previous reading(s). In the event that consistent readings are not obtained, purging will continue until a maximum of five well volumes are evacuated. In the event that recharge is insufficient to conduct the purging protocol described in Item 2 above, the well will be bailed/pumped to dryness and a sample will be collected when the well has sufficiently recovered.

4. Acceptable methods of water extraction during purging include peristaltic pumps (e.g. Solinst Model 410), bladder pumps (e.g. QED Mircopurge or Well Wizard®), Waterra® pumps, and submersible variable-speed pumps (e.g. Grundfos Redi-Flo2). The purging method selected will be based upon the well depth, the water level in the well, and the recharge characteristics. Regardless of the purging equipment, the maximum allowable purge rate from the monitoring wells is one (1) gallon per minute.

5. All water extraction equipment will be cleaned in accordance with the protocols presented below in this Section of the SMP.

6. All purge water will be temporarily placed into graduated five (5) gallon buckets so that the purge volume can be tracked by field personnel.

7. All purge and decontamination water will be collected in placed in a 55-gallon drum or similar vessel. The water will then be sampled for characterization purposes. Refer to subsection "Waste Handling" for additional requirements for off-disposal of waste generated during the purging and sampling of the monitoring wells. However, in no instance may the purge/decontamination water be stored on-Site in excess of 90 days.

Well Sampling

Following the purging operation, monitoring well sampling will be carried out according to the following protocol:

1. Monitoring wells will be sampled utilizing low flow rates using either a variable speed pump or a bladder pump. A flow rate of 0.1 liters per minute or less will be utilized when sampling for VOCs.

   (Removed reference to VOC sampling protocol)

2. Sufficient groundwater will be collected for chemical analysis. Groundwater samples will be collected in containers as specified in the QAPP. The order for sample collection is as follows:

   - ~~Volatile Organic Compounds (VOCs);~~
   - Semi-volatile Organic Compounds (SVOCs);
   - PCBs; and
   - Metals.

   Note: Volatile Organic Compounds (VOCs) were eliminated from the sampling program following NYSDEC approval of the 2019 PRR.

3. Sample preservation details are presented in the QAPP. Sample containers will be prepared using washing procedures that meet or exceed the requirements of the specified methods. Sample containers will be prepared by the laboratory and shipped to the Site in sealed containers.

4. One blind duplicate sample will be collected during each monitoring event and analyzed for all of the same parameters as the grab samples. Additionally, a trip blank will be submitted with the laboratory cooler containing the VOCs samples and analyzed for VOCs only, as discussed in Section 3.3.

Laboratory Analysis

The groundwater samples will be submitted to a laboratory certified under the New York State Department of Health's (NYSDOH's) Environmental Laboratory Approval Program (ELAP) for analysis following appropriate chain-of-custody protocols. All analyses and deliverable packages

will be provided in accordance with Section 3.3.6. Each groundwater sample will be analyzed for the following parameters:

- ~~Target compound list (TCL) VOCs by EPA Method 8260~~
- Target compound list (TCL) SVOCs by EPA Method 8270
- TCL PCBs by EPA Method 8082
- RCRA-8 metals by EPA Methods 6010 and 7471

RCRA-8 metals refers to a list of eight toxicity characteristic metals identified by the Resource Conservation and Recovery Act (RCRA), including arsenic, barium, cadmium, chromium, lead, silver, and selenium that will be analyzed for via EPA Method 6010, and an eighth metal, mercury, that will be analyzed for via EPA Method 7471.

Based upon the results of the baseline sampling event, the NYSDEC may authorize a reduction in the number of parameters requiring analysis for future sampling events. Such a reduction may include the elimination or reduced sampling frequency for PCBs and RCRA-8 metals. However, in order for this to be considered, the Site owner or remedial party must submit a written request for a sampling reduction to the NYSDEC and continue with the aforementioned sampling program until written authorization to reduce the sampling parameters and/or frequency is received from the NYSDEC.

Equipment Decontamination

Prior to mobilization, all non-disposable field equipment will be thoroughly cleaned to remove any contaminants, such as oil, grease, mud, and other foreign matter. To avoid cross-contamination between monitoring wells, all non-disposal equipment will also be decontaminated prior to moving the equipment to each well at the Site. The required decontamination procedure for all manual sampling equipment used to collect samples for chemical analysis is:

1. Rinse equipment with tap water to remove any debris or film from equipment.
2. Wash and scrub with low phosphate detergent.
3. Thoroughly rinse with deionized or distilled water.
4. Air dry.

All decontaminated equipment will be placed on polyethylene sheeting or wrapped in aluminum foil in order to avoid contacting a contaminated surface prior to use.

Waste Handling

All purge water and decontamination derived water will be collected and temporarily stored on-Site in 55-gallon drums or similar vessels. The water will then be characterized for parameters required by the selected contractor and/or wastewater treatment facility. While the requirements of the selected wastewater treatment facility must be verified prior to collection of the characterization samples, it is anticipated that the samples will be analyzed for TCL SVOCs via EPA Method 8270, and PCBs via EPA Method 8082 at a minimum. Additional requirements specified by the disposal facility should be verified prior to the monitoring event and should be added to the parameter list to ensure sufficient laboratory containers are available on-Site and the laboratory is aware of all required analyses.

Once the analytical characterization is completed, the appropriate was profiles will be generated so that the water can be disposed properly off-site. It is anticipated that the characterization of such waste will indicate that it is a non-hazardous liquid waste that can be disposed of at a properly permitted off-site facility under appropriate Bill of Lading or waste manifest protocols given the Site history and contaminants of concern.

Should the waste be characterized as hazardous, the Site owner will immediately submit a Notification of RCRA Subtitle C Activity to provide the United States Environmental Protection Agency (USEPA) notification of regulated waste activity and verify whether the existing USEPA identification number is valid or it is necessary to obtain a new USEPA identification number for the Site. The USEPA identification number NYR000145292 was issued by the USEPA in 2008 on a temporary basis for the Site remediation, but a new identification number will likely be required to any future hazardous waste generated at the Site.

Regardless of the analytical characterization results, the water must be disposed of within 90-days of collection at a properly permitted disposal facility. In no instance may the

purge/decontamination water be stored on-Site in excess of 90 days. All haulers will have a valid 6 NYCRR Part 364 Permit and will only haul waste in United States Department of Transportation (USDOT) approved containers.

All gloves, PPE, sampling materials, etc. will be collected daily, placed into garbage bags (double-bagged) and disposed of as solid waste off-site.

3.2.1.2 Well Repairs, Replacement & Decommissioning

If biofouling or silt accumulation occurs in the on-Site monitoring wells, the wells will be redeveloped by conducting several cycles of physical agitation (e.g. surging of wells with a surge block) and pumping of the well. Additionally, monitoring wells will be properly decommissioned and replaced (as per the Section 3 – Site Monitoring Plan), if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance. The NYSDEC must be notified prior to any repair or decommissioning of monitoring wells for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent periodic report.

Well decommissioning without replacement will be done only with the prior approval of NYSDEC. Well abandonment will be performed in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Policy", Policy CP-43, issued on November 3, 2009 (see Appendix H). Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless otherwise approved by the NYSDEC.

3.2.2 Other Media Monitoring

No routine monitoring of Site soils, sediments within the Hudson River, outdoor air quality, or biota monitoring are required under this SMP.

3.3 MONITORING QUALITY ASSURANCE/QUALITY CONTROL

All sampling and analyses will be performed in accordance with the requirements of the following Quality Assurance Project Plan (QAPP). This QAPP presents the policies, organization, objectives, functional activities and specific Quality Assurance (QA) and Quality Control (QC) activities designed to achieve the specific data quality goals associated with the Groundwater Monitor Program that will be conducted at the Site. The QAPP has been prepared to identify procedures for sample preparation and handling, sample chain-of-custody, laboratory analyses, and reporting to be implemented during this investigation to ensure the accuracy and integrity of the data generated during the investigation.

3.3.1 Quality Assurance Objectives for Measurement Data

The overall quality assurance objective (QAO) is to develop and implement procedures for sample preparation and handling, sample chain-of-custody, laboratory analyses and reporting, which will provide accurate data. The QAPP is divided into the following subsections:

- 3.3.1 – Quality Assurance Objectives for Measurement Data
- 3.3.2 – Sampling Procedures
- 3.3.3 – Sample Custody & Document Control
- 3.3.4 – Calibration Procedures & Frequency
- 3.3.5 – Analytical Procedures
- 3.3.6 – Data Reduction, Validation, Assessment & Reporting
- 3.3.7 – Internal Quality Control Checks & Frequency
- 3.3.8 – Performance & System Audits & Frequency
- 3.3.9 – Preventive Maintenance
- 3.310 – Specific Routine Procedures Used to Assess Performance
- 3.3.11 – Corrective Action
- 3.3.12 – Quality Assurance Report to Management

Sections 3.3.1 through 3.3.3 and Sections 3.3.4.2, 3.3.6.2 & 3.3.7.1 provide critical information that should be reviewed each time prior to the collection of the groundwater samples from the Site.

The purpose of Section 3.3.1 is to define the goals for the level of QA effort; namely, accuracy; precision and sensitivity of analyses; and completeness, representativeness and comparability of measurement data from the analytical laboratories. QA objectives for field measurements are also discussed.

Data quality objectives (DQOs) have been established in accordance with the USEPA and the NYSDEC regulations.

3.3.1.1 Level of QA Effort

To assess the quality of data resulting from the field sampling program, field duplicate samples, field blank samples, samples for laboratory matrix spike/matrix spike duplicate (MS/MSD) analyses, and/or trip blank samples will be collected (where appropriate) and submitted to the certified laboratory.

The following list summarizes the frequency and type of QA/QC samples that will be collected during the groundwater sampling events:

1. Trip Blanks: Trip blanks will be submitted with each cooler containing aqueous samples to be analyzed for VOCs for each sampling event. Trip blank samples (for VOC determinations only) will be shipped by the laboratory to the Site and back to the laboratory without opening in the field. The trip blank will provide a measure of potential cross-contamination of samples resulting from shipment, handling and/or ambient conditions at the Site.

2. Field Blank: Field blank samples will be collected at a frequency of one per sampling event. Field blanks will be analyzed to check procedural contamination and/or ambient conditions and/or sample container contamination at the Site that may cause sample contamination.

   Note: *The following QA/QC samples (Item Nos. 3, 4 & 5) will only be collected when end point sampling/final delineation sampling is performed. End point sampling will only be required when the Site owner is requesting to end the groundwater monitoring program or remove the IC/ECs on a portion of the Site (i.e. if further excavation is performed to achieve unrestricted use SCOs).*

3. Duplicate Samples: Field duplicate samples will be submitted at a frequency of one per ten samples collected or in the event that a sampling round consists of less than 10 samples, one field duplicate will be collected. Field duplicate samples will be collected and analyzed as a check on the aggregate analytical and sampling protocol precision.

4. MS/MSD Samples: MS/MSD samples will be analyzed at a minimum frequency of one per 20 investigative samples; however, in the event that a sampling event consists of less than 20 samples, one MS/MSD sample will be collected. Matrix spike and matrix spike duplicate samples will be analyzed as a check on the analytical method's accuracy and precision.

5. Equipment Blanks: Equipment rinsate samples will be collected at a frequency of one sample per event to verify appropriate decontamination is being performed in the field. These samples are typically collected by pouring deionized water over the surface of a piece of decontaminated field equipment and collecting the rinse water in a laboratory container for analysis.

The sampling and analysis program is summarized below and lists the specific parameters to be measured, the number of samples to be collected and the level of QA effort required for each matrix.

Groundwater samples will be analyzed for SVOCs, PCBs, and RCRA-8 metals identified in Section 3.2.1.1 and Table 3-2 on a total constituent basis.

3.3.1.2 Accuracy, Precision and Sensitivity of Analyses

The fundamental QA objective with respect to the accuracy, precision and sensitivity of analytical data is to achieve the QC acceptance of each analytical protocol. The method(s) precision (relative percent difference of duplicate analysis) will be determined from the duplicate analyses of matrix spike samples, but only when end point or final delineation sampling is performed. A minimum of one sample per site will be spiked and analyzed in duplicate. Analysis will compare with the criteria presented in the appropriate methods identified in Section 3.3.1.2.

The method(s)' accuracy (percent recovery) for the water samples will be determined by spiking selected samples (matrix spikes) with test compounds. Accuracy will be reported as the percent

recovery of the test compound and will compare with the criteria given in the appropriate methods as identified in Section 3.3.1.2.

3.3.1.3 Completeness, Representativeness and Comparability

It is expected that all analyses conducted in accordance with the methods will provide data meeting QC acceptance criteria for the majority of all samples tested. Any reasons for variances will be documented.

The sampling program has been designed to provide data representative of Site conditions. During development of these networks, consideration was given to existing data from past studies completed for the Site, the physical Site setting, observations made while implementing the remedial action at the Site. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data are documented in this QAPP. However, it may be necessary to verify similar documentation from previous analytical data to adequately establish comparability. Comparability of laboratory analyses will be ensured by the use of consistent units. Following completion of data collection, the existing database will be evaluated for representativeness.

3.3.1.4 Field Measurements

Field measurements and observations will assist in the interpretation of analytical results obtained. Therefore, it is important that these measurements and observations be as complete as possible. For each sample collected, the following shall be recorded in indelible ink on the field log sheet:

1. Site location identification;
2. Depth interval of sample;
3. Unique sample identification number;
4. Date and time of sample collection;
5. Name of sampler;
6. Weather conditions;

7. Designation as to the type of sample (soil, water, etc.);
8. Designation as to the means of collection (pump, bailer, etc.);
9. Water quality parameters to demonstrate well stability prior to sample collection, including, but not limited to, pH, specific conductivity, temperature, oxidation-reduction potential (ORP), dissolved oxygen concentrations, etc. of the water samples;
10. Field observations such as visual evidence of staining or sheens, odors, and PID readings.
11. Presence or absence of NAPLs, and if present, the thickness of the NAPL layer(s).
12. Analyses to be performed on sample; and
13. Any other relevant comments such as size of area sampled, damage to a well casing, etc.

The general QA objective for measurement data is to obtain reproducible and comparable measurements to a degree of accuracy consistent with the use of standardized procedures.

3.3.2 Sampling Procedures

The procedures for collecting samples and for performing all related field activities are described in detail in Section 3.2 of this SMP. Sample preservation methods and maximum sample holding times are summarized below for groundwater. All sample holding times will be in accordance with the NYSDEC ASP requirements.

Table 3-2. Sample Preservation & Holding Times

Analysis	Preservation	Max. Holding Times	Shipping Means	Packaging
Groundwater Samples				
~~VOCs via EPA 8260~~	~~Cool to 4°C~~	~~7 days from VTSR[1] to analysis~~	~~Hand Delivery/ FedEx Priority~~	~~Cooler with Bubble Pack~~
SVOCs via EPA 8270 B/N	Cool to 4°C	5 days from VTSR to extraction	Hand Delivery/ FedEx Priority	Cooler with Bubble Pack
RCRA-8 Metals	Cool to 4°C	6 months from collection to analysis	Hand Delivery/ FedEx Priority	Cooler with Bubble Pack
PCBs via EPA 8082	Cool to 4°C	5 days from VTSR to extraction/ 40 days from VTSR to analysis	Hand Delivery/ FedEx Priority	Cooler with Bubble Pack

Note: VTSR = Validated Time of Sample Receipt.
VOC analyses via EPA 8260 was eliminated with the NYSDEC approval of the 2019 PRR.

All sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservatives will be tagged as such.

3.3.3 Sample Custody & Document Control

3.3.3.1 Chain-of-Custody

A Chain-of-Custody will be maintained to document the transfer of all samples. Each sample container will be properly sealed. Sample container labels will include sample number, place of collection and date and time of collection. Sample containers will be shipped to the certified laboratory at 4°C (±2°C) in sealed coolers.

Each sample cooler being shipped to the laboratory will contain a Chain-of-Custody form. One copy will be returned to the sampler upon receipt of the samples by the laboratory and one copy will be returned to the sampler with the data deliverables package.

Upon receipt of the cooler at the laboratory, it will be inspected by the designated sample custodian. The condition of the cooler and sample containers will be noted on the Chain-of-Custody record sheet by the sample custodian. The sample custodian will also document the date and time of receipt of the container and sign the form. If damage or discrepancies are noticed, they will be recorded in the remarks column of the record sheet, and be dated and signed. Any damage or discrepancies will be reported to the lab supervisor who will inform the lab manager and sampler.

3.3.3.2 Sample Documentation in the Laboratory

Each sample or group of samples shipped to the laboratory for analysis will be given a unique identification number. The laboratory sample custodian will record the client name, number of samples and date of receipt of samples in the Sample Control Log Book.

The laboratory will be responsible for maintaining analytical log books and laboratory data as well as sample inventory on hand for submittal to the sampler on an "as required" basis. Samples will be maintained by the laboratory for a period of 30 days, under the conditions prescribed by the appropriate USEPA methods, for additional analyses, if necessary. Raw laboratory data files will be inventoried and maintained by the laboratory for a period of five years, at which time groundwater monitoring consultant will advise them as to the need for additional storage.

3.3.3.3 Storage of Samples

Evidentiary files for the entire project will be inventoried and maintained by the groundwater monitoring consultant and will consist of the following:

1. Project related plans;
2. Project log books;
3. Field data records;
4. Sample identification documents;
5. Chain-of-Custody records;
6. Report notes, calculations, etc.;
7. References, literature;
8. Miscellaneous - photos, maps, drawings, etc.; and
9. Copies of all final reports pertaining to the project.

3.3.3.4 Split Sampling

When obtaining samples and before leaving the premises the groundwater monitoring consultant will provide, upon request, to the Site owner or the NYSDEC a receipt describing the sample obtained and, if requested, a portion of each such sample. A copy of the results of any analysis made of such samples shall be furnished promptly to the owner, operator, tenant, or other person in charge, if such person can be located.

3.3.4 Calibration Procedures & Frequency

3.3.4.1 Instrument Calibration & Tuning

Calibration of instrumentation is required to ensure that the analytical system is operating correctly and functioning at the proper sensitivity to meet established reporting limits. Each instrument is calibrated with standard solutions appropriate to the type of instrument and the linear range established for the analytical method. The frequency of calibration and the concentration of calibration standards are determined by the manufacturer's guidelines, the analytical method, or the requirements of special contracts. The laboratory will follow all calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.

Gas Chromatography/Mass Spectrometry (GC/MS)

Each day, prior to analysis of samples, the laboratory shall tune the instrument with bromofluorobenzene (BFB), or an equivalent, for volatile organic compounds and decafluorotriphenylphosphine (DFTPP), or an equivalent, for semi-volatile compounds. This shall be done according to the tuning criteria specified in the appropriate United States Environmental Protection Agency (USEPA) Methods. No samples shall be analyzed until the instrument has met tuning criteria.

The instrument shall then be calibrated for all target compounds. All method specified calibration criteria must be met prior to sample analyses. All calibrations must be performed using either average response factors or first-order linear regression (with a correlation coefficient requirement of > 0.995). Higher order fits will not be allowed.

Chromatography

The field of chromatography involves a variety of instrumentation and detection systems. While calibration standards and acceptance criteria vary depending on the type of system and analytical methodology required for a specific analysis, the general principles of calibration apply uniformly. Each chromatographic system shall be calibrated prior to performance of analyses. Initial

calibration shall consist of determining the linear range, establishing limits of detection, and establishing retention time windows. The calibration shall be checked on a daily basis to ensure that the system remains within specifications. If the daily calibration check does not meet established criteria, the system shall be recalibrated, and samples analyzed since the last acceptable calibration check shall be reanalyzed.

Standard Curves for Inorganic Analyses

Standard curves used in the determination of inorganic analytes will be prepared as follows:

Standard curves derived from data consisting of one reagent blank and a minimum of three concentrations (one reagent blank and one concentration for Inductively Controlled Plasma (ICP)) will be prepared for each inorganic analyte. The standard curve will be used with each subsequent analysis provided the standard curve is verified by using at least one reagent blank and one standard at a level normally encountered or expected in such samples. If the results of the verification are not within ±10 percent of the original curve, a new standard will be prepared and analyzed. If the results of the second verification are not within ±10 percent of the original standard curve, a reference standard will be used to determine if the discrepancy is with the standard or with the instrument. New standards will also be prepared on a quarterly basis at a minimum. All data used in drawing or describing the curve will be so indicated on the curve or its description. A record will be made of the verification.

3.3.4.2 Field Instrument Calibration

Calibration of the field instruments and analytical equipment will be done immediately prior to each day's use in accordance with the manufacturer's instructions or during groundwater sampling activities if the data indicates a change (>±10 percent) in pH and/or conductivity from the last location sampled. The field equipment will be maintained, calibrated and operated in a manner consistent with the manufacturer's guidelines and USEPA standard methods.

3.3.5 Analytical Procedures

3.3.5.1 Overview

Soil and groundwater samples collected for laboratory chemical analysis will be analyzed for VOCs, SVOCs, PCBs and metals.

3.3.5.2 Identification

Compounds which will be analyzed by GC/MS are identified by comparison of the sample mass spectrum with the mass spectrum of a standard of the suspected compound (standard reference spectrum). Mass spectra for standard references should be obtained on the user's GC/MS within the same 12 hours as the sample analysis. These standard reference spectra may be obtained through analysis of the calibration standards. The following criteria must be satisfied to verify identification: (1) elution of the sample component at the same GC relative retention time (RRT) as the standard component; and (2) correspondence of the sample component and the standard component mass spectrum.

For GC determinations of specific analytes, the RRT of the unknown will be compared with that of an authentic standard. Since a true identification by GC is not possible, an analytical run for compound confirmation will be followed according to the specifications in the methods. Peaks must elute within daily retention time windows established for each indicator parameter to be declared a tentative or confirmed identification. Retention time windows are determined using standard protocols defined in each method.

3.3.5.3 Quantification

The procedures for quantification of analytes are discussed in the appropriate analytical methods. For any analysis by GC/MS, estimation of concentration of an organic compound not contained within the calibration standard may be accomplished by comparing the mass spectral responses of the compound with that of an internal standard. This procedure is specified in the referenced USEPA methods.

3.3.5.4 Detection Limit Requirements

The data used to conduct the investigation will have targeted detection limits that are the lowest applicable limit for the appropriate method.

3.3.6 Data Reduction, Validation, Assessment & Reporting

3.3.6.1 General

Preparation of a Data Usability Summary Report (DUSR), which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method will only be required end point sampling/final delineation sampling as previously described. The laboratory will perform analytical data reduction and validation in-house under the direction of the laboratory QA Officer. The laboratory's QA Officer will be responsible for assessing data quality and advising the sampler of any data which were rated "preliminary" or "unacceptable" or other qualifications based on the QC criteria outlined in the methods, which would caution the data user of possible unreliability.

The groundwater monitoring consultant will conduct an independent evaluation of data reduction and reporting by the laboratory. The data validation will be performed in general compliance with the following documents: "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review", EPA 540-R-08-01, June 2008; and "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", EPA 540-R-04-004, October 2004. Data analyzed using methods not covered in these documents will be validated using the general principles used in these documents, and the analytical requirements specified in the methods.

Assessment of analytical and field data will include checks for data consistency by looking for comparability of duplicate analyses, laboratory QA procedures, adherence to accuracy and precision criteria, transmittal errors and anomalously high or low parameter values. The results of

these data validations will be reported to the project managers, noting any discrepancies and their effect upon acceptability of the data.

Raw data from field measurements and sample collection activities that are used in project reports will be appropriately identified and appended to the report. Where data have been reduced or summarized, the method of reduction will be documented in the report. Field data will be reviewed for anomalously high or low values that may appear to be inconsistent with other data.

3.3.6.2 Laboratory Reporting

All reporting and deliverables will be in accordance with the July 2005 NYSDEC ASP, Category A requirements or most current version. All reports will be received by the groundwater monitoring consultant within 30 days of the last day of sampling.

All sample data and its corresponding QA/QC data as specified in Category A, shall be maintained accessible to the groundwater monitoring consultant either in hard copy or on disk. NYSDEC ASP, Category B will be required for all end point sampling/final delineation sampling events.

3.3.7 Internal Quality Control Checks & Frequency

3.3.7.1 Field QC

Quality control procedures for field measurements will be limited to checking the reproducibility of the measurement in the field by obtaining multiple readings and by calibrating the instruments. Quality control of field sampling will involve collecting field duplicates, trip blanks, field blanks with the applicable activities described in this SMP.

3.3.7.2 Laboratory QC

Specific procedures related to internal laboratory QC samples (namely blanks, MS/MSD, surrogates and QC check samples) are described in the following subsections.

Blank Samples

A reagent blank, which is an aliquot of analyte free water or solvent, will be carried through the entire analytical procedure.

Matrix Spike/Matrix Spike Duplicates (MS/MSDs)

Acceptable criteria and compounds that will be used for matrix spikes are identified in the appropriate methods. Percent spike recoveries will be used to evaluate analytical accuracy while percent relative standard deviation or the relative percent difference (RPD) between matrix spike analyses will be used to assess analytical precision.

Surrogate Analyses

Surrogates are organic compounds which are similar to the analytes of interest, but which are not normally found in environmental samples. Surrogates are added to samples to monitor the effect of the matrix on the accuracy of the analysis. Every blank, standard and environmental sample analyzed by GC or GC/MS, including MS/MSD samples, will be spiked with surrogate compounds prior to sample preparation.

Surrogates will be spiked into samples according to the appropriate analytical methods. Surrogate spike recoveries will be compared with the control limits set by procedures specified in the method (or from laboratory specific control limits) for analytes falling within the quantification limits without dilution. Dilution of samples to bring the analyte concentration into the linear range of calibration may dilute the surrogates out of the quantification limit; assessment of analytical quality in these cases will be based on the quality control embodied in the check and MS/MSD samples.

3.3.8 Performance & System Audits & Frequency

For the purpose of external evaluation, performance evaluation check samples from the USEPA and various State agencies may be required to be analyzed periodically by the laboratory. The QA Officer may carry out performance and/or systems audits to ensure that data of known or defensible quality are consistently produced during a program.

Systems audits are qualitative evaluations of all components of field and laboratory quality control measurement systems. They determine if the measurement systems are being used appropriately. The audits may be carried out before all systems are operational, during the program, or after the completion of the program. Such audits typically involve a comparison of the activities given in the QAPP described herein, with activities actually scheduled or performed. A special type of systems audit is the data management audit. This audit addresses only data collection and management activities.

The performance audit is a quantitative evaluation of the measurements systems used for a monitoring program. It requires testing the measurement systems with samples of known composition or behavior to evaluate precision and accuracy. A performance audit may be carried out by or under the auspices of the QA Officer without the knowledge of the analyst during each sampling event for this program.

In addition, an external QA audit may be conducted by the groundwater monitoring consultant prior to the analyses of any investigatory samples. It should be noted, however, that any external QA audits will only be performed if deemed necessary by either the groundwater monitoring consultant project manager or QA/QC Officer. The laboratory may also undergo QC audit(s) by the NYSDEC or NYSDOH, if so required.

3.3.9 Preventive Maintenance

All analytical instruments to be used in this project will be serviced by laboratory personnel at regularly scheduled intervals in accordance with the manufacturers' recommendations. Instruments may also be serviced at other times due to failure. Requisite servicing beyond the abilities of laboratory personnel will be performed by the equipment manufacturer or their designated representative.

Daily checks of each instrument will be performed by the analyst who has been assigned the responsibility for that instrument. This will include changing GC inlet liners, tuning of the GC/MS,

checking operation of data systems, checking for leaks, etc. Manufacturers' recommended procedures will be followed in every case.

3.3.10 Specific Routine Procedures Used to Assess Performance

3.3.10.1 QA Measurement Quality Indicators

Precision

Precision will be assessed by comparing the analytical results between duplicate spike analyses. Precision as relative percent difference (RPD) will be calculated as follows:

$$\text{Precision} = \frac{[D_2 - D_1]}{[(D_1 + D_2)/2]} \times 100$$

D_1 = matrix spike recovery

D_2 = matrix spike duplicate spike recovery

Accuracy

Accuracy will be assessed by comparing a set of analytical results to the accepted or "true" values that would be expected. In general, MS/MSD and surrogate spike recoveries will be used to assess accuracy. Accuracy as percent recovery will be calculated as follows:

$$\text{Accuracy} = [(A-B) / C] \times 100$$

A = The analyte determined experimentally from the spike sample.

B = The background level determined by a separate analysis of the un-spiked sample.

C = The amount of spike added.

Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared with the amount that was expected to be obtained under normal conditions.

To be considered complete, the data set must contain all QC check analyses verifying precision and accuracy for the analytical protocol. In addition, all data are reviewed in terms of stated goals in order to determine if the database is sufficient.

When possible, the percent completeness for each set of samples will be calculated as follows:

$$\text{Completeness} = \frac{\text{No. valid data samples obtained}}{\text{Total No samples}} \times 100 \text{ percent}$$

Outliers

Procedures discussed previously will be followed for documenting deviations. In the event that a result deviates significantly from method established control limits, this deviation will be noted and its effect on the quality of the remaining data will be assessed and documented.

3.3.11 Corrective Action

The need for corrective action may be identified by system or performance audits or by standard QC procedures. The essential steps in the corrective action system will be:

1. Checking the predetermined limits for data acceptability beyond which corrective action is required;
2. Identifying and defining problems;
3. Assigning responsibility for investigating the problem;
4. Investigating and determining the cause of the problem;
5. Determination of a corrective action to eliminate the problem (this may include reanalysis or re-sampling and analyses);
6. Implementing the corrective action and evaluating the effectiveness;
7. Verifying that the corrective action has eliminated the problem; and
8. Documenting the corrective action taken.

For each measurement system, the Laboratory QA/QC Officer will be responsible for initiating the corrective action and the laboratory supervisor will be responsible for implementing the corrective action.

3.3.12 Quality Assurance Report to Management

The groundwater monitoring consultant project manager will receive reports on the performance of the measurement system and the data quality following each sampling round and at the conclusion of the project. At a minimum, these reports will include:

1. Assessment of measurement quality indicators; (i.e. data accuracy, precision and completeness);
2. Results of systems audits; and
3. QA problems and recommended solutions.

The groundwater monitoring consultant's QA/QC Officer will be responsible within the organizational structure for preparing these periodic reports. The final report for the project will also include a separate QA section which will summarize data quality information contained in the periodic QA/QC reports to management, and present an overall data assessment and validation in accordance with the data quality objectives outlined in this QAPP.

3.4 SITE-WIDE INSPECTION

Site-wide inspections will be performed on a regular schedule at a minimum of once a year, with the first inspection being completed 18 months following the NYSDEC's issuance of the certificate of completion. Site-wide inspections will also be performed after all severe weather conditions (e.g. 10-year frequency storm of more, flooding events, hurricanes, tornadoes, significant periods of drought that could result in desiccation cracking of soil cover material, etc.), earthquakes and other natural disasters, explosion or fires, riots resulting in property damage on the Site, major structural failures (e.g. the collapse of a bulkhead or the concrete retaining wall along the east side of the Site), reportable spills or other environmental releases, etc. that may affect Engineering Controls or monitoring devices. During these inspections, an inspection form will be completed (Appendix I). The form will compile sufficient information to assess the following:

- Compliance with all ICs, including Site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General Site conditions at the time of the inspection;
- The Site management activities being conducted including, where appropriate, confirmation sampling;
- Compliance with permits and schedules included in the Operation and Maintenance Plan; and
- Confirm that Site records are up to date.

All Site-wide inspections should be performed by or under the direction of a qualified professional engineer licensed in New York State. The bulkhead inspections should be completed by or under the direction of a qualified structural engineer who is familiar with inspection of marine structures.

The following subsections summarize some of the Site ECs that will be reviewed during each Site-Wide Inspection.

3.4.1 Soil Cover System Monitoring

The soil cover system will be inspected on an annual basis to determine whether or not there is damage that needs to be repaired to maintain the intended level of protection. The soil cover system at the Site incorporates a non-woven geotextile demarcation layer (biaxial geogrid on slopes equal to or steeper than 3:1) and a minimum of a one foot of soil cover material. The finished surface of the Site varies with location on the Site, but generally consists of a minimum of six inches of topsoil in green space areas, a minimum of four inches of asphalt in parking lot areas, and concrete or concrete pavers in walkway areas. The most likely problems to occur with the soil cover system include settlement (total and differential) of the Site, erosion of surface soils, loss of vegetative cover on the Site, and potential intrusive activities associated with subsurface utility repairs or the installation of future Site amenities.

Annual inspections of the Site will be performed to identify and document any damage or problems that may have developed with time after installation of the soil cover system. A Site-Wide Inspection Checklist, which has been included in Appendix I, will be completed during each of the annual inspections and will be appended to the periodic monitoring reports submitted to the NYSDEC. Additionally, severe condition inspections of the soil cover should be completed after any of the severe conditions listed below:

- After a flooding event/storm surge in the Hudson River
- After a significant storm event in excess of the 10-years storm frequency
- After an earthquake
- Other weather events that potentially impacted the integrity of the soil cover system

The following list provides a summary of the types of damage that are most typical for soil cover systems and the recommended repair procedures:

1. **Shallow depressions (less than 6 inches in impervious areas or less than 12 inches in green space areas) where the demarcation barrier is not exposed:** In areas where shallow depressions are discovered in the cover system, the soil cover system may be repaired by placing additional soil in the area of the depression, grading it to maintain positive drainage, and compacting the soil prior to re-establishing the finished surface (e.g. vegetative cover).

2. **Deep depressions and/or sink holes (greater than 6 inches in imperious areas or greater than 12 inches in green space areas):** Deep depressions may be attributable to subsurface erosion and scouring which will need to be investigated prior to making repairs to reduce the likelihood of future reoccurrence. Following the requirements of the Excavation Work Plan (Section 6), the area should be excavated to explore for the cause of the depression. Items such as abandoned utility vaults or utility pipes associated with the historical manufacturing operations should be removed and/or filled in with clean, imported materials, such as stone, concrete, flowable fill, etc. All imported materials must be certified to be "virgin" and tested in accordance with Section 6.11 prior to use. Materials cannot be utilized without analytical testing unless material-specific, written authorization of the NYSDEC is obtained prior to use. Such consideration will only be provided for material such as riprap stone that can be certified as "virgin" from a quarry and contains no files (e.g. silt, sands, and clays).

After repair the subsurface repair is complete, the demarcation layer will need to be repaired by placing a new piece of 6-ounce non-woven geotextile over the repaired area, as specified in Section 6.10 of this SMP. The fabric should overlay the existing demarcation barrier by a minimum of twenty-four (24)-inches in all directions. All materials used to repair the soil cover layer (top 12 inches) must be imported virgin materials, and certification of such to the Site owner and NYSDEC will be required. All materials shall be graded and compacted in appropriate size lifts for the material being placed, in accordance with Section 6 of this SMP.

3. **Eroded areas of the soil cover or ruts:** Erosion of the soil cover layer is most likely to occur in green space areas of the Site. Areas where erosion of the cover soil is observed should be repaired by replacing the eroded soil and compacting it prior to re-establishing the vegetative cover. Drainage paths should be rerouted to prevent future erosion problems, and appropriate erosion and sedimentation controls (ESCs) should be temporarily installed (e.g. silt fence, hay bales, rock check dams, etc.).

4. **Bare spots:** In green space areas, bare spots on the top of the soil cover system will be repaired by re-working soil cover, re-seeding, fertilizing and mulching.

5. **Damage due to excavation:** It is anticipated that the demarcation layer will be damaged from time to time due to addition of Site amenities, installation of landscaping features, installation of new utilities work outside cleaned utility corridors line with the demarcation barrier, etc. All such work should be done in accordance with the Excavation Work Plan (Section 6).

6. **Vector activity:** The annual Site-wide inspection should identify the presence of any live vectors, dead vectors, animal tracks, droppings, feeding areas, or dens. If the visual observations determine that there is a presence of burrowing vectors on-Site, a professional exterminator will be contacted to develop and implement a plan to control the vector population.

7. **Overgrowth of vegetation:** The use of shallow rooting plants is highly encouraged at the Site to avoid breaching of the demarcation barrier that would trigger the need to utilize the Excavation Work Plan. Additionally, the lawn/grass areas of the Site shall be mowed periodically to prevent establishment of "woody" vegetation that may potentially damage the soil cover system.

3.4.2 Bulkhead Systems

The bulkheads were designed as permanent structures to reduce the potential migration of remaining contamination at the Site from migrating to the Hudson River. Annual inspections of the bulkhead will be required to ensure that this EC continues to serve as a barrier between remaining contamination at the Site and the river. All monitoring (inspections) must be performed

by a qualified professional engineer, experienced with the design, construction, and inspection of similar waterfront structures in conformance to *ASCE Underwater Investigations Standard Practice Manual No. 101*.

3.4.2.1 Above Water Bulkhead Inspections

Certain inspections, as subsequently described in more detail, must be conducted during a low tide. Low tide inspections must be completed from the mean low water (MLW) elevation (refer to Section 1.2.3.2) to the top of the structures. The bulkhead record drawings have been included in Appendix D and detail all components of the bulkhead structures, including all materials utilized. These documents should be reviewed prior to completion the inspection of the bulkheads so that the engineer completing the inspections is familiar with all components of the bulkhead structures.

The Site-Wide Inspection Checklist includes a list of items that will be observed during the annual inspections. While these inspections are not intended to be full structural inspections or inspections for safety of Site development amenities, the following items will be examined:

1. **Leaking Interlocks:** Evidence of leaking interlocks or sheens in front of the bulkhead that suggest a breach in the water tightness of the structures. Areas where the waterstop material appears to be displaced from the sheet pile interlock or heavily corroded welds at the interlocks also suggest areas of potential leaks that should be examined more carefully.

2. **Deflection:** The bulkhead will be visually inspected for evidence of significant new movement or deflections that may suggest the bulkhead is being placed under significant stress. It should be noted that some deflection of the bulkheads existing at the completion of the construction. Additionally, the bulkheads were constructed with no drains to remove hydrostatic loads and the Zone 3 bulkhead was designed as a cantilevered bulkhead that is expected to experience some deflection. Evidence of additional deflection may include, but is not limited to the following types:

    - Evidence of separation of the bulkhead from the backfill behind the bulkhead.
    - Significant visual rotation of deflection of the bulkhead waterward.
    - Depressions or sink holes behind the bulkhead.
    - Cracks of fissures in the fill, sidewalks, etc. behind the bulkheads.

- Significant rotation and/or damage to the precast concrete caps.

If evidence of additional deflection is a concern in the opinion of the engineering conducting the inspection, additional monitoring will be recommended. The engineer should make a recommendation for the inspection frequency and scope that is warranted based upon their professional opinion in the periodic review report and include any documentation supporting this recommendation.

While the scope of the monitoring program should be recommended by the engineer, one option would be to use survey equipment to monitor movement of the bulkhead of concern. This could be done by setting points on the precast concrete at a maximum of 100-foot intervals along the waterfront and at every angle point and establishing a three-dimensional coordinate of each location. These exact survey points could then be surveyed periodically thereafter to monitor for additional movement. If movement is observed, the bulkhead could then also be monitor for changes in plumbness using a plumb bob and a level and measurement tool (e.g. ruler or tape measure). Additional monitoring requirements should be completed in accordance with the recommendations of the engineer completing the inspections.

3. **Deterioration:** Evidence of significant deterioration to the waterward side of the bulkhead at low tide. Evidence of deterioration may include observation of:

   - Coating damage – As previously indicated the steel sheet piles along the waterfront were coated with an epoxy coating to extend the service life of the sheet piles. However, the coating was determined to be applied incorrectly during the construction process. Attempts were made to repair the coating; however, the repairs were not made correctly and have also failed. The City of Poughkeepsie made the decision not to complete the repairs to the coating after several failed attempts by the contractor, and to accept a reduced service life.

     The coating was intended to provide an additional 20 plus years of service life to the bulkheads, but the estimated service life (the point at which perforation of the steel sheet piles begin as opposed to catastrophic failure) is estimated to be between 36 & 43 years from the initial installation in 2008 due to the previously noted coating defect. While observation of the coating condition should be documented on the inspection reports, continued failure of the coating is anticipated and will not be significant indicator of the condition of the bulkhead. Additionally, while repairs can be made by the owner if elected, repairs to the coating are not required by the SMP. The reduced service life of the bulkheads due to the coating failure has resulted in the need for more frequent underwater inspections of the bulkhead described in the Section 3.4.2.2 of this SMP.

   - Corrosion damage – Evidence of corrosion will be documented annually. A pit gauge will be utilized to measure the depth of the corrosion in heavily corroded

areas representative of the overall structure condition. Additionally, the thickness of the steel shall be measured at representative locations using an ultrasonic or other non-destructive testing technique at least one (1) time every five (5) years. The computed rate of loss in thickness of the steel sheet piles will be utilized in estimating the remaining service life of the bulkhead and determining when repairs should be made or replacement of the structure is warranted. The sheet piles were manufactured with a flange thickness of 0.512 inches (13.00 millimeters) and a web thickness of 0.480 inches (12.20 millimeters). Finally, the condition of the welded interlocks should be examined for evidence of significant corrosion and material loss.

- Abrasion damage
- Loosening of structural connections (e.g. the loosening of loss of the hex nuts and/or plate washers for the wale bolts on the Zone 1 bulkhead)
- Fatigue
- Overloading/deflection
- Loss of backfill behind the structure

4. **Concrete Cap Damage:** Evidence of significant cracking, spalling, or movement in the precast concrete caps on top of the bulkheads. Signs of new movement may be evident by the joint sealant pulling away from the concrete; however, this may also be due to an adhesion failure of the sealant. In areas of the cap where the sealant is failing or significant movement is apparent, additional monitoring will be conducted.

5. **Subsidence:** Evidence of subsidence behind the bulkheads (e.g. cracks in sidewalks, sink holes, evidence of scour or undermining, etc.).

6. **Toe Protection Damage:** Evidence of loss of toe protection stone (to the extent visible from a boat at a low tide).

Items 1, 2, 3 & 6 must be conducted at low tide such that the structure can be viewed from the mean low water elevation to the top, as previously indicated. Items 4 & 5 can be completed at any time regardless of tide levels.

Should evidence of significant damage to the bulkheads be observed during the annual inspections, additional investigations may be necessary, including but not limited to, the underwater inspection via diving to examine the condition of the bulkhead between the low tide level and the top of the

toe protection stone and/or excavation behind the Zone 1 bulkhead to investigate the condition of buried elements of the this anchored bulkhead. The engineer completing the inspection of the bulkhead structures should make a recommendation for any modifications to the inspection frequency and scope that is warranted based upon their professional opinion in the periodic review report and include any documentation supporting this recommendation.

3.4.2.2 Underwater Bulkhead Inspections

In addition to the annual inspections of the bulkheads periodic under water inspections of the bulkhead are also required. The initial underwater inspections will be completed at 10, 20 & 25 years following the NYSDEC's issuance of the Certification of Completion. Inspections will then be completed at a frequency of once every three (3) years in perpetuity. However, the engineer completing the inspection of the bulkhead structures should make a recommendation for any modifications to the inspection frequency and scope that is warranted based upon their professional opinion in the periodic review report and include any documentation supporting this recommendation.

The following list provides a summary of the primary items that will be reviewed during the underwater inspections of the bulkheads:

1. **Corrosion:** As previously indicated, the coating system on the bulkhead was already experiencing failure at the time of the completion of the construction. The Site owner elected to accept the reduce service life of the bulkheads following several failed attempts by a contractor to repair the coating properly. Thus, condition of the coating will not be utilized as an indicator of the condition of the bulkhead. Inspection of coating repairs (if done in the future) should be performed by National Association of Corrosion Engineers (NACE) trained inspectors.

   A visual inspection will be conducted to evaluate the extent of corrosion. The thickness of the steel will be measured by non-destructive testing methods and the data will be utilized in estimating the remaining service life of the bulkhead and determining when repairs should be made or replacement of the structure is warranted. Any perforations or holes in the steel sheeting will be identified and recorded for evaluating repair options (e.g. welding steel plates over perforated areas, replacement of the bulkhead, etc.). Additionally, the inspector should review the condition of interlocks to look for potential leaks, including both the welded interlocks and the interlocks with the waterstop material.

2. **Leaking Interlocks:** The condition of the interlocks will be reviewed to evaluate potential leakage of the structures. Welded interlocks will be inspected for evidence of significant corrosion, cracking or looseness while the interlocks containing waterstop will be reviewed for a potential loss or failure of the waterstop material. Additionally, any visual evidence of leakage (e.g. signs of silt scour emanating from an interlock) will be documented.

3. **Toe Protection Damage:** Evidence of displacement or loss of toe protection stone will be reviewed and documented during the underwater inspections.

3.4.3 Riprap Revetment

Riprap revetment was installed along the portions of the DeLaval Site to stabilize the shoreline where no bulkheads are present. Specifically, the following three areas of revetment will be inspected on an annual basis:

1. At the southwest corner of the DeLaval Site, there is an approximately 50-foot long area located south of the Zone 1 bulkhead. No significant contamination was identified in the area south of the bulkhead and bedrock was found to be shallow in this area.

2. The Zone 2 section of revetment is approximately 848 lineal feet in length and is located near the center of the property between the Zone 1 and Zone 3 bulkheads.

3. Near the northwest corner of the Site is an approximately 370-footlong section of revetment located immediately north of the Zone 3 bulkhead. While this Zone 4 section of revetment is extends further northward, only the southernmost 370-lineal feet is part of the DeLaval Site will be monitored under this SMP. The off-site revetment work, including 360 lineal feet of additional revetment in Zone 4 and all of Zone 5, will not be monitored under the requirements of this SMP.

Annual inspections of the revetment will be conducted to reduce the potential for exposure and/or scouring of Site soils from the Hudson River. The inspections must be conducted at low tide so that the entire revetment section from the mean low water (MLW) elevation to the top of the revetment is observable. The task will require a visual inspection of the portions of revetment visible at a low tide (as previously described for the bulkhead inspections) to look for evidence of displacement of the armor stone. Such evidence may include, but should not be limited to:

- Large voids or gaps in the surface of the revetment.

- Displaced armor stones.
- Visible stone bedding or geotextile fabric placed beneath the armor stones.
- Significant movement of the concrete jersey barriers installed at the top of the revetment section to separate the material from Site soils.
- The presence of large debris that could become lodged in the revetment (e.g. trees or large tree limbs) and potentially result in future damage to the revetment.

3.4.4 Sub-slab Depressurization & Ventilation Systems

Section 4.0 of this SMP discusses the operational and maintenance requirements for the sub-slab depressurization systems at the Site.

3.4.5 Drainage Systems

Inspection of the Site drainage systems should be conducted during each annual inspection as well as after all major storm events (10-year storms). The drainage system inspection should identify any erosion, siltation, settlement, or restriction to the flow of water in the drainage ditches/swales and stormwater piping systems. All eroded or settled areas should be repaired in accordance with Section 6.10. In areas where drainage ditches/swales are stone or riprap lined, additional lining material may be required. In areas where siltation or some other restriction to the flow of water in the drainage ditches on piping has occurred, excess silt or other blockage should be removed and the surface repaired to allow the free passage of water.

The inspection of closed drainage systems will include the inspection of five (5) drainage manholes associated with the weep hole drainage system adjacent to the concrete retaining wall along the east side of the Site and an inspection of the outfalls to check for significant obstructions that could result in the surcharging of the drainage systems, since such significant surcharging could ultimately result in damage to the soil cover system at the Site. Additionally, all stormwater catch basins and manholes located on the Site will be visually inspected for evidence of debris buildup, surcharging, infiltration, etc. If private drainage systems require maintenance and/or repairs, the Site owner will notify the private party of the required maintenance with two (2) weeks of discovery. If the private utility owner does not perform the required maintenance within four (4)

weeks of notification, the Site owner will then assume responsibility for the needed maintenance such that the integrity of the engineering controls is maintained.

The annual inspections of the drainage systems will be limited to inspections inside the structures (e.g. manholes and catch basins) and outfall locations. No closed-circuit television inspections of the pipelines will be required as part of the annual inspection, unless the findings of the routine annual inspection indicate that there are likely more significant problems within the pipelines (e.g. separated pipe joints, crushed pipes, etc.), such as the lack of flow in the system or sink holes visible at the ground surface.

3.4.6 Existing Structures

Any and all monitoring well covers, fences, gates, and any other onsite structures should be checked to insure that they are undamaged and have been secured. Any damaged structures should be repaired using suitable methods based on the nature of the structure and damage. All structures should be re-secured immediately. Refer to Section 4.0 of this SMP for monitoring and inspection requirements associated with the sub-slab depressurization systems located in each of the occupied structures at the Site.

3.5 MONITORING REPORTING REQUIREMENTS

Forms and any other information generated during annual monitoring events and inspections will be kept on file with the owner and on-Site. All forms, and other relevant reporting formats used during the monitoring/inspection events, will be (1) subject to approval by NYSDEC and (2) submitted at the time of the Periodic Review Report, as specified in the Reporting Plan (Section 5.0) of this SMP. All Periodic Review Reports must be certified and approved by a Qualified Environmental Professional as previously described.

All monitoring results will be reported to NYSDEC on a periodic basis in the Periodic Review Report. A letter report summarizing the monitoring event findings (e.g. a Site inspection following a major storm event) will also be prepared, subsequent to each sampling event. A separate letter report from the Periodic Review Report will not be required unless one of the following occurs:

- The sampling results show a significant increase (greater than 15 percent) in the concentration of any groundwater contaminant in a given well, unless said increase is to a value less than its groundwater standard, criteria or guidance value (SCG); or
- Measurable NAPL is encountered; or
- Sheens are encountered/visible in an area where they were not previously encountered.
- The engineer completing the periodic reviews recommends additional monitoring of any of the engineering controls following the Site-wide inspection.

All reports will include the following, at a minimum:

- Date of event;
- Personnel conducting sampling;
- Description of the activities performed;
- Type of samples collected (e.g., groundwater, sub-slab vapor, indoor air, etc.);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, Site inspection reports, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether groundwater conditions have changed since the last reporting event.

Data will be reported in hard copy or digital format as determined by NYSDEC. A summary of the monitoring program deliverables are summarized in Table 3-3 below.

Table 3-3. Schedule of Routine Monitoring/Inspection Reports

Task	Reporting Frequency
Groundwater Monitoring Program	18-month rotation. Periodic Review Report (PRR) due to the NYSDEC on a three-year rotation to include two groundwater monitoring events beginning with the submission of the January 2022 PRR. The next PRR is scheduled to be submitted in January 2025.
Site Wide Inspection	Annual basis. PRR due to the NYSDEC on a three-year rotation to include three site-wide inspections. If issues are noted that require immediate action, CHA will provide a brief letter to the NYSDEC within 30 days of the site inspection. First report due 18 months following Department of Environmental Conservation (DEC) issuance of Certificate of Completion. Underwater inspections of the bulkhead will be performed at 10, 20 & 25 years following issuance of the Certificate of Completion and every 3 years thereafter, at a minimum.
Sub-slab Depressurization System Monitoring	At the startup of the remedial system and prior to the termination of these mitigation systems. Additionally, these systems will be inspected annually and completed forms will be include and discussed in annual/periodic monitoring reports.

**The frequency of events will be conducted as specified until otherwise approved by NYSDEC in writing.*

4.0 OPERATION & MAINTENANCE PLAN

4.1 INTRODUCTION

This Operation and Maintenance (O&M) Plan describes the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the Site. This O&M Plan:

- Includes the steps necessary to allow individuals unfamiliar with the Site to operate and maintain the sub-slab depressurization (SSD) systems;
- Includes an operation and maintenance contingency plan; and,
- Will be updated periodically to reflect changes in Site conditions or the manner in which the SSD systems are operated and maintained.

Information on non-mechanical Engineering Controls (i.e. soil cover system) is provided in Section 2 of this SMP - Engineering & Institutional Control Plan. A copy of this O&M Plan, along with the complete SMP, will be kept at the City of Poughkeepsie Engineer's office located at City Hall, 62 Civic Center Plaza, Poughkeepsie, New York at all times. A copy of this document will also be maintained on-Site in the property manager's office following redevelopment of the Site. This O&M Plan is not to be used as a stand-alone document, but as a component document of the SMP.

4.2 SSD SYSTEM OPERATION & MAINTENANCE

To address remaining contamination beneath the buildings on the Site, SSD systems will be installed in all buildings on Site. The only exception to this requirements is that small structures designed to occupied only on a part-time basis and are open to the atmosphere when occupied (e.g. public restrooms, food kiosks, storage sheds, etc.) will be designed with passive ventilation systems. The passive ventilation will include all components of the mitigation system except for the blower units, but should be designed such that it can easily be converted to an active system in the future, if monitoring indicates active ventilation is necessary. Therefore, since there are no

mechanical systems associated with the passive ventilation systems, these systems will not be discussed further in this section of the SMP.

All SSD systems will be installed to meet the minimum requirements outlined in Section 2.2.1.3 of this SMP. As-built drawings and specific operation and maintenance manuals for each system will be appended to this SMP as such systems are installed.

4.2.1 SSD Scope

This O&M plan for the SSD systems provides a general introduction to operational and maintenance requirements for the systems. The most common way for soil vapor associated with residual volatile organic contamination to enter a building is from pressure-driven transport or diffusion. Operation and maintenance of the systems is integral to maintaining the overall safety of building occupants. The SSD systems must be operated continuously. The blower systems should be placed in secured locations within each building to reduce the likelihood of tampering and lockouts should be placed on all power controls to prevent persons from turning off power to the units.

4.2.2 System Startup & Testing

The owner's manual and specific startup recommendations provided for the SSD system will be appended to this SMP as they become available (Appendix J) for each system installed at the Site. However, the following items will be required at a minimum prior to occupancy of the buildings:

1. Prior to startup, each of the systems will be inspected to ensure that all components of the system (e.g. piping, fan, gauges, etc.) are properly installed. Additionally, all floor penetrations and joints within each building should be checked to ensure that they have been sealed, as such leaks may impact the overall efficiency of the system. It is important that all sealants and/or concrete patches be allowed sufficient time to properly cure before system startup (minimum of 24 hours).

2. Once all checks of the system are complete, the system should be turned on and allowed to operate for at least two hours prior to further testing. During this time, another check for leaks in the system appurtenances should be made. The operator should also ensure that pressure and vacuum gauges on the blower system show proper operation of the fan.

Additionally, all VOC monitors and/or carbon monoxide detectors should be tested for appropriate operation.

3. There are two levels of performance testing required for each SSD system. The first test consists of physical testing of the pressure field after a minimum of two hours of continuous operation. To evaluate the pressure field extension (PFE), it is necessary to drill approximately ten small holes (approximately ½-innh to 1-inch in diameter) through the slab at various distances and directions from the blower system, including points most remote from the blower. If permanent vacuum monitoring points are installed, the need to drill holes through the slab can be eliminated. With the blower system in operation, the sub-slab pressure in each hole should be measured, one at a time. A digital micromanometer should be utilized to monitor the PFE. While smoke tubes can be utilized to verify the drawdown effect beneath the slab, the use of a micromanometer will allow the user to verify that a minimum sub-slab pressure of -0.002 inches of water column is achieved. The ball valves installed on the piping network can be throttled/adjusted to balance the PFE as needed. If the minimum vacuum cannot be achieved at all points, the system should be inspected for leaks again. If after performing diagnostic checks the desired PFE is not achieved, it is possible that a larger blower system will need to be installed.

4. After a minimum of two weeks of operation, confirmatory air monitoring will be conducted in each structure as a second level of performance testing for the SSD system. This testing will include the collection of an indoor air quality sample from the lowest occupied level within each building. Specifically, an eight-hour composite sample will be collected inside each building using a 1-liter or 5-liter SUMMA® canister to collect the sample. Additionally, one outdoor sample should be collected upwind to serve as an ambient background reference. All samples will be submitted to a certified laboratory for analysis of VOCs via EPA Method TO-15.

   The analytical results for methylene chloride, tetrachloroethene (PCE) and trichloroethene (TCE) will be compared to New York State DOH guidance values in air as per Section 3.2.5 of the NYSDOH *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006)*. The remaining compounds that are detected in the air samples will be compared to both the 1997-2003 NYSDOH *Study of VOCs in Air for Fuel Oil Heated Homes* (90th Percentile Values), and the 2001 USEPA *Indoor Air Building Assessment and Survey Evaluation (BASE) Database*, (90th Percentile of Indoor Air Results). However, these two sets of data are referenced for comparison purposes only, as the values referenced in the study are not regulatory standards. While a properly designed SSD system should mitigate the potential for indoor air contaminants related to the remaining contamination on-Site, the NYSDEC and NYSDOH will work with the Site owner to provide notification to building occupants and tenants of any elevated VOC levels. Specifically, validated SVI data will be transmitted to the Site owner and any tenants within 30 days of validation. If any indoor air test results exceed NYSDOH guidelines, relevant NYSDOH fact sheets will be provided to all tenants and occupants of the property within 15 days of receipt of validated data.

The system testing described above will be conducted if, in the course of the SSD system lifetime, significant changes are made to the system, and the system must be restarted.

4.2.3 SSD System Operation: Routine Operation Procedures

The manufacturer's recommendations for routine operation procedures for the blower systems will be included in Appendix J as the systems are installed and these manuals become available. The SSD systems will be designed to operate continuously. While diagnostics and trouble-shooting will be specific to each system and blower, the following table provides a list of general trouble-shooting guidelines for most blower units:

Table 4-1. Blower System Trouble-Shooting Chart

Problem	Reason	Remedy
Increased sound/noise	Noise absorbing foam is damaged. The impeller may be rubbing inside the blower unit.	Replace foam. Send unit to an authorized repair facility.
Excessive Vibration	Damaged impeller. Motor and/or impeller may be dirty.	Replace impeller. Clean motor and impeller periodically.
Ambient and exhaust temperature increases	Motor and/or blower are dirty. Filters are dirty.	Clean motor and blower periodically. Replace filters.
Decreased inlet air pressure	Inlet air filter is clogged.	Clean or replace inlet filter.
Unit is very hot	Wrong wiring. Low voltage. Inlet air filter is clogged. Motor and/or blower are dirty. Operating at too high of pressure or vacuum.	Check wiring. Supply proper voltage. Clean inlet filter. Replace cartridge. Clean motor and blower periodically. Install a relive valve and pressure or vacuum gauge.
Unusual sound	Impeller is damaged or dirty. Bearing Failure	Clean or replace impeller. Send unit to an authorized repair facility.

Problem	Reason	Remedy
Motor overload	Low voltage	Check power source. Check wire size and wire connections.
Unit does not start	Incorrect electrical connection or power source. Impeller is damaged.	Check wiring diagram, circuit fusing and circuit capacity. Clean and replace impeller. Install proper filtration.

Sections 4.2.4 and 4.2.5 of this SMP provide a summary of routine and non-routine maintenance requirements. Failure to follow these maintenance guidelines as well as specific maintenance requirements specified by the manufacturer could also result in operational issues with the SSD system or premature failure of the blower unit.

4.2.4 SSD System Operation: Routine Equipment Maintenance

The following routine equipment maintenance must be performed periodically to ensure continued operation of the SSD system:

1. Blower unit maintenance (for serviceable blowers only):
    - Ensure that the blower is de-energized and rotating parts have stopped before servicing.
    - Spare parts and filters should be stored on-Site, so that the blower is not out of service for more than eight hours. Temporary replacement blowers should be utilized for longer service timeframes.
    - All blower maintenance will be performed in accordance with the specific manufacturer's recommendations. Some units are sealed and require no lubrication; however, some units will require the removal and replacement of fresh grease in the bearing housing periodically (typically once per year under normal operating conditions).
    - The motor housing and impeller should be cleaned on an annual basis, unless operating conditions dictate that need for more frequent cleanings (e.g. dusty environments).
    - Replace filter elements as they visibly become soiled to maintain the least amount of inlet air restriction.

- Check noise absorbing foam for damage or excessive wear on an annual basis and replace as necessary.

- Check in-line mufflers to ensure that they are unobstructed and remove any foreign material as necessary.

2. Condensate/moisture removal: If the condensate collection vessel (moisture knockout) is not plumbed directly to a sanitary sewer system, the collection vessel will need to be emptied periodically to avoid damage to the blower unit. The frequency of this task will be dependent on the amount of moisture beneath the building slab, but more importantly, on the actual size of the storage vessel.

4.2.5 SSD System Operation: Non-Routine Equipment Maintenance

The SSD system will be equipped with pressure/vacuum gauges that can be visually inspection to ensure that the blower system is operating properly. Additionally, the SSD system will be equipped with an audible alarm that will notify building management of a malfunction. Alternatively, telemetry or autodial systems may be utilized to notify remote Site managers of a problem with the system.

Any damaged components critical to the operation of the SSD system (e.g. the blower unit, inlet/discharge piping, etc.) will be repaired or replaced within a maximum of five (5) days of discovery. Any peripherally damaged equipment (e.g. gauges, sampling ports, labeling systems, etc.) will be repaired within a maximum of 48 hours of discovery.

Section 4.3 of this SMP identifies performance monitoring requirements for the SSD system. Should the effectiveness of the SSD system be found to be reduced either through monitoring of the pressure field or indoor air quality monitoring, diagnostic testing will be performed to determine the cause. Diagnostic testing will include checking the operation of the blower unit (and ensuring it has been properly maintained), checking the piping systems for leaks or cracks, checking the discharge pipe for obstructions, checking joints and penetrations in the slab for leaks, etc. If the system effectiveness cannot be restored, the blower unit may need to be replaced.

4.3 ENGINEERING CONTROL PERFORMANCE MONITORING

Sub-slab depressurization systems will be installed to mitigate possible soil vapor intrusion into occupied buildings. Performance monitoring is required to ensure the SSD systems are operating properly upon startup, but also to ensure continued long-term performance of the systems.

4.3.1 SSD Monitoring Schedule

After the SSD systems startup and initial testing is complete, periodic monitoring of the equipment will be required to verify continued performance of the systems. The initial monitoring shall occur at least one week following the initial performance testing and will be conducted on an annual basis thereafter. Section 4.3.2 describes the types of monitoring required during the annual inspections.

The inspection frequency is subject to change with the approval of the NYSDEC. Unscheduled inspections and/or sampling may take place when a suspected failure of the SSD system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. Monitoring deliverables for the SSD system are specified later in Section 5 of this SMP.

4.3.2 SSD General Equipment Monitoring

A visual inspection of the complete SSD system will be conducted during the annual monitoring event for the SSD system. SSD system components to be monitored include, but are not limited to, the following:

- Vacuum blower;
- Vacuum and pressures gauges
- Moisture knockout vessel
- Above-grade vacuum & discharge piping, including mufflers/silencers;
- Discharge piping above roof line
- Pipe support systems
- Labeling systems
- Alarm systems

- Floor joints, penetrations and crack (e.g. checking of floors for potential leak points)

A complete list of components to be checked is provided in the SSD System Inspection Checklist, presented in Appendix K. If any equipment readings are not within their typical range, any equipment is observed to be malfunctioning, or the system is not performing within specifications, maintenance and repair as per the Operation and Maintenance Plan are required immediately, and the SSD system restarted.

4.3.3 SSD System Monitoring Devices and Alarms

The SSD system will be equipped with pressure/vacuum gauges that can be visually inspected to ensure that the blower system is operating properly. Additionally, the SSD system will be equipped with an audible alarm that will notify building management of a malfunction. Alternatively, telemetry or autodial systems may be utilized to notify remote Site managers of a problem with the system. If the moisture separator is not directly connected to a sewer system, the storage vessel will also be equipped with a high level alarm system.

In the event that the warning device is activated, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SSD system restarted. Operational problems will be noted in the subsequent Periodic Review Report.

4.4 MAINTENANCE & PERFORMANCE MONITORING REPORTING REQUIREMENTS

Maintenance reports and any other information generated during regular operations at the Site will be kept on-file on-Site, following the redevelopment of the Site and installation of any SSD systems. All reports, forms, and other relevant information generated will be available upon request to the NYSDEC and submitted as part of the Periodic Review Report, as specified in the Section 5 of this SMP.

4.4.1 Routine Maintenance Reports

Checklists or forms (see Appendix K) will be completed during each routine maintenance event. Checklists/forms will include, but not be limited to the following information:

- Date;
- Name, company, and position of person(s) conducting maintenance activities;
- Maintenance activities conducted;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

4.4.2 Non-Routine Maintenance Reports

During each non-routine maintenance event, a form will be completed which will include, but not be limited to, the following information:

- Date;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Presence of leaks;
- Date of leak repair;
- Other repairs or adjustments made to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and,
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

4.5 SOIL COVER SYSTEM MAINTENANCE

If damage to any of the soil cover systems is identified, the cover system(s) should be restored in accordance with Section 6.11 of this SMP.

4.6 BULKHEAD & REVENTMENT MAINTENANCE

As previously described, the bulkheads have an estimated service life of 36 to 43 years following their installation in 2008. While an epoxy coating was applied to extend this service life by approximately 20 years, the coating failed during the construction of the bulkheads and the owner elected not to make final repairs to the coating after several failed attempts by the contractor. While the reduced service life of the bulkheads has necessitated more frequent underwater inspections of the bulkheads, the existing coating is not required to be repaired by this SMP.

4.6.1 Maintenance for Steel Corrosion

Maintenance of steel structures and components will entail repair or replacement of damaged or corroded steel. Although physical damage from impact or loading may occur, corrosion is the anticipated major cause of the deterioration of these steel marine structures. The extent or severity of corrosion will vary with the exposure zone of the material; that is, whether it is in the atmospheric zone, the splash or tidal zone, or the submerged zone. The most severe corrosion is expected to occur in the splash zone of the structures due to the cycling of wet and dry conditions as well as wave action and debris floating on the water surface. The repairs to the structural steel components of the bulkheads may include the following:

1. Repair of the existing coating system prior to significant corrosion if the City decides to repair it at some point in the future.

2. Welding steel plating over holes and/or perforations through the steel.

3. Preparation (e.g. grinding) of deteriorated welds (e.g. sheet pile interlocks) and re-welding of damaged areas.

4. Replacing or replacing any missing or heavily corroded hardware (e.g. the wale fixing bolts, hex nuts and plate washers).

5. Applying a new coating system (including preparation of all surfaces to be coated) or installation of a cathodic protection system to extend the life of the steel components.

6. Replacement of the bulkhead structures.

The record drawings included in Appendix D, provide technical information and specifications for all components of the bulkhead systems. These documents should be referenced whenever repairs to the bulkheads are required and repairs should be made using the same materials or materials with the same minimal performance and/or strength. The materials utilized to attempt to repair the existing coating system are identified on the record drawings, but again, the SMP does not require the coating to be repaired or maintained. The bulkhead monitoring frequency has been adjusted to treat the bulkheads as uncoated steel sheet piles.

If repairs to the existing coating system are desired at some point in the future, the following list provides a summary of the repair procedures that were conducted during the bulkhead construction. However, since materials and technology are continuously evolving, it is highly recommended that the repair contractor review both repair materials and procedures before attempting to repair the existing coating system. Inspection of coating repairs (if done) should be performed by National Association of Corrosion Engineers (NACE) trained inspectors.

1. **Repair procedures above elevations +2.0 feet:**
    a. Using grinders, all delaminated coating will be removed at areas where crack coating, disbonded coating, holidays, rust through, and other types of coating failure are identified. The coating will be removed at least 1-inch either side of the damaged area.

    b. Areas where bare or rusted steel is exposed will be prepared in accordance with SSPC-SP-11 – Power Tool Cleaning to Bare Metal.

    c. The periphery of coating repair areas will be sanded to produce a roughened surface profile in the intact surrounding coating in all directions to a distance of at least 2 inches. The roughening should produce a uniform 2 to 3 mil profile of the existing intact coating.

    d. The surface will be blown down or vacuum cleaned to removal all dust, dirt and loose coating material leaving a sound, dry substrate to receive the coating application.

e. Two coats of Sherwin Williams Macropoxy 646 coating should be brushed applied to a thickness of 4.0 to 6.0 mils dry film thickness each for a total dry film thickness of 8.0 to 12.0 mils. All work should be completed in strict accordance with the manufacturer's recommendations for mixing, application, recoat times, cure times, and necessary ambient/substrate conditions (e.g. temperature).

2. **Repair procedure for map cracking below elevation +2.0 feet:**
(Note: Map cracking is described as small hairline cracks in the coating which may or may not completely penetrate to the substrate or the previous coat. The cracks often intersect and may be described as looking like a checkerboard pattern. Map cracking is typically the result shrinkage stresses associated with the coating material being placed too thick.)

   a. While some work may be completed from a boat or platform suspended from above the bulkheads, repairs beneath the waterline will need to be completed by a dive team.

   b. Cracks in the coating should be cleaned in accordance with SSPC-SP-11 – Power Tool Cleaning to Bare Metal to a distances of at least 4-inches either side of the corroded/cracked areas feathering the cleaning onto the intact coating periphery another 2 to 3 inches.

   c. Areas of coating loss will be cleaned by pressure washing and wire brush prior to the epoxy application.

   d. The two part epoxy (FX-764 Hydro-Ester Splash Zone and Underwater Paste) will be mixed in strict accordance with the manufacturer's recommendations, given to the diver(s) and hand applied per the product specifications. All work should be completed in strict accordance with the manufacturer's recommendations for mixing, application, recoat times, cure times, and necessary ambient/substrate conditions (e.g. temperature above 50 degrees Fahrenheit).

3. **Repair procedure for mechanical damage below elevation +2.0 feet:**
   a. While some work may be completed from a boat or platform suspended from above the bulkheads, repairs beneath the waterline will need to be completed by a dive team.

   b. Repaired areas (above and below water) must be washed first with potable water followed by mechanical abrasion. Areas re-wetted by tides should be re-prepared in the same manner.

   c. Damaged areas should be cleaned in accordance with SSPC-SP-11 – Power Tool Cleaning to Bare Metal to a distances of at least 4-inches either side of the corroded areas feathering the cleaning onto the intact coating periphery another 4 inches to feather repair area, but not beyond non-prepared areas.

d. The two part epoxy (FX-764 Hydro-Ester Splash Zone and Underwater Paste) will be mixed in strict accordance with the manufacturer's recommendations, given to the diver(s) and hand applied per the product specifications. All work should be completed in strict accordance with the manufacturer's recommendations for mixing, application, recoat times, cure times, and necessary ambient/substrate conditions (e.g. temperature above 50 degrees Fahrenheit).

4.6.2 Maintenance of Interlocks

Two methods were utilized to seal the interlocks on the bulkhead structures, including welding of the interlocks to form double sheet piles and the installation of a hydrophilic waterstop material in the remaining interlocks (between the each sheet pile "double"). Welding interlocks will be repaired by first removing the corroded, cracked, or loose weld material. The surface will then be prepared in accordance with standard welding preparation standards (e.g. grinding the corroded material to bare, non-corroded steel). The damaged area then will be re-welded, followed by repair of damaged protective coating (should the City elect to repair the existing coating at some point in the future or install a new coating).

If interlocks containing the waterstop material are found to be leaking, they will be repaired utilizing the following materials and procedures:

1. **Adeka Ultraseal KM String followed by Adeka Ultraseal P-201 Sealant:** The gap in the leaking interlock should be verified. The selected diameter of the Adeka Ultraseal KM String should be 1.2 times the width of the gap to be repaired. After thoroughly cleaning the repair area with high pressure water (no wire wheel or brush should be used), the string should be stretched and forced into the leaking interlock using hand tools, being careful not to cut the string. It is not necessary to stop the flow of water to repair the interlock using this material. After the active leak has been stopped by the placement of the Adeka Ultraseal KM String, inject Adeka Ultraseal P-201 Sealant in the interlock gap above the repaired area with a caulking gun.

2. **Other Alternatives:** During the bulkhead construction, the contractor attempted to utilize the Fox FX-764 epoxy to repair some of the leaking interlocks with mixed results. Surface preparation of the repair area and proper mixing of the epoxy are critical to the success of this type of repair. If this method is selected, it is highly recommended that the repair contractor contact representatives of Fox Industries for repair procedure recommendations prior to commencing the repair work. Additionally, new products are being developed continuously. Therefore, alternative materials may be proposed for repairing the leaking interlocks in the future.

4.6.3 Maintenance of Toe Protection Stone & Riprap Revetment

If damaged of the toe protection stone is found (e.g. displaced or missing stone), the revetment section must be repaired and/or replaced. The bulkhead toe protection and riprap revetment consists of the following elements:

1. **Woven geotextile:** Mirafi FW-700 woven geotextile was placed on the existing subgrade to reduce the potential for scour of the on-Site fines in the subgrade material through the bedding and armor stone.

2. **Bedding stone:** A 12-inch layer of bedding stone was placed over the woven geotextile in all riprap revetment stabilization areas prior to placement of the riprap stone. This material consisted of 2-1/2-inch coarse stone. Relative to the revetment, this layer serves as an intermediate filtration layer helping to reduce the scour of fines beneath the revetment as well as providing a solid base for the armor stone.

3. **Armor stone:** A four (4)-foot layer of riprap armor stone, consisting of stones ranging from 235 to 2,125 pound stones, was placed over the bedding stone to provide a stable shoreline capable of dissipating wave energy in the river.

4. **Toe stones:** Stones ranging in size from 1,100 to 4,400 pounds were placed along the toe of the revetment section to protect the revetment from toe scour that could potentially jeopardize the overall stability of the revetment if left unprotected. The same armor and toe protection stone were placed in front of the bulkheads as well to provide toe support to the bulkheads and reduce the potential for scour of the existing mud line in the river.

4.6.4 Concrete Caps

The precast concrete caps on top of the bulkheads are not structural elements of the bulkhead. While periodic maintenance and repairs may be required, the repairs will typically be for cosmetic purposes. If repairs are necessary due to cracks, spalling or loss of sealant in the joints, a concrete specialist contractor should be contacted to provide a recommendation on repair procedures and materials to make the repairs. The repair materials previously utilized to make repairs and seal the cap joints are described under the product listing in Section 2.2.1.2 of this SMP.

5.0 INSPECTIONS, REPORTING & CERTIFICATIONS

5.1 SITE INSPECTIONS

5.1.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in Section 3 Site Monitoring Plan and Section 4 Operation & Maintenance Plan of this SMP. At a minimum, a Site-wide inspection will be conducted annually. Inspections of remedial components will also be conducted when a breakdown of any treatment system component has occurred or whenever a severe condition has taken place, such as an erosion or flooding event that may affect the ECs.

5.1.2 Inspection Forms, Sampling Data, and Maintenance Reports

All inspections and monitoring events will be recorded on the appropriate forms for their respective system which are contained in Appendix K for the SSD systems. Additionally, a general Site-wide inspection form will be completed during the Site-Wide Inspection (see Appendix I). These forms are subject to NYSDEC revision. Color photographs must also be provided in the Periodic Review Report (PRR) to document the condition of the Site during the monitoring period. At a minimum, ten (10) 4-inch by 6-inch color photographs shall be included in each Periodic Review Report to document Site conditions and all major elements of the remedy. The following photographs shall be included in the report, at a minimum:

1. Photographs of the Site facing north, south, west and east.
2. Photographs documenting the use of the Site (e.g. open spaces, structures, walkways, etc.)
3. Photographs documenting the condition of the bulkheads and revetment sections.
4. Photographs documenting each soil cover system type and current condition
5. Photographs documenting the presence of SSD systems in each on-Site structure.
6. Photographs representative of the typical conditions of existing drainage systems on the Site.

7. Photographs representative of the typical monitoring well condition of the monitoring network.

8. Photographs documenting any issues or concerns identified during the Site Wide Inspection.

All applicable inspection forms and other records, including all media sampling data and system maintenance reports, generated for the Site during the reporting period will be provided in electronic format in the Periodic Review Report.

5.1.3 Evaluation of Records and Reporting

The results of the inspection and Site monitoring data will be evaluated as part of the EC/IC certification to confirm that the:

- EC/ICs are in place, are performing properly, and remain effective;
- The Monitoring Plan is being implemented;
- Operation and maintenance activities are being conducted properly; and, based on the above items,
- The Site remedy continues to be protective of public health and the environment and is performing as designed in the RDWP and FER (i.e. all EC/ICs are performing and there is no change in use of the Site that would result in a change in level of protection of public health or the environment).

5.2 CERTIFICATION OF ENGINEERING & INSTITUTIONAL CONTROLS

After the last inspection of the reporting period, a qualified environmental professional (QEP) will prepare the following certification:

> "For each institutional or engineering control identified for the Site, I certify that all of the following statements are true:

- The inspection of the Site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;

- The institutional control and/or engineering control employed at this Site is unchanged from the date the control was put in place, or last approved by the Department;
- Nothing has occurred that would impair the ability of the control to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any Site management plan for this control;
- Access to the Site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;
- If a financial assurance mechanism is required under the oversight document for the Site, the mechanism remains valid and sufficient for the intended purpose under the document;
- Use of the Site is compliant with the environmental easement;
- The engineering control systems are performing as designed and are effective;
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the Site remedial program; and
- The information presented in this report is accurate and complete.
- I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as [Owner or Owner's Designated Site Representative] for the Site."

The signed certification will be included in the Periodic Review Report described below.

5.3 PERIODIC REVIEW REPORT

A Periodic Review Report will be submitted to the Department every year, beginning eighteen months after the Certificate of Completion is issued. In the event that the Site is subdivided into separate parcels with different ownership, a **single** Periodic Review Report will be prepared that addresses the Site described in Appendix A (Metes and Bounds). The report will be prepared in accordance with NYSDEC DER-10 and submitted within 45 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the Site;

- Results of the required annual Site inspections and severe condition inspections, if applicable;

- All applicable inspection forms and other records generated for the Site during the reporting period, including minimum of ten (10) 4-inch by 6-inch color photographs documenting Site conditions and major elements of the Site (photographs illustrating Site conditions must be included in the hard copy report while all photographs, including those inconsequential to the report must be included electronically) – Refer Section 5.1.2 for additional details;

- A summary of any discharge monitoring data and/or information generated during the reporting period with comments and conclusions;

- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends;

- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables, including QA/QC data, for all samples collected during the reporting period will be submitted electronically in a NYSDEC-approved format;

- A Site evaluation, which includes the following:

    - The compliance of the remedy with the requirements of the Site-specific RDWP, ROD or Decision Document;

    - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;

    - Any new conclusions or observations regarding Site contamination based on inspections or data generated by the Monitoring Plan for the media being monitored;

    - Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; and

    - The overall performance and effectiveness of the remedy.

- Any certifications or summary reports provided in accordance with Section 6.2 and provided by lessees, tenants, or Site occupants for work completed in accordance with Section 6, the Excavation Work Plan.

The Periodic Review Report will be submitted, in hard-copy format, to the NYSDEC Central Office and Regional Office in which the Site is located, and in electronic format to NYSDEC Central Office, Regional Office and the NYSDOH Bureau of Environmental Exposure Investigation. As previously indicated, laboratory QA/QC data and photographs inconsequential to documenting current Site conditions may be included electronically on a compact disk (CD) or digital video disk (DVD) with each hard copy report. No hard copies of this information are required. The hard copy report should include the following at a minimum:

1. The text of the report.
2. A compact disk containing the entire report in Portable Document Format (PDF). The PDF should be collated and include all photographs, figures, photographs, field logs, analytical data packages, etc. in appendices/attachments as appropriate.
3. All figures shall be provided in hard copy on a minimum of 11”x17” size paper.
4. All analytical summary tables.
5. A photograph log of representative Site photographs, particularly any photographs documenting issues identified during the periodic Site inspection.

Finally, the addresses for submitting the periodic reports to the appropriate agency offices are as follows:

NYSDEC Central Office:
Attn: Project Manager, Site ID B00190
NYSDEC Remedial Bureau C
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7014
Phone: (518) 402-9662

NYSDEC Regional Office:
Attn: Region 3 Hazardous Waste Remediation Engineer
NYSDEC Region 3 Headquarters
21 South Putt Corners Road
New Paltz, New York 12561-1696
Phone: (845) 256-3137

NYSDOH:
Attn: Ms. Kristin Kulow
New York State Department of Health
Bureau of Environmental Exposure
28 Hill Street, Suite 201
Oneonta, New York 13820
Phone: (607) 432-3911

5.4 CORRECTIVE MEASURES PLAN

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a corrective measures plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the corrective measures plan until it is approved by the NYSDEC.

6.0 EXCAVATION WORK PLAN

As previously indicated, the Site contains contamination left after the completion of the remedial action. The specific types and concentrations of remaining contaminants at the Site are further described in Section 1.4.5 of this SMP. This Excavation Work Plan (EWP) will be implemented for all intrusive activities at the Site following the completion of the remedial action. Specifically, all activities that involve intrusive activities beneath or potentially beneath the Site demarcation barrier and/or the groundwater table will necessitate the implementation of this EWP as well as the preparation of a Site-specific, task-specific health and safety plan. Such activities may include, but are not limited to, the following:

- The excavation of Site soils to install new structures, such as building foundations, light pole bases, retaining walls, holding tanks, mooring dolphins/anchors, etc.
- The excavation of Site soils to install new underground utilities or repair/maintenance associated with subsurface utilities.
- The excavation of Site soils to alter Site surfaces and/or change the Site grades.
- The installation of landscaping, particularly trees or shrubs that will require excavation deeper than 12-inches.

The objective of this EWP is to set guidelines for the management of soil, groundwater, and air quality during future intrusive activities at the Site. Following the guidelines in the EWP will provide protection of human health and the environment during and subsequent to the redevelopment construction at the DeLaval Site.

It should be noted that simple excavations may only require compliance with a portion of the EWP. For example, excavation of a small volume of soil from above the water table that is directly loaded for off-site disposal would not require the stockpiling or fluids management provisions of this template.

Finally, working hours will be limited to 7:00 AM to 7:00 PM Monday through Friday and 8:00 AM to 5:00 PM on Saturdays. No work will be permitted on Sundays. Exceptions to these working times must be granted by the Site owner in writing prior to commencement.

6.1 NOTIFICATION REQUIREMENTS

At least fifteen (15) days prior to the start of any activity that is anticipated to encounter remaining contamination and/or penetrate the demarcation barrier, the Site owner or their representative will notify the NYSDEC. Currently, this notification will be made to:

Attn: Region 3 Hazardous Waste Remediation Engineer
NYSDEC Region 3 Headquarters
21 South Putt Corners Road
New Paltz, New York 12561-1696
Phone: (845) 256-3137

If a lessee, tenant or occupant of the Site starts any activity that is anticipated to encounter remaining contamination or penetrate the demarcation barrier, notification must be provide to the current Site owner as well as the Site owner's representative/qualified environmental professional performing the periodic reviews for the Site. Currently, these notifications will be made to the following:

Site Owner:
Attn: Engineering Department
City of Poughkeepsie
62 Civic Center Plaza
P.O. Box 300
Poughkeepsie, New York 12602
Phone: (845) 451-4074

Site Owner's Representative:
CHA Consulting, Inc.
300 South State Street, Suite 600
Syracuse, New York 13202
Phone: (315) 471-3920

This notification will include:

- A detailed description of the work to be performed, including the location, the areal and vertical extent of the disturbance, plans for Site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control;

- A summary of environmental conditions anticipated in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;
- A copy of the contractor's health and safety plan, in electronic format, that meets the requirements of Section 7 of this SMP;
- Identification of disposal facilities for potential waste streams along with appropriate approvals and copies of permits for the selected disposal facilities;
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

In case of emergencies, such as the emergency repair of a subsurface utility, notification to the NYSDEC must be made within a maximum of twenty-four (24) of the discovery of said emergency.

6.2 REPORTING & MONITORING REQUIREMENTS

For any potentially intrusive activities performed by the current Site owner that trigger this SMP, the current Site owner's representative or qualified environmental professional will be responsible for observing the activities for compliance with this SMP and preparing appropriate documentation to include in the Periodic Review Report. As part of this obligation, the lessee, tenant, or occupant of the Site will be responsible for providing appropriate documentation to the Site owner following the completion of activities for which they are responsible for (e.g. construction of a new on-Site structure, modifications to Site features such as parking lots or landscaping, subsurface utility repairs, etc.). At a minimum, a summary report including the following information will be provided to the Site owner:

1. A certification statement at the beginning of the document indicating that all elements of this SMP as well as previously prepared contractor's health and safety plan were complied with. If variation from the plan was necessitated, any such variations must be clearly identified in the certification statement. Certification shall be made by a qualified environmental professional, as defined in Section 2.4.1 of this SMP.

2. A summary of the activity performed along with a map or sketch depicting the location of the activity.

3. A summary of analytical results, including waste characterization samples and any confirmatory soil samples that were collected as part of the work.

4. All air monitoring data with a summary of any action level exceedances along with a description of potential causes and mitigation measures implemented.

5. A summary of any field screening results (e.g. visual, olfactory and photoionization detector screening results of soils beneath the demarcation barrier.

6. A summary of all materials disposed off-site including type s and quantities of each material. Additionally, all waste profile sheets, manifests, weight tickets, etc. should be included in an appended to the report.

7. A summary of all materials imported to the Site, including types and quantities of each. Certifications, as discussed in Section 6.11 of this SMP, must also be provided for each borrow source.

6.3 SOIL TESTING & SCREENING METHODS

6.3.1 Waste/Soil Characterization Sampling

Depending on the anticipated amount of soil that will be excavated for off-site disposal and the amount of space available on-Site to stage the excavated soils, it may be preferable to direct load the material to be disposed of off-site directly into trucks for immediate hauling to the disposal facility. Direct loading of the materials requiring off-site disposal will also reduce the need to handle the material multiple times. If direct loading of materials is determined to be desirable, pre-excavation sampling and analysis will be required.

Regardless of whether pre-excavation samples are collected or whether characterization samples are collected from on-Site stockpiles, the sampling frequency will be specified by the disposal facility based upon the total volume of material requiring disposal. For larger projects, the sampling frequency should be one (1) sample per very 1,000 cubic yards (CY) of material requiring disposal at a minimum; however, in no case should the frequency be less than one (1) sample per work area. The sampling program will require the collection of both grab samples and composite samples. Unless otherwise specified by the disposal facility, samples collected for VOC analysis will be discrete grab samples and other analyses will be performed on composite samples. The basic sampling methodology is described below.

Grab Samples

The grab samples shall be collected by personnel wearing a freshly donned pair of latex gloves (or equivalent) and appropriately decontaminated, stainless steel hand tools. The samples should be immediately placed into the appropriately pre-preserved laboratory containers and labeled. The labeled containers should then be placed on ice and cooled to 4° Fahrenheit.

Composite Sampling

The composite samples shall be collected from various depths and locations in each work area that is representative of the entire work zone. Each composite will be formed from five equally sized, discrete sub-sample soil samples. The samples can be collected by hand with a fresh pair of gloves or with appropriately decontaminated stainless steel hand tools. The sub-samples will then immediately be placed into a stainless steel bowl and covered with aluminum foil between the additions of each subsample. While composite sampling will not be utilized for samples collected for VOC analysis, the bowl will be covered between the additions of each sub-sample to minimize the potential for volatilization of any semivolatile contaminates that may have been present in the soil.

Once all five of the sub-samples are added to the bowl, the soil samples will be thoroughly homogenized using a stainless steel spoon/scoop and immediately transferred to the appropriate laboratory containers and managed in a similar manner as the grab samples. The locations of each

soil sample should be identified on a map or sketch and submitted to the NYSDEC along with the analytical results.

The soil samples will be submitted to a laboratory certified under the NYSDOH's ELAP for analysis following appropriate chain-of-custody protocols, in accordance with Section 3.3 of this SMP. The specific analytical waste characterization requirements of the waste disposal facility may vary and shall be verified prior to sampling. The parameters required for waste disposal characterization will likely include following:

- Target compound list (TCL) VOCs by EPA Method 8260.
- TCL SVOCs by EPA Method 8270.
- TCL PCBs by EPA Method 8082.
- Pesticides by EPA Method 8081
- Herbicides by EPA Method 8151
- Target Analyte List (TAL) metals and cyanide by EPA Methods 6010/7471.
- Toxicity Leaching Characteristic Procedure (TCLP) Extraction
- Hazardous Waste Characteristics as defined under the Resource Conservation and Recovery Act (RCRA), including ignitability, corrosivity, and reactivity.
- pH via EPA Method 9045
- Percent Solids via Method 160.3
- Paint Filter Test via Method 9095
- Additional analyses as required by the disposal facility.

6.3.2 Field Screening Methods

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed by a qualified environmental professional during all future excavations into known or potentially contaminated material (remaining contamination) at the Site. Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal, material that requires testing, material that can be returned to the subsurface, and material that can be used as cover soil.

6.4 STOCKPILE METHODS

If temporary stockpiling of Site soils is determined to be necessary, all excavated materials beneath the demarcation barrier will be required to be stockpiled on temporary containment pads within the exclusion zone (see Section 7 for requirements to establish work zones). The temporary containment pads will be of sufficient size to store up to a minimum of 110 percent of the maximum amount of soil that will be stockpiled prior to re-use or off-site disposal. At a minimum, any soil containment pads will include the following:

1. A sufficiently large area with accessibility for trucks and construction equipment. The area shall be relatively flat and away from drainage inlets on the waterfront.

2. A 10-mil thick polyethylene sheeting liner with a minimum of two-foot wide overlaps between successive rows.

3. A minimum of a one-foot high soil berm shall be constructed around the perimeter of each pad to control runoff/run-on to and from the stockpiles. Gravel/stone ramps with gentler slopes will be constructed at locations of ingress and egress for each pad.

4. Some excavations may involve the handling of saturated soils (e.g. soils below the groundwater table). When handling saturated soils, a minimum of a continuous (no laps permissible unless the seams are sealed/welded) 15-mil thick polyethylene sheeting must be used to line the containment area and the side berms must be a minimum of two (2) feet high. The contractor will be responsible for sizing the containment pad area and berm height to ensure that all water on the pad is contained and no water drains into the River, Site stormwater drainage systems, or un-impacted outside the work zone (i.e. into areas of the Site where the final cover system is in place). The berms must be of sufficient height to contain the soils, any water draining from the material, and still provide sufficient freeboard (a minimum of six (6) inches) for precipitation events. All water on the pad will be collected and handled in accordance with Section 6.9 of this SMP.

5. Soil stockpiles that will remain in place for more than one (1) week will also be continuously encircled with silt fence.

6. Hay bales and other erosion and sediment controls will be installed as needed near catch basins, surface waters, and other discharge points.

7. Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

8. Stockpiles shall be maintained at a maximum height of 15 feet above surrounding surface subgrade elevation with a maximum slope of 1.5:1 to maintain stability. However, the appropriate slope may vary by material and the contractor performing stockpiling activities will be responsible for determining the safe allowable slopes for each material stockpiled on Site in accordance with all applicable regulations.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC.

6.5 MATERIALS EXCAVATION & LOAD OUT

A qualified environmental professional or person under their supervision will oversee all intrusive work and the excavation and load-out of all excavated material. The current owner of the Site and its contractors are solely responsible for safe execution of all intrusive and other work performed under this EWP. The presence of utilities and easements on the Site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the Site.

6.5.1 General Requirements

The following minimum procedures will be required for all intrusive activities extending beneath the demarcation barrier at the Site:

1. Provide a minimum of three (3) working days of notice to Dig Safely New York (1-800-962-7962) for utility clearance.

2. Establish Site Controls, including, but not limited to the following:

    - Installation of appropriate sediment and erosion controls
    - Setup of appropriate work zones
    - Setup of air monitoring stations as required to comply with the requirements of the CAMP – Refer to Section 6.14 of the SMP for details.
    - Construction of containment pads

- Construction of decontamination pads

3. Excavate all soil cover materials above the demarcation barrier and stage them separately. Erosion and sediments controls should be established around these stockpiles, but covering of the piles is not required unless covers are utilized as an erosion control measure or a means to control dust. These soils may be re-used on Site without characterization sampling.

4. Cut through the demarcation barrier in the excavation area with caution. Effort should be made to minimize the area of disturbance. The demarcation barrier must not be "pulled" or "ripped" from areas adjacent to the excavation. Such damage would result in the need for additional restoration of the soil cover system following completion of the intrusive activity.

5. Excavate Site soils utilizing field screening procedures. To minimize potential cross-contamination on-Site via tracking and reduce the amount of required decontamination, the following work practices should be implemented:

   - Efforts will be made to advance the excavation face towards the excavator such that the tracks on the machine do not come into contact with the petroleum impacted soils.

   - Where possible, all trucks will be loaded adjacent to the excavation. Care will be taken to ensure that impacted soil is not spilled on the sides of the trucks as they are loaded and that the trucks do not drive through contaminated soils. If wet soils are encountered, dry soils will be placed near the rear tailgate of the truck and wetter soils will be placed near the front of the truck. If the soils are saturated, liners will need to be installed in the dump box or the soils will be stabilized prior to loading to avoid drippage out of the truck during the hauling process.

   - Efforts will be made to minimize the amount of equipment and machinery that comes into contact with the impacted soils.

6. If field screening processes indicate a change in material is encountered (e.g. change in color, noticeable odors, etc.), the newly encountered material should be stockpiled and characterized separately.

7. If excavation beneath the water table is required, the material will need to be dewatered prior to placement back on-Site or transportation off-site for disposal. Additional measures should be implemented to collect all water on the containment pads for future off-site disposal (e.g. construction of a sump on containment pad).

8. All excavations faces must be covered with a minimum of 10-mil polyethylene sheeting at the end of each work day at a minimum. Additionally, all excavations shall be backfilled

within 48-hours of commencement, unless special circumstances require the excavation to be open longer. In such cases, the anticipated duration of the open excavation should be identified to the NYSDEC during the notification process.

6.5.2 ACM Requirements

When the intrusive activities include work in the areas of potential remaining asbestos-containing materials (ACMs) as shown on Figure 5, the intrusive activities will be considered an asbestos abatement project by the NYSDOL. Therefore intrusive activities will need to be completed by an NYS licensed abatement contractor. As the work involved with the intrusive activities and the handling of asbestos contaminated soil is not explicitly set forth in Title 12 of the New York Codes, Rules and Regulations Part 56 (12 NYCRR 56), also known as New York State Industrial Code Rule 56 (Code Rule 56), the Site owner or the Site owner's representative will need to file a variance petition with the NYSDOL to procure relief from Code Rule 56.The variance will allow for the procedures to be approved to facilitate proper handling and management of the asbestos contaminated soil.

The following procedures will typically be utilized to ensure the safety and health of the public, although further task-specific requirements may be required and all procedures must be approved by the NYSDOL through the above referenced variance petition procedure.

1. The regulated area must be established to clearly delineate the active work areas and ensure only certified workers enter the active work area and all entrance or exit will be from one designated "access way". A figure identifying the regulated area should be prepared and submitted with the variance petition.

2. All equipment operators will be NYS certified asbestos workers and a NYS certified asbestos supervisor will be present at all times to oversee intrusive activities.

3. No visible emissions will be allowed within the regulated area during any portion of the asbestos removal project.

4. Full time project/air monitoring will be required during intrusive activities with all air samples being run per Subpart 56-4 or as approved in the site specific variance.

6.5.3 Decontamination Pad Requirements

A truck wash/decontamination pad will be operated on-Site. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the Site until the activities performed under this section are complete. Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the Site are clean of dirt and other materials derived from the Site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

6.6 MATERIALS TRANSPORT OFF-SITE

The following requirements have been established for all materials being transported off-site:

1. All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly registered and placarded. In addition to a Part 364 permit, all haulers will maintain appropriate shipping papers and/or waste manifests (6 NYCRR Part 372). Emergency response procedures and emergency telephone numbers will be maintained in all vehicles, and operators will be trained in emergency response procedures.

2. Loaded vehicles will be in compliance with load height and weight regulations.

3. Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

4. Material transported by trucks exiting the Site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers or mesh/open weave type covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

5. All trucks will be washed prior to leaving the Site. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

6. Truck traffic is prohibited from using Pine Street, Pine Street Spur and Columbia Street. Truck transport routes are as follows:

Directions to the Site from the North:

- Take US Route 9 south to the Laurel Street Exit.
- Turn right (west) at the bottom of ramp onto Laurel Street.
- Turn left (south) onto Rinaldi Boulevard.
- Site entrance is located at intersection of Rinaldi Boulevard & Pine Street.

Directions to the Site from the West:

- Take US Route 44 east across the Mid-Hudson Bridge.
- Take ramp to US Route 9 south.
- Stay in left lane and exit onto US Route 9 north.
- After crossing back under US Route 44, take ramp to left back onto US Route 9 south.
- Merge right and take first exit on Right onto Laurel Street.
- Turn right (west) at bottom of ramp onto Laurel Street.
- Turn left (south) onto Rinaldi Boulevard.
- Site entrance is located at intersection of Rinaldi Boulevard & Pine Street.

Directions to the Site from the South:

- Take US Route 9 to the exit (left exit) for US Route 44 (Mid-Hudson Bridge)/US Route 9 South for Wappingers Falls.
- Merge right onto US Route 9 and take first exit on Right onto Laurel Street.
- Turn right (west) at bottom of ramp onto Laurel Street.
- Turn left (south) onto Rinaldi Boulevard.
- Site entrance is located at intersection of Rinaldi Boulevard & Pine Street.

Directions to the Site from the East:

- Take US Route 44 west until US Route 9.
- Turn right onto ramp and merge onto US Route 9 north.
- Merge into the left lane and follows signs to US Route 9 south.
- Merge right onto US Route 9 and take first exit on Right onto Laurel Street.
- Turn right (west) at bottom of ramp onto Laurel Street.
- Turn left (south) onto Rinaldi Boulevard.
- Site entrance is located at intersection of Rinaldi Boulevard & Pine Street.

Departing the Site:

- All trucks will go north on Rinaldi Boulevard.
- Turn right (east) onto Laurel Street.
- Cross under US Route 9 and follow signs onto US Route 9.

All trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of City mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total

distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport; and (g) community input.

7. Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site. Trucks operators shall comply with all applicable regulations, including, but not limited to 6 NYCRR Subpart 217-3, relative to idling engines; however, under no circumstances shall truck engines be left idling on Site for more than 15 minutes.

8. Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during intrusive activities.

9. Queuing of trucks will be performed on-Site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

6.7 MATERIAL DISPOSAL OFF-SITE

All soil/fill/solid waste excavated and removed from the Site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6 NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this Site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this Site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate (i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, construction & demolition (C&D) debris recycling facility, etc.). Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6 NYCRR Part 360-1.2. Material that does not meet Track 1 unrestricted soil cleanup objectives (SCOs) is prohibited from being taken to a New York State recycling facility (6 NYCRR Part 360-16 Registration Facility).

6.8 MATERIAL REUSE ON-SITE

"Reuse on-Site" means reuse on-Site of material that originate from the Site and which does not leave the Site during the excavation. Soils excavated above the demarcation barrier and segregated from Site soils containing remaining contamination may be reutilized on-Site without restriction; however, the top six (6) inches of soil cover in vegetated areas must be capable of supporting vegetation (e.g. topsoil). Under no circumstances shall any materials such as large boulders, vegetation (e.g. trees, stumps, brush, lawn clippings, etc.), construction and demolition debris (e.g. brick, concrete foundations, or other building materials) or other waste materials be buried or reused on-Site. Any such materials must be disposed off-site at a properly permitted facility. The following table summarizes the requirements for allowable reuse of material on-Site.

Table 6-1. Requirements for Reuse of Existing Materials On-Site

Original Location of Soil	Allowable Reuse
Above Demarcation Layer	Reuse allowed without restriction provided that soils are properly segregated. Additionally, the top six (6) inches of soil cover in vegetated areas must be capable of supporting vegetation.
Below Demarcation Layer	Reuse allowed beneath the demarcation layer, provided that the soil exhibits no evidence of gross-contamination and there are no contaminants detected at concentrations in excess of the restricted use-commercial SCO concentrations, as further described in subsequent paragraphs of this section. As previously indicated, soils that exhibit gross-contamination will be properly stockpiled, characterized, and disposed offsite at a properly permitted facility.

All materials excavated from beneath the demarcation barrier shall be directly loaded into trucks (if pre-excavation characterization samples indicated that need for off-site disposal) or placed onto temporary soil containment pads. All soil desired for reuse on-Site must be sampled for the following criteria at a frequency of one (1) sample per very 1,000 CY of material excavated; however, in no case should the frequency be less than one (1) sample per work area:

- TCL VOCs by EPA Method 8260
- TCL SVOCs by EPA Method 8270

- TCL PCBs by EPA Method 8082
- RCRA-8 metals by EPA Methods 6010 and 7471

Many of these parameters are the same as those collected for waste characterization purposes. If the material has already been characterized in preparation of the potential need for off-site disposal, additional sampling may not be necessary. However, should the material be staged on-Site for reuse initially, the material must be sampled in accordance with the above requirements. If the samples do not meet the chemical criteria established in this section of the EWP, additional sampling of the material may be required for waste characterization purposes.

Chemical criteria for on-Site reuse of material have been approved by NYSDEC. In order for soil to be reused on-Site, the contaminant concentrations for the soil samples must be free of gross-contamination and below the restricted use SCOs for the protection of public health for commercial use, as established in Table 375-6.8(b) of 6 NYCRR Subpart 375-6. Grossly-contaminated media is defined by the NYSDEC as "soil, sediment, surface water or groundwater which contains sources of substantial quantities of mobile contamination in the form of NAPL that is identifiable either visually, though strong odor, by elevated contaminant vapor levels, or is otherwise readily detectable without laboratory analysis."

The qualified environmental professional (QEP) will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-Site. Contaminated on-Site material, including historic fill and contaminated soil, that is acceptable for reuse on-Site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Any demolition material proposed for reuse on-Site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-Site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site will not be reused on-Site. All impacted media will be dewatered and stabilized, if necessary.

6.9 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including excavation dewatering, groundwater monitoring well purge and development waters, decontamination water, etc. will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the Site, but will be managed off-site. Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

Pumping and collection of water on-Site will be done in a manner to prevent the migration of particulates or soil/fill, and to prevent damage to the existing subgrade materials. The collected water will be collected and stored in drums or temporary storage tanks (e.g. polyethylene tanks or frac tanks) that are approved and labeled in accordance with USDOT requirements.

The water collected will be sampled by the contractor or persons performing the intrusive activity on a frequency of one sample per every ten drums or one sample per every 2,000 gallons of water collected in larger vessels. However, more frequent sampling may be directed by the NYSDEC or the disposal facility (e.g. a local publicly-owned treatment works (POTW)), should observable changes in the water quality be identified in the field. The water samples will be analyzed for TCL VOCs and TCL SVOCs, TCL PCBs, pesticides, herbicides and the TAL metals and any other parameters required by the selected disposal facility for characterization purposes. It is anticipated that pretreatment of particulate matter in the water will be required such that the turbidity of the water is at or below 50 Nephelometric turbidity units (NTUs) through filtering of settling processes prior to shipment.

Oil-absorbent pads will be deployed on the water surface if sheens or NAPLs are observed in the groundwater within the excavation area to remove product. If absorbent pads are ineffective at removing the product, additional measures will be required to control the product, including, but not limited to the following or combinations of the following:

- Dewatering of the excavation in its entirety, if feasible (preferred method)

- The use of floating booms with solid curtains to isolate the product
- The use of blower systems to try to control the spread of product on the water surface
- The use of pumps and floating oil skimmers to extract the product
- The use of vacuum trucks to extract the product
- The installation of extraction wells with oil recovery systems installed around the perimeter of the excavation.

Under no circumstances will the use of any type of dispersant be permitted to control product observed on water surfaces.

Additionally, appropriate controls will be used to prevent spills and overflows, including but not limited to, monitoring, gauging, quick-close shut-off valves, and secondary containment. All storage containers will be decontaminated following disposal or discharge activities. Any residual sediment in the storage containers will be dewatered/stabilized, if necessary, and disposed of off-site in a similar manner as other materials requiring off-site disposal.

6.10 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the Record of Decision (ROD) and this SMP. All materials being reused in accordance with Section 6.8 of this SMP should be placed beneath the demarcation barrier, with the exception of clean soils that were previously segregated as clean material above the demarcation barrier. Prior to backfilling of utility trenches with clean fill or restoring the cover system, a demarcation barrier, consisting of a six ounce non-woven geotextile or biaxial geogrid will be replaced as a visual reference to the top of the 'Remaining Contamination Zone', the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this Site Management Plan.

After the demarcation barrier, clean, imported soils (unless reusing prior soil cover material) must be placed to a minimum thickness of twelve (12) inches over the top of the demarcation barrier. If the finish surface is grass, the top layer of soil cover material (minimum six (6) inches) shall be capable of supporting vegetation (e.g. topsoil). If the type of cover system changes from that

which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the 'Remaining Contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in any updates to the Site Management Plan.

The cover systems should typically be replaced in kind and should only be modified with the written approval by NYSDEC. The various existing cover types at the Site are described in Section 2.2.1.1 and are shown on Figures 6 & 7. It should be noted that the minimum thickness of the soil cover is twelve (12) inches in all areas of the Site, except for the areas of potential remaining ACM as identified on Figure 5. In these areas, the soil cover thickness must be maintained at a minimum of twenty-four (24) inches.

The following summarizes the minimum requirements for materials utilized for the cover system restoration:

1. **Demarcation barrier:** A non-woven, six (6)-ounce geotextile fabric will be placed over remaining contaminated soils on slopes less than 3 Horizontal:1 Vertical to serve as a demarcation barrier. The demarcation barrier shall be Mirafi 160N or approved equal that meets the following properties.

Property	**Design Value**	**Test Method**
Tensile Strength	150 lbs. (min.)	ASTM D4632
Elongation	50% (max.)	ASTM D4632
Burst Strength	300 PSI (min.)	ASTM D3786
Puncture Strength	95 lbs. (min.)	ASTM D4833
Apparent Opening Size (AOS)	70	ASTM D4751
Permittivity	1.2 sec^{-1} (min.)	ASTM D4491
Weight	6 oz/yd^2 (min.)	ASTM D5261

The following guidelines provide the minimum criteria for placement of the demarcation barrier:

A. Surfaces to be covered with geotextile fabric shall be smooth and free of rocks, sticks, roots, sharp objects, and all debris that may damage the fabric. The surface to be covered shall be firm and unyielding, with no sudden changes or breaks in grade. There

shall be no standing water or excessive moisture on the surface when the fabric is placed. The compacted subbase shall be maintained in a smooth, uniform and compacted condition during installation of the fabric.

B. The fabric shall be cleaned of all debris or other materials that may negatively affect the fabric's performance.

C. Mechanical equipment shall not be permitted to operate directly on the fabric unless authorized to do so by the manufacturer and approved by the Engineer.

D. Fabric shall be placed as recommended by the manufacturer and approved by the Engineer on surfaces which have been prepared to conform to these Specifications and found acceptable for fabric installation.

E. The fabric shall be placed as smooth and wrinkle-free as possible. All laps, including repair areas, shall be at least twenty-four (24) inches in width without tension, stress, folds, or creases.

F. Fabric shall be placed with long dimension down slope. In areas where wind is prevalent, fabric installation shall be started at the upwind side of the project and proceed downwind. The leading edge of the fabric shall be secured at all times with sandbags or other means sufficient to hold it down during high winds.

G. During back dumping and spreading, a minimum depth of six inches of granular material shall be maintained at all times between the fabric and wheels of trucks or spreading equipment. All equipment used in spreading or traveling on the cover layer for any reason shall exert low ground pressures and shall be approved by the manufacturer. Dozer blades, etc. shall not make direct contact with the fabric; however, if tears occur in the fabric during the spreading operation, the granular material shall be cleared from the fabric and the damaged area repaired as previously described.

H. The granular material shall be spread in the direction of fabric overlap. Large fabric wrinkles which may develop during the spreading operations shall be folded and flattened in the direction of the spreading. Occasionally, large folds may reduce the fabric overlap width. Special care shall be given to maintain proper overlap and fabric continuity.

I. Fabric shall be covered as soon as possible after placement to minimize exposure to sunlight. Fabric shall not be exposed for more than seven days.

For slopes greater than or equal 3 Horizontal:1 Vertical, a biaxial geogrid shall be utilized to serve as a demarcation barrier, following the guidelines provided for the non-woven geotextile. The demarcation barrier in these areas shall be Tensar BX1100 or approved equal that meets the following properties:

Property	**Design Value**	**Test Method**
Aperture Dimensions	1.5 in. x 1.5 in. (max.)	--
Rib Thickness	0.025 in. (min.)	--
Ultimate Tensile Strength	10 lb./ft.	ASTM D6637

2. **Soil cover material (beneath hard surface or bottom six (6) inches in vegetated areas):** In addition to the environmental testing specified in Section 6.11, this material must consist of sound, durable, soil, sand, gravel, stone, or blends of these materials, free from organic, frozen or other deleterious materials.

   Specific material gradations, compaction requirements, and other geotechnical considerations shall be in accordance with the needs of the future development. The general placement and compaction guidance for this material include:

   A. Remove or re-compact any soft or loose soils as determined by the Engineer prior to filling.

   B. Do not place fill material on surfaces that are muddy, frozen, or contain frost, ice, ponded water or extraneous debris.

   C. When work is suspended during periods of freezing weather, measures shall be taken to prevent fill already in place from freezing. Upon resumption of work after any inclement weather, prepare the exposed surface by proof rolling to identify any zones of soft/loose soils. Soft/loose materials or frozen soils shall be removed and replaced.

   D. The distribution of materials throughout the soil cover layer shall be such that the layer will be free from lenses, pockets, streaks, and layers of materials differing substantially from the surrounding materials.

   E. The placing of material shall be done so as to obtain a layer of uniform thickness without spaces between successively deposited loads.

   F. Compaction of each layer shall proceed in a systematic, orderly, and continuous manner so as to ensure the specified coverages by the compaction equipment.

   G. Materials which cannot be compacted by the approved rolling compaction equipment because of interferences shall be compacted with smaller approved compactors to a

density at least equal to the density achieved in adjacent areas by the rolling compaction equipment and methods.

H. Should the fill surface become rutted or uneven subsequent to compaction, it shall be re-leveled and re-compacted before placing the next layer of material.

I. Place fill material in layers not more than 12 inches in depth. Lift height shall be governed by the ability of the compaction equipment to obtain the required compaction with 12 inches as a maximum lift height.

J. Where fill must be moisture conditioned before compaction, uniformly apply water to the surface of each layer of fill. Prevent ponding or other free water on the surface subsequent to, or during, compaction operations.

K. Remove and replace, or scarify and air dry, soil that is too wet to permit compaction to the specified density. Soil that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing, until moisture content is reduced to a value which will permit compaction to the percentage of maximum density specified.

L. Rolling compaction equipment shall be heavy smooth drum vibratory equipment capable of achieving the intended result. Any equipment not originally manufactured for compaction purposes and equipment which is not in proper working order will not be approved. Furnish manufacturer's specifications covering data not obvious from a visual inspection of the equipment and necessary to determine its classification and performance characteristics.

M. Compaction equipment shall make a minimum of 4 complete passes over the entire area of each lift.

N. The Contractor shall grade partially completed fill areas for drainage and thoroughly compact and smooth the surface at the end of each workday.

O. The final surface of the soil cover layer shall be uniform and suitable for placement of the next subsequent layer.

P. Remove all surplus material and legally dispose of off-Site.

3. **Topsoil/Soil Capable of Sustaining Vegetation (top four (4) to six (6) inches of material in vegetated areas):** In addition to the environmental testing specified in Section 6.11, this material must consist of fertile, friable, natural loam free of subsoil, clay lumps, brush, stones, or other deleterious materials larger than two (2) inches in greatest dimension. The

organic content shall be at least 5%; however, the material may be amended with material approved by the owner to meet this specification.

Specific material gradations, pH requirements, higher organic content requirements, etc. shall be in accordance with the needs of the future development. The minimal placement and compaction guidance for this material include:

A. Subgrades shall conform to the specified lines and grades.

B. Scarify the subgrade parallel to the contours to permit sufficient bonding with the topsoil. Do not scarify to the extent that the subgrade stability or density is disrupted.

C. Place topsoil in areas where seeding is to be performed. Place a minimum of six (6) inches of topsoil to the finished grade elevations as shown on the Drawings.

D. Mix approved soil amendments into six (6) inches of topsoil at specified rates. Ensuring thorough mixing throughout the entire (6) inch topsoil layer.

E. Fine grade topsoil to eliminate uneven areas and to ensure proper drainage. Maintain finished grade elevations required.

F. Remove all stones, roots, grass, weeds or other foreign matter while placing.

G. Lightly compact the topsoil to ensure its stability.

H. Topsoil in an unworkable condition due to excessive moisture, frost, or other conditions shall not be placed until it is suitable for placement.

4. **Seeding for vegetated areas:** All seed must be fresh, clean, new-crop seed mixed in the proportions specified for species and variety, conforming to Federal and State Standards. The seed mixture utilized in all grass-covered areas shall be selected to meet the requirements of the future development, but should be appropriate for the climate conditions typical of the Site. The seed shall be placed, fertilized, mulched, and water in accordance with good industry standard and other requirements specified by the Site owner or Developer.

5. **Asphalt pavement:** For parking lots and/or walkways, hot mix bituminous pavement may be utilized. The pavement shall be a minimum of four (4) inches in compacted thickness and concrete meeting the requirements for top course or binder course asphalts as specified in the most recently updated NYSDOT Standard Specifications.

6. **Concrete pavement:** Concrete utilized for paved parking lots and or walkways must a minimum of four (4) inches in thickness. The minimum 28-day design strength, the need for reinforcing steel and concrete admixtures will be left to the designer. However, the

concrete must be maintained in good condition and any cracks in excess of one-quarter (1/4) inch wide during the Site Wide Inspection will be required to be repaired.

7. **Pavers:** Precast concrete or stone pavers may also be used in parking lots. Pavers shall be a minimum of two (2) inches in thickness and all joints shall be filled with sand or other similar materials.

8. **Stone material:** While stone subbase and gravels may be included in the overall twelve (12)-inch thick cover system, such materials cannot be included in the top four (4) inches of the cover system. Rather, the top four (4) inches of material must be capable of sustaining vegetation in green space areas and must include a hard surface (e.g. asphalt, concrete or pavers) in parking lot and sidewalk areas.

9. **Decorative mulch and stone:** Decorative mulching and stone may be utilized as the final surface in landscaped areas. However, a minimum of twelve (12) inches of soil cover material, topsoil, etc. must first be installed in these areas. The thickness of the decorative mulch and stone must not be counted as part of the thickness requirements for the overall cover system.

6.11 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the Site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the Site. Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the Site. All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Specifically for this Site, all off-site borrow/imported fill soils will be from a documented source of "virgin" soil/rock or from off-site borrow soils that do not exceed the lower of the NYSDEC's Soil Cleanup Objectives (SCOs) for the protection of groundwater and the SCOs for the protection of public health for commercial use as established in Table 375-6.8(b) of 6 NYCRR Subpart 375-6. The following documentation should be submitted to the NYSDEC to demonstrate compliance with these requirements and with the NYSDEC's DER-10:

1. **General documentation for <u>all</u> sources of fill:**

    a. The name of the person providing the documentation and relationship to the source of the fill.

b. The location of where the fill is to be obtained.

c. Identification of any state or local approvals as a fill source.

d. A brief history of the use of the property for the proposed fill source.

2. **Imported soil for use as backfill or cover material:** All soil imported for use as soil cover material or as backfill must be:

   a. Free of extraneous debris and solid waste.

   b. Be recognizable soil or other unregulated material as set forth in 6 NYCRR Part 360 and materials for which the NYSDEC has issued a beneficial use determination (BUD). Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Solid waste will not be imported onto the Site.

   c. Free of contaminant concentrations exceeding the lower of the NYSDEC's SCOs for the protection of groundwater and the SCOs for the protection of public health for commercial use as established in Table 375-6.8(b) of 6 NYCRR Subpart 375-6.

   Sampling is also required for all imported soils, with a minimum of one (1) sample analyzed for every new source of material, at the following frequency:

   a. Soil or sand imported from a "virgin" mine or pit, at least one round of characterization samples for the initial 1,000 cubic yards of material imported in accordance with Table 6-2 on the following page. For material designated as "virgin," written documentation shall be provided to the Site owner or owner's representative and the NYSDEC to document that the soil is native material from areas not having supported any known prior industrial or commercial development or agricultural use and is not now, nor has ever been, identified as a suspected depository for chemical, toxic, hazardous, or radioactive wastes.

   b. Material sources other than virgin mine/pit (e.g. a formerly developed site) must be sampled in accordance with Table 6-2 on the following page.

   c. The sampling frequency can be reduced from those specified in Table 6-2 on the following page for projects involved large amounts of cover material and/or backfill, once a trend of compliance is established and the NYSDEC provides written authorization to reduce the sampling frequency.

Table 6-2. Sampling Frequency Requirements for Imported Soils

Analysis Required	VOCs	SVOCs, PCBs, Pesticides & Inorganics	
Soil Quantity (Cubic Yards)	**Discrete Samples**	**Composite Samples**	**Requirements for Preparation of Composite Samples**
0-50	1	1	Five (5) discrete samples from different locations within the fill being provided will comprise a composite sample for analysis. Additional requirements for composite sampling are described in Section 6.3.1 of this SMP.
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1,000	7	2	
>1,000	Add an additional two (2) VOC grab samples and one (1) composite sample for each additional 1,000 cubic yards of material required, unless otherwise approved in writing by the NYSDEC.		

As indicated in Table 6-2, VOC analysis must be performed on discrete samples only, while all other testing parameters will be analyzed for from composite samples. The testing frequency may be modified by the NYSDEC project manager in accordance with Section 1.6 of the NYSDEC's DER-10.

The following analyses will be performed on the imported fill characterization samples:

- TCL VOCs by EPA Method 8260 (grab samples only)
- TCL SVOCs by EPA Method 8270
- TCL PCBs by EPA Method 8082
- Pesticides by EPA Method 8081
- TAL metals and cyanide by EPA Methods 6010 and 7471

The results of this chemical testing will be compared to the lower of the NYSDEC's SCOs for the protection of groundwater and protection of public health for commercial use as established in Table 375-6.8(b) of 6 NYCRR Subpart 375-6 as well as the supplemental soil cleanup objectives in the NYSDEC's *CP-51: Soil Cleanup* Guidance dated October 2010 and/or any future pertinent soil cleanup guidance document. The source shall be rejected if any of these SCO's are exceeded.

3. **Non-soil Material Imported to the Site:** The following material may be imported without chemical testing, to be used as backfill beneath paved surfaces, buildings, or as part of the final soil cover layer, provided that it contains less than ten (10) percent by weight material which would pass through a size No. 80 sieve and consists of:

    a. Gravel, rock or stone, consisting of virgin material from a permitted mine or quarry; or

b. Recycled concrete or brick from a NYSDEC registered construction and demolition debris processing facility if the material conforms to the requirements of Section 304 of the NYSDOT *Standard Specifications Construction and Materials - Volume 1 (2002).*

For material designated as "virgin," written documentation shall be provided to the Site owner or owner's representative and the NYSDEC to document that the soil is native material from areas not having supported any known prior industrial or commercial development or agricultural use and is not now, nor has ever been, identified as a suspected depository for chemical, toxic, hazardous, or radioactive wastes.

The environmental professional and/or engineer will be responsible for determining the need for additional material testing, such as particle size analysis, maximum dry density determination, moisture content, Atterberg limits, etc. for geotechnical purposes.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases. Stockpiles will be limited to a maximum size of 500 cubic yards. Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Bill of ladings should be provided to the Site owner or owner's representative to document that the fill was delivered from a NYSDEC approved source. The bill of ladings will be included with Periodic Review Reports.

6.12 SITE CONTROLS

The Site controls implemented at the Site will minimize the potential for detrimental impacts to the environment and human health associated with the proposed excavations and handling of petroleum impacted soils and/or remaining contamination. All appropriate Site controls must be in place prior to conducting any intrusive activities at the Site.

6.12.1 Stormwater Pollution Prevention

Prior to beginning any intrusive activities, appropriate erosion and sediment controls (ESCs) will be installed. This section is intended to provide general guidelines for installing and maintaining ESCs; however, the appropriate ESCs need to be selected on a case-by-case basis given the location of the activity, the size on the disturbance, the proximity of the activity to the Hudson River or other discharge points, etc. For activities resulting in a disturbance of one (1) acre or more of land, a Notice of Intent (NOI) should be filed with NYSDEC seeking to gain coverage under State Pollution Discharge Elimination System (SPDES) General Permit GP-02-01 and a Stormwater Pollution Prevention Plan (SWPPP) describing the intended ESCs to be utilized should be submitted to NYSDEC for approval. All erosion and sediment controls should be designed and installed in accordance with the NYSDEC's Standards and Specifications for Erosion and Sediment Control, dated August 2005 or later.

All SWPPPs, if required, must fulfill all permit requirements and will provide the following minimum information:

- A background discussion of the scope of the construction/remedial project.
- A description of proposed soil erosion and sediment controls.
- A description of the type and frequency of maintenance activities required to support the control measure.
- Spill prevention measures
- Certifications

The SWPPP will also include a contingency plan to be implemented in the event that heavy rain events are determined to be impacting water quality in the Hudson River due to intrusive activities being conducted at the Site. All descriptions of proposed features and structures at the Site will include a description of structure placement, supporting engineering data, construction scheduling, and references to established detailed design criteria. The SWPPP will conform to all requirements as established by applicable regulatory agencies.

Proven soil conservation practices will be incorporated in future work plans involving intrusive activities to mitigate soil erosion, off-site sediment migration, and water pollution from erosion. These practices may combine both vegetative and structural measures. Some measures will be permanent in nature and become part of the completed project (design features such as drainage channels and grading). Other measures will be temporary and serve only during the construction stage. The contractor will remove temporary measures at the completion of construction and stabilization of the Site. The selection of erosion and sediment control measures will be based on several general principles, including:

- The minimization of erosion through project design (maximum slopes, phased construction, etc.).
- The incorporation of temporary and permanent erosion control measures.
- The removal of sediment from sediment-laden storm water before it leaves the Site.

The use of appropriate temporary erosion control measures such as silt fencing and/or hay bales will be required around all soil/fill stockpiles and un-vegetated soil surfaces during redevelopment activities. These methods are described below. Stockpiles shall be graded and compacted as necessary to provide positive surface water runoff and dust control. Stockpiles of soil/fill will be placed a minimum of twenty feet from the Site boundaries and as far away from the Hudson River as practical.

Temporary Erosion Control Measures

Prior to any intrusive activity, temporary erosion and sediment control measures shall be installed and maintained until such time that permanent erosion control measures are installed and effective. Additional sediment control measures may also be necessary. Structural measures, such as those described below, will be designed and installed to provide the required sediment and erosion control:

- Silt fencing
- Straw bales

- Temporary vegetation/mulching
- Fiber reinforced plastic sheeting and turbidity curtains (work adjacent to River)

Re-grading and cover activities may result in sheet flow to various areas of the Site, and therefore, silt fencing will be used as the primary sediment control measure for disturbed areas. Prior to extensive clearing, grading, excavation, and placement of cover soils, silt fences will be installed along all construction perimeter areas to prevent sedimentation in low areas and drainage areas. The location and orientation of silt fencing will be determined based upon the planned intrusive activities, drainage pathways, etc. Breaks and overlaps in the silt fencing may be required to allow construction vehicles access to the construction areas, but will be minimized. Intermediate silt fencing will be used upslope of perimeter areas where phased construction activities are occurring. This measure will effectively lower sheet flow velocities and reduce sediment loads to perimeter fencing. In addition, silt fencing around soil stockpiles will be required. The perimeter silt fences will remain in place until construction activities in the area are completed and vegetative cover or other erosion control measures are adequately established.

Straw bales will be used to intercept sediment-laden runoff from storm water channels as needed during various phases of intrusive activities. Additional straw bale dikes may be necessary in some areas during some phases of construction. Use of straw bales will be limited to swales and/or diversion ditches where the anticipated flow velocity will not be greater than five feet per second (FPS). Where flows may eventually exceed five (5) FPS along a swale or diversion ditch, an intermediate straw bale barrier will be installed up-gradient of the final bale barrier. The intermediate bale barrier will effectively reduce flow velocities and sediment load to the final barrier. Straw bale barriers will remain in place until construction activities contributing sediment to the barrier are complete and vegetative cover or other erosion control measures are adequately established.

In areas where activities will not resume for a period in excess of two weeks, the disturbed areas will be seeded with a quick germinating variety of grass or covered with a layer of straw

mulch. The temporary cover will act to stabilize the soil and reduce erosion. As construction progresses, areas containing temporary vegetation or straw mulch can be covered without removal of the temporary vegetation or mulch.

The following minimal checks will be made throughout the duration of intrusive activities to ensure the continued performance of the ESCs:

- Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. All necessary repairs shall be made immediately.

- Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Accumulated sediment will be removed when fifty (50) percent of the storage capacity of the straw bale barrier has been reached in order to maintain performance of the barrier and prevent overtopping or failure of the straw bale barrier.

- All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials. Accumulated sediment on the up-gradient side of the silt fence will be removed whenever fifty (50) percent of the storage capacity of the fence has been reached in order to maintain performance of the fence and reduce the likelihood of a structural failure of the fence.

- Removed sediment will be stockpiled and characterized for the same parameters as the excavated soils screened for reuse at a rate of one sample per every 500 cubic yards of sediment collected. Sediment that meets the criteria in Section 6.8 can be stockpiled and reused as fill at the Site; however, any sediment exceeding the criteria in Section 6.7 will be managed as impacted and will be disposed of off-site. Sediment laden straw bales that have lost their structural integrity and/or effectiveness will be disposed of off-site as a solid waste.

- Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

- Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters

- Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

Permanent Erosion Control Measures

Permanent erosion control measures and facilities will be incorporated into the Site as part of the redevelopment of the property and all future intrusive activities as appropriate. Permanent ESCs and facilities will be installed as early as possible during construction phases. Parking and building systems associated with redevelopment will not be permitted to include dry wells or other subsurface injections/disposal piping or facilities. Preventing erosion and scour of the final soil cover system will be a critical component of all future intrusive activities. Therefore, permanent erosion control measures will incorporate a combination of design features to limit overall erosion and sediment problems by ensuring that the restored soil cover is designed based on the following criteria, particularly in greenspace areas:

- Maximum slope of 33 percent (3 Horizontal: 1 Vertical) to limit erosion.
- Minimize the potential contact with, and migration of, waste fill.
- Provide a medium for the growth of vegetation to control erosion.

Design features incorporated into the construction plans to control erosion will include limiting steep slopes, routing runoff to surface water collection channels, limiting flow velocities in the collection channels to the extent practical, and lining collection channels, where appropriate. In areas where flow will be concentrated (i.e.; collection channels) the channel slopes and configuration will be designed to maintain channel stability.

Following the placement of final cover soils over re-graded areas, a re-vegetation program will be implemented to establish permanent vegetation in pervious areas. Vegetation serves to reduce erosion, enhance evapotranspiration, and improve runoff water quality. Future lawn areas will be seeded in stages as construction is completed with a minimum of one-hundred pounds of seed per acre.

In addition to the above seed mixture, mulch, mulch blankets, or synthetic fabric will be placed as appropriate to prevent erosion during turf establishment. Mulch will be placed on all slopes less than fifteen percent and a mulch blankets will be used on all slopes greater than

fifteen percent. Synthetic erosion control fabric will only be placed in drainage ditches and swales. As an aid to turf establishment, seeded areas will be fertilized with a starter fertilizer.

6.12.2 Work Zone Security

All work zones must be secured with a minimum of four (4)-foot high orange construction fencing around the perimeter to maintain security of the work area and minimize the potential for unauthorized personnel to enter areas of potential exposure. Access points and/or gates shall be controlled at all times and closed/secured during non-working hours. Additionally, "Danger – Construction Site" or "Keep Out" signs shall be posted every 200 lineal feet maximum around the perimeter of all work zones. All work zones will be maintained as needed to maintain security of the work zone. Information relative to the establishment of exclusion zones, contamination-reduction zones, and support zones is presented in Section 7.4.9 of this SMP.

6.13 CONTINGENCY PLAN

If underground tanks, drums or other previously unidentified contaminant sources (e.g. stained soils) are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition. Identification of unknown or unexpected contaminated media identified by screening during intrusive Site work will be promptly communicated by phone to NYSDEC's Project Manager as well as the Site Owner. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. Finally, the environmental professional will call the 24-hour emergency response contractor (see contact information in Section 2.5.1 of this SMP) to mobilize appropriate response personnel and equipment to manage the source area.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (TCL volatiles and semi-volatiles, PCBs & TAL metals), unless the Site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

These findings, including spill reports, analytical results, field notes, maps depicting the extent of the impacted area, remedial action descriptions, etc. will also be included in the periodic reports prepared pursuant to Section 5 of the SMP.

The responsibility to undertake and pay the costs of implementing the contingency plan will be in accordance with §56-0509 of the Environmental Conservation Law (ECL), which describes the liability limitations offered to the Site owner following issuance of the Certificate of Completion. In general terms, the Site owner remains responsible for the management of "Remaining Contamination" on the Site, as previously described. However, should new sources or areas of contamination be identified at a later date, the liability of the Site owner will be limited. In such cases, the Site owner will cooperate with the NYSDEC during the process of determining such liability.

6.14 COMMUNITY AIR MONITORING PLAN

Air monitoring will be performed at the Site during all intrusive activities in accordance with the New York State Department of Health (NYSDOH) *Generic Community Air Monitoring Plan (CAMP),* and Appendix 1A and 1B of DER-10. All air monitoring will be conducted on a real-time basis using both hand-held field instruments and perimeter air monitoring stations. All air monitoring readings will be recorded in a logbook and/or recorded by data loggers, and made available for review by both the NYSDEC and NYSDOH. The CAMP developed for the Site consists of two primary components. The fugitive dust control plan is discussed in 6.14.1 while the vapor control plan is discussed in Section 6.14.2. The presence of petroleum-related contaminates remaining at the Site necessitates the need for vapor monitoring while the presence of metals is the primary contaminant that necessitates the need for dust monitoring. Air monitoring will be conducted both upwind and downwind of the construction areas and will be compared to assess if the construction activities are causing potential airborne migration of contaminants.

The CAMP is not intended for use in establishing action levels for worker respiratory protection that are otherwise described in Site-specific HASPs prepared for the intrusive Site activities. 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 the proposed remedial work activities. Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas, and supplements to the CAMP may be required depending on the nature of the planned intrusive activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP will help prevent the intrusive activities from spreading contamination off-site through the air.

The generic CAMP presented in Sections 6.14.1 and 6.14.2 will be sufficient to cover many types of intrusive activities at the Site. However, specific requirements for each planned intrusive activity should be reviewed in consultation with the NYSDOH and NYSDEC to ensure proper applicability. Again, supplements to this generic CAMP may be required for particularly activities, such as excavations being performed within 20 feet of potentially exposed individuals or structures and for indoor work at any of the on-Site structures.

"**Continuous monitoring**" will be required for all ground intrusive activities, such as soil/waste excavation and handling of soils, test pitting and trenching, the installation of soil borings and monitoring wells, installation or repairs to subsurface utilities, installation of landscaping beneath the demarcation barrier, additions to or demolition of on-Site structures that will disturb soils beneath the demarcation barrier, etc.

"**Periodic monitoring**" for VOCs will be required during non-intrusive activities such as the collection of soil samples and 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 bailing/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 near publically accessible areas or

adjacent to a school or residence.

Air monitoring will be required for all separate intrusive activities performed at the Site. Therefore, depending upon wind directions, multiple air monitoring stations may be necessary to provide monitoring coverage of each work area and/or intrusive activity. For example, since stockpiling of soils/materials beneath the demarcation barrier is considered an intrusive activity, a second monitoring station will be needed for each stockpile area if they are not located immediately adjacent to the excavation area.

In addition to air monitoring, the faces of any open excavations within the AOCs will be covered with 10-mil thick polyethylene sheeting to control fugitive dust and odors at the Site at the end of each day at a minimum, unless all excavations are backfilled.

6.14.1 Fugitive Dust Control

Dust emissions may occur at the project Site during intrusive activities, including but not limited to, excavation and loading activities. Therefore, fugitive dust control measures will be implemented during all intrusive excavation/construction activities. Fugitive dust is described as discrete particles, liquid droplets or solids, which become airborne and contribute to air quality as a nuisance and threat to human health and the environment.

The USEPA has set the standard for particulate matter that may impact human health as those particulates less than ten microns in diameter (PM_{10}), regardless of whether the particulate materials are contaminated or not. This number is based upon values considered to be protective of human health with an adequate margin of safety. The primary standards established to protect human health are a fugitive dust concentration of a maximum of 150 micrograms per cubic ($\mu g/m^3$) meter of a 24-hour averaging period and 50 $\mu g/m^3$ over an annual average time.

Appendix 1B – Fugitive Dust Suppression and Particulate Monitoring as provided in the NYSDEC's DER-10 provides guidance for monitoring particulate matter at impacted sites and suppressing fugitive dust. The program described below provides a basis for the development of

a dust control plan at the Site due to the identified metal contaminants in both the surface and subsurface soils at the Site.

The following particulate monitoring program and fugitive dust suppression program, as identified in Appendix 1B of DER-10 will be implemented at the DeLaval property during all construction and other intrusive activities that warrant its use:

1. Reasonable fugitive dust suppression techniques will be employed during all Site activities which may generate fugitive dust.
2. Particulate monitoring will be employed during the handling of soil/materials beneath the demarcation barrier or when activities on Site may generate fugitive dust from exposed waste or contaminated soil. Site activities may also include the excavation, grading, or placement of clean fill. While dust control measures must still be implemented, dust/particulate monitoring will not be required for activities involving clean fill.
3. Particulate monitoring will be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM_{10}) in size with the following minimum performance standards:
    - Object to be measured: dust, mists, and aerosols.
    - Measurement Range: 0.001 to 400 milligrams per cubic meter (mg/m^3) [1 to 400,000 $\mu g/m^3$].
    - Precision (2-sigma) at constant temperature: ±10 g/m^3 for one second averaging and ±1.5 g/m^3 for sixty second averaging).
    - Overall Accuracy: ±5% of reading +/- precision (Refer to gravimetric calibration with Society of Automotive Engineers (SAE) fine test dust (mass median diameter (mmd) = 2 to 3; g-2.5, as aerosolized).
    - Resolution: 0.1% of reading or 1 g/m3, whichever is larger.
    - Particle size range of maximum response: <0.1 to 10 microns (µm).
    - Total number of data points in memory: 10,000 or greater
    - Logged data: Each data point with average concentration, time/date and data point number.
    - Run summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), Short-term Exposure Limit (STEL) concentration and time/date of occurrence, averaging/logging period, calibration factor, and tag number.

- Alarm averaging time (user selectable): real-time (1 to 60 seconds) of STEL (15 minutes), alarms required. Personnel conducting air monitoring must be immediately notified of any alarms by remote sensors, pagers, or other similar equipment. Utilizing periodic checks of instrumentation in alarm mode only is not acceptable monitoring practice.

- Operating Time: Battery operated for a minimum of 48 hours (fully charged nickel-cadmium (NiCd) or lithium-ion rechargeable battery); continuously with charger.

- Operating Conditions:

  Temperature: 0 to 50 degree Celsius (^{o}C)
  Humidity: 10 to 99 percent Relative Humidity

- Enclosures: Enclosures must be provided for remote air monitoring stations to reduce potential weather-induced performance issues. The enclosures should be located in areas where they are not subject to damage from vehicular traffic and there is minimal potential for tampering in publically accessible areas. If necessary, air monitoring stations should be enclosed with temporary fencing to reduce the potential for tampering. Additionally, all intake ports on the instruments must be equipped with rain guards/shields to minimize the potential for water intrusion.

Particulate levels will be monitored immediately downwind at the working Site/exclusion zone and integrated over a period not to exceed 15 minutes. Consequently, instrumentation shall require necessary averaging hardware to accomplish this task. The DustTrack™ II Aerosol Monitor, Model No. 8531, as manufactured by TSI Incorporated, or a similar instrument, is appropriate and will be used during the fugitive dust monitoring program.

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 entity operating the equipment 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 $\mu g/m^3$over the integrated period not to exceed 15 minutes. 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 $\mu g/m^3$, the upwind background level must be measured immediately using the same portable monitor. If the working Site particulate measurement is greater than 100 $\mu g/m^3$ 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 below). Should the action level of150 micrograms per cubic meter ($\mu g/m^3$) be exceeded, the NYSDEC's Division of Environmental Remediation (DER) must be notified verbally at the telephone

numbers provided in this SMP within two (2) hours of occurrence followed by notice in writing within five (5) working days; the notification must 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 PM_{10} at or above the action level. Since this situation has the potential to transport 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 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:

    - Applying water on haul roads.
    - Wetting equipment and excavation faces.
    - Spraying water on equipment during excavation and dumping.
    - Hauling materials in properly tarped and watertight containers.
    - Restricting vehicle speeds to ten (10) miles per hour (MPH) or less.
    - Covering excavated areas and material after excavation activity ceases.
    - Reducing the excavation size and/or number of excavations.
    - Utilizing dust suppressing spray foams (only with explicit written authorization from NYSDEC when other dust suppression techniques have not been effective).

    Experience has shown that utilizing the above-mentioned dust suppression techniques, within reason as not to create excess water which would result in unacceptable wet conditions and the need to manage the excess water, the chance of exceeding the 150 micrograms per cubic meter action level during Site remediation/intrusive activities is remote. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. If the dust suppression techniques being utilized at the Site do not lower particulates to an acceptable level (that is, below 150 $\mu g/m^3$and no visible dust), work must be suspended until appropriate corrective measures are approved to remedy the situation. The use of dust suppressant materials (e.g. calcium chloride or spray foams) will not be permitted without the written authorization of the NYSDEC.

9. Evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, intrusive activities may need to be temporarily suspended as a last resort.

10. 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. Additional requirements are not anticipated, and thus are not initially required for intrusive work conducted under this SMP. However, should unknown contaminates be encountered at the Site or Site conditions change significantly, the need for additional monitoring mitigation measures must be considered for both the CAMP and when preparing health and safety plans. The NYSDEC and NYSDOH will have jurisdiction to require additional monitoring is such unforeseen conditions are encountered.

11. All readings will be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings from handheld instruments, if any, used for decision purposes should also be recorded and made available.

Organic vapor monitoring will be conducted simultaneously with the dust monitoring program and is described further in the following section of the SMP.

6.14.2 Organic Vapor Control

Based upon the investigation conducted at the Site and the documented remaining contamination following remedial construction, minor emissions of organic vapors are expected during intrusive activities. Based upon the NYSDOH's Generic CAMP and NYSDEC's requirements in Appendix 1A of DER-10, VOCs must be monitored at the downwind perimeter of the immediate work area(s) (i.e. the exclusion zone) on a continuous basis or as otherwise specified when the potential for VOC emissions exist. 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 will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will 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 will 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 are less than 25 PPM, work activities will 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 is no case less than 20 feet, is below 5 PPM over background for the 15-minute average.

3. If the organic vapor level in the downwind work area perimeter exceeds 25 PPM, the Major Vapor Emission Response Plan will be initiated. Under this plan, the following actions will be taken:

    a. All work will be halted.

    b. All Emergency Response Contacts identified in the Site-Specific Health and Safety Plan, including the local police and fire departments, will be contacted by the Site Safety Officer.

    c. The NYSDEC, NYSDOH, and the Site owner will be notified of the situation.

    d. Air monitoring will be conducted at 15 minute intervals at a 20-foot offset from the exclusion zone. If two successive readings are measured by the field instrument and documented, the work may resume following the previously described monitoring plan.

4. All (15) fifteen minute readings will be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

6.14.3 Air Monitoring Station Locations

The prevailing wind direction is generally to the east, but varies greatly on a day to day basis, and sometimes even through the course of a day. Therefore, the monitoring station locations will need to be adjusted on a daily or more frequently basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations. The Site is long and narrow, so the location of the air monitoring stations will also be based upon the actual location of the intrusive activities. Given the presence of the residential townhouses along the eastern side of the MetroNorth rail lines, at least one down-wind station shall be located adjacent to the concrete retaining wall along the east side of the Site, immediately east of the intrusive work zone.

Again, air monitoring will be required for all separate intrusive activities performed at the Site. Therefore, depending upon wind directions, multiple air monitoring stations may be necessary to provide monitoring coverage of each work area and/or intrusive activity. For example, since stockpiling of soils/materials beneath the demarcation barrier is considered an intrusive activity, a second monitoring station will be needed for each stockpile area if they are not located immediately adjacent to the excavation area.

6.14.4 Exceedances

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers. Should the particulate action level of150 µg/m^3 or the organic vapor concentration of 25 ppm be exceeded, the NYSDEC's Division of Environmental Remediation (DER), the NYSDOH, and the Dutchess County Health personnel must be notified verbally at the telephone numbers provided in this SMP within two (2) hours of occurrence followed by notice in writing within five (5) working days; the notification must include suspected causes of the exceedances along with a description of the control measures implemented to prevent further exceedances. Additionally, the written notification should include a description of the activities on-going at the time of the exceedance and a map depicting the location of the intrusive activities and the location of the air monitoring stations.

6.14.5 ACM Air Monitoring Requirements

When the intrusive activities are performed in areas of potential remaining asbestos-containing materials (ACMs) as shown on Figure 5, additional air monitoring will be required to be performed at the Site, as further described in Section 6.5 of this SMP and 6 NYCRR, Subpart 56-4.

6.15 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site and on-Site. Specific odor control methods to be used on a routine basis are listed below.

If nuisance odors are identified at the Site boundary or in uncontrolled areas of the Site (e.g. areas which are already developed or occupied), or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the Site owner's or remedial party's environmental professional, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, the following specific odor control measure will be used on a routine basis:

1. Limiting the area of open excavations and size of soil stockpiles.
2. Reducing the speed of excavation activities.
3. Shrouding open excavations with tarps and other covers.
4. Consider weather factors when planning daily activities (e.g. wind direction).
5. Using foams to cover exposed odorous soils.
6. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include:
    a. Direct load-out of soils to trucks for off-site disposal.
    b. Use of chemical odorants via spray or misting systems.
    c. Use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

Additionally, polyethylene sheeting will be placed over the face of all excavations not backfilled at the end of the day to reduce emission of petroleum vapors and reduce fugitive dust generation.

6.16 DUST CONTROL PLAN

A dust suppression plan that addresses dust management during invasive on-Site work will include, at a minimum, the items listed below:

1. Dust suppression will be achieved through the use of a dedicated on-Site water truck for road wetting for larger intrusive projects. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles. Fire hoses and/or garden hoses equipped with sprayers will be utilized for smaller type projects. All water utilized for dust control must be potable water from municipal water systems. The use of groundwater from the Site or River water will not be permitted.

2. Clearing and grubbing of larger sites will be done in stages to limit the size of the area of exposed, un-vegetated soils vulnerable to dust production.

3. Gravel will be used on access roadways to provide a clean and dust-free road surface.

4. On-Site roads will be limited in total area to minimize the area required for water truck sprinkling.

5. Paved areas will be swept clean on a daily basis, or more frequently as needed, to reduce the potential for dust generation.

6. Traffic speeds, particularly for construction traffic, will be reduced.

7. Stockpiles and excavations will be covered with tarps and polyethylene sheets, as previously described, will be used to reduce the potential for dust generation.

7.0 HEALTH & SAFETY PLAN REQUIREMENTS

All contractors and/or consultants performing redevelopment, improvement, maintenance, monitoring, or other intrusive activities on the Site will be required to prepare a Site-specific and activity-specific Health and Safety Plan (HASP), which must be prepared by a qualified person in accordance with the most recently adopted and applicable general industry (29 CFR 1910) and construction (29 CFR 1926) standard of the federal Occupational Safety and Health Administration (OSHA), U.S. Department of Labor (DOL), as well as any other federal, state or local applicable statutes and regulations.

Since it is impossible to prepare a HASP that is inclusive of all possible activities that may occur on the Site, a separate HASP will prepared for each project or project type. The persons performing the annual Site wide inspection and monitoring activities will be responsible for preparing a HASP to cover activities such as groundwater sampling, opening of covers on manhole structures, etc. A copy of the HASP will be included in the Periodic Review Report. It is anticipated that much of the information contained in this section of the SMP will be able to be incorporated into future HASPs.

Contractor's performing work at the Site on behalf of lessee, tenant or occupant will be responsible for preparing their own task-specific HASP. While much of the information contained in this SMP may be sufficient, the need for additional hazard analyses is expected to change based upon the type of work to be performed (e.g. hot work permits, confined space entry, etc.) and the equipment (e.g. heavy machinery, ladders, scaffolding, etc.) that is to be used. Additionally, some of the emergency contact info may change, additional Material Safety Data Sheets (MSDSs) may need to be added, etc. As indicated in Section 6.1 of this SMP, the contractor's HASP must be submitted to the Site owner and/or the Site representative prior to the commencement of intrusive activities so that it can be included in the annual Periodic Review Report.

This section provides only the minimum requirements for a HASP, but should not be construed as the HASP, as it is not activity specific. The Contractor will not be permitted to commence with construction/intrusive activities until the HASP has been received by the NYSDEC and Site

owner's representative. The Site owner's representative will acknowledge the receipt of the HASP and review the plan to observe whether or not the plan covers the Site-specific characterization and clearly identifies the proposed intrusive activities; however, the Site owner's representative will not be responsible for ensuring the completeness of the document to meet all applicable regulations or the implementation of the HASP.

Acceptance of the Plan does not waive any responsibility of the Contractor to ensure that the HASP is adequate to comply with all regulations or compliance by personnel. Neither the Site owner, nor the NYSDEC, assume, in any manner, the control or responsibility of the Contractor to provide safe working conditions of the contractor's employees or subcontractors in requiring the Contractor to follow general safety requirements. The contractors shall maintain the following items on the Site at a minimum:

- A copy of the HASP
- First aid kit
- Fire extinguisher(s)
- Personal protective equipment (PPE)
- Air monitoring equipment and calibration equipment
- Spill containment equipment and cleanup materials

To facilitate the creation of appropriate HASPs by the contractor(s) performing work on the Site, the range of concentrations of contaminants detected in soil and groundwater samples collected at the Site prior to the completion of the remedial construction have been included in Appendix B, while the results of confirmatory samples collected post remedial construction have been included in Appendix C.

7.1 COMPLIANCE

All on-Site workers **must** comply with the requirements of the HASP. The Contractor's HASP must comply with all applicable federal (including 29 CFR 1910.120 and 29 CRF 1926) and state regulations protecting human health and the environment from the hazards posed by

activities during intrusive Site activities. However, the general health a safety responsibilities and definitions are summarized subsequent subsections of the SMP.

Disregard for the provisions of the HASP by the remedial Contractor and/or his subcontractors or employees shall be deemed just and sufficient to cause for stoppage of work by the Owner and/or NYSDEC. Furthermore, compliance with the minimum requirements in this document does not relieve the Contractor from the responsibility for implementing proper health and safety procedures during unanticipated conditions throughout the duration of the work at the Site covered by this SMP.

7.2 HEALTH & SAFETY DEFINITIONS

1. **Authorized Visitor:** The Safety Officer (SO) has primary responsibility for determining who is qualified and may enter the Site. The Site Safety Officer will only allow authorized visitors with written proof that they have been medically certified and trained in accordance with 29 CFR 1910.120 (40-Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training) to enter the contamination reduction zone and/or exclusion area.
2. **Contamination Reduction Zone:** An area at the Exit Point of the Exclusion Zone through which all personnel, vehicles, and equipment must enter and exit. All decontamination of vehicles and equipment and removal of personal protective clothing and breathing apparatus must take place at the boundary between the Exclusion Zone and the Contamination Reduction Zone.
3. **Contractor Support Zone:** An area of the Contractor Work Area outside the Exclusion Zone, accessible for deliveries and visitors. No persons, vehicles, or equipment may enter these areas from the Exclusion Zone without having gone through specified decontamination procedures in the adjacent Contamination Reduction Zone.
4. **Contractor Work Area**: An area of the project Site including the Support Zone, access roads, staging areas, and the Exclusion Zone.
5. **Exclusion Zone:** The innermost area within the Contractor Work Area that encloses the area of contamination. Protective clothing and breathing apparatus as specified in the health and safety requirements and in the Contractor's approved HASP must be worn.
6. **Health and Safety Coordinator (HSC):** The HSC shall be a Certified Industrial Hygienist (CIH) or Certified Safety Professional (CSP) retained by the Contractor. The HSC will be responsible for the development and implementation of the HASP.

7. **Health and Safety Technicians (HST):** The HST(s) will be the Contractor's on-Site personnel who will assist the SO in the implementations of the HASP, in particular, with air monitoring in active work areas and maintenance of safety equipment.
8. **Medical Consultant (MC):** The MC is a physician retained by the Contractor who will be responsible for conducting physical exams as specified under the Medical Monitoring Programs in this section.
9. **Monitoring:** The use of direct reading field instrumentation to provide information regarding the levels of gases and/or vapor, which are present during remedial action. Monitoring shall be conducted to evaluate employee exposures to toxic materials and hazardous conditions.
10. **Project Personnel:** Project personnel include the Contractor, subcontractor, and Federal, and State, and local Representatives, working or having official business at the Project Site.
11. **Project Site:** The project Site includes the entire DeLaval Property, but may be reduce for smaller, localized intrusive activities.
12. **Safety Officer (SO):** The SO will be the Contractor's on-Site person, who will-, be responsible for the day-to-day implementation and enforcement of the HASP.
13. **Staging Areas:** Areas within the Exclusion Zone for the segregated temporary staging of uncontaminated and contaminated soil and debris.
14. **Work:** Work includes all labor, materials, and other items that are part of Site redevelopment activities or other intrusive activities covered by this SMP.

7.3 RESPONSIBILITIES

The Contractor shall:

1. Be responsible and liable for the health and safety of all on-Site personnel and off-site community impacted by the Site redevelopment activities.

2. Ensure all OSHA health and safety requirements are met (29 CFR 1910 – General Industry Safety and Health Standards and 29 CFR 1926 – Construction Industry Safety and Health Standards) and be responsible for compliance with all federal and state regulations.

3. Ensure that all project personnel have been trained in accordance with 29 CFR 1910.120.

4. Perform all work in a safe and environmentally acceptable manner. The Contractor will provide for the safety of all project personnel and make all reasonable efforts to protect the environment and community during the remedial activities. Barricades, warning lights, roped-off areas, and proper signs shall be furnished in sufficient amounts and locations to safeguard the project personnel and public at all times.

5. Employ a safety officer (SO) who shall be assigned full-time responsibility for all tasks herein described under this HASP and be on-Site during all remedial activities. In the event the SO cannot meet his responsibilities, the Contractor shall be responsible for obtaining the services of an "alternate" SO meeting the minimum requirements and qualifications. No work will proceed on this project in the absence of an approved SO.

6. Ensure that all project personnel have obtained the required physical examination prior to and at the termination of work covered by the contract.

7. Be responsible for the pre-job indoctrination of all project personnel with regard to the HASP and other safety requirements to be observed during work, including but not limited to (a) potential hazards, (b) personal hygiene principles, (c) personal protection equipment, (d) respiratory protection equipment usage and fit testing, and (e) emergency procedures dealing with fire and medical situations.

8. Be responsible for the implementation of this HASP and the Emergency Contingency and Response Plan.

9. Provide and ensure that all project personnel are properly clothed and equipped and that all equipment is kept clean and properly maintained in accordance with the manufacturer's recommendations or replaced as necessary.

10. Will perform all Site redevelopment work in a safe and environmentally acceptable manner. The Contractor will provide for the safety of all project personnel and the community for the duration of the intrusive activities covered by this SMP.

11. Have sole and complete responsibility for safety conditions for the project, including safety of all persons (including employees).

12. Maintain a chronological log of all persons entering the project Site. It will include organization, date, and time of entry and exit. Each person must sign in and out.

13. Maintain and keep available safety records, up-to-date copies of all pertinent safety rules and regulations, material safety data sheets, the Contractor’s Site-specific HASP, and the emergency response plan.

14. Hold safety meetings, including routine on-Site safety meetings.

15. Stop work whenever a work procedure or a condition at the work Site is deemed unsafe by the SO.

7.4 ELEMENTS OF THE HEALTH & SAFETY PLAN

A Site-specific HASP will be prepared in accordance with OSHA regulations and 29 CFR 1910.120.

The will contain the following elements at a minimum:

1. Site description/characterization and history.
2. Health and safety team key personnel and organization.
3. Emergency contacts
4. Site entry objectives
5. Safety meeting and pre-entry briefing requirements
6. Safety training requirements
7. Medical surveillance requirements
8. Hazard analysis/evaluation, including physical, biological, and chemical hazards
9. Air monitoring requirements and action levels
10. Personal protective equipment (PPE) requirements
11. Site control measures and work zones
12. Decontamination requirements (personnel & equipment) and procedures
13. Hazard communication and need for MSDSs
14. Emergency procedures/contingency plan
15. Spill containment program
16. Emergency medical care (e.g. first aid) and route to nearest hospital
17. Standard Operating Procedures (SOPs)
18. Confined space (as applicable)
19. Lockout/tagout (as applicable)
20. Hot work permits and safe work practices (as applicable)
21. Ladder/scaffolding safety (as applicable)
22. Competent Person requirements for excavations (as applicable)
23. Emergency Equipment/First Aid Requirements
24. Emergency Response and Contingency Plan.
25. Record keeping requirements
26. Certification and agreement

The following subsections provide a more detailed synopsis of the minimum requirements of a HASP needed to perform intrusive activities at the Site.

7.4.1 Site Description & History

This section of the HASP should provide a general introduction and purpose of the HASP, as well as identify the Site history, the neighboring property uses, the Site topography, and meteorological data. Most of this information is provided in Section of this SMP. Meteorological data will vary by season in which the intrusive activities are planned and should be considered when preparing the HASP. For example, working during the winter time could result in cold exposure to Site personnel, hinder proper operation of real-time air monitoring instruments. Snow and ice in the river could also have significant impacts on safe operations. Similarly, working in the summer time could introduce workers to heat stress, UV exposure, more vector activity, potential for thunderstorms, etc.

7.4.2 Project Personnel & Organization Structure

All personnel involved with the intrusive activities of the Site have a role in implementing the HASP. The following list summarizes the personnel that should be identified for each project/activity:

7.4.2.1 Off-Site Personnel

Title:	**Project Manager**
Description:	Responsible for defining project objectives, allocating resources, determining the chain of command, and evaluating program outcome. Also has authority to direct response operations and assumes total control over Site activities.
Contact:	To be determined

Title:	**Scientific Advisor**
Description:	Guides the Project Manager in scientific matters.
Contact:	To be determined

Title:	**Medical Consultant**
Description:	Responsible for conducting physical exams as specified under the Medical Monitoring Programs

Contact: To be determined

Title: **Health & Safety Coordinator**
Description: Overall responsibility for developing and implementing health and safety standards and the HASP, procuring appropriate personal protective clothing and equipment, staff training, etc.
Contact: To be determined

7.4.2.2 On-Site Personnel

This section should identify all on-Site personnel and should be task specific.

Title: **Safety Officer**
Description: Advises the field team on all aspects of health and safety issues, recommends stopping work if any operation threatens worker or public health and safety.
Contact: To be determined

Title: **Health & Safety Technician**
Description: Responsible to assist the SO in implementation of the HASP, particularly the air monitoring activities in the work area
Contact: To be determined

Title: **Site Supervisor/Field Team Leader**
Description: Responsible for field team operations.
Contact: To be determined

Title: **Work Party**
Description: Performs field operations
Contact: To be determined

7.4.3 Emergency Contacts

Emergency contacts are identified in Section 2.5.1 of this SMP and directions to the nearest hospital are provided in Section 2.5.2.

7.4.4 Site Entry

7.4.4.1 Site Entry Objectives

The objective of each intrusive activity should be identified in this section (e.g. to install a new waterline service). This section should describe all steps or procedures involved with the anticipated activity, including activity setup, performance of the activity, testing of soils, and restoration of the soil cover system.

7.4.4.2 Safety Meetings

To ensure that the HASP is being followed, the task Safety Officer (SO) will conduct a safety meeting prior to entry to the Site or the initiation of any Site activity (pre-entry briefing), if any conditions change, and before work commences each day.

7.4.4.3 Safety Training

The task SO will confirm that every person assigned to a task has had adequate training for that task and that the training is up-to-date by checking with the HSC. On-Site personnel working at this Site shall have a minimum of a 40-hour initial HAZWOPER training and a current 8-hour refresher course. Additionally, the SO will confirm that all subcontractor's on-Site personnel have the HAZWOPER training and a current 8-hour refresher course.

All training will have been conducted and certified in accordance with the OSHA regulations as outlined in 29 CFR 1910.120.

7.4.4.4 Medical Surveillance

The intent of medical surveillance is to monitor and reduce health risks to employees potentially exposed to hazardous materials and to provide baseline medical data for each employee involved in intrusive work activities. It is also intended to determine all personnel's ability to wear personal protective equipment such as chemical resistant clothing and respirators.

Medical examinations will be administered to all trained personnel on a pre-employment, post-employment, and annual basis. Additionally, exams will be performed as warranted by symptoms of exposure or specialized activities.

All on-Site personnel will have had a medical surveillance physical consistent with OSHA regulations in 29 CFR 1910.120 and performed by a qualified occupational health physician. The SO will confirm prior to initiation of work on this Site that every person assigned to a task has had an annual physical, has passed the medical examination and has been determined medically fit by an occupational health physician for the planned type of work.

7.4.5 Hazard Evaluation

This section of the HASP must provide an assessment of general hazards that may be encountered during intrusive activities at the Site. Site hazards that potentially could be encountered at the Site include three primary groups, including physical, biological, and chemical hazards, each of which is discussed below. Mitigation and controls will include work procedures, work/rest regimen, vapor and dust control measures, PPE, and respiratory protection as appropriate.

7.4.5.1 Physical Hazards

Physical hazards such as the following may be encountered on Site:

- Slip/trip/fall (e.g. from curbing, debris, steep topography, ice, etc.)
- Ultraviolet rays
- Lifting strains (e.g. from generators, drums, equipment)
- Heavy machinery and vehicles (e.g. excavators, drill rigs)
- Flying debris (e.g. debris from drilling equipment)
- Noise (e.g. elevated noise levels associated with heavy equipment)
- Heat/cold stress (see Section 7.4.13.3)

7.4.5.2 Biological Hazards

Biological hazards such as the following may be encountered on Site:

- Poisonous plants – poison ivy, poison oak, poison sumac
- Insects/animals – deer ticks, mosquitoes, rabid animals, snakes, stray animals

7.4.5.3 Chemical Hazards

Based upon past environmental investigations completed at the Site, Site personnel may be exposed to the chemicals identified in Appendices B, C & E of this SMP. The primary contaminants on the Site, include VOCs, SVOCs (namely PAHs), PCBs, and heavy metals. OSHA Permissible Exposure Levels (PELs) and the National Institute for Occupational Safety and Health (NIOSH) recommended exposure limits-time weighted average (REL-TWA) concentrations are provided in the following table:

Table 7-1. Exposure Limit Summary

Chemical	OSHA PEL-TWA (mg/m^3 or ppm)	NIOSH REL-TWA (mg/m^3 or ppm)
Acetone	1,000	250
Benzene	1	0.1
sec-Butylbenzene	--	--
Carbon Disulfide	20	1
Chlorobenzene	75	75
cis-1,2-Dichloroethene	200	200
Ethylbenzene	100	100
Methylene Chloride	25	--
Toluene	200	100
Tetrachloroethene	100	--
Trichloroethene	100	25
Xylene	100	100
Acenaphthylene	--	--
Acenaphthene	--	--
Anthracene	0.2	0.1
Benzo(a)anthracene	--	--
Benzo(a)pyrene	0.2	0.1
Benzo(b)fluoranthene	--	--
Benzo(g,h,i)perylene	--	--
Benzo(k)fluoranthene	--	--
Bis(2-Ethylhexyl)phthalate	--	--
Carbazole	--	--
Chrysene	0.2	0.1
Dibenz(a,h)anthracene	--	--
Dibenzofuran	--	--
Fluoranthene	--	--
Fluorene	--	--
Indeno(1,2,3-cd)pyrene	--	--
2-Methylnapthalene	--	--

Chemical	OSHA PEL-TWA (mg/m^3 or ppm)	NIOSH REL-TWA (mg/m^3 or ppm)
Naphthalene	10	10
Phenanthrene	0.2	0.1
Pyrene	0.2	0.1
PCBs	0.5	0.001
4,4'-DDT	1	0.5
Aluminum	15	10
Antimony	0.5	0.5
Arsenic	0.01	--
Barium	--	--
Beryllium	0.002	0.0005
Cadmium	0.005	--
Calcium	--	--
Chromium	0.5	0.5
Cobalt	0.1	0.05
Copper	1	1
Iron	10	5
Lead	0.05	0.05
Magnesium	--	--
Manganese	5	1
Mercury	0.1	0.05
Nickel	1	0.015
Potassium	--	--
Selenium	0.2	0.2
Silver	0.01	0.01
Sodium	--	--
Thallium	0.1	0.1
Vanadium	0.05	0.05
Zinc	--	--
Asbestos	0.1 fiber/cm^3	0.1 fiber/cm^3

The potential exposure mechanism that can transport particulates and contaminants from the areas of the intrusive activity to other areas of the Site as well as beyond the boundaries of the Site are:

- Contaminated dust projected by air currents
- Failure to adhere to proper decontamination procedures
- Contact with the surface water and groundwater

7.4.5.4 Respiratory Hazards

Asbestos

As described in Section 1.4.5.5 of this SMP, there are two primary areas where small amounts of ACM are anticipated to potentially exist that could pose a health risk to Site occupants and workers.

Metals/Inorganics

Given the elevated metal contaminant concentrations in the subsurface soils beneath the demarcation barrier, dust generated during intrusive activities will also pose a respiratory hazard which will require mitigation.

Organic Vapors

Given that residual petroleum-related contamination remains at the Site, the potential organic vapors stills exist at the Site. Organic vapor monitoring within the exclusion zone of each intrusive activity should be monitored for the potential presence of elevated vapor concentrations in addition to the monitoring performed as part of the CAMP previously described.

7.4.5.5 Flammable Hazards

As a precautionary measure the following shall be implemented to address flammable hazards.

- Use a fire extinguisher only to escape or to fight very small fires. Do not attempt to fight large fires.
- Field vehicles must have at least one ABC rated fire extinguisher.
- Heavy equipment used for excavation must have an ABC rated fire extinguisher located on the equipment.
- Explosive or flammable materials and liquids will be stored only in approved facilities.
- Smoking is not permitted on the Site within any work areas involving intrusive activities.
- All food and drink (including items such as chewing gum, chewing tobacco, etc.) will be prohibited in the exclusion zones or contamination-reduction zones at the Site.

- Do not use equipment that may generate a spark where there is a potential of explosive gases or vapors.

- Hot work (i.e.: cutting, grinding, welding, torching) shall not be allowed in the work area(s) unless a comprehensive Hot Work Permit is completed and authorized.

7.4.5.6 Hazard Identification & Control

Hazard controls generally consist of the following specific safety procedures: Training, Engineering Controls, Air Monitoring and PPE Selection. All Site personnel are required to use the PPE appropriate to their work task and potential exposures as outlined in the HASP. The levels of PPE assigned to each activity will be based on available information on the estimation of exposure potential associated with each work task. An example analysis is shown in the following table:

Table 7-2. Example Hazard Identification Analysis

AFFECTED PERSONNEL	TASK/ OPERATION	HAZARDS	HAZARD CONTROL
Exclusion Zone Personnel	Boring/Well Installation & Sampling of soil and ground water wells	Potential Exposure to volatile, semi-volatile, heavy metals, PAHs.	Exposure to chemical hazards: - Stand upwind when possible - Minimize direct contact - Avoid walking through discolored areas, puddles, leaning on drums or contacting anything that may; be contaminated. - Don appropriate PPE - Level D PPE work as a minimum - >10ppm organic vapor for 5 minutes, upgrade to Level C. - >200ppm organic vapor for 5 minutes upgrade to Level B
Exclusion Zone Personnel	Boring/Well Installation & Sampling of soil and ground water wells	Inclement weather	- Cease Site activities during electrical storm - Cease Site activities in extreme temps
Exclusion Zone Personnel	Boring/Well Installation & Sampling of soil and ground water wells	Back Injury	- Use mechanical lifting device when possible - Use buddy system when lifting heavy or awkward objects - Do not jerk or twist body while lifting

7.4.6 Hazard/Task Analysis

Potential physical hazards that may be associated with potential on-Site activities are listed in the in Table 7-3 on the following page. The table provides a summary of typical physical Site hazardous only. Additional hazards should be listed that are specific to the proposed intrusive activity.

7.4.7 Air Monitoring & Action Levels

7.4.7.1 Air Monitoring Equipment

The following environmental monitoring instruments shall be used on Site at the specified intervals.

Table 7-3. Example Physical Hazards Analysis

Hazards:	Precaution
1) Skin and/or eye contact with contaminated soil and/or groundwater, decon solutions, and sample preservation agents. 2) The inhalation of volatile organic vapors during Site activities. 3) The inhalation of contaminated dusts and other airborne particles during Site activities.	- Wear the required personal protective equipment when conditions or activities indicate the need for it. - Avoid walking through puddles, and contacting other potential sources of contaminants such as drums. - Keep airborne dust levels to a minimum by wetting down surfaces.
Physical injuries, such as abrasions, insect bites, back injuries, slips, trips, falls.	- Avoid slippery surfaces when possible. - Practice safe lifting techniques. - Know the location of other Site workers at all times, especially before moving and/or starting up heavy equipment such as drill rig or truck. - Be observant of possible insect nesting areas. - Have a first aid kit on hand.
Noise	- Avoid standing near noise generating equipment. - Utilize appropriate hearing protection

Hazards:	Precaution
Heat and cold stress	- Dress appropriately, wear dry clothing. - Take frequent breaks during extreme weather conditions. - Refer to the section on heat stress or cold stress, as appropriate for additional precautions.
Fire	- Have a fire extinguisher on hand. - Keep ignition sources away from flammable materials and atmospheres.
Security	- Stay alert to neighborhood activities

Photoionization Detector (PID)

A PID with a 10.6 eV lamp shall be used during tasks that require any intrusive activities. At a minimum, the PID should be utilized at the start of all intrusive activities, whenever obvious contamination is noted, and at least every 15 to 30 minutes through the duration of the intrusive activities. PID measurements shall be taken in the breathing zone of on-Site personnel, in low areas where flammable vapor may accumulate, in the headspace of soil and water samples, downwind of intrusive activities, and around the perimeter of the exclusion zone, as appropriate.

The PID shall be calibrated daily following manufacturers recommendations. Calibration data shall be recorded in daily logs by the SO or HST.

Quad Alarm Gas Monitor

Combustible gas levels, oxygen, carbon monoxide, and hydrogen sulfide concentrations shall be monitored if during the course of the activities, waste is encountered. The gas monitor shall be calibrated daily following manufacturers recommendations. Calibration data shall be recorded in daily logs by the task SO or HST.

Dust

Dust levels shall be visibly monitored. If it appears dust levels are increasing, a particulate meter shall be utilized following the manufacturer's recommendations.

Temperature

Ambient temperature should be monitored throughout the work day for potential heat stress or cold stress conditions. Based upon observed weather forecasts, a thermometer shall be utilized to monitor on-Site temperatures whenever the expected low temperature for the day is anticipated to be less than 20° Fahrenheit or the anticipated high temperature is anticipated to be in excess of 90° Fahrenheit.

7.4.7.2 Action Levels

An action level is a point at which increased protection is required due to the concentration of contaminants in the work area or other environmental conditions. Each action level is determined by the concentration level (above background level) and the ability of the personal protective equipment to protect against that specific contaminant. The action levels are based on concentrations in the breathing zone.

Should action levels be reached, work operations shall cease until further evaluation is performed and safe levels are prevalent. If ambient levels are measured which exceed the action levels in areas accessible to the public or unprotected personnel, necessary Site control measures (barricades, warning signs, and mitigative actions, etc.) must be implemented before commencing activities at the specific work site. If through engineering controls and monitoring, safe levels (below action levels) cannot be achieved, an upgrade in personal protection equipment shall be mandated by the task SO, or operations shall cease in that portion of the Site. The maximum action levels at the Site are as follows:

- VOCs (PID monitor) = consistent readings of >5ppm sustained for 5 minutes
- Atmospheric gases (Quad Alarm)
  - Combustible gases = >10% LEL, requires an self-contained breathing apparatus (SCBA)
  - Oxygen = 19.5%-23.5%, above or below requires an SCBA
  - Carbon Monoxide = >35ppm, requires an SCBA
  - Hydrogen Sulfide = >10ppm, requires an SCBA
- Temperature = body core temperature of < 36°C (96.8°F) for cold stress

In addition to health and safety air monitoring, a CAMP must be implemented for all intrusive activities, as described in Section 6.14 of this SMP.

7.4.8 Personal Protective Equipment

7.4.8.1 General Information

The purpose of personal protective clothing and equipment is to shield or isolate individuals from the chemical and physical hazards that may be encountered during work activities. The level of protection required must correspond to the level of hazard known, or suspected, in the specific work area.

There are four basic levels (A, B, C, and D) of personal protection as established by the USEPA. Level A provides the highest level of protection and Level D provides the lowest. The levels of personal protection are briefly defined below.

- ***Level D*** will consist of field clothes, outer gloves (if soil/water contact is likely), steel toe and shank safety boots, safety glasses (for splash hazards), and a hard hat (if overhead hazards are present).

- ***Modified Level D*** will consist of Tyvek coverall, safety glasses (for dust/splash hazards) outer gloves with disposable inner gloves, steel toe and shank work boots, over boots if free product is encountered or as otherwise specified, hearing protection and, if overhead hazards are present, such as during drilling, a hard hat. Safety glasses must also be worn during drilling and excavating activities.

- ***Level C*** will consist of the same equipment as listed for modified Level D with the addition of a full-faced air purifying cartridge equipped respirator.

- ***Level B***, if required for working on this project Site, consists of the same equipment as listed for Level C with the substitution of a full-faced Self-Contained Breathing Apparatus (SCBA) in place of a full-faced air purifying respirator.

- ***Level A*** is not anticipated for this project.

When wearing Level C, B, or A, all junctures between the chemical protective coverall (i.e., Tyvek suit) and boots, gloves, and respirator must be taped. The suit must be placed over the boots and gloves. When taping, remember to leave a tab for easy removal. Stress spots in the suit must also be taped, such as under the arms, down the zipper, and up or across the back.

Personal protective equipment has been selected consistent with the hazards associated with the expected field activities. PPE is available in various sizes to provide a good fit for all personnel. PPE must be stored in a clean location with access by site workers. Site workers are responsible for maintenance and storage of equipment at the Site.

7.4.8.2 Task Specific Requirements

Based on evaluation of the potential hazards for the Site, the initial levels of PPE appropriate for most anticipated intrusive activities is **Modified Level D** based on the potential route of contact and the potential contaminants, although this may be modified based upon the actual planned activity. In this plan, Modified Level D is presented as a modified protection level which consists of, at a minimum, hard hat, safety glasses, work boots, long pants , disposable Tyvek suits/coveralls, latex/nitrile gloves, rubber boots or hazmat boot covers or work boots, and other weather appropriate clothing. Respiratory protection and an upgrade in PPE to Level C shall be incorporated only where required by Site conditions. The following additional requirements should also be considered:

- A hard hat is only required when personnel are working around heavy machinery or vehicle (e.g. drilling operations) or when working in the right-of-way or an adjacent roadway and increased visibility is necessary.

- Safety glasses are only required when personnel are working around heavy machinery or vehicle (e.g. drilling operations) where there is a potential for debris to fly into worker's eyes.

- A reflective safety vest must be worn while working within the right-of-way or an adjacent roadway or when increased visibility is necessary, such as working around heavy equipment or when working at dawn/dusk.

- Tyvek suits and latex/nitrile gloves are only required to be worn during intrusive activities when soil and water samples are being handled. Tyvek suits and gloves are not required for non-intrusive activities (e.g. survey services and utility feasibility study).

- Hearing protection shall be required at the discretion of the SHSO, but at a minimum, must be utilized by all on-Site personnel when the drill rig hammer is being utilized to advance the soil sampler.

- No changes to the specified levels of PPE shall be made without first obtaining approval of the SO and the Project Manager. If action levels are reached, work shall cease and the SO and his advisors shall perform further evaluations. If necessary, an upgrade in PPE shall be mandated.

- If an upgrade to Level C PPE is required, air purifying respirators equipped with organic vapor/acid gas/high efficiency particle arrestor (HEPA) cartridges will be utilized. Organic vapor/acid gas/HEPA cartridges are the appropriate canister for use with the involved substances. All respirators used will be approved by NIOSH and/or the Mine Safety and Health Administration (MSHA) and their use shall be consistent with OSHA regulations in 29 CFR 1910.134. All on-Site personnel wearing a respirator shall have respirator clearance from a qualified occupational health physician. In addition, the respirator wearers on Site shall perform qualitative fit tests to ensure proper fit of the face seal of the respirator. Inspection logs shall be completed, signed and kept with the HASP. Filter cartridges used shall be of the same manufacturer as the respirator and shall be changed on a daily basis at a minimum and/or if breathing becomes difficult. Air purifying respirators shall not be used if any of the following conditions exist:

    - Oxygen deficiency
    - Immediately Dangerous to Life or Health (IDLH) concentrations of specific substances
    - Entry into an unventilated or confined area which has not been characterized
    - Presence or potential presence of unidentified contaminants
    - Contaminant concentrations are unknown or exceed designated maximum use concentrations (MUCs)
    - Identified gases or vapors have inadequate warning properties
    - High relative humidity, may reduce protection offered by sorbent

- The need for Level A or Level B PPE is not anticipated for tasks covered by this HASP. Should Level C PPE be deemed insufficient based upon the conditions encountered in the field, all work activities will temporarily cease and the HASP will be updated prior to continuing any on-Site activities.

Personnel should also be able to upgrade or downgrade their level of protection with the concurrence of the SO and task manager based upon air monitoring results and the following.

Reasons to upgrade:

- Known or suspected presence of dermal hazards.
- Occurrence or likely occurrence of gas, vapor or dust emission.
- Change in work task that will increase the exposure or potential exposure with hazardous materials.

Reasons to downgrade:

- New information indicating that the situation is less hazardous than was originally suspected.
- Change in Site conditions that decrease the potential hazard.
- Change in work task that will reduce exposure to hazardous materials.

7.4.9 Site Control Measures

7.4.9.1 Work Zones

All Site work zones will be clearly marked as applicable and discussed with all on-Site personnel. Site personnel will be responsible for delineating and maintaining the work zones. Site work zones shall consist of the exclusion, support, and contamination reduction zones as required.

The **exclusion zone** (EZ) is the zone which contamination is most likely to be encountered. For most intrusive activities, the exclusion zone is considered to be the actual area of the intrusive activity plus a 50 foot buffer surrounding the intrusive activity. Flow of personnel and equipment into and out of the zone will be monitored throughout the activity. While in the exclusion zone all personnel must wear the specified PPE.

The **contamination reduction zone** (CRZ) will be determined based upon the location of the intrusive activity and prevailing wind conditions at the Site.. Personnel working inside the exclusion zone will decontaminate or dispose all soiled clothing in the contamination reduction zone each time the exclusion zone is exited, if the clothing worn becomes soiled. Appropriate

equipment, supplies, and personal PPE will be made available in the contamination reduction zone to facilitate the protection and decontamination of personnel working in the exclusion zone.

A s**upport zone** (SZ) will be established in close proximity to the Contamination Reduction Zone , but again, the exact location will be based upon the actual location of the intrusive activity.

7.4.9.2 Communication

Communication shall be accomplished by a combination of person to person verbal correspondence, the use of cellular phones, and by verbal signals or hand signals depending on the pre-design programming task. Communication procedures will be reviewed at the Safety Meeting before entering the exclusion zone.

7.4.9.3 Site Security Measures

The contamination reduction zone and support zone shall be clearly marked as appropriate and reviewed at the Safety Meeting. All personnel shall report to the SO upon entering and exiting the Site so that everyone will be accounted for.

7.4.10 Decontamination

All decontamination activities will be performed on-Site within the contamination reduction zone. Decontamination pads will be constructed in a similar manner to the temporary containment pads described in Section 6.4 of this SMP. Preferably, one decontamination pad will be constructed for personnel and small hand tools/instruments, while a second pad is constructed for heavy equipment. The contractor will be responsible for ensuring that the decontamination activities do not result in erosion of the existing soils on the Site and that the water is not discharging into a surface water body. All water derived from decontamination processes will be collected and characterized for off-site disposal.

7.4.10.1 PPE

At a minimum, all non-disposable personnel protective clothing will be decontaminated by first washing the soiled items with a non-phosphate detergent and potable water mixture, followed by

potable water and distilled water rinses. All disposable/expendable PPE and clothing will be placed into plastic trash bags for off-site disposal. At a minimum, all equipment that comes into contact with contaminated soil and groundwater will be decontaminated with a high-pressure steam cleaner.

7.4.10.2 Small Equipment & Hand Tools

Small hand tools and equipment (e.g. hand augers, split spoon soil samplers, etc.) will be decontaminated as appropriate, but, at a minimum, prior to removal from the Site. The recommended decontamination procedure for equipment used during the performance of the pre-design programming tasks is:

- Wash and scrub with distilled water and low phosphate detergent
- Distilled water rinse

7.4.10.3 Heavy Equipment

Heavy equipment, such as a hydraulic excavator, may be utilized during the intrusive activities. All heavy equipment will be decontaminated with a pressure steam cleaner in the CRZ prior to demobilization of the equipment and all wash water generated from the steam cleaning operations will be collected for off-site treatment.

7.4.11 Hazard Communication

In compliance with 29 CFR 1910.1200, any hazardous materials brought on-Site by any personnel will be accompanied with an appropriate MSDS. The SO will be responsible for maintaining the MSDSs on Site, reviewing them for hazards that working personnel may be exposed to, and evaluating their use on Site with respect to compatibility with other materials including personal protective equipment, and their hazards. Should the SO deem the material too hazardous for use on-Site, the party responsible for bringing the material on Site will immediately remove it from the Site.

7.4.12 Emergency Procedures

On-Site emergencies can range in intensity from minor to serious conditions. Various procedures for responding to Site emergencies are listed in this section. The designated SO is responsible for

contacting local emergency services in emergency situations (however, others must assume responsibility if the situation warrants). An injured person shall be accompanied by another worker at all times.

The following emergency procedures will be used by on-Site personnel. The SO shall be notified of any on-Site emergencies and be responsible for ensuring that the appropriate measures are followed. Non-emergencies will be treated on-Site and documented and then directed to seek further medical attention. All occupational injuries and illnesses will be reported, recorded, and investigated.

On-Site personnel will be equipped with a cellular telephone for communication. Other emergency equipment, including a first aid kit will be on-Site at all times. In the case of a medical emergency, workers and the SO will communicate to determine the nature of the emergency and the location. After it is determined whether there is an actual emergency, he/she will instruct someone to call for an ambulance. Cellular telephones would to be used to place such a call.

If an emergency evacuation of the Site must take place, all personnel on-Site will immediately stop work, shut off all equipment, and assemble at the entrance to the Site. After assembly of all personnel, the Site will be evacuated using vehicles parked in the support zone. All vehicles will be parked facing out to enable a quick exit from the Site. If time permits, as determined by the SO, emergency decontamination will take place. This will consist of a wash and rinse of over boots, removal of disposable clothing, and washing of hands and face. After exiting the Site, all personnel will reassemble near the intersection of Pine Street and Rinaldi Boulevard. If the head count reveals someone is still on Site, the SO and his/her assistant will look for the person(s), using appropriate personal protection.

The SO will also be responsible for determining whether or not the emergency warrants complete evacuation of the Site. If so, the SO will coordinate the evacuation of all building/Site occupants with the property manager.

7.4.12.1 Personnel Injury

Upon notification of personnel injury the nature of the injury will be assessed, the appropriate first aid shall be initiated and, if necessary, contact shall be made for an ambulance and with the designated medical facility. If the injury increases the risk to others, activities on Site will stop until the added risk is removed or minimized.

7.4.12.2 Fire/Explosion

Upon notification of fire or explosion, all Site personnel shall assemble at a safe distance upwind of the involved area. The SO shall alert the appropriate fire department.

7.4.12.3 PPE Failure

If any Site worker experiences a failure or alteration of PPE that affects the protection factor that person and his/her buddy shall immediately exit the exclusion zone. Re-entry shall not be permitted until the equipment has been repaired or replaced.

7.4.12.4 Chemical Exposure

If any Site worker experiences adverse effects due to chemical exposure, the appropriate first aid procedures shall be followed according to the MSDS for that chemical. The person shall at a minimum be moved to fresh air. Whenever possible, personnel should be decontaminated before administering first aid.

Workers should go to the support zone as soon as any of the following acute symptoms of exposure are experienced:

- Rotten egg odor (indicates hydrogen sulfide)
- Sweet almond-like odor (indicates cyanide presence)
- Headache
- Nausea or vomiting
- Fatigue
- Weakness
- Confusion
- Dizziness
- Irritation of eyes, nose, throat

- Dermatitis
- Chills
- Chest tightness
- Cough
- Muscle spasms
- Staggered gait
- Increased salivation
- Indigestion
- Diarrhea
- Irritability
- Metallic taste in mouth

7.4.12.5 Spill Containment

If onsite work results in the accidental spill or release of oil or hazardous materials, containment to the extent possible will be required by onsite personnel (in proper PPE). Containment should include the use of absorbent pads or materials, diking with soils, covering and/or diverting spills from sewers, drains, surface water bodies, etc. For spills that cannot be controlled by onsite personnel or are above the reportable quantities, the SSO or designee will secure the area and notify the NYSDEC Spills hotline and notify appropriate emergency personnel through the 9-1-1 system.

7.4.13 Emergency Medical Care

7.4.13.1 Nearest Hospital

See Section 2.5.2 for directions to the nearest hospital.

7.4.13.2 On-Site First Aid

A first aid kit shall be maintained and stored within the Contamination Reduction Zone. General first aid procedures are identified in the list below:

Skin/Eye Contact: Flush eyes and/or skin thoroughly with water for 15 minutes. Remove contaminated clothing. If skin was contacted with a dry material, brush it off first, then flush with water. Seek medical attention if irritation develops.

Ingestion: Do not induce vomiting. Call the Poison Control Center. Tell them what was swallowed, if possible. Follow instructions. Arrange for transport of the victim to the hospital by calling for an ambulance.

Inhalation: Remove person from contaminated environment without risking your own safety. DO NOT ENTER A CONFINED SPACE UNLESS WEARING LEVEL B AND A STANDBY PERSON IS PRESENT. DO NOT ENTER EXCLUSION ZONE UNLESS WEARING ONE LEVEL HIGHER PROTECTION THAN VICTIM WAS WEARING. Administer CPR, if necessary. Bring victim to hospital or call ambulance.

Injuries: Do not move a victim who may have a back injury. Cover them with coats, blankets, or other appropriate items to keep them warm. Call an ambulance.

Apply pressure to bleeding wounds. If the victim is able, have the victim apply pressure to the wound. If they are not able, wear gloves to protect from exposure to blood. Put gauze bandages or other clean cloth over the wound. Do not remove blood-soaked bandages or cloth - instead put additional bandages or cloths over the blood-soaked bandages. Elevate the limb with the injury above the heart.

Administer CPR if victim does not have a pulse and if you are currently certified in CPR. Have someone call for an ambulance immediately if there is any possibility that the victim is having or had a heart attack.

Shock is likely to develop in any serious injury or illness. The following are signals of shock: restlessness or irritability; altered consciousness; pale, cool, moist skin; rapid breathing; and/or rapid pulse. In the event of shock, do the following: Immediately have someone call for an ambulance; have the victim lie down; elevate legs 12 inches unless you suspect head, neck, or back injuries; if victim is cool, cover the victim to prevent chilling; do not give the victim anything to drink, even if thirsty.

Collapses: If Site personnel have unexplainably collapsed, all personnel must evacuate work area. Rescue personnel must don a level of protection higher than the victim was in before evacuating victim from work area. Confined space rescue always requires Level B protection. No one will re-enter the work area until the cause has been determined and the SO has determined that the area is safe to re-enter.

7.4.13.3 Heat & Cold Stress

Heat Stress Symptoms and Remedies

Acclimatization and frequent rest periods must be established for conducting activities where heat stress may occur. Symptoms of heat stress and appropriate responses include:

- Heat Rash - redness of skin. Remedy - frequent rest and change of clothing.
- Heat Cramp - painful muscle spasms in hands feet, and/or abdomen. Remedy - administer lightly salted water (1/4 teaspoon per gallon) orally unless there are medical restrictions.

- Heat Exhaustion - clammy, moist, pale skin; dizziness, nausea rapid pulse, fainting. Remedy - remove to cooler area and administer fluids orally or have physician administer saline solution intravenously.

- Heat Stroke - hot dry skin; red, spotted or bluish; high body temperature of 104°F or greater, mental confusion, loss of consciousness, convulsions or coma. Remedy -immediately cool victim by immersion in cool water. Wrap in wet sheet while fanning, sponge with cool liquid. While fanning, treat for shock. Call for an ambulance. DO NOT DELAY TREATMENT. COOL BODY WHILE AWAITING AMBULANCE.

Heat Stress - Precautions

Precautions to take to reduce the possibility of heat stress include the following:

- Avoid caffeine and alcohol both during work hours and 24 hours before onsite activity.
- Drink water before feeling thirsty.
- Watch for signs and symptoms of heat stress.
- Rest in cool/dry areas, such as air conditioned vehicle or building or in the shade.
- Use cooling devices such as water sprays or fans to cool off.

Cold Stress Symptoms

Cold Stress symptoms may include any or all of the following:

- Excessive fatigue
- Irritability

- Euphoria
- Drowsiness
- Uncontrollable shivering
- Frost nip
- Medical assistance is necessary if these symptoms persist.

Cold Stress Treatment

Cold stress and frostbite emergency care:

- Remove the patient to a warm, dry place.
- If clothing is wet, remove and replace with dry clothing.
- Keep patient warm. Re-warming of the patient should be gradual to avoid heat stroke symptoms.
- Dehydration or the loss of body fluids may result in cold injury due to a significant change in blood flow to the extremities. If patient is conscious and alert, warm sweet drinks should be provided.
- Extremities affected by frostbite should be gradually warmed up and returned to normal temperature. Moist compresses should be applied; begin with lukewarm compresses and slowly increase the temperature as changes in skin temperature are detected.
- Keep patient warm and calm, remove to a medical facility as soon as possible.

Cold Stress - Prevention

- Take breaks in heated shelters at frequent intervals when working in temperatures below 20°F, including wind chill.
- Remove outer layer of clothing when entering the shelter. Loosen other layers to allow sweat to evaporate.

- Drink warm, sweet liquids or soups to reduce possibility of cold injury. Avoid caffeine and alcohol.

7.4.14 Standard Operating Procedures

The following standard operating procedures shall be implemented during intrusive Site activities:

- All construction activities shall be performed in compliance with all OSHA Construction Industry Standards and Regulations. Following the procedures, requirements, and provisions of this plan, all personnel who may be potentially exposed to hazardous materials or wastes shall be in compliance with federal/state regulations, OSHA 29 CFR 1910.120.
- Horseplay will NOT be tolerated under any circumstances.
- All work conducted on-Site will be coordinated through the Project Manager and the SO.
- Minimize contact with hazardous substances.
- Use remote sampling, handling, and container-opening techniques whenever possible.
- Any drum or tank discovered onsite shall not be sampled, opened, or handled until an appropriate task specific plan for unknown drum/tank sampling has been implemented.
- Samples from areas known, or suspected, to be contaminated with hazardous substances shall be handled with appropriate personal protective equipment.
- The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated shall result in evacuation of Site personnel and reevaluation of the hazards and the level of protection. Contact the Health and Safety Coordinator to determine the appropriate actions to take.
- Protect monitoring and sampling instruments by bagging.
- Wear disposable outer garments and use disposable equipment where appropriate.
- Use proper dressing procedures before entering the Exclusion Zone and use all fasteners (zippers, snaps, buttons, etc.).

- All personal protective equipment and skin surfaces should be checked for cuts and/or punctures.

- All equipment used in Site operations shall be properly cleaned and maintained in good working order. Equipment shall be inspected for signs of defect and/or contamination before and after use.

- Do not eat, smoke, chew gum, or drink on Site. Avoid any practice that may increase the probability of hand-to-mouth transfer and ingestion of material. Avoid any application of cosmetics. Personnel shall wash thoroughly before initiating any of the aforementioned activities.

- Avoid brushy areas to minimize allergic reactions to poison ivy, deer ticks, etc.

- Prescribed drugs should not be taken by personnel where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified person. Alcoholic beverages intake should be avoided.

- The "buddy system" must always be used and enforced. At a minimum, two persons who are in constant communication with each other shall be on Site at all times during any activity conducted on-Site in which the potential exists for exposure to hazardous materials, or accident or injury.

- Personnel entering the Contamination Reduction Zone and/or the Exclusion Zone must check in and out at the Access Control Points.

- All subcontractors shall abide by the HASP or provide one that is equivalent, at a minimum, to the conditions specified in the HASP.

- No workers with beards or heavy side burns are allowed to wear respirators.

7.4.15 Task-Specific Requirements

In the event that a confined space entry is necessary for a particular intrusive activity, all confined space entry procedures, techniques, and equipment shall be consistent with OSHA regulations in 29 CFR 1910.146. Given the nature of the Site, all confined spaces shall be considered permit-required confined spaces.

Similarly, sections should be added to the HASP to discuss lockout/tagout procedures, hot work permits, ladder/scaffolding safety, safe excavations, etc. as appropriate for the intended intrusive activity.

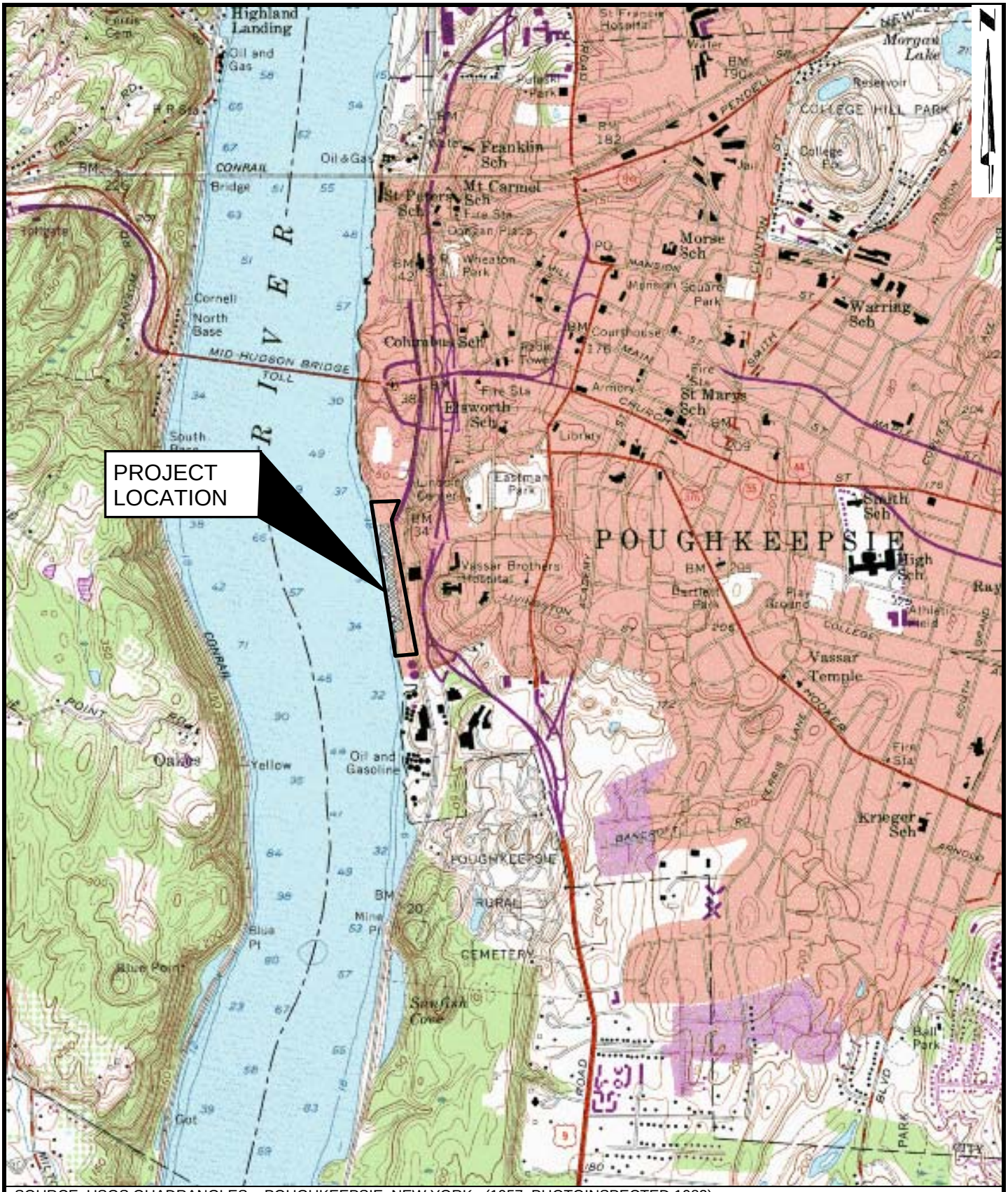
7.4.16 Certification & Agreement

An agreement should be included in all HASPs and must be signed by all contractors, subcontractors, and visitors before entering the entering the exclusion or decontamination zones. The agreement should include a statement similar to the following:

"I have read this Health and Safety Plan and I understand the requirements of the Plan. I will conduct work at this Site in accordance with the requirements of the Health and Safety Plan."

Company/Organization	Print Name	Signature	Date

FIGURES



SOURCE: USGS QUADRANGLES – POUGHKEEPSIE, NEW YORK. (1957, PHOTOINSPECTED 1982).
SCALE: 1"=2000' ±

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THE DeLAVAL PROPERTY
ENVIRONMENTAL RESTORTION PROJECT
CITY OF POUGHKEEPSIE, NEW YORK

PROJECT NO. 14357

DATE 03/29/12

VICINITY LOCATION MAP

FIGURE 1

V:\Projects\ANY\Civ\Data\14357\Rpts\FER\Figures\Figure 1 - Vicinity Location.doc

MAP NOTES

MAP REFERENCES:

1. NEW YORK STATE OFFICE OF GENERAL SERVICES – BUREAU OF LAND MANAGEMENT MAP No. 1844, AS PREPARED BY CHAZEN ENGINEERING & LAND SURVEYING Co., P.C., DATED MARCH 11, 2000 AND LAST REVISED FEBRUARY 12, 2001.

2. "LANDS TO BE DEDICATED AS PARKLAND AND REMAINDER OF DELAVAL SITE" CITY OF POUGHKEEPSIE, DUTCHESS COUNTY, NY., AS PREPARED BY ROY EDWARD TELLIER, L.L.S., DATED JUNE 13, 2004.

3. "STATE OF NEW YORK OFFICE OF GENERAL SERVICES SUBMERGED LAND APPLICATION MAP IN THE APPLICATION OF THE CITY OF POUGHKEEPSIE FOR A GRANT OF LANDS UNDER THE WATERS OF THE HUDSON RIVER" CITY OF POUGHKEEPSIE, COUNTY OF DUTCHESS, STATE OF NEW YORK AS PREPARED BY CHA INC. DATED NOVEMBER 24, 2009 AND LAST REVISED MARCH 15, 2010.

NOTES:

1. BASE MAPPING PREPARED BY CHA FROM A NOVEMBER 2006, NOVEMBER 2009, FEBRUARY 2010, AND FEBRUARY 2012 FIELD SURVEYS.

2. NORTH ORIENTATION IS REFERENCED TO MAP REF. No. 1.

3. UNDERGROUND UTILITIES ARE NOT SHOWN.

4. SUBJECT TO AN UP TO DATE ABSTRACT OF TITLE.

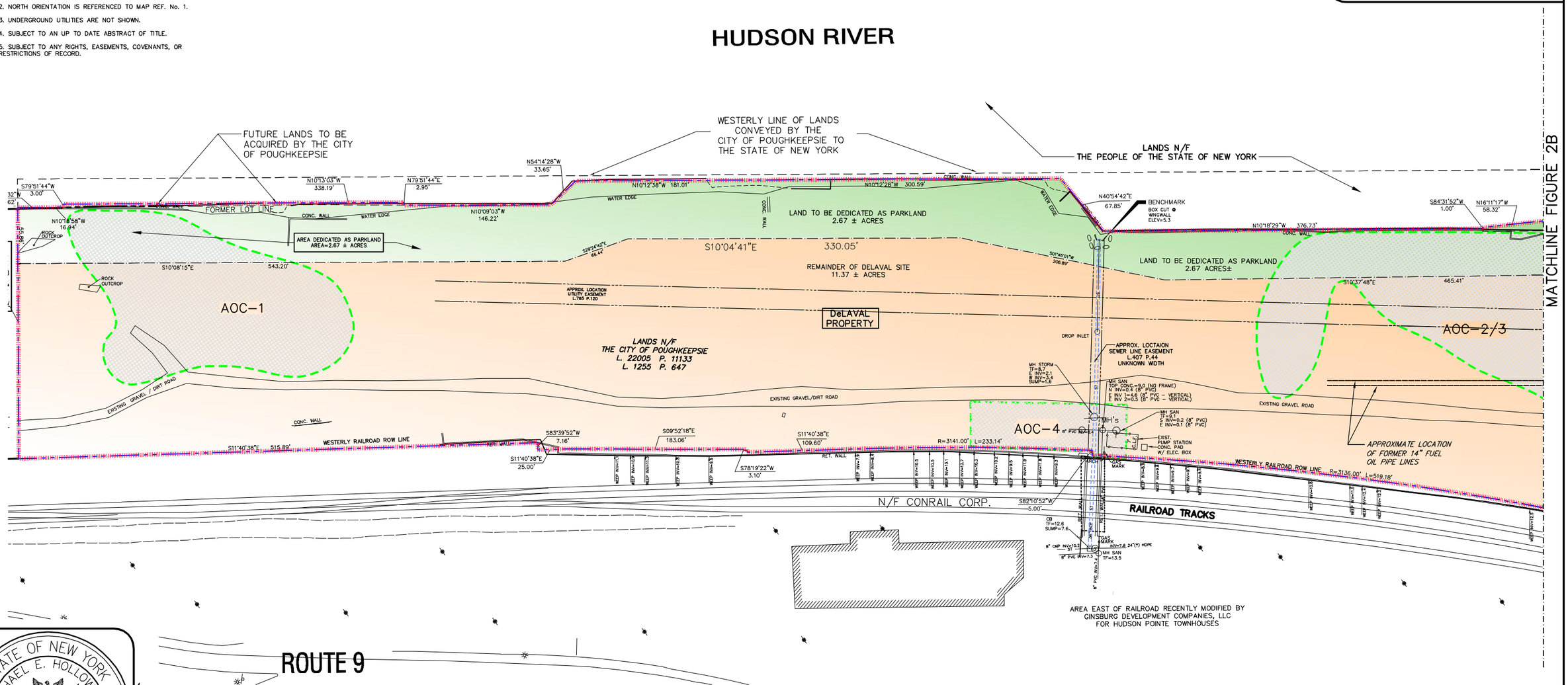
5. SUBJECT TO ANY RIGHTS, EASEMENTS, COVENANTS, OR RESTRICTIONS OF RECORD.

LEGEND

- APPROXIMATE LIMITS AOCS – (ORIGINAL)
- PROPERTY BOUNDARY
- SITE BOUNDARY
- PROJECT SITE AREA DEDICATED AS PARKLAND
- PROJECT SITE AREA TO BE REDEVELOPED
- PORTION OF PARCEL EXCLUDED FROM SITE& ENVIRONMENTAL EASEMENT



KEY PLAN



0 100 200
SCALE IN FEET

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STATE OF NEW YORK · MICHAEL E. HOLLOWOOD · EXCELSIOR · 068351 · LICENSED PROFESSIONAL ENGINEER

THE DeLAVAL PROPERTY
ENVIRONMENTAL RESTORATION PROGRAM PROJECT
CITY OF POUGHKEEPSIE, NY

SITE BOUNDARIES & PRE-REMEDIATION CONDITIONS

PROJECT NO. 14357

DATE: 03/31/12

FIGURE 2A

File: V:\PROJECTS\ANY\CIVDATA\14357\RPTS\FER\FIGURES\14357_FIGURE 2A-2B.DWG Saved: 4/25/2012 1:36:50 PM Plotted: 4/25/2012 3:34:52 PM User: Kane, Peter

File: V:\PROJECTS\ANY\CIVDATA\14357\RPTS\FER\FIGURES\14357_FIGURE 2A-2B.DWG Saved: 4/25/2012 1:36:50 PM Plotted: 4/25/2012 3:35:23 PM User: Kane, Peter

FIGURE 2A

LEGEND

- APPROXIMATE LIMITS AOCS – (ORIGINAL)
- PROPERTY BOUNDARY
- SITE BOUNDARY
- PROJECT SITE AREA DEDICATED AS PARKLAND
- PROJECT SITE AREA TO BE REDEVELOPED
- PORTION OF PARCEL EXCLUDED FROM SITE& ENVIRONMENTAL EASEMENT



KEY PLAN

HUDSON RIVER

FUTURE LANDS TO BE ACQUIRED BY THE CITY OF POUGHKEEPSIE

MATCHLINE

FORMER LOT LINE

LAND TO BE DEDICATED AS PARKLAND 2.67 ± ACRES

APPROXIMATE LOCATION OF FORMER 14" FUEL OIL PIPE LINES

APPROX. LOCATION UTILITY EASEMENT L.765 P.120

REMAINDER OF DELAVAL SITE 11.37 ± ACRES

APPROXIMATE LOCATION OF FORMER 400 GALLON UST

APPROXIMATE LOCATION OF FOUNDATION REMAINS (POSSIBLE SMOKE STACK)

AOC-2/3

100' ±

DeLAVAL PROPERTY

APPROX. LOCATION 20' DRAINAGE EASEMENT

20' DRAINAGE EASEMENT

20' DRAINAGE EASEMENT L.1091 P.455 (APPROX. LOCATION)

EXISTING GRAVEL PARKING LOT AREA

EXISTING GRAVEL TURN-AROUND AREA

GRAVEL ROAD

ASPHALT PAD

CONC. WALL

EDGE OF CONC.

EDGE OF ASPHALT

CONC MON

CONC MONUMENTS R=3146.00' L=417.91'

RAILROAD TRACKS

AREA EAST OF RAILROAD RECENTLY MODIFIED BY GINSBURG DEVELOPMENT COMPANIES, LLC FOR HUDSON POINTE TOWNHOUSES

PINE ST.

RINALDI BLVD.

CONC. WALK

WESTERLY TERMINUS OF PINE ST.

P.O.B.

RIGHTS TO PARKING AND ACCESS BY OTHERS NOT FOUND

BENCHMARK
"X" CUT ⊕ N. FLANGE BOLT
ELEV=11.1

LANDS N/F
CITY OF POUGHKEEPSIE I.D.A.
AKA "PUMP STATION SITE"

THE GRANDVIEW DEVELOPMENT (FORMER STP SITE)

LANDS N/F
CITY OF POUGHKEEPSIE I.D.A.
L.22004 P.4060
AKA "STP SITE"

UTILITY EASEMENT w/INGRESS & EGRESS
DOC No. 02-2005-10720
DOC No. 02-2004-4060

SEWER/WATER 50.07' LINE EASEMENT L.443 P.321

KAAL ROCK PARK

N10°02'03"W 366.87'
N79°20'12"E 3.83'
N10°39'48"W 29.12'
N15°58'08"W 28.77'
N18°44'08"W 25.70'
N18°19'08"W 9.46'
N15°16'08"W 2.59'
N14°10'08"W 20.34'
N64°45'42"E 3.99'
N15°25'08"W 219.87'
N75°50'30"E 44.18'
S10°36'36"E 223.95'
S20°07'51"E 157.23'
S10°53'40"E 254.83'
N75°51'22"E 85.08'
N63°15'22"E 4.81'
S89°50'48"E 23.07'
N87°51'12"E 9.07'
N85°24'12"E 27.79'
N75°43'42"E 10.14'
N46°44'22"E 57.74'
S04°39'19"E 294.64'
N20° 55' 44"W 39.60'
N04° 36' 35"W 42.50'
N36° 07' 19"E 20.93'
S85°28'58"E 42.02'
N34° 00' 47"W 36.93'
N72° 23' 09"E 20.34'
S40°07'48"E 14.86'
N40° 12' 48"W 30.03'
N88° 47' 33"E 25.42'
N39° 51' 20"E 84.53'
N85°03'32"E 113.36'
N38° 33' 22"E 6.37'
N66°00'02"E 13.83'
N26° 21' 01"E 22.98'
N10° 30' 39"E 15.82'

MH TF=9.7
MH TF=9.3
MH TF=10.2
MH TF=10.3
MH TF=11.4
MH TF=9.5
MH TF=10.6
CB TF=8.2
CB TF=11.5
HYD
WV
CATV BOX
GAS MARK
60" MAPLE

STATE OF NEW YORK
MICHAEL E. HOLLOWOOD
LICENSED PROFESSIONAL ENGINEER
068351
EXCELSIOR

0 100 200
SCALE IN FEET

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ENVIRONMENTAL RESTORATION PROGRAM PROJECT
CITY OF POUGHKEEPSIE, NY

PROJECT NO. 14357

DATE: 03/31/12

SITE BOUNDARIES & PRE-REMEDIATION CONDITIONS

FIGURE 2B

File: V:\PROJECTS\ANY\CIVDATA\14357\RPTS\FER\FIGURES\14357_FIGURE 3A-3B.DWG Saved: 4/25/2012 2:42:18 PM Plotted: 4/25/2012 3:48:01 PM User: Kane, Peter

LEGEND

- APPROXIMATE LIMITS AOCS (EXCAVATION AREA LIMITS)
- PROPERTY BOUNDARY
- SITE BOUNDARY
- BULKHEAD LOCATIONS
- RIP RAP REVETMENT



KEY PLAN

HUDSON RIVER

ZONE 1 = 381± L.F.
ANCHORED BULKHEAD
AZ-26 EPOXY-COATED STEEL SHEET PILES
(SOUTHERN 50' ZONE 1 IS REVETMENT ONLY)

ZONE 2 = 848± L.F.
RIPRAP REVETMENT

ZONE 3 = 658± L.F.
CANTILEVERED BULKHEAD
AZ-26 EPOXY-COATED STEEL SHEET PILES

CONCRETE COLLAR W/ 24" HDPE STORMWATER OUTFALL INV. ELEV. = +2.22'
TOE PROTECTION STONE
PRECAST CONCRETE BULKHEAD CAP
PRECAST CONCRETE HEADWALL W/ 24" HDPE STORMWATER OUTFALL INV. ELEV. = +0.19'
WESTERLY LINE OF LANDS CONVEYED BY THE CITY OF POUGHKEEPSIE TO THE STATE OF NEW YORK
PRECAST CONCRETE HEADWALL W/ 24" HDPE STORMWATER OUTFALL INV. ELEV. = +0.20'
PRECAST CONCRETE HEADWALL W/ 36" RCP STORMWATER OUTFALL INV. ELEV. = -0.60'
TOE PROTECTION STONE
PRECAST CONCRETE BULKHEAD CAP
AREA DEDICATED AS PARKLAND AREA=2.67 ± ACRES OR 112,522± SQ FT
PRECAST CONCRETE JERSEY BARRIER
LAND TO BE DEDICATED AS PARKLAND 2.67 ± ACRES
REMAINDER OF DELAVAL SITE 11.37 ± ACRES
LOVE/EFFRON PROPERTY
CAST-IN-PLACE CONCRETE DEADMAN / ANCHOR BLOCKS
AZ-13 STEEL SHEET PILE DEADMAN - UNCOATED (SEE RECORD DRAWINGS FOR ADDITIONAL DETAIL)
APPROXIMATE ZONE 2 SEDIMENT REMOVAL LIMITS
OUTFALL CONNECTED TO ON-SITE STORMWATER SYSTEM BY DEVELOPER'S CONTRACTOR (TYP.)
AOC-1
AOC-2/3
AOC-4A
AOC-5
36" RCP STORM PIPE
EXISTING MH
T.F. ELEV.=9.37
N INV. ELEV.=4.37
E INV. ELEV.=3.80
S INV. ELEV.=4.27
W INV. ELEV.=2.20
ST MH-1
T.F. ELEV.=12.76
N INV. ELEV.=7.80
ST MH-2
T.F. ELEV.=8.56
INVs ELEV.=5.58
ST MH-5
T.F. ELEV.=8.21
INVs ELEV.=5.79
ST MH-4
T.F. ELEV.=9.61
INVs ELEV.=6.03
ST MH-3
T.F. ELEV.=13.57
INV. ELEV.=7.37
WEEP HOLE DRAINAGE SYSTEM
WEEP HOLE CONNECTION TO EXISTING RETAINING WALL (TYP.) (SEE DETAIL 5, FIGURE 7)
10"ø HDPE
10"ø HDPE PIPE
RET. WALL
WESTERLY RAILROAD ROW LINE
N/F CONRAIL CORP.
RAILROAD TRACKS
MATCHLINE FIGURE 3B
ROUTE 9

STATE OF NEW YORK
MICHAEL E. HOLLOWOOD
068351
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ACCELSIOR

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SCALE IN FEET

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THE DeLAVAL PROPERTY
ENVIRONMENTAL RESTORATION PROGRAM PROJECT
CITY OF POUGHKEEPSIE, NY

AS-BUILT LOCATIONS OF BULKHEADS, REVETMENT, UTILITIES & AOC EXCAVATIONS

PROJECT NO. 14357

DATE: 03/31/12

FIGURE 3A

File: V:\PROJECTS\ANY\CIVDATA\14357\RPTS\FER\FIGURES\14357_FIGURE 3A-3B.DWG Saved: 4/25/2012 2:42:18 PM Plotted: 4/25/2012 3:47:36 PM User: Kane, Peter

MATCHLINE FIGURE 3A

LEGEND

- APPROXIMATE LIMITS AOCS (EXCAVATION AREA LIMITS)
- PROPERTY BOUNDARY
- SITE BOUNDARY
- BULKHEAD LOCATIONS
- RIP RAP REVETMENT



KEY PLAN

HUDSON RIVER

ZONE 3 = 658± L.F.
CANTILEVERED BULKHEAD
AZ-26 EPOXY-COATED STEEL SHEET PILES

ZONE 4 = 730± L.F.
RIPRAP REVETMENT

ZONE 5 = 311± L.F.
RIPRAP REVETMENT W/ LIVE STAKE PLANTINGS

APPROXIMATE ZONE 4 SEDIMENT REMOVAL LIMITS

CONCRETE COLLAR W/ 24" HDPE STORMWATER OUTFALL INV. ELEV. = -0.10'

PRECAST CONCRETE BULKHEAD CAP
TOE PROTECTION STONE

PRECAST CONCRETE HEADWALL W/ 54" RCP INV. ELEV. = -2.62'

PRECAST CONCRETE HEADWALL W/ 24" HDPE STORMWATER OUTFALL INV. ELEV. = +0.18'

24" HDPE OUTFALL INV. ELEV. = +0.05'

15" HDPE OUTFALL INV. ELEV. = +4.7'

PRECAST CONCRETE JERSEY BARRIER

KAAL ROCK PARK

LAND TO BE DEDICATED AS PARKLAND 2.67 ± ACRES

REMAINDER OF DELAVAL SITE 11.37 ± ACRES

PRECAST 8'ø MANHOLE T.F. ELEV.=6.37

DeLAVAL PROPERTY

N/F CITY OF POUGHKEEPSIE AKA "PUMP STATION SITE"

THE GRANDVIEW DEVELOPMENT (FORMER STP SITE)

N/F CITY OF POUGHKEEPSIE AKA "STP SITE"

20' DRAINAGE EASEMENT

30' DRAINAGE EASEMENT

AOC-2/3

APPROXIMATE LIMITS OF CHAIN LINK FENCE

CONC MON
CONC MON
CONC MONUMENTS

60" MAPLE
CATV BOX
GAS MARK
GAS MARK
MH T=0.3
TEL
HYD
WV
CB T=10.2

PINE ST.
RINALDI BLVD.

RAILROAD TRACKS

POB REMAINDER PARCEL
POC PARKLAND PARCEL

SOUTHERLY ROW LINE

STATE OF NEW YORK
MICHAEL E. HOLLOWOOD
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EXCELSIOR

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THE DeLAVAL PROPERTY
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CITY OF POUGHKEEPSIE, NY

AS-BUILT LOCATIONS OF BULKHEADS, REVETMENT, UTILITIES & AOC EXCAVATIONS

PROJECT NO. 14357

DATE: 03/31/12

FIGURE 3B

File: V:\PROJECTS\ANY\CIVDATA\14357\RPTS\FER\FIGURES\14357_FIGURE 4A-4B.DWG Saved: 4/25/2012 3:49:32 PM PLotted: 4/26/2012 10:27:46 AM User: Kane, Peter

LEGEND

- APPROXIMATE LIMITS AOCS (EXCAVATION AREA LIMITS)
- PROPERTY BOUNDARY
- SITE BOUNDARY
- BULKHEAD LOCATIONS
- RIP RAP REVETMENT
- -3.5 — APPROXIMATE ELEVATION OF BOTTOM OF EXCAVATION TO NEAREST 0.5' (NAVD 88)



KEY PLAN

HUDSON RIVER

ZONE 1 = 381± L.F.
ANCHORED BULKHEAD
AZ-26 EPOXY-COATED STEEL SHEET PILES
(SOUTHERN 50' ZONE 1 IS REVETMENT ONLY)

ZONE 2 = 848± L.F.
RIPRAP REVETMENT

ZONE 3 = 658± L.F.
CANTILEVERED BULKHEAD
AZ-26 EPOXY-COATED STEEL SHEET PILES

CONCRETE COLLAR W/ 24" HDPE STORMWATER OUTFALL INV. ELEV. = +2.22'

FUTURE LANDS TO BE ACQUIRED BY THE CITY OF POUGHKEEPSIE

PRECAST CONCRETE BULKHEAD CAP — TOE PROTECTION STONE

PRECAST CONCRETE HEADWALL W/ 24" HDPE STORMWATER OUTFALL INV. ELEV. = +0.19'

WESTERLY LINE OF LANDS CONVEYED BY THE CITY OF POUGHKEEPSIE TO THE STATE OF NEW YORK

PRECAST CONCRETE HEADWALL W/ 24" HDPE STORMWATER OUTFALL INV. ELEV. = +0.20'

PRECAST CONCRETE HEADWALL W/ 36" RCP STORMWATER OUTFALL INV. ELEV. = -0.60'

TOE PROTECTION STONE
PRECAST CONCRETE BULKHEAD CAP

PRECAST CONCRETE JERSEY BARRIER

LAND TO BE DEDICATED AS PARKLAND
2.67 ± ACRES
REMAINDER OF DELAVAL SITE
11.37 ± ACRES

AREA DEDICATED AS PARKLAND AREA=2.67 ± ACRES

LOVE/EFFRON PROPERTY

CAST-IN-PLACE CONCRETE DEADMAN / ANCHOR BLOCKS

AZ-13 STEEL SHEET PILE DEADMAN - UNCOATED (SEE RECORD DRAWINGS FOR ADDITIONAL DETAIL)

OUTFALL CONNECTED TO ON-SITE STORMWATER SYSTEM BY DEVELOPER'S CONTRACTOR (TYP.)

APPROXIMATE ZONE 2 SEDIMENT REMOVAL LIMITS

MATCHLINE FIGURE 4B

	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5			
	-2.5	-2.5	-2.5	-2.5	-2.5	-2.0	-2.5			
	-2.5	-2.5	-3.0	-3.0	-3.0	-3.0	-2.5			
		-2.5	-2.0	-3.0	-3.5	-3.5	-2.5			
		-2.5	-3.0	-3.0	-2.5	-2.5				
		-2.5	-3.5	-3.0	-1.5	-2.5				

AOC-1

-3.0	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	
-2.5	-3.0	-5.0	-7.5	-7.5	-7.0	-5.0	-2.5	-2.5	-2.5	
-2.5	-3.0	-5.0	-7.5	-7.5	-6.5	-4.5	-3.0	-3.0	-3.0	
-2.5	-2.5	-4.5	-2.5	-2.5	-2.5	-3.0	-2.5	-2.5	-3.0	
-1.5	-1.5	-1.5	-1.5	-1.5	-2.0	-2.5				
							-2.5	-2.5	-3.0	
								-2.5	-3.0	

AOC-2/3

AOC-4A

AOC-5

ST MH-1
T.F. ELEV.=12.76
N INV. ELEV.=7.80

WEEP HOLE DRAINAGE SYSTEM

WEEP HOLE CONNECTION TO EXISTING RETAINING WALL (TYP.) (SEE DETAIL 5, FIGURE 7)

EXISTING MH
T.F. ELEV.=9.37
N INV. ELEV.=4.37
E INV. ELEV.=3.80
S INV. ELEV.=4.27
W INV. ELEV.=2.20

ST MH-2
T.F. ELEV.=8.56
INVs ELEV.=5.58

36" RCP STORM PIPE

10"ø HDPE

ST MH-5
T.F. ELEV.=8.21
INVs ELEV.=5.79

ST MH-4
T.F. ELEV.=9.61
INVs ELEV.=6.03

ST MH-3
T.F. ELEV.=13.57
INV. ELEV.=7.37

WESTERLY RAILROAD ROW LINE

RET. WALL

10"ø HDPE PIPE

N/F CONRAIL CORP.

RAILROAD TRACKS

ROUTE 9

STATE OF NEW YORK
MICHAEL E. HOLLOWOOD
LICENSED PROFESSIONAL ENGINEER
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THE DeLAVAL PROPERTY
ENVIRONMENTAL RESTORATION PROGRAM PROJECT
CITY OF POUGHKEEPSIE, NY

AOC REMOVAL LIMITS

PROJECT NO. 14357

DATE: 03/31/12

FIGURE 4A

File: V:\PROJECTS\ANY\CIVDATA\14357\RPTS\FER\FIGURES\14357_FIGURE 4A-4B.DWG Saved: 4/25/2012 3:49:32 PM PLotted: 4/26/2012 10:28:21 AM User: Kane, Peter

MATCHLINE FIGURE 4A

LEGEND

- APPROXIMATE LIMITS AOCS (EXCAVATION AREA LIMITS)
- PROPERTY BOUNDARY
- SITE BOUNDARY
- BULKHEAD LOCATIONS
- RIP RAP REVETMENT
- −3.5 APPROXIMATE ELEVATION OF BOTTOM OF EXCAVATION TO NEAREST 0.5' (NAVD 88)

KEY PLAN



HUDSON RIVER

ZONE 3 = 658± L.F.
CANTILEVERED BULKHEAD
AZ-26 EPOXY-COATED STEEL SHEET PILES

ZONE 4 = 730± L.F.
RIPRAP REVETMENT

ZONE 5 = 311± L.F.
RIPRAP REVETMENT W/ LIVE STAKE PLANTINGS

FUTURE LANDS TO BE ACQUIRED BY THE CITY OF POUGHKEEPSIE

CONCRETE COLLAR W/ 24" HDPE STORMWATER OUTFALL INV. ELEV. = −0.10'

TOE PROTECTION STONE

PRECAST CONCRETE BULKHEAD CAP

PRECAST CONCRETE HEADWALL W/ 54" RCP INV. ELEV. = −2.62'

PRECAST CONCRETE HEADWALL W/ 24" HDPE STORMWATER OUTFALL INV. ELEV. = −0.18'

APPROXIMATE ZONE 4 SEDIMENT REMOVAL LIMITS

24" HDPE OUTFALL INV. ELEV. = +0.05'

15" HDPE OUTFALL INV. ELEV. = +4.7'

PRECAST CONCRETE JERSEY BARRIER

KAAL ROCK PARK

DeLAVAL PROPERTY

PRECAST 8'ø MANHOLE T.F. ELEV.=6.37

30' DRAINAGE EASEMENT

N/F CITY OF POUGHKEEPSIE AKA "PUMP STATION SITE"

THE GRANDVIEW DEVELOPMENT (FORMER STP SITE)

N/F CITY OF POUGHKEEPSIE AKA "STP SITE"

60" MAPLE

CATV BOX

GAS MARK

AOC−2/3

CONC MON

CONC MON

CONC MONUMENTS

RAILROAD TRACKS

PINE ST.

RINALDI BLVD.

ROB REMAINDER PARCEL
POC PARKLAND PARCEL

−2.5	−2.5	−2.5	−2.5	−2.5	−2.5	−2.5	−2.5	−2.5	−3.0	−2.5
−2.5	−2.5	−2.5	−2.5	−3.0	−2.5	−3.0	−2.5	−2.5	−3.0	−3.0
−3.0	−3.0	−3.0	−3.0	−3.0	−2.5	−3.0	−2.5	−3.0	−3.0	−2.5
−3.0	−3.0	−3.0	−3.0	−3.0	−3.0	−3.0	−3.0	−3.5	−2.5	
−3.0	−3.0	−3.0	−3.0	−3.0	−3.0	−3.0	−3.5	−3.5		
−3.0	−3.0	−3.0	−3.0	−3.0	−3.0	−3.0	−3.0	−3.0		
−2.5	−2.5	−3.5	−3.0	−3.0	−3.0	−3.0	−3.0	−3.0		
−1	−4.0	−4.0	−4.0	−4.0	−4.0	−4.0	−3.0			
−2.5	−6.5	−6.5	−6.5	−6.5	−6.5	−3.0				

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THE DeLAVAL PROPERTY
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CITY OF POUGHKEEPSIE, NY

AOC REMOVAL LIMITS

PROJECT NO. 14357

DATE: 03/31/12

FIGURE 4B

File: V:\PROJECTS\ANY\CIVDATA\14357\RPTS\FER\FIGURES\14357_FIGURE 5A-5B.DWG Saved: 4/25/2012 3:48:30 PM PLotted: 4/26/2012 10:31:58 AM User: Kane, Peter

LEGEND

- APPROXIMATE LIMITS AOCS (EXCAVATION AREA LIMITS)
- PROPERTY BOUNDARY
- SITE BOUNDARY
- BULKHEAD LOCATIONS
- RIP RAP REVETMENT
- AREA OF REMAINING POTENTIAL ACM
- AREA OF REMAINING KNOWN PETROLEUM CONTAMINATION
- BUILDING PAD BACKFILL AREA ITEM 4 IMPORTED FILL
- CONFIRMATORY SAMPLE LOCATION



KEY PLAN

HUDSON RIVER

ZONE 1 = 381± L.F.
ANCHORED BULKHEAD
AZ-26 EPOXY-COATED STEEL SHEET PILES
(SOUTHERN 50' ZONE 1 IS REVETMENT ONLY)

ZONE 2 = 848± L.F.
RIPRAP REVETMENT

ZONE 3 = 658± L.F.
CANTILEVERED BULKHEAD
AZ-26 EPOXY-COATED STEEL SHEET PILES

FUTURE LANDS TO BE ACQUIRED BY THE CITY OF POUGHKEEPSIE

WESTERLY LINE OF LANDS CONVEYED BY THE CITY OF POUGHKEEPSIE TO THE STATE OF NEW YORK

TOE PROTECTION STONE
PRECAST CONCRETE BULKHEAD CAP

AREA DEDICATED AS PARKLAND
AREA=2.67 ± ACRES

LAND TO BE DEDICATED AS PARKLAND
2.67 ± ACRES

REMAINDER OF DELAVAL SITE
11.37 ± ACRES

LOVE/EFFRON PROPERTY

CAST-IN-PLACE CONCRETE DEADMAN

AZ-12 STEEL SHEET PILE DEADMAN – UNCOATED

APPROXIMATE ZONE 2 SEDIMENT REMOVAL LIMITS

AOC-1

AOC-2/3

AOC-4A

AOC-5

AOC 2/3 GRID 4

AOC 2/3 GRID 11

AOC 2/3 2

#7 BOTTOM

#13 BOTTOM

#10 SIDE

3&3A EAST

2&2A NORTH

1&1A BOTTOM

BOTTOM MH1

WEST MH-1

SOUTH MH-1

NORTH MH-1

WESTERLY RAILROAD ROW LINE

RET. WALL

N/F CONRAIL CORP.

RAILROAD TRACKS

ROUTE 9

MATCHLINE FIGURE 5B

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CONFIRMATORY SAMPLING & LIMITS OF REMAINING KNOWN CONTAMINATION

PROJECT NO. 14357

DATE: 03/31/12

FIGURE 5A

File: V:\PROJECTS\ANY\CIVDATA\14357\RPTS\FER\FIGURES\14357_FIGURE 5A-5B.DWG Saved: 4/25/2012 3:48:30 PM PLotted: 4/26/2012 10:32:35 AM User: Kane, Peter

MATCHLINE FIGURE 5A

LEGEND

- APPROXIMATE LIMITS AOCS (EXCAVATION AREA LIMITS)
- PROPERTY BOUNDARY
- SITE BOUNDARY
- BULKHEAD LOCATIONS
- RIP RAP REVETMENT
- AREA OF REMAINING POTENTIAL ACM
- AREA OF REMAINING KNOWN PETROLEUM CONTAMINATION
- BUILDING PAD BACKFILL AREA ITEM 4 IMPORTED FILL
- CONFIRMATORY SAMPLE LOCATION

KEY PLAN



HUDSON RIVER

ZONE 3 = 658± L.F.
CANTILEVERED BULKHEAD
AZ-26 EPOXY-COATED STEEL SHEET PILES

ZONE 4 = 730± L.F.
RIPRAP REVETMENT

ZONE 5 = 311± L.F.
RIPRAP REVETMENT W/ LIVE STAKE PLANTINGS

APPROXIMATE ZONE 4 SEDIMENT REMOVAL LIMITS

FUTURE LANDS TO BE ACQUIRED BY THE CITY OF POUGHKEEPSIE

PRECAST CONCRETE BULKHEAD CAP
TOE PROTECTION STONE

PRECAST CONCRETE JERSEY BARRIER

KAAL ROCK PARK

LAND TO BE DEDICATED AS PARKLAND
2.67 ± ACRES

AOC 2/3 GRID 19

REMAINDER OF DELAVAL SITE
11.37 ± ACRES

AOC 2/3 3

#23 BOTTOM

#18 BOTTOM

#18 SIDE

11'
12'
100' ±

APPROXIMATE AREA OF REMAINING PETROLEUM-CONTAMINATION NOT REMOVED DUE TO PROXIMITY OF RETAINING WALL

AOC 2/3 1

APPROXIMATE LOCATION OF FOUNDATION REMAINS (POSSIBLE SMOKE STACK)

AOC-2/3

CONC MON
CONC MON
CONC MONUMENTS

RAILROAD TRACKS

20' DRAINAGE EASEMENT

30' DRAINAGE EASEMENT

N/F
CITY OF POUGHKEEPSIE
AKA "PUMP STATION SITE"

DeLAVAL PROPERTY

THE GRANDVIEW DEVELOPMENT (FORMER STP SITE)

N/F
CITY OF POUGHKEEPSIE
AKA "STP SITE"

60" MAPLE
MH TEL TF=0.3
CATV BOX
GAS MARK GAS MARK
MH2
MV

PINE ST.
RELOCATED SOUTHERLY ROW LINE

RINALDI BLVD.

STATE OF NEW YORK
MICHAEL E. HOLLOWOOD
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CONFIRMATORY SAMPLING & LIMITS OF REMAINING KNOWN CONTAMINATION

PROJECT NO. 14357

DATE: 03/31/12

FIGURE 5B

File: V:\PROJECTS\ANY\CIVDATA\14357\RPTS\FER\FIGURES\14357_FIGURE_6A-6B.DWG Saved: 4/25/2012 3:49:59 PM PLotted: 4/26/2012 10:36:08 AM User: Kane, Peter

LEGEND

- APPROXIMATE LIMITS AOCS (EXCAVATION AREA LIMITS)
- PROPERTY BOUNDARY
- SITE BOUNDARY
- BULKHEAD LOCATIONS
- RIP RAP REVETMENT
- MONITORING WELL LOCATION — MW-1

- SOIL COVER IN FUTURE GREEN SPACE AREAS: 6 OZ. NON-WOVEN GEOTEXTILE, 12" MIN. SILT/TOPSOIL
- SOIL COVER OVER FUTURE IMPERVIOUS AREAS: 6 OZ. NON-WOVEN GEOTEXTILE, 12" MIN. ITEM 4
- SOIL COVER ON SOUTH EAST SLOPE: GEOGRID, 6" ITEM 4, 6" TOPSOIL
- SOIL COVER OVER FUTURE IMPERVIOUS AREAS w/ POTENTIAL REMAINING ACM: 6 OZ. NON-WOVEN GEOTEXTILE, 24" MIN. ITEM 4
- SOIL COVER OVER FUTURE PERVIOUS AREAS w/ POTENTIAL REMAINING ACM: 6 OZ. NON-WOVEN GEOTEXTILE, 24" MIN. SILT / TOPSOIL

- SOIL COVER IN FUTURE BUILDING PAD AREAS: 6 OZ. NON-WOVEN GEOTEXTILE, > 24" MIN. ITEM 4
- SOIL COVER AT PUMP STATION (INSTALLED PRIOR TO 2008): 6 OZ. NON-WOVEN GEOTEXTILE, 12" MIN. ITEM 4
- SOIL COVER INSTALLED PRIOR TO 2008: 6 OZ. NON-WOVEN GEOTEXTILE, 12" MIN. ITEM 4 & PAVED w/ ASPHALT, OR CONCRETE
- SOIL COVER INSTALLED PRIOR TO 2008: 6 OZ. NON-WOVEN GEOTEXTILE, 12" MIN. ITEM 4 & TOPSOIL AND/OR MULCH
- NO SOIL COVER INSTALLED



KEY PLAN

HUDSON RIVER

ZONE 1 = 381± L.F.
ANCHORED BULKHEAD
(SOUTHERN 50' ZONE 1 IS REVETMENT ONLY)
FUTURE LANDS TO BE ACQUIRED BY THE CITY OF POUGHKEEPSIE

ZONE 2 = 848± L.F.
RIPRAP REVETMENT

ZONE 3 = 658± L.F.
CANTILEVERED BULKHEAD

SEE DETAIL 3, FIGURE 7 FOR BACKFILL BETWEEN BULKHEAD & DEADMAN

SEE DETAIL 4, FIGURE 7 FOR SOIL COVER AROUND LIGHT POLE BASES

AOC-1

AOC-2/3

MW-1

MW-2

MW-3

MW-4

MW-5

MW-8

LOVE/EFFRON PROPERTY

SEE DETAIL 1, FIGURE 7

SEE DETAIL 2, FIGURE 7

RET. WALL

N/F CONRAIL CORP.

RAILROAD TRACKS

AOC-5

AOC-4A

MATCHLINE FIGURE 6B

ROUTE 9

STATE OF NEW YORK
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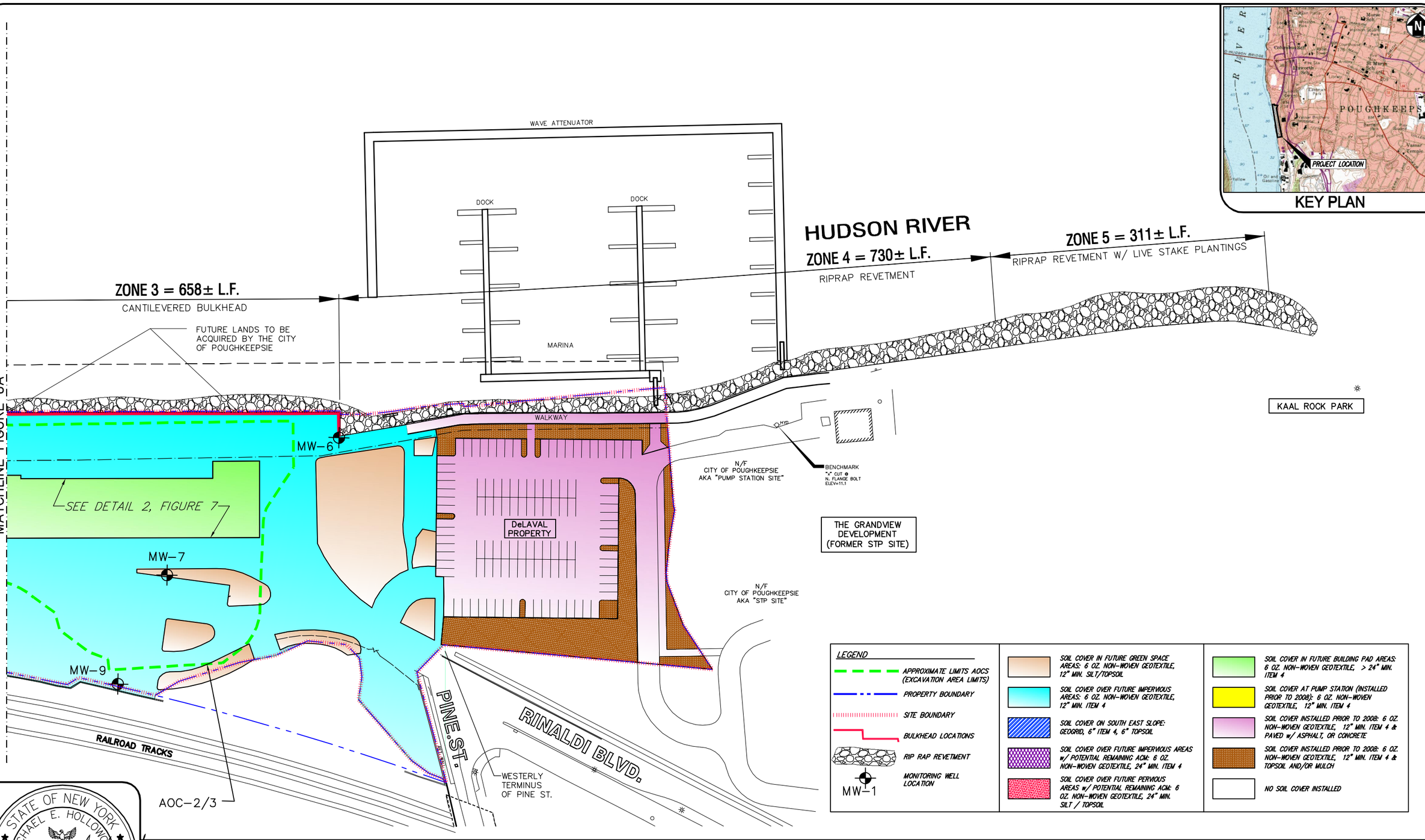
THE DeLAVAL PROPERTY
ENVIRONMENTAL RESTORATION PROGRAM PROJECT
CITY OF POUGHKEEPSIE, NY

SOIL COVER SYSTEM & MONITORING WELL LOCATION MAP

PROJECT NO. 14357

DATE: 03/31/12

FIGURE 6A



STATE OF NEW YORK
MICHAEL E. HOLLOWOOD
068351
LICENSED PROFESSIONAL ENGINEER

0 100 200
SCALE IN FEET

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ENVIRONMENTAL RESTORATION PROGRAM PROJECT
CITY OF POUGHKEEPSIE, NY

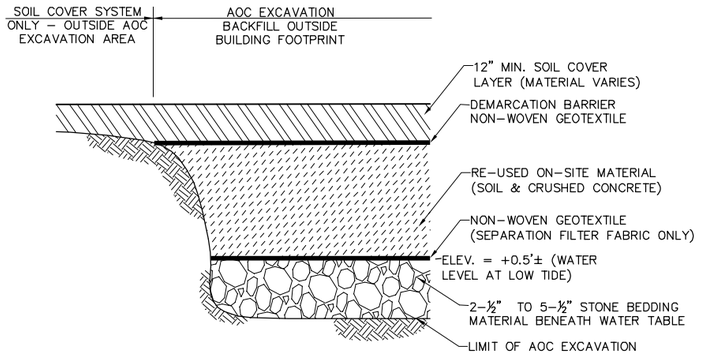
SOIL COVER SYSTEM & MONITORING WELL LOCATION MAP

PROJECT NO. 14357

DATE: 03/31/12

FIGURE 6B

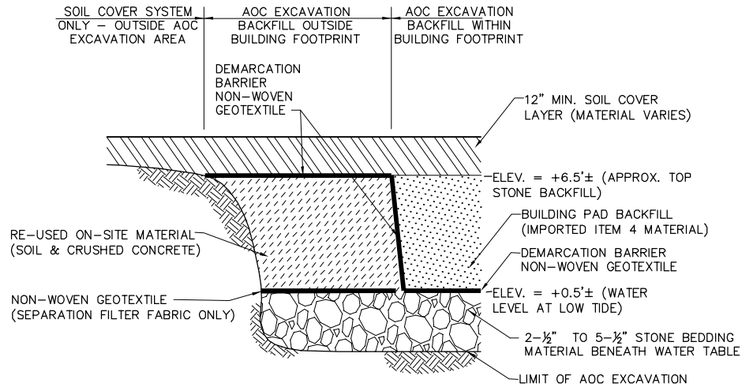
File: V:\PROJECTS\ANY\CIVDATA\14357\RPTS\FER\FIGURES\14357_FIGURE_6A-6B.DWG Saved: 4/25/2012 3:49:59 PM PLotted: 4/26/2012 10:37:09 AM User: Kane, Peter



AREAS BACKFILLED WITH ON–SITE MATERIALS

1 TYPICAL SECTION A

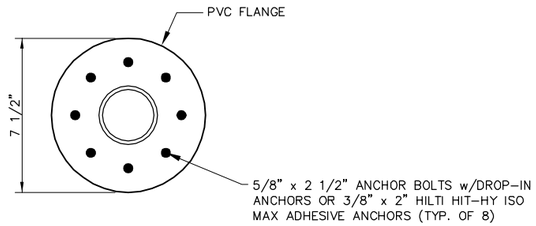
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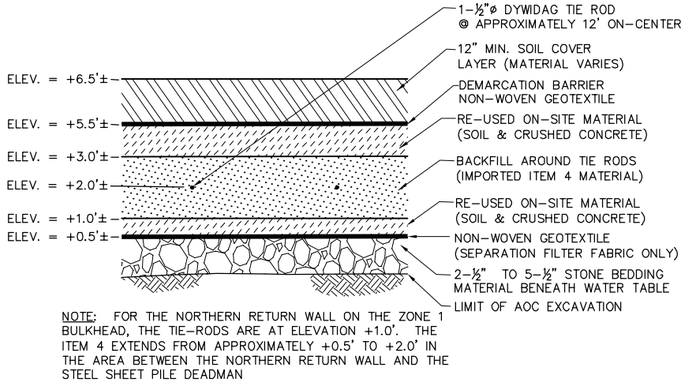
BUILDING PAD AREA

2 TYPICAL SECTION B

SCALE: NO SCALE



FLANGE LAYOUT

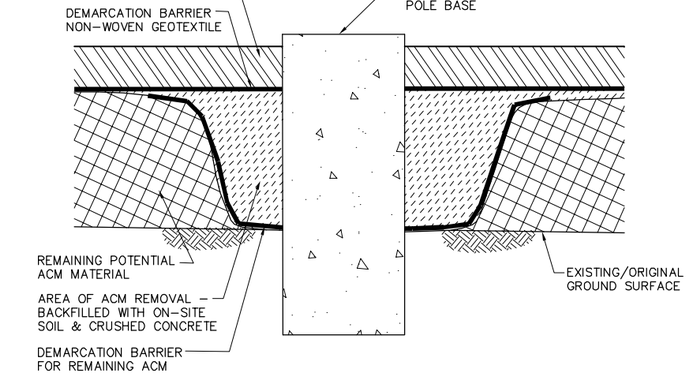


NOTE: FOR THE NORTHERN RETURN WALL ON THE ZONE 1 BULKHEAD, THE TIE–RODS ARE AT ELEVATION +1.0'. THE ITEM 4 EXTENDS FROM APPROXIMATELY +0.5' TO +2.0' IN THE AREA BETWEEN THE NORTHERN RETURN WALL AND THE STEEL SHEET PILE DEADMAN

BACKFILL AROUND TIE–RODS BETWEEN BULKHEAD & DEADMAN

3 TYPICAL SECTION C

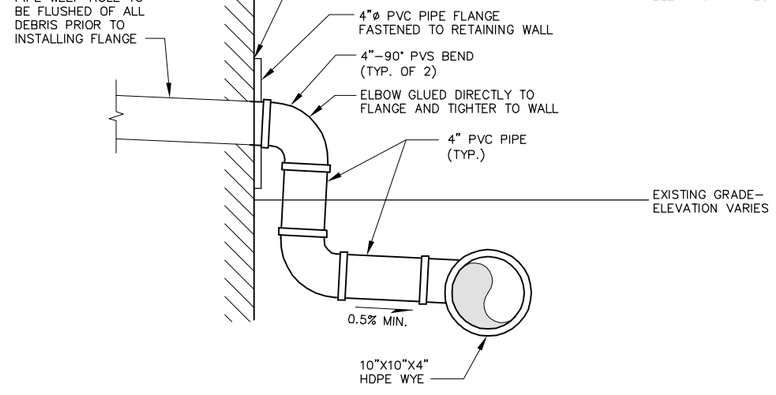
SCALE: NO SCALE



ACM REMOVAL AT LIGHT POLE BASES

4 TYPICAL SECTION D

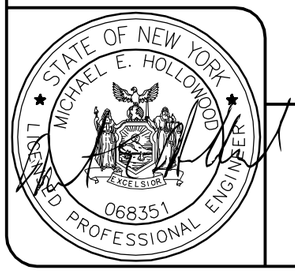
SCALE: NO SCALE



SECTION

5 WEEP HOLE CONNECTION DETAIL

SCALE: NO SCALE



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THE DeLAVAL PROPERTY
ENVIRONMENTAL RESTORATION PROGRAM PROJECT
CITY OF POUGHKEEPSIE, NY

DETAILS

PROJECT NO. 14357

DATE: 03/31/12

FIGURE 7

File: V:\PROJECTS\ANY\CIVDATA\14357\RPTS\FER\FIGURES\14357_FIGURE_7.DWG Saved: 4/24/2012 1:48:05 PM PLotted: 4/25/2012 3:34:07 PM User: Kane, Peter



Source: Google Maps – City of Poughkeepsie, NY, 2009.

DIRECTIONS TO HOSPITAL:

1. **Start out northeast on Pine Street toward Pine Street Spur.**
2. **Turn Right on Pine Street Spur.**
3. **Turn left onto Columbia Street.**
4. **Turn right onto Young Street.**
5. **Turn right onto Reade Place. Vassar Brothers Medical Center will be on the left.**

Total Estimated Distance = 0.5 miles.
Total Estimated Time = 2 minutes

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HOSPITAL LOCATION MAP

ROUTE FROM PROJECT SITE TO
VASSAR BROTHERS MEDICAL CENTER

PROJECT NO. 14357

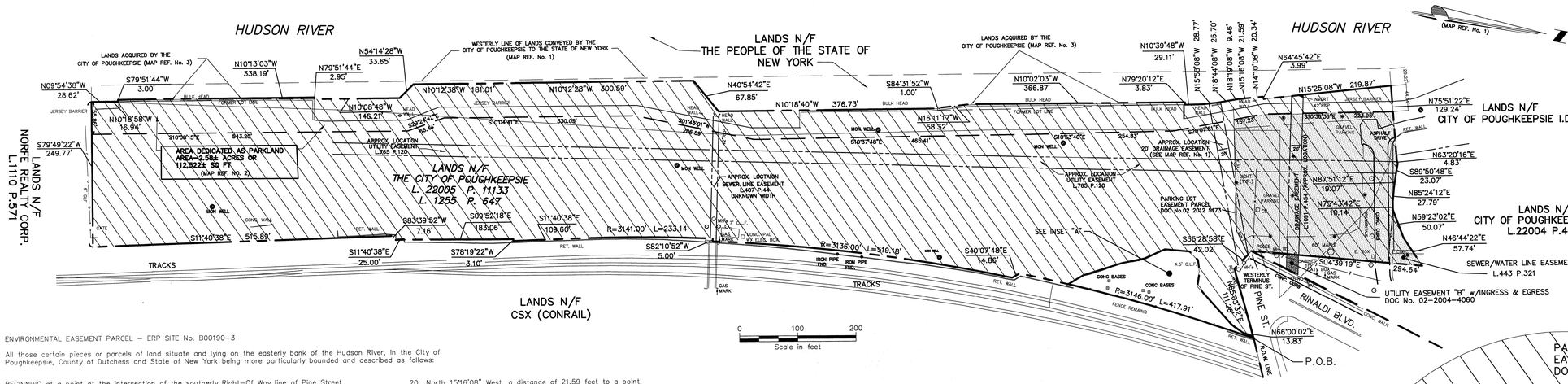
DATE 03/29/12

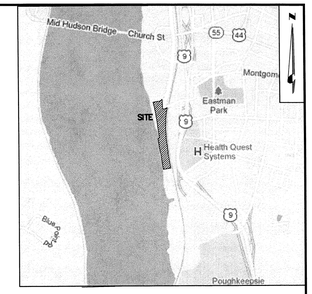
FIGURE 8

V:\Projects\ANY\Civ\Data\14357\Rpts\Site Management Plan - Post Remediation\Figures\Figure 8 - Hospital

APPENDIX A

Site Metes & Bounds Description





SITE LOCATION: NO SCALE

ENVIRONMENTAL EASEMENT PARCEL – ERP SITE No. B00190-3

All those certain pieces or parcels of land situate and lying on the easterly bank of the Hudson River, in the City of Poughkeepsie, County of Dutchess and State of New York being more particularly bounded and described as follows:

BEGINNING at a point at the intersection of the southerly Right-Of Way line of Pine Street and the westerly railroad Right-Of Way line of lands now or formerly of Conrail Corp; being the property division line between lands now or formerly of The City Of Poughkeepsie as described in Liber 22005 of Deeds at page 11133, on the West; thence southerly along said westerly Conrail Corp. Right-Of Way line the following eleven (11) courses and distances:

1. Along an arc of a curve to the left having a radius of 3,146.00 feet, through a central angle of 07°36'40", and an arc length of 417.91' to a point,
2. South 40°07'48" East, departing said curve non radially, a distance of 14.86 feet to a non-tangent point of curvature,
3. Along an arc of a curve to the left having a radius of 3,136.00 feet, through a central angle of 09°29'08", and an arc length of 519.18' to a point,
4. South 82°10'52" West, departing said curve non radially, a distance of 5.00 feet to a non-tangent point of curvature,
5. Along an arc of a curve to the left having a radius of 3,141.00 feet, through a central angle of 04°15'10", and an arc length of 233.14 feet to a point,
6. South 11°40'38" East, departing said curve non radially, a distance of 109.60 feet to a point,
7. South 78°19'22" West, a distance of 3.10 feet to a point,
8. South 09°52'18" East, a distance of 183.06 feet to a point,
9. South 11°40'38" East, a distance of 25.00 feet to a point,
10. South 83°39'52" West, a distance of 7.16 feet to a point,
11. South 11°40'38" East, a distance of 515.89 feet to a point on the property division line between said lands of The City of Poughkeepsie. on the north and lands now or formerly of Norfe Realty Corp. as described in Liber 1110 of Deeds at page 571, on the south; thence along said property division line South 79°49'22" West a distance of 249.77 feet to a point on the property division line between said lands of The City of Poughkeepsie. on the east and lands now or formerly of The People of The State of New York on the west: thence along said property division line the following twenty three (23) courses and distances:

1. North 09°54'31" West, a distance of 28.62 feet to a point,
2. North 10°18'58" West, a distance of 16.94 feet to a point,
3. South 79°51'44" West, a distance of 3.00 feet to a point,
4. North 10°13'03" West, a distance of 338.19 feet to a point,
5. North 79°51'44" East, a distance of 2.95 feet to a point,
6. North 10°08'48" West, a distance of 146.21 feet to a point,
7. North 54°14'28" West, a distance of 33.65 feet to a point,
8. North 10°12'38" West, a distance of 181.01 feet to a point,
9. North 10°12'28" West, a distance of 300.59 feet to a point,
10. North 40°54'42" East, a distance of 67.85 feet to a point,
11. North 10°18'40" West, a distance of 376.73 feet to a point,
12. South 84°31'52" West, a distance of 1.00 feet to a point,
13. North 16°11'17" West a distance of 58.32 feet to a point,
14. North 10°02'03" West a distance of 366.87 feet to a point,
15. North 79°20'12" East a distance of 3.83 feet to a point,
16. North 10°39'48" West a distance of 29.11 feet to a point,
17. North 15°58'08" West, a distance of 28.77 feet to a point,
18. North 18°44'08" West, a distance of 25.70 feet to a point,
19. North 18°19'08" West, a distance of 9.46 feet to a point,
20. North 15°16'08" West, a distance of 21.59 feet to a point,
21. North 14°10'08" West, a distance of 20.34 feet to a point,
22. North 64°45'42" East, a distance of 3.99 feet to a point, and
23. North 15°25'08" West, a distance of 219.87 feet to a point on the property division line between said lands of The City of Poughkeepsie. on the south and lands now or formerly of The City of Poughkeepsie I.D.A. on the north; thence along said property division line and along other lands now or formerly of The City Of Poughkeepsie I.D.A. , as described in Liber 22004 of Deeds at page 4060, the following nine (9) courses and distances:

1. North 75°51'22" East, a distance of 129.24 feet to a point,
2. North 6°3'20"16" East, a distance of 4.83 feet to a point,
3. South 89°50'48" East, a distance of 23.07 feet to a point,
4. North 87°51'12" East, a distance of 19.07 feet to a point,
5. North 85°24'12" East, a distance of 27.79 feet to a point,
6. North 75°43'42" East, a distance of 10.14 feet to a point,
7. North 59°23'02" East, a distance of 50.07 feet to a point, and
8. North 46°44'22" East, a distance of 57.74 feet to a point, and
9. South 04°39'19" East, a distance of 294.64 feet to a point at the westerly terminus of Pine Street; thence along the property division line between said lands now or formerly of The City Of Poughkeepsie and the southerly Right-Of Way line of Pine Street the following three (3) courses and distances:

1. South 55°28'58" East, a distance of 42.02 feet to a point,
2. North 65°03'32" East, a distance of 111.26 feet to a point, and
3. North 66°00'02" East, a distance of 13.83 feet to the point or place of beginning.

Containing 611,369 square feet or 14.04 acres of land, more or less.

Excepting and Reserving from the above described easement all that piece or parcel of land that are described as follows:

BEGINNING at a point at the intersection of the southerly Right-Of Way line of Pine Street and the westerly railroad Right-Of Way line of lands now or formerly of Conrail Corp; being the property division line between lands now or formerly of The City Of Poughkeepsie as described in Liber 22005 of Deeds at page 11133, on the West; thence southerly along said westerly Conrail Corp. Right-Of Way line along an arc of a curve to the left having a radius of 3,146.00 feet, through a central angle of 06°03'05", and an arc length of 332.27 feet to a point, thence through said lands of the C.O.P. the following twelve (12) courses:

1. North 40°12'48" West, a distance of 30.03 feet to a point,
2. North 27°09'00" West, a distance of 69.38 feet to a point,
3. North 20°55'44 West, a distance of 39.60 feet to a point,
4. North 34°00'47" West, a distance of 38.93 feet to a point,
5. North 04°36'35" West, a distance of 42.50 feet to a point,
6. North 36°07'19" East, a distance of 20.53 feet to a point,
7. North 72°23'09" East, a distance of 20.34 feet to a point,
8. North 88°47'33" East, a distance of 25.42 feet to a point,
9. North 39°03'20" East, a distance of 88.93 feet to a point,
10. North 26°21'01" East, a distance of 22.98 feet to a point,
11. North 10°30'39" East, a distance of 15.82 feet to a point and,
12. North 38°33'22" East, a distance of 6.37 feet to the point or place of beginning.

Containing 17,251 square feet or 0.40 acres of land, more or less.

MAP REFERENCES:

1. NEW YORK STATE OFFICE OF GENERAL SERVICES – BUREAU OF LAND MANAGEMENT MAP No. 1844, AS PREPARED BY CHAZEN ENGINEERING & LAND SURVEYING Co., P.C., DATED MARCH 11, 2000 AND LAST REVISED FEBRUARY 12, 2001.
2. "LANDS TO BE DEDICATED AS PARKLAND AND REMAINDER OF DELAVAL SITE" CITY OF POUGHKEEPSIE, DUTCHESS COUNTY, NY., AS PREPARED BY ROY EDWARD TELLIER, L.L.S., DATED JUNE 13, 2004.
3. "STATE OF NEW YORK OFFICE OF GENERAL SERVICES SUBMERGED LAND APPLICATION MAP IN THE APPLICATION OF THE CITY OF POUGHKEEPSIE FOR A GRANT OF LANDS UNDER THE WATERS OF THE HUDSON RIVER" CITY OF POUGHKEEPSIE, COUNTY OF DUTCHESS, STATE OF NEW YORK AS PREPARED BY CHA INC. DATED NOVEMBER 24, 2009, LAST REVISED APRIL 10, 2013 AND FILED WITH NYSOGS – BUREAU OF LAND MANAGEMENT ON APRIL 16, 2013 AS MAP No. 2433.

NOTES:

1. BASE MAPPING PREPARED BY CHA FROM A NOVEMBER 2006, NOVEMBER 2009, FEBRUARY 2010, AND FEBRUARY 2012 FIELD SURVEYS.
2. NORTH ORIENTATION IS REFERENCED TO MAP REF. No. 1.
3. UNDERGROUND UTILITIES ARE NOT SHOWN.
4. SUBJECT TO CHICAGO TITLE INSURANCE COMPANY POLICY No. 1310040164, AS PREPARED BY FELDMAN-JACOBSON ABSTRACT CORP. EFFECTIVE DATE: JUNE 1, 2013.

SURVEYORS COMMENTS:

- SCHEDULE B-II, ITEM 5 – SEWER AND WATER LINE EASEMENT, AS DESCRIBED IN LIBER 443 OF DEEDS AT PAGE 321, AFFECTS SUBJECT PARCEL AND IS AS SHOWN HEREON.
- SCHEDULE B-II, ITEM 7 – SUBJECT TO RESERVATION AND RIGHT OF WAY AS DESCRIBED IN LIBER 269 OF DEEDS AT PAGE 350. NON-PROTRACTABLE.
- SCHEDULE B-II, ITEM 8 – SUBJECT TO RIGHT OF WAY, AS DESCRIBED IN LIBER 143 OF DEEDS AT PAGE 568 AND LIBER 184 OF DEEDS AT PAGE 332. NON-PROTRACTABLE.
- SCHEDULE B-II, ITEM 13 – SEWER EASEMENT, AS DESCRIBED IN LIBER 407 OF DEEDS AT PAGE 44, AFFECTS SUBJECT PARCEL AND IS AS SHOWN HEREON.
- SCHEDULE B-II, ITEM 14 – SUBJECT TO EASEMENT AGREEMENT, AS DESCRIBED IN LIBER 440 OF DEEDS AT PAGE 372. NON-PROTRACTABLE.
- SCHEDULE B-II, ITEM 15 – SUBJECT TO UTILITY EASEMENTS, AS DESCRIBED IN LIBER 765 OF DEEDS AT PAGE 129 (SHOWN HEREON), DOC No. 02-2011-3228 (NON-PROTRACTABLE), AND DOC No. 02-2011-3231 (NON-PROTRACTABLE).
- SCHEDULE B-II, ITEM 16 – EASEMENTS AS DESCRIBED IN LIBER 1110 OF DEEDS AT PAGE 568 AND LIBER 1110 OF DEEDS AT PAGE 571 DO NOT AFFECT SUBJECT PARCEL.
- SCHEDULE B-II, ITEM 18 – PARKING LOT EASEMENT, AS DESCRIBED IN DOC No. 02-2012-5173 AFFECTS SUBJECT PARCEL AND IS AS SHOWN HEREON.

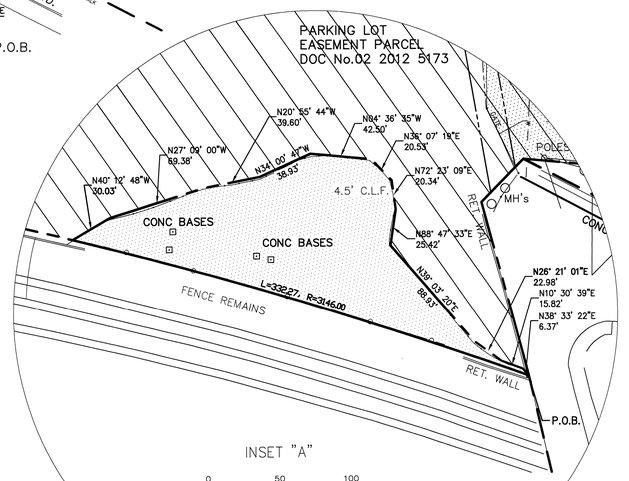


TABLE OF AREAS

TMP# 131300-6061-43-752749-0000 RINALDI BLVD AREA = 14.01 ACRES (INCLUDING PROPOSED DEDICATED PARKLANDS)	
EXCEMPTED AREA	= 0.40 ACRES
TOTAL EASEMENT AREA	=13.61 ACRES

ELECTRIC MANHOLE
SIGNAL SUPPORT POLE
UTILITY POLE
MONITORING WELL
HYDRANT
WATER VALVE
TELEPHONE MANHOLE
GAS VALVE
TELEPHONE PEDESTAL
SIGN
LAMP POLE
GAS LINE
WATER LINE
ENVIRONMENTAL EASEMENT

ENGINEERING/INSTITUTIONAL CONTROLS

a. 12" MINIMUM CLEAN SOIL COVER SYSTEM
b. 6-OZ. NON-WOVEN GEOTEXTILE FABRIC DEMARCATION BARRIER BENEATH SOIL COVER
c. STEEL SHEET PILE BULKHEADS ALONG WATERFRONT
d. SUB-SLAB DEPRESSURIZATION SYSTEMS BENEATH ANY BUILDINGS REQUIRED
e. ACTIVITIES AND LAND USE RESTRICTIONS – COMMERCIAL AND PASSIVE RECREATION
f. ANNUAL CERTIFICATION & GROUNDWATER MONITORING REQUIRED
g. GROUNDWATER USE RESTRICTIONS COVER ENTIRE ENVIRONMENTAL EASEMENT

CERTIFICATION EXTENDS TO THE EXTENTS OF THE ENVIRONMENTAL EASEMENT ONLY.

CERTIFIED TO:

1. THE PEOPLE OF THE STATE OF NEW YORK, ACTING THROUGH THEIR COMMISSIONER OF THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
2. CITY OF POUGHKEEPSIE
3. CHICAGO TITLE INSURANCE COMPANY

WILLIAM S. LUCARELLI, PLS
NYS Lic. No. 49.477
DATE: 9/6/13

The DEC or their agent may access the Environmental Easement area, as shown here on, through any existing street access or building ingress/egress access point.

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the New York Environmental Conservation Law.

THE ENGINEERING AND INSTITUTIONAL CONTROLS for the Easement are set forth in more detail in the Site Management Plan ("SMP"). A copy of the SMP must be obtained by any party with an interest in the property. The SMP may be obtained from the New York State Department of Environmental Conservation, Division of Environmental Remediation, Site Control Section, 625 Broadway, Albany, NY 12233 or at derweb@gw.dec.state.ny.us.

	Drawn By:	App'd. By:	Date:
REVISED PER TITLE CO. COMMENTS (7/31/13)	JEQ	WSL	08/16/13
REVISED PER REVIEW OF TITLE COMMITMENT (SEE NOTE 4)	JEQ	WSL	07/10/13
MAP ISSUED	JEQ	WSL	04/18/13

DWG: Cert Survey_143572000.dwg Dview: 260.1

UNAUTHORIZED ALTERATION OR ADDITION TO THIS SURVEY MAP IS A VIOLATION OF SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW. COPIES OF THIS SURVEY MAP NOT BEARING THE LAND SURVEYOR'S EMBOSSED SEAL SHALL NOT BE CONSIDERED TO BE VALID COPIES. CERTIFICATES INDICATED OR IMPLIED HEREON SHALL RUN ONLY TO THE PARTY FOR WHOM THE SURVEY IS PREPARED, AND ON THEIR BEHALF TO THE ADDITIONAL PARTIES LISTED HEREON. CERTIFICATES ARE NOT TRANSFERABLE TO ADDITIONAL PARTIES, OR SUBSEQUENT OWNERS, NOT LISTED HEREON.

LICENSED LAND SURVEYOR WILLIAM S. LUCARELLI STATE OF NEW YORK
WILLIAM S. LUCARELLI, PLS
NYS LIC. No. 49.477

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CHA Project Number: 14357-2000-34000

Survey Service Group

ENVIRONMENTAL EASEMENT
OVER LANDS OF
CITY OF POUGHKEEPSIE
DeLaval Property ERP Site
NYSDEC SITE No. B00190-3
STATE OF NEW YORK
COUNTY OF DUTCHESS CITY OF POUGHKEEPSIE

SCALE: 1"=100' | DATE: 02-23-12 | Sheet 1 of 1

APPENDIX B

RI Analytical Summary Tables

Figures

OIL STORAGE FACILITY

AOC-1

HUDSON RIVER

DELAVAL PROPERTY LINE (TYP.)

AOC-2

BURIED TANK

APPROXIMATE LOCATION OF FUEL LINE

HUDSON RIVER

FORMER WASTEWATER TREATMENT PLANT

EXISTING CONCRETE BULK HEAD

EXISTING CONCRETE BULK HEAD

42" RCP

SS-1 SS-2 SS-3 SS-4 SS-5 SS-6 SS-7 SS-8 SS-9 SS-10 SS-11 SS-12 SS-13 SS-14 SS-15 SS-16 SS-17 SS-18 SS-19 SS-20 SS-21 SS-22 SS-23 SS-24 SS-25 SS-26 SS-27 SS-28 SS-29

ROAD

CHAINLINK FENCE

ASPHALT DRIVE

CONC. RETAINING WALL

RAILROAD TRACKS

ASPHALT PAD

AOC-4

AOC-3

CHAINLINK FENCE

ASPHALT DRIVE

LEGEND

AREA OF CONCERN AS REPRESENTED IN THE CHAZEN COMPANIES PHASE II ESA REPORT

SS-5 SURFICIAL SOIL SAMPLE LOCATION

NOTE:

BASEMAP PROVIDED FROM THE CHAZEN COMPANIES (TCC) PHASE SUBSURFACE INVESTIGATION REPORT, DATED MAY 2001.

0 150 300

Scale in feet

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11205.1011.1102

DATE: JANUARY, 2005

FIGURE 2

SURFICIAL SOIL SAMPLE LOCATION PLAN AND AREAS OF ENVIRONMENTAL CONCERN

DEVAVAL PROPERTY
CITY OF POUGHKEEPSIE
DUTCHESS COUNTY, STATE OF NEW YORK

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OIL STORAGE FACILITY

AOC-1

HUDSON RIVER

DELAVAL PROPERTY LINE (TYP.)

AOC-2/3

BURIED TANK

APPROXIMATE LOCATION OF FUEL LINE

HUDSON RIVER

FORMER WASTEWATER TREATMENT PLANT

AOC-4

EXISTING CONCRETE BULK HEAD

TP-11 TP-10 TP-9 TP-8 TP-7 TP-6 TP-5 TP-4 TP-12 TP-17 TP-16 TP-18 TP-13 TP-15 TP-1 TP-2 TP-3 TP-14

AT-1 AT-2 AT-3 AT-4 AT-5 AT-6

CHAINLINK FENCE

ASPHALT DRIVE

TP-42 TP-43 TP-41

RAILROAD TRACKS

CONC. RETAINING WALL

TP-22 TP-23 TP-24 TP-21 TP-20 TP-27 TP-25 TP-26 TP-28 TP-29 TP-30 TP-31 TP-19 TP-44 TP-34 TP-35 TP-36 TP-33 TP-32 TP-38 TP-40 TP-39 TP-37

ASPHALT PAD

AT-8 AT-7

42" RCP

CHAINLINK FENCE

ASPHALT DRIVE

LEGEND

AREA OF CONCERN BASED ON SUPPLEMENTAL INVESTIGATION

TP-1 ENVIRONMENTAL EXPLORATORY TEST PIT

AT-1 ARCHEOLOGICAL TEST PIT

NOTE:

BASEMAP PROVIDED FROM THE CHAZEN COMPANIES (TCC) PHASE SUBSURFACE INVESTIGATION REPORT, DATED MAY 2001.

0 150 300

Scale in feet

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11205.1011.1102

DATE: JANUARY, 2005

FIGURE 3

TEST PIT LOCATION PLAN AND AREAS OF ENVIRONMENTAL CONCERN

DEVAVAL PROPERTY
CITY OF POUGHKEEPSIE
DUTCHESS COUNTY, STATE OF NEW YORK

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OIL STORAGE FACILITY

AOC-1

HUDSON RIVER

DELAVAL PROPERTY LINE (TYP.)

AOC-2/3

FORMER WASTEWATER TREATMENT PLANT

BURIED TANK

APPROXIMATE LOCATION OF FUEL LINE

HUDSON RIVER

EXISTING CONCRETE BULK HEAD

EXISTING CONCRETE BULK HEAD

42" RCP

CHA-2

CHA-3

CHA-5

CHA-6

MW-1

B-7

B-8

CHA-1

CHAINLINK FENCE

ASPHALT

DRIVE

ASPHALT PAD

CHA-4

CONC. RETAINING WALL

RAILROAD TRACKS

AOC-4

CHAINLINK FENCE

ASPHALT DRIVE

CHAINLINK FENCE

LEGEND

AREA OF CONCERN BASED ON SUPPLEMENTAL INVESTIGATION

CHA-1 MONITORING WELL LOCATION

B-7 BORING LOCATION

NOTE:

BASEMAP PROVIDED FROM THE CHAZEN COMPANIES (TCC) PHASE SUBSURFACE INVESTIGATION REPORT, DATED MAY 2001.

0 150 300

Scale in feet

N

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11205.1011.1102

DATE: JANUARY, 2005

FIGURE 4

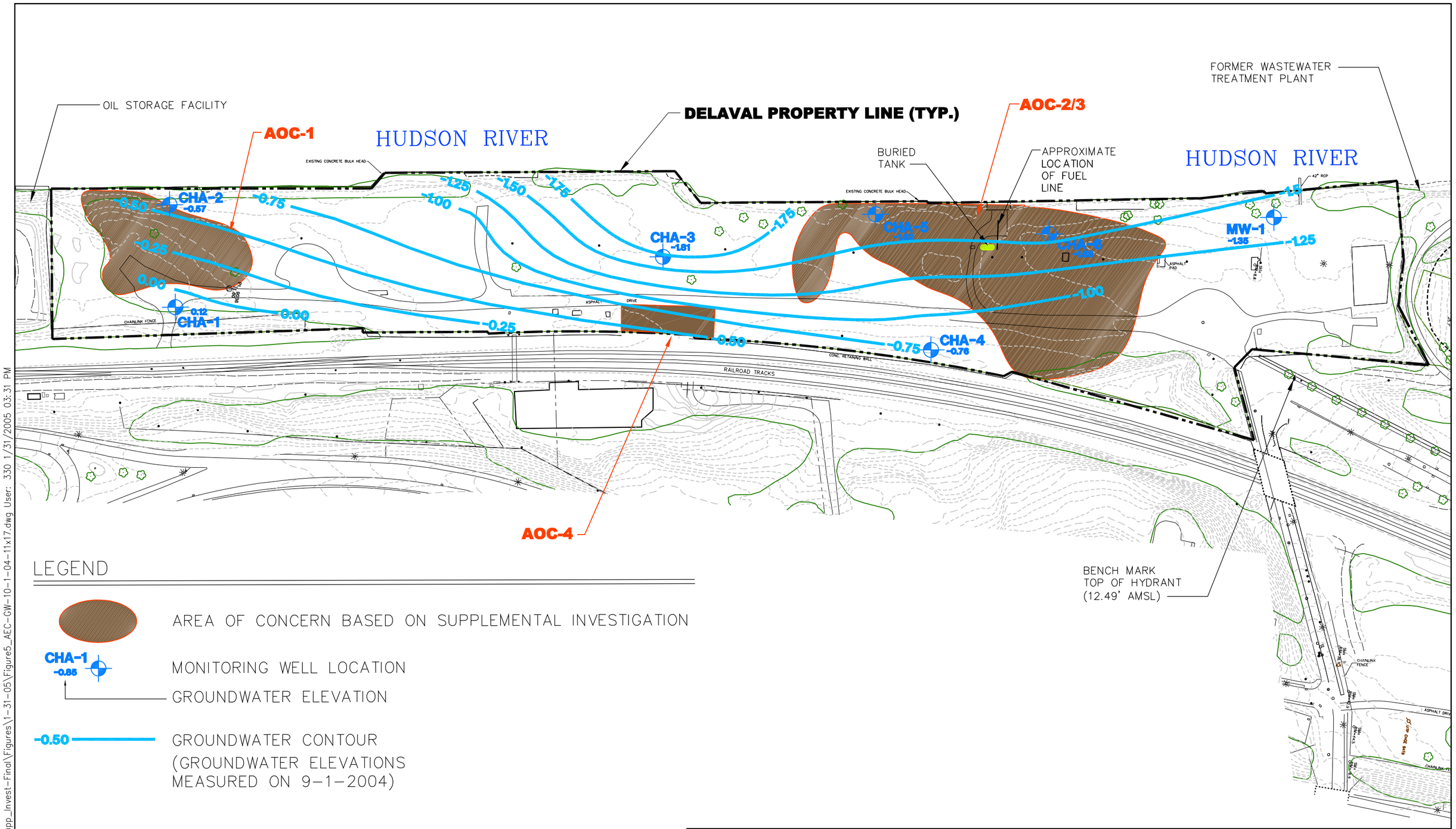
MONITORING WELL AND BORING LOCATION PLAN AND AREAS OF ENVIRONMENTAL CONCERN

DEVAVAL PROPERTY

CITY OF POUGHKEEPSIE

DUTCHESS COUNTY, STATE OF NEW YORK

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LEGEND

- AREA OF CONCERN BASED ON SUPPLEMENTAL INVESTIGATION
- CHA-1 -0.85 — MONITORING WELL LOCATION; GROUNDWATER ELEVATION
- -0.50 — GROUNDWATER CONTOUR (GROUNDWATER ELEVATIONS MEASURED ON 9-1-2004)

NOTE:

BASEMAP PROVIDED FROM THE CHAZEN COMPANIES (TCC) PHASE SUBSURFACE INVESTIGATION REPORT, DATED MAY 2001.

0 150 300
Scale in feet

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FIGURE 5
GROUNDWATER CONTOUR MAP AND AREAS OF ENVIRONMENTAL CONCERN

DEVAVAL PROPERTY
CITY OF POUGHKEEPSIE
DUTCHESS COUNTY, STATE OF NEW YORK

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Summary of Analytical Results

Summary of Analytical Results for Surficial Soils
DeLaval Property Supplemental Investigation, July 2004

Contaminant of Concern	Standard, Criteria and Guidance Value	Concentration Range Detected[1]	Frequency of Samples Exceeding SCGs
SVOCs (units in micrograms per kilogram (μg/kg))			
Acenaphthylene	41,000	140-8,000	0 of 30
Acenaphthene	50,000	120-430	0 of 30
Anthracene	50,000	74-18,000	0 of 30
Benzo(a)anthracene	224	85-150,000	23 of 30
Benzo(a)pyrene	61	160-100,000	24 of 30
Benzo(b)fluoranthene	1,100	85-180,000	18 of 30
Benzo(g,h,i)perylene	50,000	110-25,000	0 of 30
Benzo(k)fluoranthene	1,100	150-64,000	10 of 30
Bis(2-Ethylhexyl)phthalate	50,000	220-6,100	0 of 30
Carbazole		79-490	Detected in 7 of 30
Chrysene	400	81-130,000	21 of 30
Dibenz(a,h)anthracene	14	100-120	2 of 30
Dibenzofuran	6,200	110-230	0 of 30
Fluoranthene	50,000	140-320,000	2 of 30
Fluorene	50,000	80-280	0 of 30
Indeno(1,2,3-cd)pyrene	3,200	88-16,000	2 of 30
2-Methylnapthalene	36,400	160-310	0 of 30
Naphthalene	13,000	250-420	0 of 30
Phenanthrene	50,000	130-92,000	1 of 30
Pyrene	50,000	130-260,000	2 of 30
PCBs (units in micrograms per kilogram (μg/kg))			
Aroclor-1260	1,000	50-3600	3 of 30
METALS (units in milligrams per liter (mg/L))			
Arsenic	7.5	4.89-24.8	20 of 30
Barium	300	15.1-374	2 of 30
Cadmium	1 or SB (1.93)	0.973-8.7	25 of 30
Chromium	10 or SB (15.8)	5.94-627	17 of 30
Lead	500	22.8-908	22 of 30
Selenium	2	0.602-3.20	6 of 30
Silver	SB (0.117)	0.149-240	12 of 30
Mercury	0.1	0.02-1.30	21 of 30

Note: 1. If a single value is noted, the referenced parameter was detected either only one time, or multiple times at the same concentration.

Summary of Analytical Results for Subsurface Soils
Supplemental Investigation of the DeLaval Property, July & August 2004

Contaminant of Concern	Standard, Criteria and Guidance Value	Concentration Range Detected[1]	Frequency of Samples Exceeding SCGs
VOCs (units in micrograms per kilogram (µg/kg))			
Acetone	200	34-3,500	4 of 22
Benzene	60	43-2,300	2 of 22
Carbon Disulfide	2,700	1.6-56	0 of 22
Chlorobenzene	1,700	13,000	1 of 22
Ethylbenzene	5,500	3.5-530	0 of 22
Methylene Chloride	100	2.6-67	0 of 22
Toluene	1,500	2.8-320	0 of 22
Tetrachloroethene	1,400	4.1-110	0 of 22
m/p-Xylene (Total)	1,200	1.1-4,900	2 of 22
o-Xylene	1,200	0.47-1300	1 of 22
SVOCs (units in micrograms per kilogram (µg/kg))			
Acenaphthylene	41,000	210-850	0 of 21
Acenaphthene	50,000	140-1500	0 of 21
Anthracene	50,000	62-3,300	0 of 21
Benzo(a)anthracene	224	130-11,000	13 of 21
Benzo(a)pyrene	61	96-14,000	11 of 21
Benzo(b)fluoranthene	1,100	77-19,000	5 of 21
Benzo(g,h,i)perylene	50,000	48-3,200	0 of 21
Benzo(k)fluoranthene	1,100	65-7,100	4 of 21
Bis(2-Ethylhexyl)phthalate	50,000	44-280	0 of 21
Carbazole		100-550	Detected in 4 of 21
Chrysene	400	120-13,000	10 of 21
Dibenz(a,h)anthracene	14	95-420	3 of 21
Dibenzofuran	6,200	59-160	of 21
Fluoranthene	50,000	250-18,000	of 21
Fluorene	50,000	49-1,800	of 21
Indeno(1,2,3-cd)pyrene	3,200	56-2,200	0 of 21
2-Methylnapthalene	36,400	54-7,500	of 21
Naphthalene	13,000	91-490	0 of 21
Phenanthrene	50,000	180-10	0 of 21
Pyrene	50,000	61-18,000	0 of 21
PCBs (units in micrograms per kilogram (µg/kg))			
Aroclor-1254	10,000	97-11,000	1 of 21
Aroclor-1260	10,000	60-340	0 of 21
METALS (units in milligrams per liter (mg/L))			
Arsenic	7.5	0.306-35.5	12 of 21
Barium	300	10.1-1,900	4 of 21
Cadmium	1 or SB (1.93)	0.307-21.7	11 of 21

Contaminant of Concern	Standard, Criteria and Guidance Value	Concentration Range Detected[1]	Frequency of Samples Exceeding SCGs
Chromium	10 or SB (15.8)	4.17-1,730	13 of 21
Lead	500	16.4-17,200	12 of 21
Selenium	2	0.564-9.18	7 of 21
Silver	SB (0.11)	0.206-1.13	7 of 21
Mercury	0.1	0.01-1.4	7 of 21

Note: 1. If a single value is noted, the referenced parameter was detected either only one time, or multiple times at the same concentration.

Summary of Analytical Results for Groundwater
Supplemental Investigation of the DeLaval Property, August & October 2004

Contaminant of Concern	Standard, Criteria and Guidance Value	Concentration Range Detected[1]	Frequency of Samples Exceeding SCGs
VOCs (units in micrograms per kilogram (µg/kg))			
cis-1,2-Dichloroethene	5	0.77 - 49	1 of 8
Trichloroethene	5	0.67 - 5.0	1 of 8
SVOCs (units in micrograms per kilogram (µg/kg))			
Acenaphthene	20[2]	2.6	0 of 8
Bis(2-Ethylhexyl)phthalate	5	1.2-1.8	0 of 8
Di-n-butylphthalate	50[2]	3.9	0 of 8
Fluorene	50[2]	2.2	0 of 8
Naphthalene	10	1.5	0 of 8
Phenanthrene	50[2]	1.1	0 of 8
PCBs (units in micrograms per kilogram (µg/kg))			
Aroclor-1260	0.09	0.31 - 4.7	2 of 9
METALS (units in milligrams per liter (mg/L))			
Barium	1,000	16.1-204	0 of 8
Chromium	50	1.8-3.1	0 of 8
Lead	25	21-39.2	1 of 8
Mercury	0.7	0.03-0.08	0 of 8

Note: 1. If a single value is noted, the referenced parameter was detected either only one time, or multiple times at the same concentration.
2. Indicates value is a guidance value rather than a standard.

Analytical Summary Tables

Table 1. Surficial Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard
Poughkeepsie, New York

Semivolatile Organics Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	SS-1 S3753-01 07/22/04 1.0 ug/Kg	SS-1DL S3753-01DL 07/22/04 5.0 ug/Kg	SS-2 S3753-02 07/22/04 1.0 ug/Kg	SS-3 S3753-03 07/22/04 1.0 ug/Kg	SS-3DL S3753-03DL 07/22/04 5.0 ug/Kg	SS-4 S3753-04 07/22/04 1.0 ug/Kg	SS-5 S3753-05 07/22/04 1.0 ug/Kg
bis(2-Chloroethyl)ether		38 U	190 UD	36 U	35 U	180 UD	37 U	230 U
1,2-Dichlorobenzene	7,900	42 U	210 UD	40 U	39 U	200 UD	40 U	250 U
1,3-Dichlorobenzene	1,600	29 U	140 UD	27 U	27 U	130 UD	27 U	170 U
1,4-Dichlorobenzene	8,500	32 U	160 UD	31 U	30 U	150 UD	31 U	200 U
2,2-oxybis(1-Chloropropane)		42 U	210 UD	40 U	39 U	190 UD	40 U	250 U
N-Nitroso-di-n-propylamine		34 U	170 UD	32 U	32 U	160 UD	33 U	210 U
Hexachloroethane		37 U	190 UD	35 U	34 U	170 UD	36 U	220 U
Nitrobenzene	200	39 U	200 UD	37 U	37 U	180 UD	38 U	240 U
Isophorone	4,400	29 U	140 UD	27 U	27 U	130 UD	28 U	170 U
bis(2-Chloroethoxy)methane		35 U	180 UD	34 U	33 U	160 UD	34 U	210 U
1,2,4-Trichlorobenzene	3,400	22 U	110 UD	21 U	21 U	100 UD	21 U	130 U
Naphthalene	13,000	280 J	420 JD	16 U	16 U	78 UD	16 U	100 U
4-Chloroaniline	220 or MDL	290 U	1400 UD	270 U	270 U	1300 UD	280 U	1700 U
Hexachlorobutadiene		27 U	140 UD	26 U	25 U	130 UD	26 U	160 U
2-Methylnaphthalene	36,400	160 J	67 UD	13 U	12 U	62 UD	13 U	81 U
Hexachlorocyclopentadiene		19 U	97 UD	18 U	18 U	90 UD	19 U	120 U
2-Chloronaphthalene		16 U	81 UD	15 U	15 U	75 UD	16 U	98 U
2-Nitroaniline	430 or MDL	28 U	140 UD	27 U	26 U	130 UD	27 U	170 U
Dimethylphthalate	2,000	19 U	93 UD	18 U	17 U	86 UD	18 U	110 U
Acenaphthylene	41,000	140 J	120 UD	22 U	22 U	110 UD	22 U	140 U
2,6-Dinitrotoluene	1,000	33 U	170 UD	31 U	31 U	150 UD	32 U	200 U
3-Nitroaniline	500 or MDL	130 U	630 UD	120 U	120 U	580 UD	120 U	760 U
Acenaphthene	50,000**	430 J	530 JD	120 J	16 U	79 UD	16 U	100 U
Dibenzofuran	6,200	230 J	130 UD	24 U	24 U	120 UD	24 U	150 U
2,4-Dinitrotoluene		15 U	77 UD	15 U	14 U	72 UD	15 U	93 U
Diethylphthalate	71,000	24 U	120 UD	23 U	23 U	110 UD	23 U	150 U
4-Chlorophenyl-phenylether		19 U	96 UD	18 U	18 U	89 UD	18 U	120 U
Fluorene	50,000**	280 J	110 UD	80 J	20 U	100 UD	21 U	130 U
4-Nitroaniline		61 U	300 UD	58 U	56 U	280 UD	58 U	370 U
N-Nitrosodiphenylamine		20 U	98 UD	19 U	18 U	91 UD	19 U	120 U
4-Bromophenyl-phenylether		20 U	100 UD	19 U	19 U	95 UD	20 U	120 U
Hexachlorobenzene	410	15 U	73 UD	14 U	13 U	67 UD	14 U	88 U
Phenanthrene	50,000**	6300 EJ	4500 D	970	330 J	80 UD	290 J	1100 J
Anthracene	50,000**	830	1100 JD	230 J	74 J	86 UD	18 U	110 U
Carbazole		380 J	490 JD	79 J	16 U	79 UD	16 U	100 U
Di-n-butylphthalate	8,100	10 U	52 UD	9.8 U	9.6 U	48 UD	9.9 U	62 U
Fluoranthene	50,000**	8500 EJ	6800 D	1600	630 J	540 JD	540 J	3000 J
Pyrene	50,000**	7700 EJ	6600 D	1500	530 J	490 JD	560 J	2500 J
Butylbenzylphthalate	50,000**	26 U	130 UD	25 U	24 U	120 UD	25 U	160 U
3,3-Dichlorobenzidine		120 U	620 UD	120 U	120 U	580 UD	120 U	750 U
Benzo(a)anthracene	224 or MDL	3300	3200 JD	900	320 J	54 UD	320 J	1600 J
Chrysene	400	2800	2400 JD	790	300 J	110 UD	350 J	1600 J
bis(2-Ethylhexyl)phthalate	50,000**	18 U	89 UD	17 U	6100 EJ	4900 D	220 J	110 U
Di-n-octyl phthalate	50,000**	19 U	93 UD	18 U	17 U	86 UD	18 U	110 U
Benzo(b)fluoranthene	1,100	4600 J	3600 JD	1600 J	450 J	190 UD	510 J	2000 J
Benzo(k)fluoranthene	1,100	2300	1900 JD	720 J	290 J	120 UD	360 J	840 J
Benzo(a)pyrene	61 or MDL	3000	2600 JD	940	260 J	62 UD	310 J	1300 J
Indeno(1,2,3-cd)pyrene	3,200	420 J	500 JD	180 J	96 J	87 UD	88 J	800 J
Dibenz(a,h)anthracene	14 or MDL	100 J	110 UD	22 U	21 U	110 UD	22 U	140 U
Benzo(g,h,i)perylene	50,000**	940	920 JD	370 J	110 J	160 UD	160 J	770 J
Total Confident Conc. SVOC		42,690	35,560	10,079	9,490	5,930	3,708	15,510
Total TICs		23,830	0	25,350	17,870	0	7,690	53,900

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 1. Surficial Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard
Poughkeepsie, New York

Semivolatile Organics Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	SS-6 S3753-06 07/22/04 1.0 ug/Kg	SS-7 S3753-07 07/22/04 5.0 ug/Kg	SS-8 S3753-08 07/22/04 1.0 ug/Kg	SS-9 S3753-09 07/22/04 1.0 ug/Kg	SS-10 S3753-10 07/22/04 5.0 ug/Kg	SS-11 S3753-11 07/22/04 1.0 ug/Kg	SS-12 S3753-12 07/22/04 1.0 ug/Kg
bis(2-Chloroethyl)ether		200 U	220 U	38 U	190 U	200 U	39 U	180 U
1,2-Dichlorobenzene	7,900	220 U	240 U	42 U	210 U	220 U	43 U	200 U
1,3-Dichlorobenzene	1,600	150 U	160 U	28 U	140 U	150 U	29 U	140 U
1,4-Dichlorobenzene	8,500	170 U	190 U	32 U	160 U	170 U	33 U	150 U
2,2-oxybis(1-Chloropropane)		220 U	240 U	42 U	200 U	220 U	43 U	200 U
N-Nitroso-di-n-propylamine		180 U	200 U	34 U	170 U	180 U	35 U	160 U
Hexachloroethane		200 U	210 U	37 U	180 U	190 U	38 U	170 U
Nitrobenzene	200	210 U	230 U	39 U	190 U	200 U	40 U	190 U
Isophorone	4,400	150 U	170 U	29 U	140 U	150 U	29 U	140 U
bis(2-Chloroethoxy)methane		190 U	200 U	35 U	170 U	180 U	36 U	170 U
1,2,4-Trichlorobenzene	3,400	120 U	130 U	22 U	110 U	110 U	23 U	110 U
Naphthalene	13,000	89 U	97 U	17 U	82 U	87 U	17 U	80 U
4-Chloroaniline	220 or MDL	1500 U	1600 U	290 U	1400 U	1500 U	290 U	1400 U
Hexachlorobutadiene		140 U	160 U	27 U	130 U	140 U	28 U	130 U
2-Methylnaphthalene	36,400	71 U	77 U	13 U	65 U	69 U	14 U	63 U
Hexachlorocyclopentadiene		100 U	110 U	19 U	95 U	100 U	20 U	92 U
2-Chloronaphthalene		86 U	93 U	16 U	79 U	83 U	16 U	76 U
2-Nitroaniline	430 or MDL	150 U	160 U	28 U	140 U	140 U	29 U	130 U
Dimethylphthalate	2,000	98 U	110 U	18 U	90 U	95 U	19 U	87 U
Acenaphthylene	41,000	120 U	130 U	23 U	110 U	1700 J	24 U	110 U
2,6-Dinitrotoluene	1,000	170 U	190 U	33 U	160 U	170 U	34 U	160 U
3-Nitroaniline	500 or MDL	660 U	720 U	120 U	610 U	650 U	130 U	590 U
Acenaphthene	50,000**	91 U	98 U	17 U	83 U	88 U	17 U	81 U
Dibenzofuran	6,200	140 U	150 U	25 U	120 U	130 U	26 U	120 U
2,4-Dinitrotoluene		82 U	89 U	15 U	75 U	80 U	16 U	73 U
Diethylphthalate	71,000	130 U	140 U	24 U	120 U	130 U	25 U	120 U
4-Chlorophenyl-phenylether		100 U	110 U	19 U	94 U	99 U	20 U	91 U
Fluorene	50,000**	120 U	130 U	22 U	110 U	110 U	22 U	100 U
4-Nitroaniline		320 U	350 U	60 U	300 U	310 U	62 U	290 U
N-Nitrosodiphenylamine		100 U	110 U	20 U	96 U	100 U	20 U	93 U
4-Bromophenyl-phenylether		110 U	120 U	20 U	99 U	110 U	21 U	96 U
Hexachlorobenzene	410	77 U	83 U	14 U	71 U	75 U	15 U	69 U
Phenanthrene	50,000**	1500 J	3100 J	130 J	980 J	6500	18 U	2200 J
Anthracene	50,000**	470 J	810 J	18 U	90 U	1600 J	19 U	580 J
Carbazole		91 U	98 U	17 U	83 U	460 J	17 U	81 U
Di-n-butylphthalate	8,100	55 U	59 U	10 U	50 U	53 U	10 U	49 U
Fluoranthene	50,000**	3300 J	5700	300 J	2200 J	24000	140 J	2800 J
Pyrene	50,000**	2600 J	5100	270 J	1800 J	15000	130 J	2500 J
Butylbenzylphthalate	50,000**	140 U	150 U	26 U	130 U	130 U	26 U	120 U
3,3-Dichlorobenzidine		660 U	710 U	120 U	610 U	640 U	130 U	590 U
Benzo(a)anthracene	224 or MDL	1800 J	3400 J	200 J	1200 J	10000	85 J	1400 J
Chrysene	400	1500 J	2400 J	200 J	1200 J	7200	81 J	1200 J
bis(2-Ethylhexyl)phthalate	50,000**	94 U	100 U	18 U	87 U	92 U	18 U	84 U
Di-n-octyl phthalate	50,000**	98 U	110 U	18 U	90 U	95 U	19 U	87 U
Benzo(b)fluoranthene	1,100	1700 J	3800 J	200 J	1500 J	11000 J	85 J	1300 J
Benzo(k)fluoranthene	1,100	1000 J	1400 J	150 J	640 J	7500	27 U	500 J
Benzo(a)pyrene	61 or MDL	1300 J	2300 J	160 J	720 J	6900	14 U	900 J
Indeno(1,2,3-cd)pyrene	3,200	460 J	490 J	19 U	410 J	1100 J	19 U	380 J
Dibenz(a,h)anthracene	14 or MDL	120 U	130 U	23 U	110 U	120 U	23 U	110 U
Benzo(g,h,i)perylene	50,000**	490 J	680 J	34 U	420 J	1800 J	34 U	370 J
Total Confident Conc. SVOC		16,120	29,180	1,610	11,070	94,760	521	14,130
Total TICs		3,100	6,510	7,290	4,080	19,100	6,680	6,680

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 1. Surficial Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard
Poughkeepsie, New York

Semivolatile Organics Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	SS-13 S3753-13 07/22/04 5.0 ug/Kg	SS-14 S3753-14 07/22/04 1.0 ug/Kg	SS-14B S3753-15 07/22/04 1.0 ug/Kg	SS-14BDL S3753-15DL 07/22/04 5.0 ug/Kg	SS-15 S3753-16 07/22/04 1.0 ug/Kg	SS-16 S3753-17 07/22/04 1.0 ug/Kg	SS-17 S3753-18 07/22/04 5.0 ug/Kg
bis(2-Chloroethyl)ether		920 U	34 U	35 U	170 UD	39 U	170 U	200 U
1,2-Dichlorobenzene	7,900	1000 U	38 U	39 U	190 UD	43 U	190 U	220 U
1,3-Dichlorobenzene	1,600	690 U	26 U	26 U	130 UD	29 U	130 U	150 U
1,4-Dichlorobenzene	8,500	780 U	29 U	30 U	150 UD	33 U	150 U	170 U
2,2-oxybis(1-Chloropropane)		1000 U	38 U	38 U	190 UD	43 U	190 U	220 U
N-Nitroso-di-n-propylamine		830 U	31 U	31 U	160 UD	35 U	160 U	180 U
Hexachloroethane		890 U	33 U	34 U	170 UD	38 U	170 U	190 U
Nitrobenzene	200	950 U	35 U	36 U	180 UD	41 U	180 U	200 U
Isophorone	4,400	700 U	26 U	26 U	130 UD	30 U	130 U	150 U
bis(2-Chloroethoxy)methane		850 U	32 U	32 U	160 UD	36 U	160 U	180 U
1,2,4-Trichlorobenzene	3,400	540 U	20 U	20 U	100 UD	23 U	100 U	110 U
Naphthalene	13,000	410 U	15 U	15 U	77 UD	17 U	77 U	87 U
4-Chloroaniline	220 or MDL	6900 U	260 U	260 U	1300 UD	300 U	1300 U	1500 U
Hexachlorobutadiene		660 U	24 U	25 U	120 UD	28 U	120 U	140 U
2-Methylnaphthalene	36,400	320 U	12 U	12 U	61 UD	14 U	61 U	69 U
Hexachlorocyclopentadiene		470 U	17 U	18 U	89 UD	20 U	89 U	100 U
2-Chloronaphthalene		390 U	14 U	15 U	74 UD	17 U	74 U	83 U
2-Nitroaniline	430 or MDL	680 U	25 U	26 U	130 UD	29 U	130 U	150 U
Dimethylphthalate	2,000	450 U	17 U	17 U	85 UD	19 U	84 U	96 U
Acenaphthylene	41,000	6600 J	370 J	540 J	420 JD	24 U	110 U	1100 J
2,6-Dinitrotoluene	1,000	800 U	30 U	30 U	150 UD	34 U	150 U	170 U
3-Nitroaniline	500 or MDL	3000 U	110 U	110 U	570 UD	130 U	570 U	650 U
Acenaphthene	50,000**	410 U	15 U	16 U	78 UD	18 U	78 U	88 U
Dibenzofuran	6,200	620 U	23 U	23 U	120 UD	26 U	120 U	130 U
2,4-Dinitrotoluene		370 U	14 U	14 U	71 UD	16 U	71 U	80 U
Diethylphthalate	71,000	590 U	22 U	22 U	110 UD	25 U	110 U	130 U
4-Chlorophenyl-phenylether		460 U	17 U	18 U	88 UD	20 U	88 U	99 U
Fluorene	50,000**	530 U	20 U	20 U	100 UD	23 U	100 U	110 U
4-Nitroaniline		1500 U	54 U	56 U	280 UD	63 U	280 U	310 U
N-Nitrosodiphenylamine		480 U	18 U	18 U	90 UD	20 U	90 U	100 U
4-Bromophenyl-phenylether		490 U	18 U	19 U	93 UD	21 U	93 U	110 U
Hexachlorobenzene	410	350 U	13 U	13 U	66 UD	15 U	66 U	75 U
Phenanthrene	50,000**	22000	1200	1800	1300 JD	290 J	3100 J	6900 J
Anthracene	50,000**	5500 J	270 J	370 J	360 JD	120 J	790 J	1300 J
Carbazole		410 U	86 J	110 J	78 UD	18 U	78 U	450 J
Di-n-butylphthalate	8,100	250 U	9.2 U	9.4 U	47 UD	11 U	47 U	53 U
Fluoranthene	50,000**	88000	4600	6500 EJ	4600 D	910	8000	19000
Pyrene	50,000**	54000	2900	4000	3200 JD	910	5800	11000
Butylbenzylphthalate	50,000**	630 U	23 U	24 U	120 UD	27 U	120 U	130 U
3,3-Dichlorobenzidine		3000 U	110 U	110 U	570 UD	130 U	570 U	640 U
Benzo(a)anthracene	224 or MDL	42000	2200	3100	2500 JD	680 J	3800	8100
Chrysene	400	31000	1500	2200	2000 JD	570 J	3200 J	6000
bis(2-Ethylhexyl)phthalate	50,000**	430 U	16 U	16 U	81 UD	18 U	81 U	92 U
Di-n-octyl phthalate	50,000**	450 U	17 U	17 U	85 UD	19 U	84 U	96 U
Benzo(b)fluoranthene	1,100	49000 J	2900 J	5300 J	2900 JD	900 J	5100 J	10000
Benzo(k)fluoranthene	1,100	25000	1300	2100	1200 JD	430 J	1900 J	3600 J
Benzo(a)pyrene	61 or MDL	26000	1400	2100	1600 JD	610 J	3100 J	5200
Indeno(1,2,3-cd)pyrene	3,200	5200 J	340 J	370 J	610 JD	120 J	810 J	1400 J
Dibenz(a,h)anthracene	14 or MDL	550 U	20 U	120 J	100 UD	23 U	100 U	120 U
Benzo(g,h,i)perylene	50,000**	7700 J	450 J	540 J	610 JD	170 J	1100 J	1600 J
Total Confident Conc. SVOC		362,000	19,516	29,150	21,300	5,710	36,700	75,650
Total TICs		29,600	4,080	10,530	0	6,100	5,870	8,300

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 1. Surficial Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard
Poughkeepsie, New York

Semivolatile Organics Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	SS-18 S3753-19 07/22/04 5.0 ug/Kg	SS-19 S3754-10 07/22/04 1.0 ug/Kg	SS-20 S3754-01 07/22/04 1.0 ug/Kg	SS-21 S3754-02 07/22/04 10.0 ug/Kg	SS-22 S3754-03 07/22/04 1.0 ug/Kg	SS-23 S3754-04 07/22/04 1.0 ug/Kg	SS-24 S3754-05 07/22/04 1.0 ug/Kg
bis(2-Chloroethyl)ether		190 U	190 U	190 U	1800 U	190 U	210 U	180 U
1,2-Dichlorobenzene	7,900	210 U	210 U	210 U	2000 U	210 U	230 U	200 U
1,3-Dichlorobenzene	1,600	140 U	140 U	140 U	1400 U	140 U	150 U	140 U
1,4-Dichlorobenzene	8,500	160 U	160 U	160 U	1500 U	160 U	170 U	160 U
2,2-oxybis(1-Chloropropane)		210 U	210 U	200 U	2000 U	210 U	230 U	200 U
N-Nitroso-di-n-propylamine		170 U	170 U	170 U	1600 U	170 U	180 U	170 U
Hexachloroethane		180 U	190 U	180 U	1800 U	180 U	200 U	180 U
Nitrobenzene	200	200 U	200 U	190 U	1900 U	200 U	210 U	190 U
Isophorone	4,400	140 U	140 U	140 U	1400 U	140 U	160 U	140 U
bis(2-Chloroethoxy)methane		180 U	180 U	170 U	1700 U	180 U	190 U	170 U
1,2,4-Trichlorobenzene	3,400	110 U	110 U	110 U	1100 U	110 U	120 U	110 U
Naphthalene	13,000	84 U	85 U	82 U	810 U	84 U	91 U	82 U
4-Chloroaniline	220 or MDL	1400 U	1400 U	1400 U	14000 U	1400 U	1500 U	1400 U
Hexachlorobutadiene		130 U	140 U	130 U	1300 U	140 U	150 U	130 U
2-Methylnaphthalene	36,400	66 U	67 U	65 U	640 U	67 U	72 U	65 U
Hexachlorocyclopentadiene		96 U	98 U	95 U	930 U	97 U	100 U	94 U
2-Chloronaphthalene		80 U	81 U	79 U	770 U	81 U	87 U	78 U
2-Nitroaniline	430 or MDL	140 U	140 U	140 U	1300 U	140 U	150 U	140 U
Dimethylphthalate	2,000	92 U	93 U	90 U	880 U	92 U	100 U	90 U
Acenaphthylene	41,000	120 U	120 U	110 U	1100 U	120 U	130 U	110 U
2,6-Dinitrotoluene	1,000	160 U	170 U	160 U	1600 U	160 U	180 U	160 U
3-Nitroaniline	500 or MDL	620 U	630 U	610 U	6000 U	620 U	680 U	610 U
Acenaphthene	50,000**	85 U	86 U	83 U	820 U	85 U	92 U	83 U
Dibenzofuran	6,200	130 U	130 U	120 U	1200 U	130 U	140 U	120 U
2,4-Dinitrotoluene		77 U	78 U	75 U	740 U	77 U	83 U	75 U
Diethylphthalate	71,000	120 U	120 U	120 U	1200 U	120 U	130 U	120 U
4-Chlorophenyl-phenylether		95 U	97 U	94 U	920 U	96 U	100 U	93 U
Fluorene	50,000**	110 U	110 U	110 U	1100 U	110 U	120 U	110 U
4-Nitroaniline		300 U	310 U	300 U	2900 U	300 U	330 U	290 U
N-Nitrosodiphenylamine		98 U	99 U	96 U	940 U	98 U	110 U	95 U
4-Bromophenyl-phenylether		100 U	100 U	99 U	970 U	100 U	110 U	99 U
Hexachlorobenzene	410	72 U	73 U	71 U	690 U	72 U	78 U	70 U
Phenanthrene	50,000**	630 J	610 J	500 J	830 U	820 J	94 U	420 J
Anthracene	50,000**	92 U	93 U	90 U	880 U	92 U	100 U	90 U
Carbazole		85 U	86 U	83 U	820 U	85 U	92 U	83 U
Di-n-butylphthalate	8,100	51 U	52 U	50 U	490 U	51 U	56 U	50 U
Fluoranthene	50,000**	1500 J	1500 J	1100 J	3900 J	1300 J	660 J	630 J
Pyrene	50,000**	1300 J	1400 J	1100 J	3800 J	1300 J	700 J	670 J
Butylbenzylphthalate	50,000**	130 U	130 U	130 U	1200 U	130 U	140 U	130 U
3,3-Dichlorobenzidine		620 U	630 U	610 U	5900 U	620 U	670 U	600 U
Benzo(a)anthracene	224 or MDL	950 J	740 J	640 J	560 U	630 J	63 U	57 U
Chrysene	400	840 J	900 J	630 J	1200 U	670 J	130 U	120 U
bis(2-Ethylhexyl)phthalate	50,000**	88 U	90 U	87 U	850 U	89 U	96 U	86 U
Di-n-octyl phthalate	50,000**	92 U	93 U	90 U	880 U	92 U	100 U	90 U
Benzo(b)fluoranthene	1,100	1200 J	770 J	700 J	3800 J	670 J	220 U	200 U
Benzo(k)fluoranthene	1,100	540 J	540 J	500 J	1300 U	130 U	140 U	130 U
Benzo(a)pyrene	61 or MDL	800 J	720 J	600 J	640 U	510 J	72 U	65 U
Indeno(1,2,3-cd)pyrene	3,200	93 U	540 J	91 U	900 U	93 U	100 U	91 U
Dibenz(a,h)anthracene	14 or MDL	110 U	110 U	110 U	1100 U	110 U	120 U	110 U
Benzo(g,h,i)perylene	50,000**	170 U	510 J	160 U	1600 U	170 U	180 U	160 U
Total Confident Conc. SVOC		7,760	8,230	5,770	11,500	5,900	1,360	1,720
Total TICs		3,890	5,720	12,830	0	2,570	7,000	20,900

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 1. Surficial Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard
Poughkeepsie, New York

Semivolatile Organics Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	SS-25 S3754-06 07/22/04 1.0 ug/Kg	SS-26 S3753-20 07/22/04 1.0 ug/Kg	SS-27 S3754-07 07/22/04 10.0 ug/Kg	SS-28 S3754-08 07/22/04 10.0 ug/Kg	SS-29 S3754-09 07/22/04 2.0 ug/Kg
bis(2-Chloroethyl)ether		170 U	40 U	2100 U	1800 U	360 U
1,2-Dichlorobenzene	7,900	180 U	44 U	2300 U	2000 U	400 U
1,3-Dichlorobenzene	1,600	120 U	30 U	1500 U	1300 U	270 U
1,4-Dichlorobenzene	8,500	140 U	34 U	1700 U	1500 U	310 U
2,2-oxybis(1-Chloropropane)		180 U	44 U	2300 U	1900 U	400 U
N-Nitroso-di-n-propylamine		150 U	36 U	1800 U	1600 U	320 U
Hexachloroethane		160 U	39 U	2000 U	1700 U	350 U
Nitrobenzene	200	170 U	41 U	2100 U	1800 U	370 U
Isophorone	4,400	130 U	30 U	1500 U	1300 U	270 U
bis(2-Chloroethoxy)methane		150 U	37 U	1900 U	1600 U	340 U
1,2,4-Trichlorobenzene	3,400	97 U	23 U	1200 U	1000 U	210 U
Naphthalene	13,000	74 U	250 J	910 U	780 U	160 U
4-Chloroaniline	220 or MDL	1300 U	300 U	15000 U	13000 U	2700 U
Hexachlorobutadiene		120 U	29 U	1500 U	1300 U	260 U
2-Methylnaphthalene	36,400	58 U	310 J	720 U	620 U	130 U
Hexachlorocyclopentadiene		85 U	20 U	1000 U	900 U	180 U
2-Chloronaphthalene		71 U	17 U	870 U	750 U	150 U
2-Nitroaniline	430 or MDL	120 U	30 U	1500 U	1300 U	270 U
Dimethylphthalate	2,000	81 U	19 U	990 U	860 U	180 U
Acenaphthylene	41,000	100 U	130 J	8000 J	1100 U	220 U
2,6-Dinitrotoluene	1,000	140 U	35 U	1800 U	1500 U	310 U
3-Nitroaniline	500 or MDL	550 U	130 U	6700 U	5800 U	1200 U
Acenaphthene	50,000**	75 U	18 U	920 U	790 U	160 U
Dibenzofuran	6,200	110 U	110 J	1400 U	1200 U	240 U
2,4-Dinitrotoluene		67 U	16 U	830 U	720 U	150 U
Diethylphthalate	71,000	110 U	26 U	1300 U	1100 U	230 U
4-Chlorophenyl-phenylether		84 U	20 U	1000 U	890 U	180 U
Fluorene	50,000**	96 U	23 U	1200 U	1000 U	210 U
4-Nitroaniline		260 U	64 U	3300 U	2800 U	580 U
N-Nitrosodiphenylamine		86 U	21 U	1100 U	910 U	190 U
4-Bromophenyl-phenylether		89 U	21 U	1100 U	940 U	190 U
Hexachlorobenzene	410	63 U	15 U	780 U	670 U	140 U
Phenanthrene	50,000**	76 U	1200	92000	4200 J	160 U
Anthracene	50,000**	81 U	170 J	18000 J	860 U	180 U
Carbazole		75 U	120 J	920 U	790 U	160 U
Di-n-butylphthalate	8,100	45 U	11 U	550 U	480 U	98 U
Fluoranthene	50,000**	47 U	1900	320000	12000 J	100 U
Pyrene	50,000**	60 U	1400	260000	11000 J	130 U
Butylbenzylphthalate	50,000**	110 U	27 U	1400 U	1200 U	250 U
3,3-Dichlorobenzidine		540 U	130 U	6700 U	5800 U	1200 U
Benzo(a)anthracene	224 or MDL	51 U	660 J	150000	7300 J	110 U
Chrysene	400	110 U	790 J	130000	7400 J	230 U
bis(2-Ethylhexyl)phthalate	50,000**	78 U	19 U	960 U	820 U	170 U
Di-n-octyl phthalate	50,000**	81 U	19 U	990 U	860 U	180 U
Benzo(b)fluoranthene	1,100	180 U	1200 J	180000 J	8100 J	390 U
Benzo(k)fluoranthene	1,100	120 U	470 J	64000	6800 J	250 U
Benzo(a)pyrene	61 or MDL	58 U	460 J	100000	6800 J	130 U
Indeno(1,2,3-cd)pyrene	3,200	82 U	160 J	16000 J	870 U	180 U
Dibenz(a,h)anthracene	14 or MDL	99 U	24 U	1200 U	1100 U	220 U
Benzo(g,h,i)perylene	50,000**	150 U	200 J	25000 J	3900 J	320 U
Total Confident Conc. SVOC		0	9,530	1,363,000	67,500	0
Total TICs		0	13,530	265,000	70,000	0

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 1. Surficial Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard
Poughkeepsie, New York

PCBs and Metals Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	SS-1 S3753-01 07/22/04 1.0 ug/Kg	SS-2 S3753-02 07/22/04 1.0 ug/Kg	SS-3 S3753-03 07/22/04 1.0 ug/Kg	SS-4 S3753-04 07/22/04 1.0 ug/Kg	SS-5 S3753-05 07/22/04 1.0 ug/Kg	SS-5DL S3753-05DL 07/22/04 10.0 ug/Kg	SS-6 S3753-06 07/22/04 1.0 ug/Kg
Aroclor-1016	1,000	6.1 U	5.7 U	5.7 U	5.9 U	7.4 U	74 UD	6.4 U
Aroclor-1221	1,000	4.1 U	3.9 U	3.9 U	4.0 U	5.0 U	50 UD	4.4 U
Aroclor-1232	1,000	2.8 U	2.6 U	2.6 U	2.7 U	3.4 U	34 UD	3.0 U
Aroclor-1242	1,000	3.6 U	3.4 U	3.4 U	3.5 U	4.4 U	44 UD	3.8 U
Aroclor-1248	1,000	4.3 U	4.0 U	4.0 U	4.1 U	5.2 U	52 UD	4.5 U
Aroclor-1254	1,000	1.6 U	1.5 U	1.5 U	1.5 U	1.9 U	19 UD	1.7 U
Aroclor-1260	1,000	3.4 U	3.2 U	3.2 U	3.3 U	1200 EJ	1000 D	1700 EJ
Units **COMPOUND**		**mg/Kg**	**mg/Kg**	**mg/Kg**	**mg/Kg**	**mg/Kg**		**mg/Kg**
Arsenic	7.5 or SB/(5.89)	15.6	7.430	11.5	24.8	4.890		9.240
Barium	300 or SB/(52.5)	170	68.0	175	85.7	127		159
Cadmium	1 or SB/(1.93)	2.440	8.700	2.760	3.310	2.190		2.710
Chromium	10 or SB/(15.8)	88.7	58.2	18.2	74.3	14.6		27.0
Lead	SB/(87.9)	908 J	78.4 J	185 J	414 J	210 J		265 J
Selenium	2 or SB/(1.25)	2.500	1.400	1.030 J	3.210	2.150		1.100 J
Silver	SB/(0.117)	1.120 J	240	0.534 J	2.070	0.149 U		0.262 J
Mercury	0.1	0.40	0.13	0.11	0.18	0.34		0.39

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 1. Surficial Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard
Poughkeepsie, New York

PCBs and Metals Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	SS-6DL S3753-06DL 07/22/04 10.0 ug/Kg	SS-7 S3753-07 07/22/04 1.0 ug/Kg	SS-7DL S3753-07DL 07/22/04 10.0 ug/Kg	SS-8 S3753-08 07/22/04 1.0 ug/Kg	SS-9 S3753-09 07/22/04 1.0 ug/Kg	SS-10 S3753-10 07/22/04 1.0 ug/Kg	SS-11 S3753-11 07/22/04 1.0 ug/Kg
Aroclor-1016	1,000	64 UD	6.9 U	69 UD	6.1 U	5.9 U	6.2 U	6.2 U
Aroclor-1221	1,000	44 UD	4.7 U	47 UD	4.2 U	4.0 U	4.2 U	4.2 U
Aroclor-1232	1,000	30 UD	3.2 U	32 UD	2.8 U	2.7 U	2.9 U	2.9 U
Aroclor-1242	1,000	38 UD	4.1 U	41 UD	3.6 U	3.5 U	3.7 U	3.7 U
Aroclor-1248	1,000	45 UD	4.9 U	49 UD	4.3 U	4.1 U	4.4 U	4.3 U
Aroclor-1254	1,000	17 UD	1.8 U	18 UD	1.6 U	1.5 U	1.6 U	1.6 U
Aroclor-1260	1,000	1500 D	3600 EJ	3400 D	3.4 U	3.3 U	3.5 U	3.5 U
Units **COMPOUND**			**mg/Kg**		**mg/Kg**	**mg/Kg**	**mg/Kg**	**mg/Kg**
Arsenic	7.5 or SB/(5.89)		19.2		8.800	9.990	10.2	6.780
Barium	300 or SB/(52.5)		318		70.6	134	179	38.4
Cadmium	1 or SB/(1.93)		3.730		2.290	2.800	2.900	2.080
Chromium	10 or SB/(15.8)		146		15.4	21.3	18.9	12.6
Lead	SB/(87.9)		456 J		58.8 J	289 J	657 J	25.4 J
Selenium	2 or SB/(1.25)		2.820		1.860	1.140	1.760	1.130 J
Silver	SB/(0.117)		2.020		0.123 U	0.119 U	0.524 J	0.126 U
Mercury	0.1		1.3		0.07	0.11	0.22	0.02

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 1. Surficial Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard
Poughkeepsie, New York

PCBs and Metals Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	SS-12 S3753-12 07/22/04 1.0 ug/Kg	SS-13 S3753-13 07/22/04 1.0 ug/Kg	SS-14 S3753-14 07/22/04 1.0 ug/Kg	SS-14B S3753-15 07/22/04 1.0 ug/Kg	SS-15 S3753-16 07/22/04 1.0 ug/Kg	SS-16 S3753-17 07/22/04 1.0 ug/Kg	SS-17 S3753-18 07/22/04 1.0 ug/Kg
Aroclor-1016	1,000	5.7 U	5.9 U	5.5 U	5.6 U	6.2 U	5.5 U	6.3 U
Aroclor-1221	1,000	3.9 U	4.0 U	3.7 U	3.8 U	4.3 U	3.8 U	4.3 U
Aroclor-1232	1,000	2.7 U	2.7 U	2.5 U	2.6 U	2.9 U	2.6 U	2.9 U
Aroclor-1242	1,000	3.4 U	3.5 U	3.2 U	3.3 U	3.7 U	3.3 U	3.7 U
Aroclor-1248	1,000	4.0 U	4.2 U	3.8 U	3.9 U	4.4 U	3.9 U	4.4 U
Aroclor-1254	1,000	1.5 U	1.5 U	1.4 U	1.4 U	1.6 U	1.4 U	1.6 U
Aroclor-1260	1,000	3.2 U	3.4 U	3.1 U	3.2 U	3.5 U	3.1 U	3.6 U
Units **COMPOUND**		**mg/Kg**	**mg/Kg**	**mg/Kg**	**mg/Kg**	**mg/Kg**		
Arsenic	7.5 or SB/(5.89)	6.770	7.340	7.550	6.570	6.580	5.070	8.840
Barium	300 or SB/(52.5)	66.1	121	83.5	72.2	78.9	374	164
Cadmium	1 or SB/(1.93)	2.090	1.720	2.060	1.570	2.240	1.610	2.620
Chromium	10 or SB/(15.8)	13.2	10.9	12.8	8.790	15.3	11.3	15.2
Lead	SB/(87.9)	80.6 J	447 J	166 J	141 J	71.6 J	262 J	793 J
Selenium	2 or SB/(1.25)	1.060 J	1.470	1.350	1.170	1.740	0.777 J	1.390
Silver	SB/(0.117)	0.115 U	0.121 U	0.112 U	0.113 U	0.621 J	0.113 U	0.127 U
Mercury	0.1	0.03	0.13	0.07	0.13	0.07	0.12	0.10

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 1. Surficial Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard
Poughkeepsie, New York

PCBs and Metals Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	SS-18 S3753-19 07/22/04 1.0 ug/Kg	SS-19 S3754-10 07/22/04 1.0 ug/Kg	SS-20 S3754-01 07/22/04 1.0 ug/Kg	SS-21 S3754-02 07/22/04 1.0 ug/Kg	SS-22 S3754-03 07/22/04 1.0 ug/Kg	SS-23 S3754-04 07/22/04 1.0 ug/Kg	SS-24 S3754-05 07/22/04 1.0 ug/Kg
Aroclor-1016	1,000	6.0 U	6.2 U	6.0 U	5.8 U	6.1 U	6.5 U	5.9 U
Aroclor-1221	1,000	4.1 U	4.2 U	4.1 U	3.9 U	4.2 U	4.5 U	4.0 U
Aroclor-1232	1,000	2.8 U	2.9 U	2.8 U	2.7 U	2.8 U	3.0 U	2.7 U
Aroclor-1242	1,000	3.6 U	3.7 U	3.5 U	3.4 U	3.6 U	3.9 U	3.5 U
Aroclor-1248	1,000	4.2 U	4.3 U	4.2 U	4.1 U	4.3 U	4.6 U	4.2 U
Aroclor-1254	1,000	1.6 U	1.6 U	1.5 U	1.5 U	1.6 U	1.7 U	1.5 U
Aroclor-1260	1,000	3.4 U	140	83	67	290	3.7 U	140
Units **COMPOUND**			**mg/Kg**	**mg/Kg**	**mg/Kg**	**mg/Kg**	**mg/Kg**	**mg/Kg**
Arsenic	7.5 or SB/(5.89)	8.980	21.5	9.450	8.460	15.1	8.790	8.870
Barium	300 or SB/(52.5)	130	92.7	123	57.6	80.4	51.7	62.1
Cadmium	1 or SB/(1.93)	2.500	2.340	2.920	2.100	2.500	3.400	2.460
Chromium	10 or SB/(15.8)	17.0	123 J	90.0 J	14.4 J	24.4 J	44.9 J	16.1 J
Lead	SB/(87.9)	273 J	245 J	261 J	73.7 J	130 J	139 J	192 J
Selenium	2 or SB/(1.25)	0.930 J	1.140 J	1.300	1.510	1.720	1.940	1.580
Silver	SB/(0.117)	0.124 U	0.683 J	0.120 U	0.119 U	0.124 U	1.130 J	0.120 U
Mercury	0.1	0.08	0.57 J	0.27 J	0.11 J	0.11 J	0.10 J	0.08 J

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** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 1. Surficial Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard
Poughkeepsie, New York

PCBs and Metals Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	SS-25 S3754-06 07/22/04 1.0 ug/Kg	SS-26 S3753-20 07/22/04 1.0 ug/Kg	SS-27 S3754-07 07/22/04 1.0 ug/Kg	SS-28 S3754-08 07/22/04 1.0 ug/Kg	SS-29 S3754-09 07/22/04 1.0 ug/Kg
Aroclor-1016	1,000	5.3 U	6.4 U	6.6 U	5.6 U	5.7 U
Aroclor-1221	1,000	3.6 U	4.4 U	4.5 U	3.8 U	3.9 U
Aroclor-1232	1,000	2.5 U	3.0 U	3.0 U	2.6 U	2.6 U
Aroclor-1242	1,000	3.2 U	3.8 U	3.9 U	3.3 U	3.4 U
Aroclor-1248	1,000	3.7 U	4.5 U	4.6 U	3.9 U	4.0 U
Aroclor-1254	1,000	1.4 U	1.7 U	1.7 U	1.4 U	1.5 U
Aroclor-1260	1,000	50 PJ	3.6 U	99 PJ	86	3.2 U
Units **COMPOUND**		**mg/Kg**	**mg/Kg**	**mg/Kg**	**mg/Kg**	**mg/Kg**
Arsenic	7.5 or SB/(5.89)	5.540	22.1	20.1	9.680	5.890
Barium	300 or SB/(52.5)	15.1 J	123	101	41.6	52.5
Cadmium	1 or SB/(1.93)	0.973	2.220	3.220	2.480	1.930
Chromium	10 or SB/(15.8)	5.940 J	627	32.7 J	15.6 J	15.8 J
Lead	SB/(87.9)	22.8 J	189 J	406 J	138 J	87.9 J
Selenium	2 or SB/(1.25)	0.320 U	3.050	2.120	0.602 J	1.250
Silver	SB/(0.117)	0.107 U	1.960	0.809 J	0.114 U	0.117 U
Mercury	0.1	0.03 J	0.18	0.27 J	0.24 J	0.04 J

Qualifiers & Notes:

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J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

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D - Compound identified in analysis at a secondary dilution factor.

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NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 2. Subsurface Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard

Volatile Organics Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	TP-1S-1 S3970-01 08/02/04 1.0 ug/Kg	TP-5S-1 S3970-02 08/02/04 1.0 ug/Kg	TP-6S-1 S3970-03 08/02/04 1.0 ug/Kg	TP-8S-1 S3970-04 08/03/04 1.0 ug/Kg	TP-9S-1 S3970-05 08/03/04 1.0 ug/Kg	TP-9S-1RE S3970-05RE 08/03/04 1.0 ug/Kg	TP-16S-1 S3970-06 08/03/04 1.0 ug/Kg	TP-19S-1 S3970-07 08/04/04 1.0 ug/Kg	TP-20S-1 S3970-08 08/04/04 1.0 ug/Kg	TP-20S-1RE S3970-08RE 08/04/04 1.0 ug/Kg
Chloromethane		110 U	0.42 U	0.37 U	130 U	0.36 U	0.36 U	120 U	100 U	0.44 U	110 U
Vinyl Chloride	200	44 U	0.30 U	0.26 U	49 U	0.26 U	0.26 U	45 U	40 U	0.31 U	44 U
Bromomethane		130 U	0.90 U	0.80 U	140 U	0.77 U	0.77 U	130 U	120 U	0.94 U	130 U
Chloroethane	1,900	150 U	0.66 U	0.59 U	160 U	0.57 U	0.57 U	150 U	130 U	0.70 U	150 U
1,1-Dichloroethene	200	53 U	0.27 U	0.24 U	59 U	0.23 U	0.23 U	54 U	48 U	0.29 U	54 U
Acetone	200	540 U	34 J	8.4 U	610 U	8.1 U	8.1 U	3500 J	500 U	63	550 U
Carbon Disulfide	2,700	64 U	0.13 U	1.6 J	72 U	0.11 U	0.11 U	66 U	59 U	0.13 U	65 U
Methylene Chloride	100	100 U	4.4 J	4.5 J	110 U	2.6 J	1.8 J	110 U	94 U	0.91 U	100 U
trans-1,2-Dichloroethene	300	85 U	0.47 U	0.42 U	94 U	0.40 U	0.40 U	87 U	77 U	0.49 U	86 U
1,1-Dichloroethane	200	35 U	0.45 U	0.40 U	40 U	0.38 U	0.38 U	36 U	32 U	0.47 U	36 U
2-Butanone	300	470 U	2.9 U	2.6 U	520 U	2.5 U	2.5 U	480 U	430 U	3.0 U	470 U
Carbon Tetrachloride	600	77 U	0.38 U	0.33 U	86 U	0.32 U	0.32 U	79 U	71 U	0.40 U	78 U
cis-1,2-Dichloroethene		130 U	0.45 U	0.40 U	140 U	0.38 U	0.38 U	130 U	120 U	0.47 U	130 U
Chloroform	300	95 U	0.30 U	0.27 U	110 U	0.26 U	0.26 U	97 U	87 U	0.32 U	96 U
1,1,1-Trichloroethane	800	67 U	0.34 U	0.30 U	75 U	0.29 U	0.29 U	69 U	61 U	0.36 U	68 U
Benzene	60	40 U	0.26 U	0.23 U	44 U	0.22 U	0.22 U	2300	36 U	0.27 U	40 U
1,2-Dichloroethane	100	53 U	3.9 U	3.5 U	59 U	3.3 U	3.3 U	54 U	48 U	4.1 U	53 U
Trichloroethene	700	110 U	0.41 U	0.36 U	120 U	0.35 U	0.35 U	110 U	100 U	0.43 U	110 U
1,2-Dichloropropane		52 U	0.42 U	0.38 U	58 U	0.36 U	0.36 U	54 U	48 U	0.45 U	53 U
Bromodichloromethane		57 U	0.42 U	0.37 U	64 U	0.36 U	0.36 U	59 U	52 U	0.44 U	58 U
4-Methyl-2-Pentanone	1,000	220 U	3.0 U	2.7 U	240 U	2.6 U	2.6 U	220 U	200 U	3.2 U	220 U
Toluene	1,500	64 U	0.33 U	0.29 U	290 J	3.2 J	2.8 J	150 J	200 J	0.35 U	64 U
t-1,3-Dichloropropene		70 U	0.32 U	0.29 U	78 U	0.28 U	0.28 U	72 U	64 U	0.34 U	71 U
cis-1,3-Dichloropropene		25 U	0.25 U	0.22 U	28 U	0.21 U	0.21 U	26 U	23 U	0.26 U	25 U
1,1,2-Trichloroethane		85 U	0.64 U	0.57 U	95 U	0.55 U	0.55 U	87 U	78 U	0.67 U	86 U
2-Hexanone		110 U	4.0 U	3.6 U	120 U	3.5 U	3.5 U	110 U	99 U	4.3 U	110 U
Dibromochloromethane		62 U	0.37 U	0.33 U	69 U	0.32 U	0.32 U	64 U	57 U	0.39 U	63 U
Tetrachloroethene	1,400	54 U	0.80 U	0.71 U	61 U	0.69 U	0.69 U	56 U	50 U	9.6	55 U
Chlorobenzene	1,700	61 U	0.45 U	0.40 U	68 U	0.38 U	0.38 U	13000	55 U	0.47 U	61 U
Ethyl Benzene	5,500	67 U	0.32 U	0.28 U	530 J	0.27 U	0.27 U	69 U	420 J	0.33 U	68 U
m/p-Xylenes	1,200	560 J	0.65 U	1.1 J	4900	3.3 J	2.8 J	160 U	1200 J	0.69 U	160 U
o-Xylene	1,200	60 U	0.55 U	0.49 U	610 J	0.47 U	0.47 J	62 U	1300	0.58 U	61 U
Styrene		56 U	0.40 U	0.35 U	63 U	0.34 U	0.34 U	58 U	52 U	0.42 U	57 U
Bromoform		41 U	0.38 U	0.34 U	46 U	0.32 U	0.32 U	43 U	38 U	0.40 U	42 U
1,1,2,2-Tetrachloroethane	600	81 U	0.67 U	0.59 U	91 U	0.57 U	0.57 U	84 U	75 U	0.71 U	83 U
Total Confident Conc. VOC		560	38.4	7.2	6330	9.1	7.4	18950	3120	72.6	0
Total TICs		22400	0	385	235000	299	0	101300	99700	4140	0

Qualifiers & Notes:

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B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

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NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 2. Subsurface Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard

Volatile Organics Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	TP-23S-1 S3970-09 08/04/04 1.0 ug/Kg	TP-24S-1 S3970-10 08/04/04 1.0 ug/Kg	TP-28S-1 S4063-01 08/08/04 1.0 ug/Kg	TP-30S-1 S4063-02 08/08/04 10.0 ug/Kg	TP-34S-1 S4063-03 08/08/04 1.0 ug/Kg	TP-35S-1 S4063-04 08/08/04 1.0 ug/Kg	TP-37S-1 S4063-05 08/06/04 5.0 ug/Kg	TP-38S-1 S4063-06 08/06/04 1.0 ug/Kg	TP-39S-1 S4063-07 08/06/04 1.0 ug/Kg	TP-41S-1 S4063-08 08/06/04 1.0 ug/Kg	TP-42S-1 S4063-09 08/06/04 1.0 ug/Kg
Chloromethane		120 U	0.48 U	0.40 U	3.9 U	0.39 U	0.41 U	2.0 U	0.43 U	0.39 U	0.42 U	0.41 U
Vinyl Chloride	200	46 U	0.34 U	0.28 U	2.8 U	0.28 U	0.29 U	1.4 U	0.31 U	0.28 U	0.30 U	0.29 U
Bromomethane		130 U	1.0 U	0.85 U	8.4 U	0.83 U	0.87 U	4.3 U	0.92 U	0.83 U	0.91 U	0.87 U
Chloroethane	1,900	150 U	0.76 U	0.63 U	6.2 U	0.62 U	0.65 U	3.2 U	0.68 U	0.62 U	0.67 U	0.65 U
1,1-Dichloroethene	200	55 U	0.31 U	0.26 U	2.6 U	0.25 U	0.27 U	1.3 U	0.28 U	0.25 U	0.28 U	0.27 U
Acetone	200	570 U	100	9.0 U	270 J	8.8 U	9.2 U	250 J	61 J	8.8 U	9.6 U	9.2 U
Carbon Disulfide	2,700	67 U	5.2 J	0.12 U	1.2 U	0.12 U	0.12 U	56	0.13 U	0.12 U	0.13 U	0.12 U
Methylene Chloride	100	110 U	4.3 J	0.82 U	8.1 U	0.80 U	0.84 U	4.1 U	0.88 U	0.80 U	0.87 U	0.84 U
trans-1,2-Dichloroethene	300	88 U	0.54 U	0.45 U	4.4 U	0.44 U	0.46 U	2.3 U	0.48 U	0.44 U	0.48 U	0.46 U
1,1-Dichloroethane	200	37 U	0.51 U	0.43 U	4.2 U	0.42 U	0.44 U	2.2 U	0.46 U	0.42 U	0.45 U	0.44 U
2-Butanone	300	480 U	16 J	2.7 U	27 U	2.7 U	2.8 U	14 U	3.0 U	2.7 U	2.9 U	2.8 U
Carbon Tetrachloride	600	80 U	0.43 U	0.36 U	3.5 U	0.35 U	0.37 U	1.8 U	0.39 U	0.35 U	0.38 U	0.37 U
cis-1,2-Dichloroethene		130 U	0.51 U	0.42 U	4.2 U	0.41 U	0.43 U	2.1 U	0.46 U	0.41 U	0.45 U	0.43 U
Chloroform	300	98 U	0.34 U	0.29 U	2.8 U	0.28 U	0.29 U	1.4 U	0.31 U	0.28 U	0.30 U	0.29 U
1,1,1-Trichloroethane	800	70 U	0.39 U	0.33 U	3.2 U	0.32 U	0.33 U	1.7 U	0.35 U	0.32 U	0.35 U	0.33 U
Benzene	60	41 U	0.29 U	0.24 U	43 J	0.24 U	0.25 U	1.2 U	0.26 U	0.24 U	0.26 U	0.25 U
1,2-Dichloroethane	100	55 U	4.5 U	3.7 U	37 U	3.6 U	3.8 U	19 U	4.0 U	3.6 U	3.9 U	3.8 U
Trichloroethene	700	110 U	0.46 U	0.39 U	3.8 U	0.38 U	0.40 U	2.0 U	0.42 U	0.38 U	0.41 U	0.40 U
1,2-Dichloropropane		54 U	0.49 U	0.40 U	4.0 U	0.39 U	0.41 U	2.0 U	0.44 U	0.39 U	0.43 U	0.41 U
Bromodichloromethane		60 U	0.48 U	0.40 U	4.0 U	0.39 U	0.41 U	2.0 U	0.43 U	0.39 U	0.43 U	0.41 U
4-Methyl-2-Pentanone	1,000	230 U	3.5 U	2.9 U	29 U	2.8 U	3.0 U	15 U	3.1 U	2.8 U	3.1 U	3.0 U
Toluene	1,500	66 U	0.38 U	0.31 U	320	0.30 U	0.32 U	1.6 U	0.34 U	0.30 U	0.33 U	0.32 U
t-1,3-Dichloropropene		73 U	0.37 U	0.31 U	3.0 U	0.30 U	0.32 U	1.6 U	0.33 U	0.30 U	0.33 U	0.32 U
cis-1,3-Dichloropropene		26 U	0.28 U	0.23 U	2.3 U	0.23 U	0.24 U	1.2 U	0.25 U	0.23 U	0.25 U	0.24 U
1,1,2-Trichloroethane		89 U	0.73 U	0.61 U	6.0 U	0.60 U	0.62 U	3.1 U	0.66 U	0.60 U	0.65 U	0.62 U
2-Hexanone		110 U	4.6 U	3.9 U	38 U	3.8 U	3.9 U	19 U	4.2 U	3.8 U	4.1 U	3.9 U
Dibromochloromethane		65 U	0.42 U	0.35 U	3.5 U	0.34 U	0.36 U	1.8 U	0.38 U	0.34 U	0.37 U	0.36 U
Tetrachloroethene	1,400	57 U	0.92 U	0.77 U	110	0.75 U	9.3	3.9 U	11	0.75 U	5.0 J	4.1 J
Chlorobenzene	1,700	63 U	0.51 U	0.42 U	4.2 U	0.41 U	0.43 U	2.1 U	0.46 U	0.41 U	0.45 U	0.43 U
Ethyl Benzene	5,500	70 U	0.36 U	0.30 U	350	0.29 U	0.31 U	1.5 U	0.32 U	0.29 U	0.32 U	3.5 J
m/p-Xylenes	1,200	170 U	0.74 U	0.62 U	970	0.60 U	0.63 U	3.1 U	0.67 U	0.60 U	0.66 U	3.1 J
o-Xylene	1,200	63 U	0.63 U	0.52 U	1100	0.51 U	0.53 U	2.6 U	0.56 U	0.51 U	0.55 U	2.6 J
Styrene		59 U	0.45 U	0.38 U	3.7 U	0.37 U	0.39 U	1.9 U	0.41 U	0.37 U	0.40 U	0.39 U
Bromoform		43 U	0.43 U	0.36 U	3.6 U	0.35 U	0.37 U	1.8 U	0.39 U	0.35 U	0.38 U	0.37 U
1,1,2,2-Tetrachloroethane	600	85 U	0.77 U	0.64 U	6.3 U	0.62 U	0.65 U	3.2 U	0.69 U	0.62 U	0.68 U	0.65 U
Total Confident Conc. VOC		0	125.5	0	3163	0	9.3	306	72	0	5	13.3
Total TICs		103700	0	0	22400	3551	2460	13520	2000	1980	7320	225

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 2. Subsurface Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard

Volatile Organics Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	AT-7S-1 S3897-01 07/29/04 1.0 ug/Kg	B-7(14-16) S4313-01 08/18/04 10.0 ug/Kg	B-7(14-16)RE S4313-01RE 08/18/04 10.0 ug/Kg	TRIPBLANK S4063-10 08/08/04 1.0 ug/L
Chloromethane		0.38 U	3.9 U	3.9 U	0.68 U
Vinyl Chloride	200	0.27 U	2.8 U	2.8 U	0.27 U
Bromomethane		0.82 U	8.4 U	8.4 U	0.78 U
Chloroethane	1,900	0.61 U	6.2 U	6.2 U	0.88 U
1,1-Dichloroethene	200	0.25 U	2.6 U	2.6 U	0.32 U
Acetone	200	8.7 U	420	360	3.3 U
Carbon Disulfide	2,700	0.12 U	1.2 U	1.2 U	0.39 U
Methylene Chloride	100	0.79 U	67	48 J	0.62 U
trans-1,2-Dichloroethene	300	0.43 U	4.4 U	4.4 U	0.51 U
1,1-Dichloroethane	200	0.41 U	4.2 U	4.2 U	0.22 U
2-Butanone	300	2.6 U	27 U	27 U	2.8 U
Carbon Tetrachloride	600	0.35 U	3.5 U	3.5 U	0.47 U
cis-1,2-Dichloroethene		0.41 U	4.2 U	4.2 U	0.77 U
Chloroform	300	0.28 U	2.8 U	2.8 U	0.58 U
1,1,1-Trichloroethane	800	0.32 U	3.2 U	3.2 U	0.41 U
Benzene	60	0.23 U	2.4 U	2.4 U	0.24 U
1,2-Dichloroethane	100	3.6 U	37 U	37 U	0.32 U
Trichloroethene	700	0.37 U	3.8 U	3.8 U	0.67 U
1,2-Dichloropropane		0.39 U	4.0 U	4.0 U	0.63 U
Bromodichloromethane		0.39 U	4.0 U	4.0 U	0.35 U
4-Methyl-2-Pentanone	1,000	2.8 U	29 U	29 U	1.3 U
Toluene	1,500	0.30 U	3.1 U	3.1 U	0.39 U
t-1,3-Dichloropropene		0.30 U	3.0 U	3.0 U	0.42 U
cis-1,3-Dichloropropene		0.23 U	2.3 U	2.3 U	0.15 U
1,1,2-Trichloroethane		0.59 U	6.0 U	6.0 U	0.52 U
2-Hexanone		3.7 U	38 U	38 U	0.66 U
Dibromochloromethane		0.34 U	3.5 U	3.5 U	0.38 U
Tetrachloroethene	1,400	0.74 U	7.6 U	7.6 U	0.33 U
Chlorobenzene	1,700	0.41 U	4.2 U	4.2 U	0.37 U
Ethyl Benzene	5,500	0.29 U	3.0 U	3.0 U	0.41 U
m/p-Xylenes	1,200	0.60 U	55 J	26 J	0.96 U
o-Xylene	1,200	0.50 U	5.1 U	5.1 U	0.37 U
Styrene		0.36 U	3.7 U	3.7 U	0.34 U
Bromoform		0.35 U	3.6 U	3.6 U	0.25 U
1,1,2,2-Tetrachloroethane	600	0.62 U	6.3 U	6.3 U	0.50 U
Total Confident Conc. VOC		0	542	434	0
Total TICs		18	16860	0	

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 2. Subsurface Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard

Semivolatile Organics Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	TP-1S-1 S3970-01 08/02/04 1.0 ug/Kg	TP-1S-1RE S3970-01RE 08/02/04 1.0 ug/Kg	TP-5S-1 S3970-02 08/02/04 1.0 ug/Kg	TP-6S-1 S3970-03 08/02/04 1.0 ug/Kg	TP-6S-1DL S3970-03DL 08/02/04 5.0 ug/Kg	TP-8S-1 S3970-04 08/03/04 1.0 ug/Kg	TP-8S-1RE S3970-04RE 08/03/04 1.0 ug/Kg	TP-9S-1 S3970-05 08/03/04 1.0 ug/Kg	TP-9S-1RE S3970-05RE 08/03/04 1.0 ug/Kg	TP-16S-1 S3970-06 08/03/04 1.0 ug/Kg
bis(2-Chloroethyl)ether		21 U	21 U	20 U	36 U	180 UD	48 U	48 U	180 U	180 U	220 U
1,2-Dichlorobenzene	7,900	23 U	23 U	22 U	40 U	200 UD	53 U	53 U	190 U	190 U	240 U
1,3-Dichlorobenzene	1,600	16 U	16 U	15 U	27 U	140 UD	36 U	36 U	130 U	130 U	160 U
1,4-Dichlorobenzene	8,500	18 U	18 U	17 U	31 U	150 UD	40 U	40 U	150 U	150 U	180 U
2,2-oxybis(1-Chloropropane)		23 U	23 U	22 U	40 U	200 UD	53 U	53 U	190 U	190 U	240 U
N-Nitroso-di-n-propylamine		19 U	19 U	18 U	32 U	160 UD	43 U	43 U	160 U	160 U	200 U
Hexachloroethane		21 U	21 U	20 U	35 U	180 UD	46 U	46 U	170 U	170 U	210 U
Nitrobenzene	200	22 U	22 U	21 U	37 U	190 UD	49 U	49 U	180 U	180 U	220 U
Isophorone	4,400	16 U	16 U	15 U	27 U	140 UD	36 U	36 U	130 U	130 U	160 U
bis(2-Chloroethoxy)methane		20 U	20 U	19 U	33 U	170 UD	44 U	44 U	160 U	160 U	200 U
1,2,4-Trichlorobenzene	3,400	12 U	12 U	12 U	21 U	110 UD	28 U	28 U	100 U	100 U	130 U
Naphthalene	13,000	9.4 U	9.4 U	91 J	16 U	80 UD	320 J	340 J	78 U	78 U	96 U
4-Chloroaniline	220 or MDL	160 U	160 U	150 U	270 U	1400 UD	360 U	360 U	1300 U	1300 U	1600 U
Hexachlorobutadiene		15 U	15 U	14 U	26 U	130 UD	34 U	34 U	130 U	130 U	160 U
2-Methylnaphthalene	36,400	57 J	54 J	7.1 U	13 U	63 UD	130 J	130 J	62 U	62 U	76 U
Hexachlorocyclopentadiene		11 U	11 U	10 U	18 U	92 UD	24 U	24 U	90 U	90 U	110 U
2-Chloronaphthalene		9.0 U	9.0 U	8.6 U	15 U	76 UD	20 U	20 U	75 U	75 U	92 U
2-Nitroaniline	430 or MDL	16 U	16 U	15 U	27 U	130 UD	35 U	35 U	130 U	130 U	160 U
Dimethylphthalate	2,000	10 U	10 U	9.9 U	18 U	88 UD	23 U	23 U	85 U	85 U	110 U
Acenaphthylene	41,000	13 U	13 U	12 U	850	640 JD	300 J	350 J	110 U	110 U	130 U
2,6-Dinitrotoluene	1,000	18 U	18 U	18 U	31 U	160 UD	41 U	41 U	150 U	150 U	190 U
3-Nitroaniline	500 or MDL	70 U	70 U	67 U	120 U	590 UD	160 U	160 U	580 U	580 U	710 U
Acenaphthene	50,000**	9.5 U	9.5 U	9.1 U	16 U	81 UD	780 J	760 J	79 U	79 U	98 U
Dibenzofuran	6,200	14 U	14 U	59 J	24 U	120 UD	150 J	160 J	120 U	120 U	150 U
2,4-Dinitrotoluene		8.6 U	8.6 U	8.2 U	15 U	73 UD	19 U	19 U	71 U	71 U	88 U
Diethylphthalate	71,000	14 U	14 U	13 U	23 U	120 UD	31 U	31 U	110 U	110 U	140 U
4-Chlorophenyl-phenylether		11 U	11 U	10 U	18 U	91 UD	24 U	24 U	89 U	89 U	110 U
Fluorene	50,000**	49 J	48 J	68 J	190 J	100 UD	910 J	830 J	100 U	100 U	130 U
4-Nitroaniline		34 U	34 U	32 U	57 U	290 UD	76 U	76 U	280 U	280 U	350 U
N-Nitrosodiphenylamine		11 U	11 U	10 U	19 U	93 UD	25 U	25 U	91 U	91 U	110 U
4-Bromophenyl-phenylether		11 U	11 U	11 U	19 U	96 UD	26 U	26 U	94 U	94 U	120 U
Hexachlorobenzene	410	8.1 U	8.1 U	7.7 U	14 U	69 UD	18 U	18 U	67 U	67 U	83 U
Phenanthrene	50,000**	240 J	230 J	1400	3300	2100 JD	4200 J	4300 J	80 U	80 U	1000 J
Anthracene	50,000**	62 J	69 J	100 J	710 J	570 JD	670 J	920 J	85 U	85 U	450 J
Carbazole		9.5 U	9.5 U	100 J	16 U	81 UD	420 J	460 J	79 U	79 U	98 U
Di-n-butylphthalate	8,100	5.7 U	5.7 U	5.5 U	9.8 U	49 UD	13 U	13 U	48 U	48 U	59 U
Fluoranthene	50,000**	250 J	250 J	2100	12000 EJ	4500 D	4400 J	6100 J	50 U	50 U	2100 J
Pyrene	50,000**	290 J	320 J	2400	7700 EJ	5200 D	6300	5600	64 U	360 J	2400 J
Butylbenzylphthalate	50,000**	14 U	14 U	14 U	25 U	120 UD	33 U	33 U	120 U	120 U	150 U
3,3-Dichlorobenzidine		69 U	69 U	66 U	120 U	590 UD	160 U	160 U	570 U	570 U	710 U
Benzo(a)anthracene	224 or MDL	130 J	130 J	630	3800	3100 JD	1400	1400	54 U	54 U	1800 J
Chrysene	400	150 J	160 J	1100	4000	3300 JD	2600	2700	110 U	110 U	2400 J
bis(2-Ethylhexyl)phthalate	50,000**	9.9 U	9.9 U	9.5 U	17 U	84 UD	22 U	22 U	82 U	82 U	100 U
Di-n-octyl phthalate	50,000**	10 U	10 U	9.9 U	18 U	88 UD	23 U	23 U	85 U	85 U	110 U
Benzo(b)fluoranthene	1,100	85 J	77 J	720	3700	2300 JD	1800	1400	190 U	190 U	2200 J
Benzo(k)fluoranthene	1,100	55 J	65 J	290 J	1400	990 JD	1700	1500	120 U	120 U	1000 J
Benzo(a)pyrene	61 or MDL	96 J	98 J	530	2500	1900 JD	1400	1400	62 U	62 U	1700 J
Indeno(1,2,3-cd)pyrene	3,200	73 J	50 J	460	530 J	1100 JD	23 U	130 J	87 U	87 U	1000 J
Dibenz(a,h)anthracene	14 or MDL	13 U	13 U	12 U	95 J	110 UD	28 U	28 U	100 U	100 U	130 U
Benzo(g,h,i)perylene	50,000**	48 J	19 U	340 J	500 J	760 JD	42 U	120 J	160 U	160 U	810 J
Total Confident Conc. SVOC		1585	1551	10388	21575	26460	27480	28600	0	360	16860
Total TICs		2670	0	2770	12300	0	69100	0	39100	0	100000

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 2. Subsurface Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard

Semivolatile Organics Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	TP-19S-1 S3970-07 08/04/04 10.0 ug/Kg	TP-19S-1RE S3970-07RE 08/04/04 10.0 ug/Kg	TP-20S-1 S3970-08 08/04/04 1.0 ug/Kg	TP-23S-1 S3970-09 08/04/04 1.0 ug/Kg	TP-23S-1RE S3970-09RE 08/04/04 1.0 ug/Kg	TP-24S-1 S3970-10 08/04/04 1.0 ug/Kg	TP-24S-1RE S3970-10RE 08/04/04 1.0 ug/Kg	TP-28S-1 S4063-01 08/08/04 1.0 ug/Kg	TP-30S-1 S4063-02 08/08/04 5.0 ug/Kg	TP-34S-1 S4063-03 08/08/04 1.0 ug/Kg	TP-35S-1 S4063-04 08/08/04 1.0 ug/Kg
bis(2-Chloroethyl)ether		1900 U	1900 U	43 U	44 U	44 U	23 U	23 U	39 U	960 U	38 U	20 U
1,2-Dichlorobenzene	7,900	2100 U	2100 U	48 U	49 U	49 U	26 U	26 U	43 U	1100 U	42 U	22 U
1,3-Dichlorobenzene	1,600	1500 U	1500 U	32 U	33 U	33 U	17 U	17 U	29 U	720 U	29 U	15 U
1,4-Dichlorobenzene	8,500	1600 U	1600 U	36 U	38 U	38 U	20 U	20 U	33 U	810 U	32 U	17 U
2,2-oxybis(1-Chloropropane)		2100 U	2100 U	47 U	49 U	49 U	26 U	26 U	43 U	1100 U	42 U	22 U
N-Nitroso-di-n-propylamine		1700 U	1700 U	39 U	40 U	40 U	21 U	21 U	35 U	860 U	34 U	18 U
Hexachloroethane		1900 U	1900 U	42 U	43 U	43 U	23 U	23 U	38 U	930 U	37 U	19 U
Nitrobenzene	200	2000 U	2000 U	44 U	46 U	46 U	24 U	24 U	40 U	990 U	39 U	21 U
Isophorone	4,400	1500 U	1500 U	32 U	34 U	34 U	18 U	18 U	29 U	720 U	29 U	15 U
bis(2-Chloroethoxy)methane		1800 U	1800 U	40 U	41 U	41 U	22 U	22 U	36 U	890 U	35 U	18 U
1,2,4-Trichlorobenzene	3,400	1100 U	1100 U	25 U	26 U	26 U	14 U	14 U	23 U	560 U	22 U	12 U
Naphthalene	13,000	860 U	860 U	19 U	20 U	20 U	10 U	10 U	150 J	420 U	240 J	8.8 U
4-Chloroaniline	220 or MDL	15000 U	15000 U	320 U	330 U	330 U	180 U	180 U	290 U	7200 U	290 U	150 U
Hexachlorobutadiene		1400 U	1400 U	31 U	32 U	32 U	17 U	17 U	28 U	680 U	27 U	14 U
2-Methylnaphthalene	36,400	680 U	680 U	15 U	16 U	16 U	8.2 U	8.2 U	14 U	7500 J	110 J	7.0 U
Hexachlorocyclopentadiene		990 U	990 U	22 U	23 U	23 U	12 U	12 U	20 U	490 U	19 U	10 U
2-Chloronaphthalene		820 U	820 U	18 U	19 U	19 U	9.9 U	9.9 U	16 U	410 U	16 U	8.4 U
2-Nitroaniline	430 or MDL	1400 U	1400 U	32 U	33 U	33 U	17 U	17 U	29 U	710 U	28 U	15 U
Dimethylphthalate	2,000	940 U	940 U	21 U	22 U	22 U	11 U	11 U	19 U	460 U	19 U	9.7 U
Acenaphthylene	41,000	1200 U	1200 U	26 U	27 U	27 U	14 U	14 U	280 J	580 U	210 J	12 U
2,6-Dinitrotoluene	1,000	1700 U	1700 U	37 U	38 U	38 U	20 U	20 U	34 U	830 U	33 U	17 U
3-Nitroaniline	500 or MDL	6400 U	6400 U	140 U	150 U	150 U	77 U	77 U	130 U	3100 U	130 U	65 U
Acenaphthene	50,000**	870 U	870 U	19 U	20 U	20 U	10 U	10 U	170 J	430 U	140 J	8.9 U
Dibenzofuran	6,200	1300 U	1300 U	29 U	30 U	30 U	16 U	16 U	140 J	640 U	26 U	13 U
2,4-Dinitrotoluene		790 U	790 U	17 U	18 U	18 U	9.5 U	9.5 U	16 U	390 U	15 U	8.1 U
Diethylphthalate	71,000	1200 U	1200 U	27 U	28 U	28 U	15 U	15 U	25 U	610 U	24 U	13 U
4-Chlorophenyl-phenylether		980 U	980 U	22 U	22 U	22 U	12 U	12 U	20 U	480 U	19 U	10 U
Fluorene	50,000**	1100 U	1100 U	25 U	26 U	26 U	13 U	13 U	160 J	550 U	260 J	11 U
4-Nitroaniline		3100 U	3100 U	68 U	71 U	71 U	37 U	37 U	62 U	1500 U	61 U	32 U
N-Nitrosodiphenylamine		1000 U	1000 U	22 U	23 U	23 U	12 U	12 U	20 U	490 U	20 U	10 U
4-Bromophenyl-phenylether		1000 U	1000 U	23 U	24 U	24 U	12 U	12 U	21 U	510 U	20 U	11 U
Hexachlorobenzene	410	740 U	740 U	16 U	17 U	17 U	8.9 U	8.9 U	15 U	360 U	15 U	7.6 U
Phenanthrene	50,000**	880 U	880 U	450 J	340 J	320 J	11 U	11 U	2700	5100 J	740 J	9.1 U
Anthracene	50,000**	940 U	940 U	95 J	22 U	91 J	11 U	11 U	590 J	460 U	290 J	9.7 U
Carbazole		870 U	870 U	19 U	20 U	20 U	10 U	10 U	410 J	430 U	17 U	8.9 U
Di-n-butylphthalate	8,100	520 U	520 U	12 U	12 U	12 U	6.3 U	6.3 U	10 U	260 U	10 U	5.4 U
Fluoranthene	50,000**	550 U	550 U	510 J	510 J	530 J	6.6 U	6.6 U	4900	270 U	2900	5.6 U
Pyrene	50,000**	700 U	700 U	650 J	630 J	650 J	8.5 U	8.5 U	4900	350 U	3100	61 J
Butylbenzylphthalate	50,000**	1300 U	1300 U	29 U	30 U	30 U	16 U	16 U	26 U	650 U	26 U	14 U
3,3-Dichlorobenzidine		6300 U	6300 U	140 U	140 U	140 U	76 U	76 U	130 U	3100 U	120 U	65 U
Benzo(a)anthracene	224 or MDL	590 U	590 U	290 J	330 J	320 J	7.2 U	7.2 U	3100	2500 J	1100	6.1 U
Chrysene	400	1200 U	1200 U	360 J	430 J	410 J	15 U	15 U	2600	3800 J	1100	13 U
bis(2-Ethylhexyl)phthalate	50,000**	900 U	900 U	20 U	21 U	21 U	11 U	11 U	140 J	450 U	130 J	76 J
Di-n-octyl phthalate	50,000**	940 U	940 U	21 U	22 U	22 U	11 U	11 U	19 U	460 U	19 U	9.7 U
Benzo(b)fluoranthene	1,100	2100 U	2100 U	260 J	450 J	480 J	25 U	25 U	2600	1000 U	1000	22 U
Benzo(k)fluoranthene	1,100	1300 U	1300 U	110 J	210 J	210 J	16 U	16 U	1300	670 U	370 J	14 U
Benzo(a)pyrene	61 or MDL	680 U	680 U	220 J	330 J	350 J	8.2 U	8.2 U	2100	340 U	580 J	7.0 U
Indeno(1,2,3-cd)pyrene	3,200	950 U	950 U	21 U	120 J	22 U	11 U	11 U	1200	470 U	310 J	9.8 U
Dibenz(a,h)anthracene	14 or MDL	1200 U	1200 U	26 U	26 U	26 U	14 U	14 U	180 J	570 U	23 U	12 U
Benzo(g,h,i)perylene	50,000**	1700 U	1700 U	38 U	110 J	100 J	21 U	21 U	1100	850 U	280 J	18 U
Total Confident Conc. SVOC		0	0	2945	3460	3461	0	0	28720	18900	12860	137
Total TICs		7900	0	4900	39400	0	590	0	7580	260000	7590	9130

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 2. Subsurface Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard

Semivolatile Organics Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	TP-37S-1 S4063-05 08/06/04 1.0 ug/Kg	TP-38S-1 S4063-06 08/06/04 1.0 ug/Kg	TP-39S-1 S4063-07 08/06/04 1.0 ug/Kg	TP-41S-1 S4063-08 08/06/04 1.0 ug/Kg	TP-42S-1 S4063-09 08/06/04 1.0 ug/Kg	AT-7S-1 S3897-01 07/29/04 1.0 ug/Kg	B-7(14-16) S4313-01 08/18/04 2.0 ug/Kg	B-7(14-16)DL S4313-01RE 08/18/04 10.0 ug/Kg
bis(2-Chloroethyl)ether		20 U	42 U	19 U	21 U	40 U	190 U	77 U	390 UD
1,2-Dichlorobenzene	7,900	22 U	46 U	21 U	23 U	44 U	210 U	85 U	430 UD
1,3-Dichlorobenzene	1,600	15 U	31 U	14 U	16 U	30 U	140 U	58 U	290 UD
1,4-Dichlorobenzene	8,500	17 U	35 U	16 U	18 U	34 U	160 U	65 U	330 UD
2,2-oxybis(1-Chloropropane)		22 U	46 U	21 U	23 U	44 U	210 U	85 U	420 UD
N-Nitroso-di-n-propylamine		18 U	37 U	17 U	19 U	36 U	170 U	69 U	340 UD
Hexachloroethane		19 U	40 U	18 U	20 U	39 U	180 U	75 U	370 UD
Nitrobenzene	200	20 U	43 U	19 U	22 U	41 U	190 U	79 U	400 UD
Isophorone	4,400	15 U	32 U	14 U	16 U	30 U	140 U	58 U	290 UD
bis(2-Chloroethoxy)methane		18 U	39 U	17 U	19 U	37 U	180 U	71 U	360 UD
1,2,4-Trichlorobenzene	3,400	12 U	24 U	11 U	12 U	23 U	110 U	45 U	220 UD
Naphthalene	13,000	8.7 U	110 J	8.3 U	9.2 U	18 U	84 U	490 J	170 UD
4-Chloroaniline	220 or MDL	150 U	310 U	140 U	160 U	300 U	1400 U	580 U	2900 UD
Hexachlorobutadiene		14 U	30 U	13 U	15 U	28 U	130 U	55 U	270 UD
2-Methylnaphthalene	36,400	6.9 U	190 J	6.6 U	7.3 U	14 U	66 U	300 J	130 UD
Hexachlorocyclopentadiene		10 U	21 U	9.6 U	11 U	20 U	96 U	39 U	200 UD
2-Chloronaphthalene		8.4 U	18 U	8.0 U	8.8 U	17 U	80 U	33 U	160 UD
2-Nitroaniline	430 or MDL	15 U	31 U	14 U	15 U	29 U	140 U	57 U	280 UD
Dimethylphthalate	2,000	9.6 U	20 U	9.1 U	10 U	19 U	92 U	37 U	190 UD
Acenaphthylene	41,000	12 U	25 U	11 U	13 U	24 U	110 U	47 U	230 UD
2,6-Dinitrotoluene	1,000	17 U	36 U	16 U	18 U	34 U	160 U	67 U	330 UD
3-Nitroaniline	500 or MDL	65 U	140 U	62 U	68 U	130 U	620 U	250 U	1300 UD
Acenaphthene	50,000**	8.8 U	19 U	8.4 U	9.3 U	18 U	85 U	1400 J	1500 JD
Dibenzofuran	6,200	13 U	28 U	13 U	14 U	27 U	130 U	51 U	260 UD
2,4-Dinitrotoluene		8.0 U	17 U	7.6 U	8.5 U	16 U	77 U	31 U	160 UD
Diethylphthalate	71,000	13 U	27 U	12 U	13 U	25 U	120 U	49 U	250 UD
4-Chlorophenyl-phenylether		9.9 U	21 U	9.5 U	10 U	20 U	95 U	39 U	190 UD
Fluorene	50,000**	11 U	24 U	11 U	12 U	23 U	110 U	1600	1800 JD
4-Nitroaniline		31 U	66 U	30 U	33 U	63 U	300 U	120 U	610 UD
N-Nitrosodiphenylamine		10 U	22 U	9.7 U	11 U	21 U	97 U	40 U	200 UD
4-Bromophenyl-phenylether		11 U	22 U	10 U	11 U	21 U	100 U	41 U	210 UD
Hexachlorobenzene	410	7.5 U	16 U	7.2 U	7.9 U	15 U	72 U	29 U	150 UD
Phenanthrene	50,000**	9.0 U	180 J	8.6 U	9.5 U	410 J	86 U	8900	10000 D
Anthracene	50,000**	9.6 U	20 U	9.1 U	10 U	120 J	92 U	3200	3300 JD
Carbazole		8.8 U	19 U	8.4 U	9.3 U	18 U	85 U	550 J	170 UD
Di-n-butylphthalate	8,100	5.3 U	11 U	5.1 U	5.6 U	11 U	51 U	21 U	100 UD
Fluoranthene	50,000**	5.6 U	12 U	5.3 U	5.9 U	500 J	420 J	11000	18000 D
Pyrene	50,000**	7.1 U	15 U	6.8 U	7.6 U	500 J	670 J	16000 E	18000 D
Butylbenzylphthalate	50,000**	13 U	28 U	13 U	14 U	27 U	130 U	52 U	260 UD
3,3-Dichlorobenzidine		64 U	140 U	61 U	68 U	130 U	620 U	260 J	1300 UD
Benzo(a)anthracene	224 or MDL	6.1 U	13 U	5.8 U	6.4 U	240 J	58 U	11000	14000 D
Chrysene	400	13 U	120 J	12 U	13 U	270 J	120 U	11000	13000 D
bis(2-Ethylhexyl)phthalate	50,000**	44 J	19 U	52 J	74 J	19 U	88 U	280 J	180 UD
Di-n-octyl phthalate	50,000**	9.6 U	20 U	9.1 U	10 U	19 U	92 U	37 U	190 UD
Benzo(b)fluoranthene	1,100	21 U	45 U	20 U	23 U	200 J	200 U	19000 E	18000 D
Benzo(k)fluoranthene	1,100	14 U	29 U	13 U	14 U	100 J	130 U	7100	7500 JD
Benzo(a)pyrene	61 or MDL	6.9 U	15 U	6.6 U	7.3 U	170 J	66 U	12000	12000 D
Indeno(1,2,3-cd)pyrene	3,200	9.7 U	20 U	9.3 U	10 U	90 J	93 U	1800	2200 JD
Dibenz(a,h)anthracene	14 or MDL	12 U	25 U	11 U	12 U	24 U	110 U	420 J	230 UD
Benzo(g,h,i)perylene	50,000**	17 U	37 U	17 U	18 U	35 U	170 U	3200	3300 JD
Total Confident Conc. SVOC		44	600	52	74	2600	1090	109500	122600
Total TICs		6660	16200	4970	4450	2050	5410	53600	0

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 2. Subsurface Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard

PCBs and Metals Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	TP-1S-1 S3970-01 08/02/04 1.0 ug/Kg	TP-5S-1 S3970-02 08/02/04 1.0 ug/Kg	TP-6S-1 S3970-03 08/02/04 1.0 ug/Kg	TP-8S-1 S3970-04 08/03/04 1.0 ug/Kg	TP-8S-1DL S3970-04DL 08/03/04 100.0 ug/Kg	TP-9S-1 S3970-05 08/03/04 1.0 ug/Kg	TP-9S-1DL S3970-05DL 08/03/04 10.0 ug/Kg	TP-16S-1 S3970-06 08/03/04 1.0 ug/Kg	TP-16S-1DL S3970-06DL 08/03/04 100.0 ug/Kg	TP-19S-1 S3970-07 08/04/04 1.0 ug/Kg
Aroclor-1016	10,000	6.8 U	6.5 U	5.8 U	7.6 U	760 UD	5.6 U	56 UD	7.0 U	700 UD	6.2 UJ
Aroclor-1221	10,000	4.6 U	4.4 U	3.9 U	5.2 U	520 UD	3.8 U	38 UD	4.7 U	470 UD	4.2 UJ
Aroclor-1232	10,000	3.1 U	3.0 U	2.7 U	3.5 U	350 UD	2.6 U	26 UD	3.2 U	320 UD	2.8 UJ
Aroclor-1242	10,000	4.0 U	3.9 U	3.4 U	4.5 U	450 UD	3.3 U	33 UD	4.1 U	410 UD	3.7 UJ
Aroclor-1248	10,000	4.8 U	4.6 U	4.1 U	5.4 U	540 UD	3.9 U	39 UD	4.9 U	490 UD	4.3 UJ
Aroclor-1254	10,000	1.8 U	1.7 U	1.5 U	11000 EPJ	6000 DPJ	1000 EJ	390 DPJ	5700 EPJ	2400 DPJ	1.6 UJ
Aroclor-1260	10,000	3.8 U	3.7 U	60	4.3 U	430 UD	3.2 U	32 UD	3.9 U	390 UD	3.5 UJ
Units COMPOUND		mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Mercury	0.1	0.17 J	0.36 J	0.23 J	0.09 J	NA	0.01 J	NA	0.06 J	NA	0.22 J
Arsenic	7.5 or SB/(5.89)	6.810	7.500	10.7	35.5	NA	1.090 J	NA	15.5	NA	8.630
Barium	300 or SB/(52.5)	77.5	103	81.2	778	NA	10.1 J	NA	48.1	NA	325
Cadmium	1 or SB/(1.93)	3.090	2.330	4.350	21.7	NA	0.358 J	NA	3.880	NA	3.280
Chromium	10 or SB/(15.8)	14.4	9.830	33.7	1730	NA	4.170	NA	33.8	NA	54.3
Lead	SB/(87.9)	155	229	445	17200 D	NA	21.3	NA	104	NA	303
Selenium	2 or SB/(1.25)	1.220 J	0.857 J	1.310	9.180	NA	0.341 U	NA	2.480	NA	0.711 J
Silver	SB/(0.117)	0.385 J	0.133 U	0.640 J	40.6	NA	0.115 U	NA	1.090 J	NA	0.126 U

Qualifiers & Notes:

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E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

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NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 2. Subsurface Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard

PCBs and Metals Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	TP-20S-1 S3970-08 08/04/04 1.0 ug/Kg	TP-23S-1 S3970-09 08/04/04 1.0 ug/Kg	TP-24S-1 S3970-10 08/04/04 1.0 ug/Kg	TP-28S-1 S4063-01 08/08/04 1.0 ug/Kg	TP-30S-1 S4063-02 08/08/04 1.0 ug/Kg	TP-34S-1 S4063-03 08/08/04 1.0 ug/Kg	TP-35S-1 S4063-04 08/08/04 1.0 ug/Kg	TP-37S-1 S4063-05 08/06/04 1.0 ug/Kg	TP-38S-1 S4063-06 08/06/04 1.0 ug/Kg	TP-39S-1 S4063-07 08/06/04 1.0 ug/Kg	TP-41S-1 S4063-08 08/06/04 1.0 ug/Kg
Aroclor-1016	10,000	6.8 U	7.1 U	7.4 U	6.2 U	6.1 UJ	6.0 UJ	6.4 UJ	6.3 UJ	6.7 UJ	6.0 UJ	6.5 UJ
Aroclor-1221	10,000	4.7 U	4.8 U	5.1 U	4.2 U	4.2 UJ	4.1 UJ	4.4 UJ	4.3 UJ	4.5 UJ	4.1 UJ	4.5 UJ
Aroclor-1232	10,000	3.2 U	3.3 U	3.4 U	2.9 U	2.8 UJ	2.8 UJ	3.0 UJ	2.9 UJ	3.1 UJ	2.8 UJ	3.0 UJ
Aroclor-1242	10,000	4.1 U	4.2 U	4.4 U	3.7 U	3.6 UJ	3.6 UJ	3.8 UJ	3.7 UJ	4.0 UJ	3.6 UJ	3.9 UJ
Aroclor-1248	10,000	4.8 U	5.0 U	5.2 U	4.4 U	4.3 UJ	4.2 UJ	4.5 UJ	4.4 UJ	4.7 UJ	4.2 UJ	4.6 UJ
Aroclor-1254	10,000	1.8 U	97 PJ	1.9 U	1.6 U	1.6 UJ	1.6 UJ	1.7 UJ	1.6 UJ	1.7 UJ	1.6 UJ	1.7 UJ
Aroclor-1260	10,000	3.9 U	4.0 U	4.2 U	180 PJ	3.5 UJ	3.4 UJ	3.6 UJ	3.5 UJ	3.8 UJ	3.4 UJ	3.7 UJ
Units **COMPOUND**				mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Mercury	0.1	0.45 J	0.01 U	0.03 J	0.01	1.4	0.17	0.03	0.06	0.05	0.03	0.04
Arsenic	7.5 or SB/(5.89)	14.9	12.2	5.800	6.020	16.6	5.550	7.670	6.430	6.790	6.350	8.700
Barium	300 or SB/(52.5)	66.3	328	70.9	177	1900	147	33.8	52.7	59.2	50.5	45.7
Cadmium	1 or SB/(1.93)	13.5	3.020	2.330	0.684	7.220	1.760	1.260	0.652	1.030	0.733	1.370
Chromium	10 or SB/(15.8)	55.5	19.8	16.8	13.6	85.0	89.5	36.2	14.0	17.1	13.0	18.3
Lead	SB/(87.9)	199	137	16.4	244	2930	518	31.1	17.5	55.4	43.1	23.7
Selenium	2 or SB/(1.25)	3.450	2.040	0.916 J	1.920	2.250	1.240	1.690	1.010 J	0.564 J	0.831 J	2.070
Silver	SB/(0.117)	1.130 J	0.144 U	0.206 J	0.124 U	0.124 U	0.123 U	0.130 U	0.128 U	0.137 U	0.122 U	0.134 U

Qualifiers & Notes:

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B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

Table 3. Ground Water Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard
Poughkeepsie, New York

Volatile Organics Sample ID Sampling Date Dilution Factor Units COMPOUND	TOGS 1.1.1 Standard or Guidance Value[1]	MW-1 S4507-01 09/01/04 1.0 ug/L	CHA-1 S4507-02 09/01/04 1.0 ug/L	CHA-2 S4507-03 09/01/04 1.0 ug/L	CHA-2 S5229-01 10/15/2004 1.0 ug/L	CHA-3 S4507-04 09/01/04 1.0 ug/L	CHA-4 S4507-07 09/01/04 1.0 ug/L	CHA-5 S4507-08 09/01/04 1.0 ug/L	CHA-6 S4507-09 09/01/04 1.0 ug/L	CHA-10 S4507-10 09/01/04 1.0 ug/L	TRIPBLANK S4507-11 09/01/04 1.0 ug/L
Chloromethane		0.68 U	0.68 U	0.68 U	NA	0.68 U	0.68 U	0.68 U	0.68 U	0.68 U	0.68 U
Vinyl Chloride	2	0.27 U	0.27 U	0.27 U	NA	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U
Bromomethane	5	0.78 U	0.78 U	0.78 U	NA	0.78 U	0.78 U	0.78 U	0.78 U	0.78 U	0.78 U
Chloroethane	5	0.88 U	0.88 U	0.88 U	NA	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U
1,1-Dichloroethene	5	0.32 U	0.32 U	0.32 U	NA	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U
Acetone	50[2]	3.3 U	3.3 U	3.3 U	NA	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Carbon Disulfide		0.39 U	0.39 U	0.39 U	NA	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
Methylene Chloride	5	0.62 U	0.62 U	0.62 U	NA	0.62 U	0.62 U	0.62 U	0.62 U	0.62 U	0.62 U
trans-1,2-Dichloroethene	5	0.51 U	0.51 U	0.51 U	NA	0.51 U	0.51 U	0.51 U	0.51 U	0.51 U	0.51 U
1,1-Dichloroethane	5	0.22 U	0.22 U	0.22 U	NA	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
2-Butanone		2.8 U	2.8 U	2.8 U	NA	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Carbon Tetrachloride	5	0.47 U	0.47 U	0.47 U	NA	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U
cis-1,2-Dichloroethene	5	0.77 U	0.77 U	0.77 U	NA	0.77 U	49	0.77 U	0.77 U	0.77 U	0.77 U
Chloroform	7	0.58 U	0.58 U	0.58 U	NA	0.58 U	0.58 U	0.58 U	0.58 U	0.58 U	0.58 U
1,1,1-Trichloroethane	5	0.41 U	0.41 U	0.41 U	NA	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U
Benzene	0.7	0.24 U	0.24 U	0.24 U	NA	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
1,2-Dichloroethane	0.6	0.32 U	0.32 U	0.32 U	NA	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U
Trichloroethene	5	0.67 U	5.0	0.67 U	NA	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U
1,2-Dichloropropane	1	0.63 U	0.63 U	0.63 U	NA	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U
Bromodichloromethane	50[2]	0.35 U	0.35 U	0.35 U	NA	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U
4-Methyl-2-Pentanone		1.3 U	1.3 U	1.3 U	NA	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
Toluene	5	0.39 U	0.39 U	0.39 U	NA	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
t-1,3-Dichloropropene	0.4	0.42 U	0.42 U	0.42 U	NA	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
cis-1,3-Dichloropropene	0.4	0.15 U	0.15 U	0.15 U	NA	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
1,1,2-Trichloroethane	1	0.52 U	0.52 U	0.52 U	NA	0.52 U	0.52 U	0.52 U	0.52 U	0.52 U	0.52 U
2-Hexanone	50[2]	0.66 U	0.66 U	0.66 U	NA	0.66 U	0.66 U	0.66 U	0.66 U	0.66 U	0.66 U
Dibromochloromethane	50[2]	0.38 U	0.38 U	0.38 U	NA	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Tetrachloroethene	5	0.33 U	0.33 U	0.33 U	NA	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
Chlorobenzene	5	0.37 U	0.37 U	0.37 U	NA	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
Ethyl Benzene	5	0.41 U	0.41 U	0.41 U	NA	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U
m/p-Xylenes	5	0.96 U	0.96 U	0.96 U	NA	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U
o-Xylene	5	0.37 U	0.37 U	0.37 U	NA	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
Styrene	5	0.34 U	0.34 U	0.34 U	NA	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U
Bromoform	50[2]	0.25 U	0.25 U	0.25 U	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,1,2,2-Tetrachloroethane	5	0.50 U	0.50 U	0.50 U	NA	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Total Confident Conc. VOC		0	5	0		0	49	0	0	0	0
Total TICs		0	0	19		0	0	0	0	0	0

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

1. Shaded values exceed TOGS 1.1.1 Standard or Guidance Value for Class GA Groundwater.

2. Indicates value is a guidance value rather than a standard.

Table 3. Ground Water Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard
Poughkeepsie, New York

Semivolatile Organics Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	TOGS 1.1.1 Standard or Guidance Value[1]	MW-1 S4507-01 09/01/04 1.0 ug/L	CHA-1 S4507-02 09/01/04 1.0 ug/L	CHA-2 S4507-03 09/01/04 1.0 ug/L	CHA-2 S5229-01 10/15/2004 1.0 ug/L	CHA-3 S4507-04 09/01/04 1.0 ug/L	CHA-4 S4507-07 09/01/04 1.0 ug/L	CHA-5 S4507-08 09/01/04 1.0 ug/L	CHA-6 S4507-09 09/01/04 1.0 ug/L	CHA-10 S4507-10 09/01/04 1.0 ug/L
bis(2-Chloroethyl)ether	1	0.330 U	0.330 U	0.330 U	NA	0.330 U	0.330 U	0.330 U	0.330 U	0.330 U
1,2-Dichlorobenzene	3	0.590 U	0.590 U	0.590 U	NA	0.590 U	0.590 U	0.590 U	0.590 U	0.590 U
1,3-Dichlorobenzene	3	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	3	0.670 U	0.680 U	0.680 U	NA	0.670 U	0.670 U	0.680 U	0.670 U	0.670 U
2,2-oxybis(1-Chloropropane)		0.830 U	0.840 U	0.840 U	NA	0.830 U	0.830 U	0.840 U	0.830 U	0.830 U
N-Nitroso-di-n-propylamine		0.770 U	0.770 U	0.770 U	NA	0.770 U	0.770 U	0.770 U	0.770 U	0.770 U
Hexachloroethane	5	0.910 U	0.920 U	0.920 U	NA	0.910 U	0.910 U	0.920 U	0.910 U	0.910 U
Nitrobenzene	0.4	0.380 U	0.380 U	0.380 U	NA	0.380 U	0.380 U	0.380 U	0.380 U	0.380 U
Isophorone	50[2]	0.480 U	0.480 U	0.480 U	NA	0.480 U	0.480 U	0.480 U	0.480 U	0.480 U
bis(2-Chloroethoxy)methane	5	0.440 U	0.450 U	0.450 U	NA	0.440 U	0.440 U	0.450 U	0.440 U	0.440 U
1,2,4-Trichlorobenzene	5	0.410 U	0.410 U	0.410 U	NA	0.410 U	0.410 U	0.410 U	0.410 U	0.410 U
Naphthalene	10	0.270 U	0.270 U	1.5 J	NA	0.270 U	0.270 U	0.270 U	0.270 U	0.270 U
4-Chloroaniline	5	4.1 U	4.1 U	4.1 U	NA	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U
Hexachlorobutadiene	0.5	0.380 U	0.380 U	0.380 U	NA	0.380 U	0.380 U	0.380 U	0.380 U	0.380 U
2-Methylnaphthalene	50[2]	0.500 U	0.500 U	0.500 U	NA	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Hexachlorocyclopentadiene	5	0.450 U	0.460 U	0.460 U	NA	0.450 U	0.450 U	0.460 U	0.450 U	0.450 U
2-Chloronaphthalene	10[2]	0.390 U	0.390 U	0.390 U	NA	0.390 U	0.390 U	0.390 U	0.390 U	0.390 U
2-Nitroaniline	5	0.300 U	0.300 U	0.300 U	NA	0.300 U	0.300 U	0.300 U	0.300 U	0.300 U
Dimethylphthalate	50[2]	0.260 U	0.260 U	0.260 U	NA	0.260 U	0.260 U	0.260 U	0.260 U	0.260 U
Acenaphthylene	20	0.430 U	0.440 U	0.440 U	NA	0.430 U	0.430 U	0.440 U	0.430 U	0.430 U
2,6-Dinitrotoluene	5	0.410 U	0.420 U	0.420 U	NA	0.410 U	0.410 U	0.420 U	0.410 U	0.410 U
3-Nitroaniline	5	1.0 U	1.1 U	1.1 U	NA	1.0 U	1.0 U	1.1 U	1.0 U	1.0 U
Acenaphthene	20[2]	0.240 U	0.240 U	0.240 U	NA	0.240 U	0.240 U	0.240 U	2.6 J	0.240 U
Dibenzofuran		0.310 U	0.320 U	0.320 U	NA	0.310 U	0.310 U	0.320 U	0.310 U	0.310 U
2,4-Dinitrotoluene	5	0.340 U	0.340 U	0.340 U	NA	0.340 U	0.340 U	0.340 U	0.340 U	0.340 U
Diethylphthalate	50[2]	0.340 U	0.340 U	0.340 U	NA	0.340 U	0.340 U	0.340 U	0.340 U	0.340 U
4-Chlorophenyl-phenylether		0.360 U	0.370 U	0.370 U	NA	0.360 U	0.360 U	0.370 U	0.360 U	0.360 U
Fluorene	50[2]	0.170 U	0.170 U	0.170 U	NA	0.170 U	0.170 U	0.170 U	2.2 J	0.170 U
4-Nitroaniline	5	0.830 U	0.840 U	0.840 U	NA	0.830 U	0.830 U	0.840 U	0.830 U	0.830 U
N-Nitrosodiphenylamine	50[2]	0.280 U	0.280 U	0.280 U	NA	0.280 U	0.280 U	0.280 U	0.280 U	0.280 U
4-Bromophenyl-phenylether		0.170 U	0.170 U	0.170 U	NA	0.170 U	0.170 U	0.170 U	0.170 U	0.170 U
Hexachlorobenzene	0.04	0.230 U	0.230 U	0.230 U	NA	0.230 U	0.230 U	0.230 U	0.230 U	0.230 U
Phenanthrene	50[2]	0.270 U	0.280 U	0.280 U	NA	0.270 U	0.270 U	0.280 U	1.1 J	0.270 U
Anthracene	50[2]	0.160 U	0.160 U	0.160 U	NA	0.160 U	0.160 U	0.160 U	0.160 U	0.160 U
Carbazole		0.310 U	0.310 U	0.310 U	NA	0.310 U	0.310 U	0.310 U	0.310 U	0.310 U
Di-n-butylphthalate	50[2]	0.098 U	0.099 U	0.099 U	NA	3.9 J	0.098 U	0.099 U	0.098 U	0.098 U
Fluoranthene	50[2]	0.210 U	0.210 U	0.210 U	NA	0.210 U	0.210 U	0.210 U	0.210 U	0.210 U
Pyrene	50[2]	0.250 U	0.250 U	0.250 U	NA	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U
Butylbenzylphthalate	50[2]	0.300 U	0.300 U	0.300 U	NA	0.300 U	0.300 U	0.300 U	0.300 U	0.300 U
3,3-Dichlorobenzidine	5	1.6 U	1.6 U	1.6 U	NA	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
Benzo(a)anthracene	0.002[2]	0.220 U	0.230 U	0.230 U	NA	0.220 U	0.220 U	0.230 U	0.220 U	0.220 U
Chrysene	0.002[2]	0.380 U	0.390 U	0.390 U	NA	0.380 U	0.380 U	0.390 U	0.380 U	0.380 U
bis(2-Ethylhexyl)phthalate	5	0.340 U	0.350 U	1.7 J	NA	0.340 U	0.340 U	1.2 J	1.8 J	0.340 U
Di-n-octyl phthalate	50[2]	0.170 U	0.170 U	0.170 U	NA	0.170 U	0.170 U	0.170 U	0.170 U	0.170 U
Benzo(b)fluoranthene	0.002[2]	0.230 U	0.230 U	0.230 U	NA	0.230 U	0.230 U	0.230 U	0.230 U	0.230 U
Benzo(k)fluoranthene	0.002[2]	0.380 U	0.390 U	0.390 U	NA	0.380 U	0.380 U	0.390 U	0.380 U	0.380 U
Benzo(a)pyrene	ND	0.450 U	0.450 U	0.450 U	NA	0.450 U	0.450 U	0.450 U	0.450 U	0.450 U
Indeno(1,2,3-cd)pyrene	0.002[2]	0.290 U	0.290 U	0.290 U	NA	0.290 U	0.290 U	0.290 U	0.290 U	0.290 U
Dibenz(a,h)anthracene	50	0.290 U	0.290 U	0.290 U	NA	0.290 U	0.290 U	0.290 U	0.290 U	0.290 U
Benzo(g,h,i)perylene		0.420 U	0.430 U	0.430 U	NA	0.420 U	0.420 U	0.430 U	0.420 U	0.420 U
Total Confident Conc. SVOC		0	0	3.2		3.9	0	1.2	7.7	0
Total TICs		6.6	6.2	131		8	6.6	24.1	311	7.4

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

1. Shaded values exceed TOGS 1.1.1 Standard or Guidance Value for Class GA Groundwater.

2. Indicates value is a guidance value rather than a standard.

Table 3. Ground Water Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard
Poughkeepsie, New York

Sample ID		MW-1	CHA-1	CHA-2	CHA-2	CHA-3	CHA-4	CHA-5	CHA-6	CHA-10
		S4507-01	S4507-02	S4507-03	S5229-01	S4507-04	S4507-07	S4507-08	S4507-09	S4507-10
Sampling Date	TOGS 1.1.1	9/1/04	9/1/04	9/1/04	10/15/2004	9/1/04	9/1/04	9/1/04	9/1/04	9/1/04
Dilution Factor	Standard or	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Units	Guidance	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
COMPOUND	Value[1]									
Aroclor-1016	0.09	0.130 U	0.130 U	0.130 U	0.130 U	0.130 U	0.130 U	0.130 U	0.130 U	0.130 U
Aroclor-1221	0.09	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Aroclor-1232	0.09	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Aroclor-1242	0.09	0.140 U	0.140 U	0.140 U	0.140 U	0.140 U	0.140 U	0.140 U	0.140 U	0.140 U
Aroclor-1248	0.09	0.060 U	0.060 U	0.060 U	0.060 U	0.060 U	0.060 U	0.060 U	0.060 U	0.060 U
Aroclor-1254	0.09	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U	0.030 U
Aroclor-1260	0.09	0.0630 U	0.0620 U	4.7 P	0.31 J	0.0640 U	0.0620 U	0.0640 U	0.0620 U	0.0630 U
Units		**ug/L**	**ug/L**	**ug/L**		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
COMPOUND										
Arsenic	25	4.8 U	4.8 U	4.8 U	NA	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U
Barium	1,000	67.3 J	78.8 J	204	NA	16.1 J	117 J	46.8 J	81.4 J	80.1 J
Cadmium	5	0.99 U	0.99 U	0.99 U	NA	0.99 U	0.99 U	0.99 U	0.99 U	0.99 U
Chromium	50	1.2 U	2.7 J	1.2 U	NA	3.1 J	2.4 J	1.8 J	1.2 U	1.2 U
Lead	25	1.8 U	22.2	1.8 U	NA	21.0	1.8 U	39.2	1.8 U	1.8 U
Selenium	10	5.2 U	5.2 U	5.2 U	NA	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U
Silver	50	3.4 U	3.4 U	3.4 U	NA	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U
Mercury	0.7	0.06 J	0.03 J	0.03 U	NA	0.04 J	0.03 U	0.08 J	0.04 J	0.03 U

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

1. Shaded values exceed TOGS 1.1.1 Standard or Guidance Value for Class GA Groundwater.

2. Indicates value is a guidance value rather than a standard.

Table 2. Subsurface Soil Sample Laboratory Results Summary
DeLaval Property
Pine Street and Rinaldi Boulevard

PCBs and Metals Sample ID Laboratory Sample No. Sampling Date Dilution Factor Units COMPOUND	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	TP-42S-1 S4063-09 08/06/04 1.0 ug/Kg	AT-7S-1 S3897-01 07/29/04 1.0 ug/Kg	B-7(14-16) S4313-01 8/18/04 1.0 ug/Kg
Aroclor-1016	10,000	6.4 UJ	6.0 U	6.2 U
Aroclor-1221	10,000	4.4 UJ	4.1 U	4.2 U
Aroclor-1232	10,000	3.0 UJ	2.8 U	2.8 U
Aroclor-1242	10,000	3.8 UJ	3.6 U	3.7 U
Aroclor-1248	10,000	4.5 UJ	4.2 U	4.3 U
Aroclor-1254	10,000	1.7 UJ	1.6 U	1.6 U
Aroclor-1260	10,000	3.6 UJ	3.4 U	340
Units COMPOUND		mg/Kg	mg/Kg	mg/Kg
Mercury	0.1	0.01 U	0.01 UJ	0.01 U
Arsenic	7.5 or SB/(5.89)	8.140	18.8	0.306 J
Barium	300 or SB/(52.5)	126	75.7	11.4 J
Cadmium	1 or SB/(1.93)	0.712	2.280	0.307 J
Chromium	10 or SB/(15.8)	8.880	29.2	5.840 J
Lead	SB/(87.9)	71.1	119	26.8
Selenium	2 or SB/(1.25)	1.020 J	2.690	1.200 J
Silver	SB/(0.117)	0.127 U	0.777 J	0.125 U

Qualifiers & Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit, but greater than zero. The concentration given is an approximate value.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.

E - Value exceeds calibration range.

D - Compound identified in analysis at a secondary dilution factor.

* - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

NA-not analyzed

MDL - Method Detection Limit

** - As per TAGM #4046, Total VOCs<10ppm., Total Semi-VOCs<500ppm., and Individual Semi-VOCs<50ppm.

1. Shaded values exceed TAGM 4046 Recommended Cleanup Objectives for Subsurface Soil.

APPENDIX C

Confirmatory Sampling Analytical Summary Tables

Table C-1
Confirmatory Soil Sample Laboratory Results (Detected Parameters Only)
AOC-1 Summary
DeLaval Property
Pine Street and Rinaldi Boulevard

COMPOUND	Units	Sample ID Laboratory Sample No. Sample No. on Figure Sampling Date NYSDEC Part 375 Unrestricted Soil Cleanup Objective Standard	AOC 1 (Zone 5) 09061029-01 5 6/29/2009	AOC 1 (Zone 1) 09060750-01 1 6/18/2009	AOC 1 (Zone 6) 09060750-02 2 6/18/2009	AOC 1 (Zone 5) 09060750-03 3 6/18/2009	AOC 1 (Zone 3) 09060750-04 4 6/18/2009	AOC 1 (Sample 6) 09070468-02 6 7/13/2009	AOC 1 (Sample 7) 09070468-03 7 7/13/2009	AOC 1 (Sample 8) 09070468-04 8 7/13/2009	AOC 1 (Sample 9) 09070468-05 9 7/13/2009	AOC 1 (Sample 10) 09070468-06 10 7/13/2009	AOC 1 (Sample 11) 09070468-07 11 7/13/2009	AOC 1 (Sample 12) 09070468-08 12 7/13/2009
Semivolatile Organic Compounds (SVOCs)														
Benzo(a)anthracene	µg/Kg	1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	300	470	230
Benzo(a)pyrene	µg/Kg	1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	370	ND
Benzo(b)fluoranthene	µg/Kg	1,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	360	ND
Benzo(k)fluoranthene	µg/Kg	800	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	330	ND
Chrysene	µg/Kg	1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	340	ND
Fluoranthene	µg/Kg	100,000	ND	370	ND	ND	ND	ND	ND	ND	390	450	930	320
Phenanthrene	µg/Kg	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	220
Pyrene	µg/Kg	100,000	ND	390	ND	ND	ND	ND	ND	ND	360	470	780	290
PCBs														
Aroclor-1254	mg/Kg	0.1 (sum of all)	ND	ND	ND	ND	ND	ND	ND	ND	0.289	0.054	ND	ND
Aroclor-1260	mg/Kg	0.1 (sum of all)	ND	ND	ND	ND	ND	ND	ND	ND	0.538	0.089	ND	ND
Metals														
Antimony	mg/Kg	na	0.92	ND	ND	1.08	0.94	1.1	1.12	0.81	3.38	1.46	1.38	1.12
Arsenic	mg/Kg	13	5.04	6.09	4.04	11.7	11.9	7	6.19	6.46	7.53	3.05	4.26	3.3
Barium	mg/Kg	350	42.9	71.8	50.8	78.6	75.9	26.8	38.2	25.3	84.5	33.6	29	29.4
Beryllium	mg/Kg	7.2	0.36	ND	ND	0.12	0.1	0.4	0.26	0.36	ND	ND	0.13	ND
Cadmium	mg/Kg	2.5	ND	0.43	ND	0.65	0.62	ND	ND	ND	0.72	0.37	ND	0.3
Chromium	mg/Kg	30	16.7	15.4	12.2	26	25.8	14.4	11.7	13.2	**121**	47.5	13.1	27.1
Copper	mg/Kg	50	47.5	**88.4**	12.1	**570**	**623**	**123**	**212**	**99.4**	**890**	**2,050**	**70.7**	**1,740**
Lead	mg/Kg	63	45.6	**95.6**	8.22	**167**	**187**	37.3	**70.4**	37.4	**201**	**192**	19.9	**135**
Nickel	mg/Kg	30	**32**	16.6	15.7	22.6	22	**36.9**	**46.3**	28.1	**180**	**347**	**51.1**	**323**
Selenium	mg/Kg	3.9	ND	ND	ND	ND	ND	1.04	1.49	1.07	1.33	1.02	ND	1.05
Silver	mg/Kg	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	ND	0.33
Zinc	mg/Kg	109	108	**325**	50	**264**	**281**	98	**220**	86.3	**362**	**476**	75	**352**
Hazardous Waste Characterisitics														
Conductivity	umhos/cm	na	55	2.42	1.72	5.59	6.49	17.7	10.2	17.3	44.2	48.5	14.9	41.2
Flash Point	°F	na	>200	>200	>200	>200	>200	>200	>200	>200	>200	>200	>200	>200
Reactivity - Cyanide	mg/Kg	na	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Reactivity - Sulfide	mg/Kg	na	16	39	20	34	43	25	20	ND	31	ND	ND	ND
Ignitability		na												
Total Petroleum Hyrocarbons-DRO	mg/Kg	na	ND	39	ND	140	131	ND	ND	43.9	410	114	182	59.5
Total Petroleum Hyrocarbons-GRO	mg/Kg	na	ND	ND	ND	ND	ND	ND	ND	ND	35	4	35	4
pH	S.U.	na	8.59	7.2	7.51	6.74	6.58	6.85	6.88	7.05	7.35	8.09	6.65	7.47

Qualifiers & Notes:
ND - The compound was not detected at the indicated concentration.
Blank cells indicate that that compound was not analyzed.
1. Shaded values exceed Part 375 Unrestricted Soil Cleanup Objectives.

Table C-2
Confirmatory Soil Sample Laboratory Results (Detected Parameters Only)
AOC-2/3 Summary
DeLaval Property
Pine Street and Rinaldi Boulevard

COMPOUND	Units	Sample ID Laboratory Sample No. Sampling Date NYSDEC Part 375 Unrestricted Soil Cleanup Objective Standard	AOC 2/3 1 09020549-01 2/13/2009	AOC 2/3 2 09020549-02 2/13/2009	AOC 2/3 3 09020549-03 2/13/2009	#23 Bottom 09040050-01 3/12/2009	#18 Side 09040050-02 3/18/2009	#18 Bottom 09040050-03 3/13/2009	#13 Bottom 09040050-04 3/13/2009	#10 Side 09040050-05 3/18/2009	#7 Bottom 09040050-06 3/18/2009	AOC 2/3 Grid 19 09040888-01 4/23/2009	AOC 2/3 Grid 11 09040888-02 4/23/2009	AOC 2/3 Grid 4 09040888-03 4/23/2009
Volatile Organic Compounds (VOCs)														
Tetrachloroethene	µg/Kg	1,300	ND	ND	ND							36	ND	ND
Semivolatile Organic Compounds (SVOCs)														
Benzo(a)anthracene	µg/Kg	1,000	ND	ND	ND	ND	ND	ND	ND	**1,900**	ND	ND	ND	380
Benzo(a)pyrene	µg/Kg	1,000	ND	ND	ND	ND	ND	ND	ND	**1,500**	ND	ND	ND	780
Benzo(b)fluoranthene	µg/Kg	1,000	ND	ND	ND	ND	ND	ND	ND	790	ND	ND	ND	510
Benzo(g,h,i)perylene	µg/Kg	100,000	ND	ND	ND	ND	ND	ND	ND	1,400	ND	ND	ND	590
Benzo(k)fluoranthene	µg/Kg	800	ND	ND	ND	ND	ND	ND	ND	800	ND	ND	ND	520
Chrysene	µg/Kg	1,000	ND	ND	ND	ND	ND	ND	ND	**1,800**	ND	ND	ND	400
Fluoranthene	µg/Kg	100,000	ND	ND	ND	ND	ND	ND	ND	3,200	ND	ND	ND	330
Indeno(1,2,3-cd)pyrene	µg/Kg	500	ND	ND	ND	ND	ND	ND	ND	**1,400**	ND	ND	ND	450
Phenanthrene	µg/Kg	100,000	ND	ND	ND	ND	ND	ND	ND	1,800	ND	ND	ND	ND
Pyrene	µg/Kg	100,000	ND	ND	ND	ND	ND	ND	800	2,700	ND	ND	ND	670
Pesticides														
4,4'-DDT	µg/Kg	3.3				ND	ND	ND	ND	ND	124			
PCBs														
Aroclor-1254	mg/Kg	0.1 (sum of all)	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1260	mg/Kg	0.1 (sum of all)	ND	0.03	ND	ND	ND	ND	**0.24**	**0.12**	ND	ND	0.02	0.02
Metals														
Aluminum	mg/Kg	na	9,220	10,200	25,400							13,900	16,400	12,400
Antimony	mg/Kg	na	ND	1.38	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.95
Arsenic	mg/Kg	13	3.35	**41.9**	5.5	5.31	**14.7**	**27**	10.9	13	7.52	**16.8**	**17.2**	7.27
Barium	mg/Kg	350	28.3	126	116	41.9	107	133	72.3	309	36.9	132	136	58.9
Beryllium	mg/Kg	7.2	ND	1.04	3.5	ND	0.13	ND	0.3	0.32	0.54	0.5	ND	ND
Cadmium	mg/Kg	2.5	ND	1.31	2.45	0.65	0.67	1.03	0.77	0.92	0.54	0.56	0.52	0.68
Calcium	mg/Kg	na	19,600	27,300	61,600							20,300	33,600	39,800
Chromium	mg/Kg	30	13.3	**35.6**	20.9	14.7	11.5	19.6	19.6	22.1	21.9	15	26.9	**68**
Cobalt	mg/Kg	na	8.05	7.33	8.36							7.41	8.13	9.02
Copper	mg/Kg	50	18.9	**265**	15.7	20.2	28	6.73	**62.3**	**117**	36.4	45.8	33.5	**67.7**
Iron	mg/Kg	na	20,600	24,900	20,000							14,300	16,100	28,900
Lead	mg/Kg	63	9.59	**306**	9.23	25.3	**97.9**	21	**105**	**199**	23.4	52.4	36.9	**79.4**
Magnesium	mg/Kg	na	4,450	9,190	26,400							12,400	15,200	5,960
Manganese	mg/Kg	1,600	442	545	938							975	730	346
Nickel	mg/Kg	30	19.8	**55**	27.6	19.8	14.8	16.3	27.6	28	**35.8**	16.6	24.4	**58.7**
Potassium	mg/Kg	na	980	774	1,050							1,110	856	790
Selenium	mg/Kg	3.9	ND	3.21	**5.87**	ND	ND	1.82	ND	ND	ND	ND	ND	ND
Sodium	mg/Kg	na	82.8	389	591							283	427	176
Vanadium	mg/Kg	na	15.5	222	12.1							14.4	12	15.4
Zinc	mg/Kg	109	57.4	**379**	**286**	109	72.7	**451**	**292**	**317**	99.9	**261**	**192**	**252**
Hazardous Waste Characterisitics														
Conductivity	umhos/cm	na				8.94	22.6	8.7	24.2	24.5	6.46			
Flash Point	°F	na				>200	>200	>200	>200	>200	>200			
Reactivity - Cyanide	mg/Kg	na	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Reactivity - Sulfide	mg/Kg	na	ND	ND	44	ND	24.6	53.6	53.6	ND	53.6	68.1	23.8	28.4
Ignitability		na	Passed	Passed	Passed							Passed	Passed	Passed
Total Petroleum Hyrocarbons-DRO	mg/Kg	na				460	ND	80	8500	344	10.4			
Total Petroleum Hyrocarbons-GRO	mg/Kg	na				ND	ND	ND	ND	ND	ND			
pH	S.U.	na	8.82	9.15	8.33	6.68	9.38	8.75	8.61	9.09	8.77	7.63	8.54	9.57

Qualifiers & Notes:
ND - The compound was not detected at the indicated concentration
Blank cells indicate that that compound was not analyzed
1. Shaded values exceed Part 375 Unrestricted Soil Cleanup Objectives

Table C-3
Confirmatory Soil Sample Laboratory Results (Detected Parameters Only)
AOC-4A Summary
DeLaval Property
Pine Street and Rinaldi Boulevard

COMPOUND	Units	Sample ID Laboratory Sample No. Sampling Date NYSDEC Part 375 Unrestricted Soil Cleanup Objective Standard (ppm)	1&1A/Bottom North 09080601-01 8/18/2009	2&2A/North side 09080601-02 8/18/2009	3&3A/East Side 09080601-03 8/18/2009
Semivolatile Organic Compounds (SVOCs)					
Fluoranthene	µg/Kg	100,000	210	ND	ND
Pyrene	µg/Kg	100,000	210	ND	ND
Metals					
Antimony	mg/Kg	na	3.30	8.47	5.63
Arsenic	mg/Kg	13	7.89	8.31	7.29
Barium	mg/Kg	350	87.1	53.4	46.1
Beryllium	mg/Kg	7.2	0.37	0.35	0.38
Cadmium	mg/Kg	2.5	0.36	ND	ND
Chromium	mg/Kg	30	20.8	16.3	14.9
Copper	mg/Kg	50	**62.8**	46.4	45.6
Lead	mg/Kg	63	**174**	**79.4**	**94**
Nickel	mg/Kg	30	28.0	26.2	25.8
Selenium	mg/Kg	3.9	ND	ND	1.82
Zinc	mg/Kg	109	**130**	75.6	76.5
Hazardous Waste Characterisitics					
Conductivity	umhos/cm	na	84.6	29.3	51.8
Flash Point	°F	na	>200	>200	>200
Reactivity - Sulfide	mg/Kg	na	35.6	18.9	25.7
Total Petroleum Hyrocarbons-DRO	mg/Kg	na	80.2	376	ND
pH	S.U.	na	8.64	8.47	ND

Qualifiers & Notes:
ND - The compound was not detected at the laboratory detection limit.
Blank cells indicate that that compound was not analyzed.
1. Shaded values exceed Part 375 Unrestricted Soil Cleanup Objectives.

Table C-4
Confirmatory Soil Sample Laboratory Results (Detected Parameters Only)
AOC-5 Summary
DeLaval Property
Pine Street and Rinaldi Boulevard

COMPOUND	Units	Sample ID Laboratory Sample No. Sampling Date NYSDEC Part 375 Unrestricted Soil Cleanup Objective Standard (ppm)	Bottm of MH1 Center 09080161-01 8/5/2009	South of MH1 5' South 09080161-02 8/5/2009	West of MH1 5' West 09080161-03 8/5/2009	North of MH1 5' North 09080161-04 8/5/2009
Metals						
Arsenic	mg/Kg	13	8.88	6.84	6.86	6.97
Barium	mg/Kg	350	40.3	43.6	35.6	40.8
Beryllium	mg/Kg	7.2	0.56	0.35	0.39	0.44
Cadmium	mg/Kg	2.5	0.44	ND	ND	0.31
Chromium	mg/Kg	30	19.8	19.4	19.5	21.0
Copper	mg/Kg	50	47.6	36.5	34.7	37.8
Lead	mg/Kg	63	26.7	51.4	30.2	25.7
Nickel	mg/Kg	30	38.0	30.6	30.8	33.8
Zinc	mg/Kg	109	108	108	83.9	93.8
Hazardous Waste Characterisitics						
Conductivity	umhos/cm	na	26.4	24.3	25.7	22.2
Flash Point	°F	na	>200	>200	>200	>200
Reactivity - Cyanide	mg/Kg	na	ND	ND	ND	ND
Reactivity - Sulfide	mg/Kg	na	ND	ND	ND	ND
Total Petroleum Hyrocarbons-DRO	mg/Kg	na	ND	ND	ND	ND
Total Petroleum Hyrocarbons-GRO	mg/Kg	na	ND	ND	ND	ND
pH	S.U.	na	7.43	7.15	7.39	7.49

Qualifiers & Notes:
ND - The compound was not detected at the laboratory detection limit.
Blank cells indicate that that compound was not analyzed.
1. Shaded values exceed Part 375 Unrestricted Soil Cleanup Objectives.

Table C-5
Confirmatory Soil Sample Laboratory Results Statistical Summary
DeLaval Property
Pine Street and Rinaldi Boulevard

Sample ID Laboratory Sample No. Sampling Date COMPOUND	Units	NYSDEC Recommended Soil Cleanup Objective Concentration[1]	MAX AOC 1	MIN AOC 1	MAX AOC 2/3	MIN AOC 2/3	Frequency of exceeding TAGM AOC 1	Frequency of exceeding TAGM AOC 2/3
Volatile Organic Compounds (VOCs)								
Napthalene	µg/Kg	13,000	92	92	630	630	0	0
sec-Butylbenzene	µg/Kg		72	72	0	0	0	0
Tetrachloroethene	µg/Kg	1,400			36	36		0
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	µg/Kg	224 or MDL	470	230	1900	380	2	2
Benzo(a)pyrene	µg/Kg	61 or MDL	370	370	1500	780	2	2
Benzo(b)fluoranthene	µg/Kg	1,100	360	360	790	510	0	0
Benzo(g,h,i)perylene	µg/Kg	50,000**	0	0	1400	590	0	0
Benzo(k)fluoranthene	µg/Kg	1,100	330	330	800	520	0	0
Chrysene	µg/Kg	400	340	340	1800	400	0	1
Fluoranthene	µg/Kg	50,000**	930	320	3200	330	0	0
Indeno(1,2,3-cd)pyrene	µg/Kg	3,200	0	0	1400	450	0	0
Phenanthrene	µg/Kg	50,000**	220	220	1800	1800	0	0
Pyrene	µg/Kg	50,000**	780	290	2700	670	0	0
PCBs								
Aroclor-1254	µg/Kg	10,000	0.289	0.054	30	30	0	0
Aroclor-1260	µg/Kg	10,000	0.538	0.089	240	0.02	0	0
Pesticides								
4,4'-DDT	µg/Kg	2100	0	0	124	124	0	0
Metals								
Aluminum	mg/Kg	SB			25400	9220		0
Antimony	mg/Kg	SB	3.38	0.81	1.95	1.38	0	0
Arsenic	mg/Kg	7.5 or SB/(5.89)	11.9	3.05	41.9	3.35	7	8
Barium	mg/Kg	300 or SB/(52.5)	84.5	25.3	309	28.3	4	7
Beryllium	mg/Kg	0.16 (HEAST) or SB	0.4	0.1	3.5	0.13	3	6
Cadmium	mg/Kg	1 or SB/(1.93)	0.72	0.3	2.45	0.52	0	1
Calcium	mg/Kg	SB			61600	19600		0
Chromium	mg/Kg	10 or SB/(15.8)	121	11.7	68	11.5	8	9
Cobalt	mg/Kg	30 or SB			9.02	7.33		0
Copper	mg/Kg	25 or SB	2050	12.1	265	6.73	6	6
Iron	mg/Kg	2000 or SB			28900	14300		3
Lead	mg/Kg	SB	201	8.22	306	9.23	0	0
Magnesium	mg/Kg	SB			26400	4450		0
Manganese	mg/Kg	SB			975	346		0
Nickel	mg/Kg	13 or SB	347	15.7	58.7	14.8	13	12
Potassium	mg/Kg	SB			1110	774		0
Selenium	mg/Kg	2 or SB/(1.25)	1.49	1.02	5.87	1.82	2	2
Silver	mg/Kg	SB	0.5	0.33	0	0	0	0
Sodium	mg/Kg	SB			591	82.8		0
Thallium	mg/Kg	SB	0	0	0	0	0	0
Vanadium	mg/Kg	150 or SB			222	12		1
Zinc	mg/Kg	20 or SB/(0.117)	476	50	451	57.4	13	12
Hazardous Waste Characterisitics								
Conductivity	umhos/cm		55	1.72	24.5	6.46	0	0
Flash Point	°F		0	0	0	0	0	0
Reactivity - Cyanide	mg/Kg		0	0	0	0	0	0
Reactivity - Sulfide	mg/Kg		43	16	68.1	23.8	0	0
Ignitability			0	0	0	0	0	0
Total Petroleum Hyrocarbons-DRO	mg/Kg		410	39	8500	10.4	0	0
Total Petroleum Hyrocarbons-GRO	mg/Kg		35	4	0	0	0	0
pH	S.U.		8.59	6.58	9.57	6.68	0	0

Notes:

SB - Site Background

Blank cells indicate that that compound was not analyzed.

APPENDIX D

Bulkhead Record Drawings

SHORELINE WORK – PROJECT NOTES

DESIGN CRITERIA

1. STRUCTURAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE 1999 BUILDING CODE OF THE STATE OF NEW YORK. WORK SHALL COMPLY WITH FEDERAL, STATE, AND LOCAL PERMIT CONDITIONS.
2. ACI 318–02, "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE".
3. ACI 315–92, "DETAILS AND DETAILING OF CONCRETE REINFORCEMENT".
4. ACI 301–99, "STANDARD SPECIFICATION FOR STRUCTURAL CONCRETE".
5. CONCRETE REINFORCEMENT SHALL CONFORM TO ASTM A 615 GRADE 60 AND SHALL BE EPOXY COATED IN ACCORDANCE WITH ASTM A 775.
6. CONCRETE SHALL BE NORMAL WEIGHT WITH A MINIMUM COMPRESSIVE STRENGTH OF 5000 PSI AT 28 DAYS. PORTLAND CEMENT SHALL BE TYPE II. CONCRETE SHALL CONTAIN A MINIMUM OF 6% (±1%) ENTRAINED AIR AND HAVE A MAXIMUM WATER TO CEMENT RATIO OF 0.40.
7. AISC, MANUAL OF STEEL CONSTRUCTION, THIRTEENTH EDITION.
8. STRUCTURAL STEEL SHAPES AND MISCELLANEOUS STEEL SHALL CONFORM TO ASTM A 572 GRADE 50, UNLESS OTHERWISE NOTED. STEEL TUBES SHALL CONFORM TO ASTM A500, GRADE B. STEEL PIPES SHALL CONFORM TO ASTM A 53, GRADE B OR ASTM A 500, GRADE B. STEEL PLATES SHALL CONFORM TO ASTM A36.
9. WELDING SHALL CONFORM TO THE 'STRUCTURAL WELDING CODE – STEEL', AS ADOPTED BY THE AMERICAN WELDING SOCIETY (AWS D1.1). A WELDER CERTIFIED IN ACCORDANCE WITH AWS STANDARDS SHALL PERFORM WELDING.
10. WELDING ELECTRODES SHALL BE E70XX–X AND COMPLY WITH AWS A5.1 AND AWS A5.5.
11. STEEL SHEET PILES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A 572 OR A 690, WITH A MINIMUM Fy = 50 KSI.
12. HIGH–STRENGTH BOLTS, NUTS AND WASHERS SHALL BE IN ACCORDANCE TO "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A 325 BOLTS".
13. GALVANIZING SHALL CONFORM TO ASTM A 123 OR ASTM A 153, AS APPLICABLE.
14. THE COMPLETED STRUCTURE HAS BEEN DESIGNED TO WITHSTAND THE FOLLOWING DESIGN LIVE LOADS APPLIED IN CONJUNCTION WITH DESIGN DREDGE/MUDLINE ELEVATIONS INDICATED ON THE CONTRACT DRAWINGS:

    LIVE LOADS:
    BULKHEAD: 250 PSF UNIFORM SURCHARGE LOAD; 8000 LBS CONCENTRATED LOAD

    WIND/WAVE LOADS:
    BULKHEAD AND RIPRAP SHORELINE PROTECTION: 100–YEAR FREQUENCY TIDAL FLOOD ELEVATION AS DEFINED BY FEMA WITH 100–YEAR FREQUENCY WIND GENERATED WAVE LOADING ADJUSTED FOR LOCAL BATHYMETRY

15. TIDAL DATUM INFORMATION IS BASED ON BENCHMARK SHEET FOR STATION ID 8518924, HAVERSTRAW BAY, NEW YORK, NEW YORK, PUBLISHED BY THE NATIONAL OCEANIC SERVICE (NOS). ELEVATIONS REFERENCE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
16. ALL HORIZONTAL POSITIONS ARE REFERRED TO THE NEW YORK STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM FOR 1983 (NAD 83).
17. TOPOGRAPHIC FEATURES TAKEN FROM "CITY OF POUGHKEEPSIE" MAPS, DATED 1/22/98, AS PRODUCED BY CHAZEN ENGINEERING AND LAND SURVEYING CO., PC AND SUPPLEMENTED BY MORRIS ASSOCIATES, MARCH 1999.
18. ADDITIONAL EXISTING CONDITION INFORMATION TAKEN FROM "EXISTING CONDITIONS PLAN PRELIMINARY", DATED 8/25/05, AS PRODUCED BY CHAZEN ENGINEERING AND LAND SURVEYING CO., PC.
19. HYDROGRAPHIC SURVEY PERFORMED BY OCEAN AND COASTAL CONSULTANTS, INC. ON DECEMBER 12, 1998.
20. (2) AS–BUILT SURVEY PROVIDED BY CLOUGH HARBOUR ASSOCIATES BASED ON INFORMATION PROVIDED BY CONTRACTOR.

SELECTIVE DEMOLITION AND DISPOSAL

1. SELECTIVE DEMOLITION AND DISPOSAL SHALL BE PERFORMED IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL PERMIT AND BUILDING CODE REQUIREMENTS.
2. THE CONTRACTOR SHALL REMOVE AND DISPOSE THOSE STRUCTURES AND DERELICT COMPONENTS REQUIRED TO PERFORM THE WORK. THIS WORK INCLUDES BUT IS NOT LIMITED TO TIMBER BULKHEAD, CONCRETE PLATFORMS, TIMBER PILES, CONCRETE AND TIMBER DEBRIS, STEEL DEBRIS, AND OTHER ITEMS THAT MAY NOT BE INDICATED ON THE DRAWINGS.
3. SELECTIVE DEMOLITION INCLUDES BUT IS NOT LIMITED TO REMOVAL AND REUSE (WHERE POSSIBLE) OF EXISTING MATERIALS, UTILITIES, AND OTHER COMPONENTS ESSENTIAL FOR A COMPLETE PROJECT.
4. THE CONTRACTOR SHALL TAKE REASONABLE CARE IN REMOVING ELEMENTS SELECTED TO BE DEMOLISHED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. DAMAGE OR DESTRUCTION BY THE CONTRACTOR TO EXISTING ELEMENTS DESIGNATED TO REMAIN SHALL BE REPAIRED OR REPLACED IN–KIND AT THE DISCRETION OF THE OWNER AT NO ADDITIONAL COST.
5. PRIOR TO COMMENCEMENT OF SELECTIVE DEMOLITION, THE CONTRACTOR SHALL SUBMIT A DISPOSAL PLAN FOR ITEMS TO BE DEMOLISHED. DEMOLITION MATERIAL DESIGNATED BY THE OWNER TO BE REMOVED FROM THE SITE SHALL BECOME THE PROPERTY OF THE CONTRACTOR. THE DEBRIS DISPOSAL PLAN SHALL ACKNOWLEDGE THIS OWNERSHIP AND SHALL IDENTIFY THE MEANS AND METHODS AND FINAL DISPOSITION FOR DISPOSAL MATERIALS.
6. PRIOR TO COMMENCEMENT OF DEMOLITION, THE CONTRACTOR SHALL CLEARLY MARK THE LIMITS OF THE DEMOLITION FOR REVIEW AND APPROVAL BY THE OWNER.
7. COMPLETELY REMOVE ITEMS DESIGNATED LEAVING SURFACES CLEAN, SOUND, AND READY TO RECEIVE NEW MATERIALS AS SPECIFIED IN THE CONTRACT DOCUMENTS.
8. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING THE COURSE OF DEMOLITION.
9. THE CONTRACTOR SHALL SUBMIT A DISPOSAL CERTIFICATE TO THE OWNER'S REPRESENTATIVE CERTIFYING LEGAL AND PROPER DISPOSAL.

TEMPORARY WORK

1. LABOR, EQUIPMENT, AND MATERIALS REQUIRED TO PERFORM THE WORK THAT, UPON COMPLETION, ARE NOT A PART OF THE WORK, SHALL BE FURNISHED, INSTALLED, AND SUBSEQUENTLY REMOVED FROM THE SITE BY THE CONTRACTOR.
2. TEMPORARY WORK SHALL BE SUBJECT TO THE REQUIREMENTS OF THE STATE AND APPLICABLE LOCAL BUILDING CODES.
3. THE CONTRACTOR SHALL SAFEGUARD AND PROTECT EXCAVATIONS.
4. DURING EXECUTION OF THE WORK, THE CONTRACTOR IS REQUIRED TO INSTALL AND MAINTAIN REQUIRED SEDIMENTATION AND EROSION CONTROL MEASURES TO PROTECT ADJACENT WATERWAYS, STREETS, AND PROPERTIES. MEASURES INCLUDE BUT ARE NOT LIMITED TO TEMPORARY BERMS, HAY BALES, SILT FENCES, CONTAINMENT BOOMS, AND TURBIDITY CURTAINS. IN ACCORDANCE WITH STATE REGULATORY AUTHORIZATIONS, THE CONTRACTOR SHALL FURNISH, INSTALL, MAINTAIN TEMPORARY TURBIDITY CURTAINS DURING CONSTRUCTION. TEMPORARY MATERIALS AND EQUIPMENT SHALL CONFORM TO REQUIREMENTS FOR TEMPORARY WORK.
5. THE CONTRACTOR SHALL LOCATE EROSION CONTROLS INCLUDING BUT NOT LIMITED TO SILT FENCE, HAY BALES, AND TRACKING PADS AS REQUIRED FOR ADEQUATE PROTECTION DURING CONSTRUCTION AND TO THE SATISFACTION OF THE LOCAL BUILDING OFFICIALS AND THE ENGINEER OF RECORD.

EXCAVATING, BACKFILLING, AND COMPACTION:

1. STRUCTURAL FILL SHALL CONSIST OF BROKEN OR CRUSHED STONE, BANK OR CRUSHED GRAVEL, OR MIXTURES THEREOF. BROKEN OR CRUSHED STONE SHALL CONSIST OF WELL–GRADED, SOUND, TOUGH, DURABLE STONE. BANK OR CRUSHED GRAVEL SHALL CONSIST OF WELL–GRADED, SOUND, TOUGH, DURABLE PARTICLES OF CRUSHED OR UNCRUSHED GRAVEL FREE FROM SOFT, THIN, ELONGATED OR LAMINATED PIECES AND ORGANIC OR OTHER DELETERIOUS SUBSTANCES. STRUCTURAL FILL SHALL WELL GRADED WITH 100% MASS PASSING THE 90mm (3.5") SQUARE MESH SIEVE. SUBMIT AN INDEPENDENT GRADATION ANALYSIS AND MODIFIED PROCTOR TEST FOR ENGINEER OF RECORD'S REVIEW. INCLUDE A REPRESENTATIVE SAMPLE OF THE FILL MATERIAL WITH THE SUBMITTAL.
2. THE CONTRACTOR SHALL EXCAVATE, BACKFILL, COMPACT, AND GRADE THE SITE TO THE ELEVATIONS AND LIMITS SHOWN AND AS NEEDED TO MEET THE REQUIREMENTS OF THE CONSTRUCTION.
3. STRUCTURAL FILL SHALL BE PLACED IN LAYERS NOT MORE THAN 8" IN LOOSE DEPTH. DO NOT PLACE FILL MATERIAL ON SURFACES THAT ARE MUDDY, FROZEN, OR CONTAINING FROST OR ICE. PLACE FILL MATERIALS EVENLY ADJACENT TO STRUCTURES, TO REQUIRED ELEVATIONS. TAKE CARE TO PREVENT WEDGING ACTION OF BACKFILL AGAINST STRUCTURES BY CARRYING THE MATERIAL UNIFORMLY AROUND THE STRUCTURE TO APPROXIMATELY THE SAME ELEVATION IN EACH LIFT.
4. CONTROL STRUCTURAL FILL COMPACTION DURING CONSTRUCTION TO PROVIDE THE MINIMUM PERCENTAGE OF DENSITY SPECIFIED FOR EACH AREA AS DETERMINED ACCORDING TO ASTM D1557. STRUCTURAL FILL AREAS SHALL NOT FALL BELOW 95% OF ITS DENSITY AT OPTIMUM MOISTURE CONTENT AS DETERMINED BY THE ABOVE TEST.

EROSION AND SEDIMENTATION CONTROL

1. SITE WORK SHALL NOT BE PERFORMED UNTIL SEDIMENT AND EROSION CONTROL DEVICES ARE INSTALLED.
2. EROSION AND SEDIMENTATION CONTROL DEVICES AND PROVISIONS SHALL BE MAINTAINED IN OPERATIONAL CONDITION BY THE CONTRACTOR AND SHALL BE REMOVED AND LEGALLY DISPOSED AT THE COMPLETION OF THE PROJECT.
3. TURBIDITY CURTAINS SHALL BE HEAVYWEIGHT TURBIDITY CURTAIN AS MANUFACTURED BY BOOM ENVIRONMENTAL PRODUCTS, SILTDAM TURBIDITY BARRIER AS MANUFACTURED BY SPILLDAM INC., OR EQUIVALENT
4. ALL SOIL EROSION AND SEDIMENTATION CONTROL MEASURES WILL BE INSPECTED WEEKLY DURING THE CONSTRUCTION PERIOD.
5. STOCKPILING OF MATERIALS WITHIN 500 YEAR FLOOD PLAIN (ZONE "A" AND "B") IS PROHIBITED UNLESS OTHERWISE SPECIFIED IN THE FLOOD CONTINGENCY PLAN.

GEOTEXTILE FABRIC

1. GEOTEXTILE FABRIC SHALL BE MIRAFI FILTERWEAVE FW–700 GEOTEXTILE FABRIC OR AN EQUIVALENT ACCEPTED BY THE ENGINEER OF RECORD.
2. INSTALL GEOTEXTILE FABRIC IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. MAINTAIN MINIMUM 12–INCH LAP AT ADJACENT SECTIONS.
3. PROVIDE ADEQUATE SLACK IN FABRIC DURING INSTALLATION BY PROVIDING CONTINUOUS 12 INCH FOLDS AT 15 FOOT CENTERS PARALLEL TO THE SHORELINE.
4. PROPERLY ANCHOR FABRIC TO PREVENT SLIDING OR TEARING DURING INSTALLATION OF OVERBURDEN MATERIAL.

RIPRAP SHORE PROTECTION

1. STONE SHALL BE OF A QUALITY TO INSURE PERMANENCE OF THE STRUCTURE IN THE CLIMATE IN WHICH IT IS TO BE USED. THE STONE SHALL BE FREE FROM ORGANIC DEBRIS, DURABLE, SOUND, FREE FROM DETRIMENTAL CRACKS, SEAMS, AND OTHER DEFECTS WHICH TEND TO INCREASE DETERIORATION FROM NATURAL CAUSES OR CAUSE BREAKAGE IN HANDLING OR PLACEMENT. ORGANICS, SAND, CLAY, CHERT AND ROCK FINES ARE PROHIBITED. THE STONE SHALL BE SELECTED GRANITE, QUARTZITE, RHYOLITE, OR LIMESTONE.
2. BEDDING STONE SHALL BE 2–INCH DIAMETER NOMINAL CRUSHED STONE.
3. RIPRAP ARMOR STONE SHALL CONFORM TO THE FOLLOWING GRADATION:

    NOMINAL SIZE: 1000 LB, 22 INCH DIAMETER
    W_{MIN} = 200 LB (DIAMETER= 13 INCHES)
    W_{50} = 1000 LB (DIAMETER= 22 INCHES)
    W_{MAX} = 2600 LB (DIAMETER= 30 INCHES)

    RIPRAP TOE STONE SHALL CONFORM TO THE FOLLOWING GRADATION:
    W_{MIN} = 1000 LB (DIAMETER= 22 INCHES)
    W_{50} = 2600 LB (DIAMETER= 30 INCHES)
    W_{MAX} = 4500 (DIAMETER= 36 INCHES)

4. ARMOR STONE SHALL HAVE A MINIMUM SIZE OF 12 INCHES MEASURED THE LEAST DIMENSION ACROSS ITS MIDSECTION.
5. NO MORE THAN 15% OF THE ARMOR SHALL BE SCATTERED SPALLS AND STONES LESS THAN 12 INCHES.
6. STONE SHALL BE PLACED IN A MANNER TO PRODUCE A WELL GRADED MASS WITHOUT CAUSING DISPLACEMENT OF THE UNDERLYING MATERIAL. THE FINISHED SURFACE SHALL BE FREE FROM POCKETS OF SMALL STONES AND CLUSTERS OF LARGE STONES.

CAST–IN–PLACE CONCRETE

1. UNLESS OTHERWISE SHOWN, LOCATE REINFORCING BARS WITH 4 INCH CLEAR DIMENSIONS TO FACE OF CONCRETE.
2. CONCRETE ACCESSORIES MUST BE ADEQUATE TO MAINTAIN REINFORCING ACCURATELY IN PLACE AND BE NON–CORROSIVE, NON–STAINING TYPE.
3. LAP BAR REINFORCEMENT IN CONCRETE ELEMENTS 51 BAR DIAMETERS, UNLESS OTHERWISE NOTED.
4. WELDED WIRE FABRIC REINFORCEMENT SHALL HAVE A MINIMUM SIDE AND END LAPS OF 12 INCHES.

PRECAST CONCRETE CAP REPAIR PRODUCTS (2)

1. PATCHING OF LIFTING INSERT LOCATIONS: PATCHED WITH SIKAGROUT 212 AS MANUFACTURED BY SIKA PRODUCTS, PRIOR TO PATCHING, EXISTING SURFACES COATED WITH SIKA ARMATEC 110 EPOCEM BONDING AGENT.
2. SPALLS AND VOIDS: BLENDCRETE AS MANUFACTURED BY PRO SPEC.
3. GAPS BETWEEN PRECAST CONCRETE FILLERS AND PRECAST CONCRETE CAPS: DRY PACKED WITH SIKAGROUT 212 AS MANUFACTURED BY SIKA PRODUCTS.
4. JOINTS CONTAINING FIELD CUT ENDS OF PRECAST CONCRETE CAP SECTIONS: JOINT FILLED WITH SIKABOOM POLYURETHANE SPRAY FOAM.

STRUCTURAL STEEL

1. STEEL HARDWARE:

PIPE (INCLUDING WALE SPACERS):	ASTM A 53 GRADE B, SCH. 40
ANCHOR BOLTS:	ASTM F 1554
CARRIAGE BOLTS:	ASTM A 307
HIGH STRENGTH STRUCTURAL BOLTS:	ASTM A 325 WITH HEX. HEADS
NUTS:	ASTM A 563
WASHERS (EXCEPT AGAINST TIMBER):	ASTM F 436

2. STEEL SHAPES AND PLATES, SHALL BE EPOXY COATED. STEEL HARDWARE SHALL BE HOT–DIPPED GALVANIZED.
3. BOLTED CONNECTIONS SHALL USE 3/4" DIAMETER A 325 HIGH–STRENGTH BOLTS.

PROTECTIVE COATING – STRUCTURAL STEEL (2)

1. MATERIAL USED FOR FACTORY EPOXY COATING OF ALL SCHEDULED SURFACES SHALL BE BAR– RUST 235 MULTI–PURPOSE EPOXY COATING AS MANUFACTURED BY DEVOE COATINGS OR EQUIVALENT ACCEPTED BY THE ENGINEER OF RECORD.
2. FIELD TOUCH–UP COATING SHALL BE IDENTICAL TO FACTORY COATING AND APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS.
3. PROTECTIVE COATING TOP COAT SHALL BE BLACK UNLESS OTHERWISE INDICATED ON THE DRAWINGS OR BY THE OWNER.
4. SURFACES SHALL BE PREPARED IN STRICT ACCORDANCE WITH THE PROTECTIVE COATING SYSTEM MANUFACTURER'S WRITTEN INSTRUCTIONS. SURFACES ARE TO BE ABRASION–BLASTED TO A NEAR–WHITE SURFACE CLEANLINESS IN ACCORDANCE WITH SSPC–SP–10. BLAST PROFILE ON STEEL SHALL BE 1.5 TO 2.5 MILS IN DEPTH AND BE OF A SHARP, JAGGED NATURE AS OPPOSED TO A "PEEN" PATTERN (FROM SHOT BLASTING). SURFACES MUST BE SOUND, DRY, CLEAN, FREE OF OIL, GREASE, DIRT, MILDEW, FORM RELEASE AGENTS, CURING COMPOUNDS, LOOSE AND FLAKING PAINT, GRIT DUST, AND OTHER FOREIGN SUBSTANCES. ROTO BLASTED SURFACES ARE NOT ACCEPTABLE.
5. THE PROTECTIVE COATING SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS. COATING IS TO BE APPLIED IN TWO COATS TO ACHIEVE A MINIMUM OVERALL DRY FILM THICKNESS OF 15 MILS.
6. ALL HOLIDAYS OR OTHER IMPERFECTIONS IN THE COATING SHALL BE REMOVED OR REPAIRED AT THE CONTRACTORS EXPENSE PRIOR TO FINAL ACCEPTANCE OF THE WORK.

PROTECTIVE COATING – STEEL SHEET PILING (2)

1. AS A CONTRACTOR REQUESTED SUBSTITUTION, FACTORY EPOXY COATING OF STEEL SHEET PILING WAS MACROPOXY 646 AS MANUFACTURED BY SHERWIN–WILLIAMS.
2. FIELD TOUCH–UP COATING IS IDENTICAL TO FACTORY COATING EXCEPT FOR AREAS BELOW ELEVATION +2.0' ON WATERWARD SIDE WHERE FX–764 HYDRO–ESTER SPLASH ZONE AND UNDERWATER PASTE WAS USED.

STEEL SHEET PILE INTERLOCK WATERSTOP

1. WATERSTOP SHALL BE ADEKA ULTRA SEAL A–30 WATERSTOP FOR STEEL SHEET PILE INTERLOCKS MANUFACTURED BY ADEKA ULTRA SEAL/OCM INC. AND DISTRIBUTED BY EPIC SALES, INC. P.O. BOX 77, HUNTINGTON, N.Y. 11742 (631–692–6704).
2. WATERSTOP FOR PENETRATIONS SHALL BE ADEKA ULTRA SEAL P–201 SEALANT AS MANUFACTURED BY ADEKA ULTRA SEAL/OCM INC. AND DISTRIBUTED BY EPIC SALES, INC. P.O. BOX 77, HUNTINGTON, N.Y. 11742 (631–692–6704).
3. WATERSTOP SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
4. INTERLOCKS AND PENETRATIONS SHALL BE CLEANED OF ALL DEBRIS AND OTHER DELETERIOUS MATERIALS.
5. INTERLOCK WATERSTOP SHALL BE INSTALLED FOR THE FULL LENGTH OF THE INSTALLED STEEL SHEET PILE.
6. PENETRATION WATERSTOP SHALL BE INSTALLED FOR THE FULL LENGTH (CIRCUMFERENCE) OF THE PENETRATION.
7. PENETRATION WATERSTOP SHALL BE INSTALLED ALONG THE LANDWARD FACE OF THE STEEL SHEET PILE.
8. ALLOW FOR AND PROVIDE PROPER CURING CONDITIONS IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
9. (2) FIELD REPAIR OF LEAKING INTERLOCKS (AFTER PILE DRIVING) WAS REPAIRED VIA THE FOLLOWING METHODS:
    - INSTALLATION OF KM STRING FOLLOWED BY SEALING WITH P–201 SEALANT ON THE UPLAND SIDE OF THE INTERLOCK. KM STRING AND P–201 SEALANT AS MANUFACTURED BY ADEKA ULTRA SEAL/OCM INC.
    - SEALED WITH FX–764 HYDRO–ESTER SPLASH–ZONE AND UNDERWATER PASTE AS MANUFACTURED BY FOX INDUSTRIES.

RECORD DRAWING

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No.	Submittal / Revision	App'd	By	Date
1	SHEET NUMBER REVISED		ADS	8/6/07
2	RECORD DRAWING		JVB	2/11/11

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OCC Project No. 98042.3

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H.R. | Drawn By:

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DeLAVAL PROPERTY
ENVIRONMENTAL RESTORATION
PROGRAM PROJECT

WATERFRONT PROJECT NOTES

Issue Date: 07/17/07 | Project No.: 14357 | Scale: NONE

W-17
Sheet 17 of 29

P:\1998\98042.3\cadd\Task10\Record drawings\W-17.dwg W-17 Rey T. Bustelo Wed, 16 Feb 2011 - 11:03am

E 645000
N 1041500
N 1042000
E 645000

HUDSON RIVER

EBB
FLOOD

NORTH

ZONE 1 | ZONE 2 | ZONE 3

APPROX. PROPERTY LINE
LIMIT OF PROJECT

DeLAVAL PROPERTY SHORELINE – 2236± LF (MEASURED AT MHW)

REMAINS OF CONCRETE SEAWALL ON PILE SUPPORTED TIMBER PLATFORM AND TIMBER BULKHEAD – 2236± LF (MEASURED AT MHW)

TIMBER PLATFORM
PORTION OF TIMBER PLATFORM EXPOSED
REMAINS OF CONCRETE SEAWALL
REMAINS OF TIMBER BULKHEAD
REMAINS OF TIMBER FENDERING
H SIM.
36"ø STORM SEWER OUTFALL WITH CONC. HEADWALL
S.H.W., M.H.W. & M.L.W. ALONG FACE OF BULKHEAD
TIMBER FENDERING
BENCHMARK
BOX CUT @ WINGWALL
ELEV=5.3
SINKHOLE
APPROX. EXTENT OF TIMBER PLATFORM
GRAVEL DRIVEWAY
CONC. RETAINING WALL
DeLAVAL PROPERTY
FEMA FLOOD ZONE "B"
LIMIT OF FEMA ZONE "A4"
APPROX. PROPERTY LINE
EXISTING GRAVEL/DIRT ROAD
EXISTING GRAVEL ROAD
RAILROAD TRACKS
TIMBER LIGHTPOLE (TYP.)
MATCHLINE "A" – FOR CONTINUATION, SEE DRAWING No. W-19

LEGEND

- SOIL BORING AND NUMBER
- SINKHOLE OR SEVERE EROSION

NOTES

1. SEE DRAWING NUMBER W-17 FOR WATERFRONT PROJECT NOTES.
2. UPLAND STRUCTURES TO REMAIN UNLESS NOTED OTHERWISE.

GRAPHIC SCALES
CHECK GRAPHIC SCALES BEFORE USING
1"=50'-0" 0 50 100 FT.

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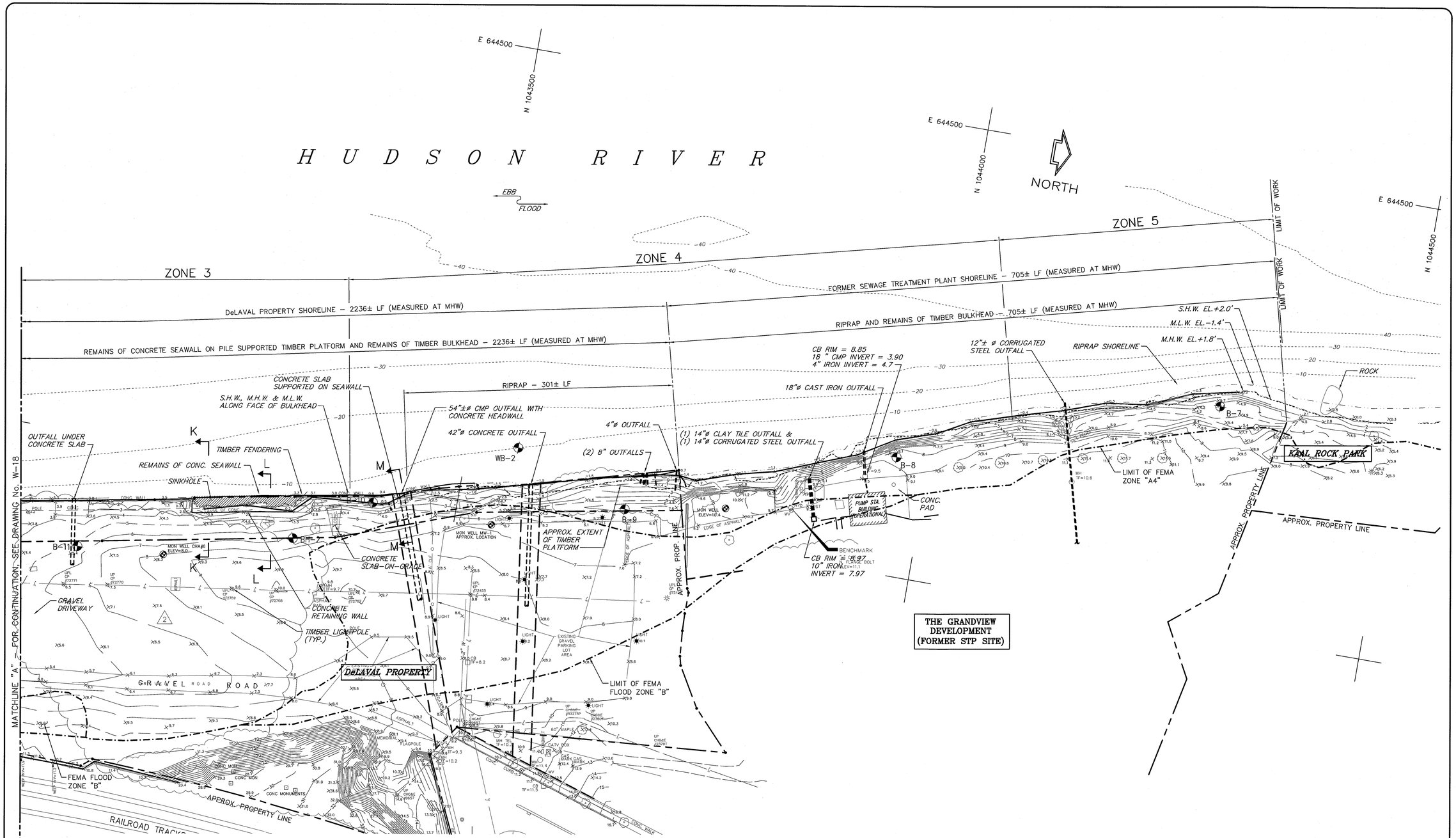
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EXISTING WATERFRONT PLAN
SHEET 1 OF 2

Issue Date: 07/17/07 | Project No.: 14357 | Scale: 1"=50'-0"

W-18
Sheet 18 of 29

P:\1998\98042.3\Cadd\Task10\Record drawings\W-18.dwg W-18 Rey T. Buzetta Tue, 15 Feb 2011 - 11:41am



LEGEND

- SOIL BORING AND NUMBER
- SINKHOLE OR SEVERE EROSION

NOTES

1. SEE DRAWING NUMBER W–17 FOR WATERFRONT PROJECT NOTES.
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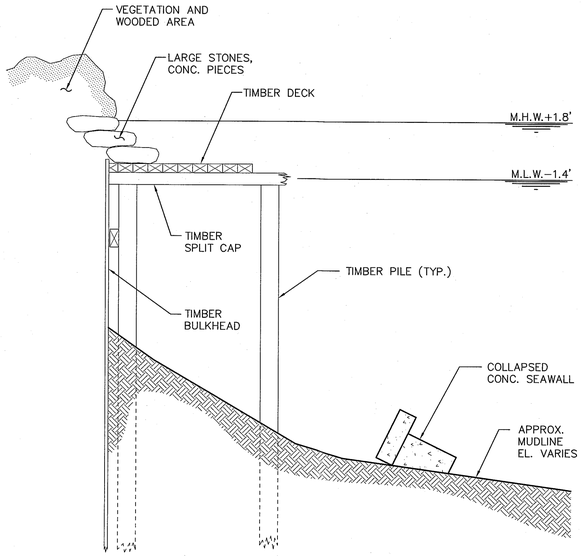
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PROGRAM PROJECT

EXISTING WATERFRONT PLAN
SHEET 2 OF 2

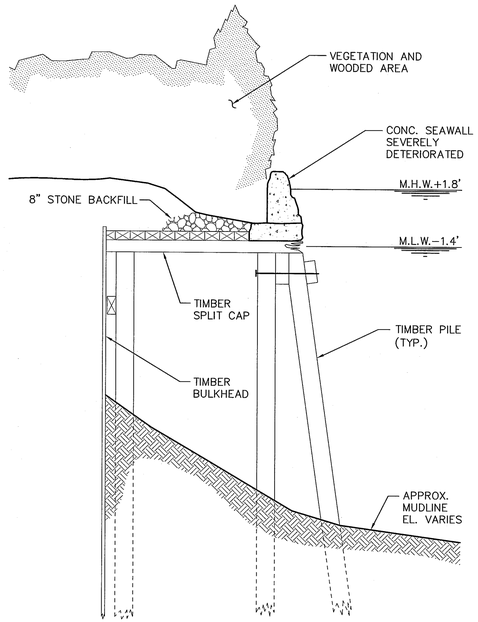
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W-19
Sheet 19 of 29

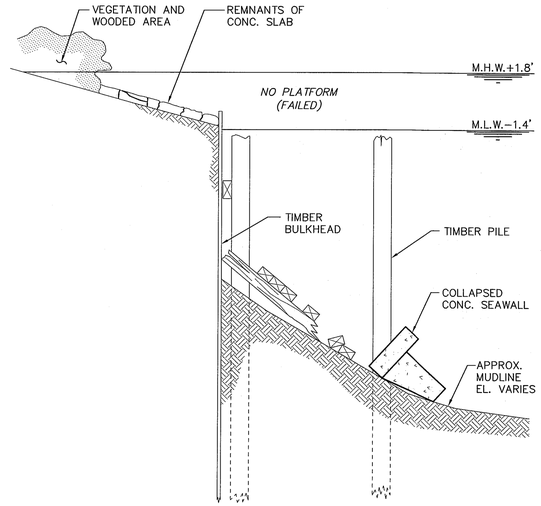
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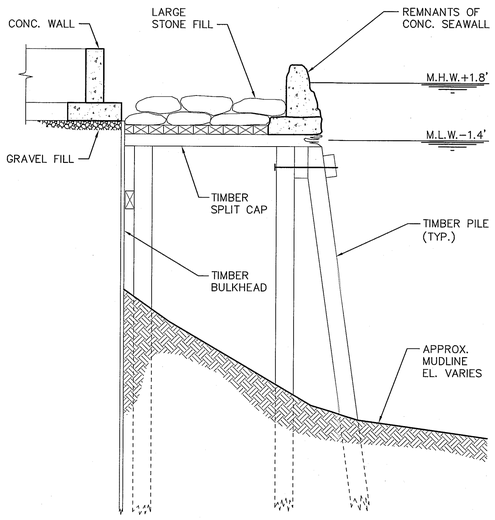
SECTION A–A
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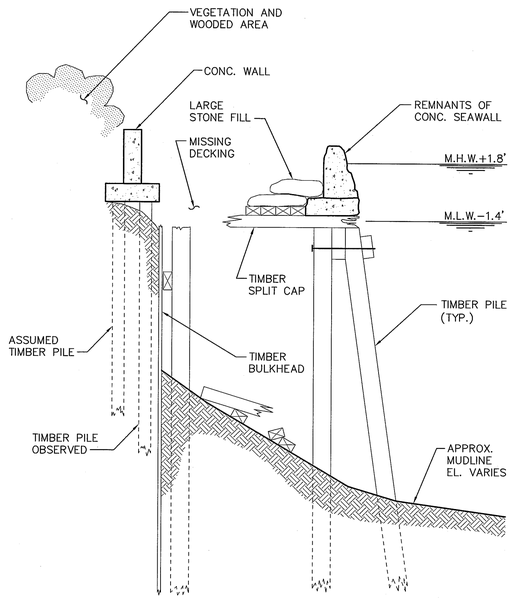
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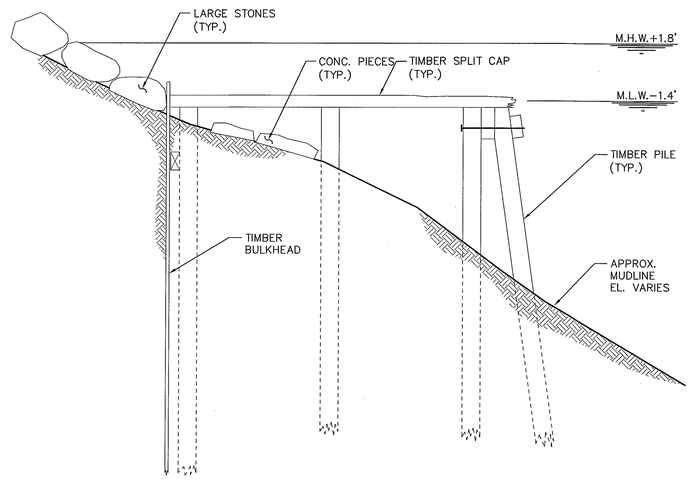
SECTION C–C
NOT TO SCALE



SECTION D–D
NOT TO SCALE



SECTION E–E
NOT TO SCALE



SECTION F–F
NOT TO SCALE

NOTES

1. SEE DRAWING NUMBER W–17 FOR WATERFRONT PROJECT NOTES.
2. FOR LOCATION OF SECTIONS A–A THRU F–F, SEE DRAWING NO. W–18.

RECORD DRAWING

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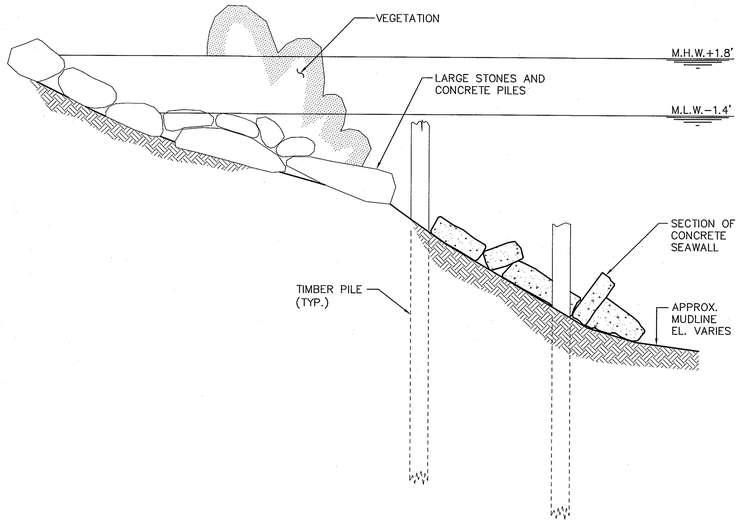
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EXISTING SECTIONS
SHEET 1 OF 2

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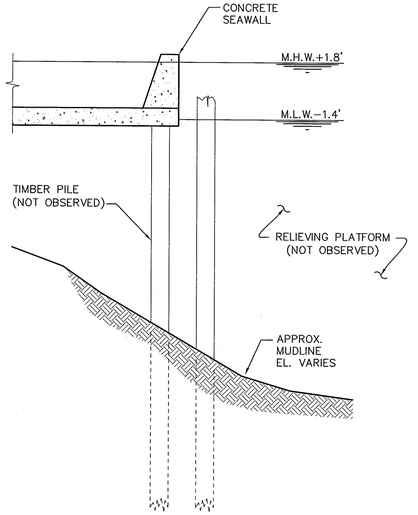
W-20
Sheet 20 of 29

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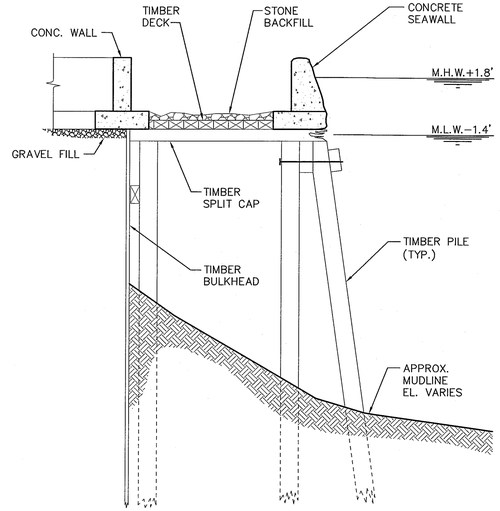
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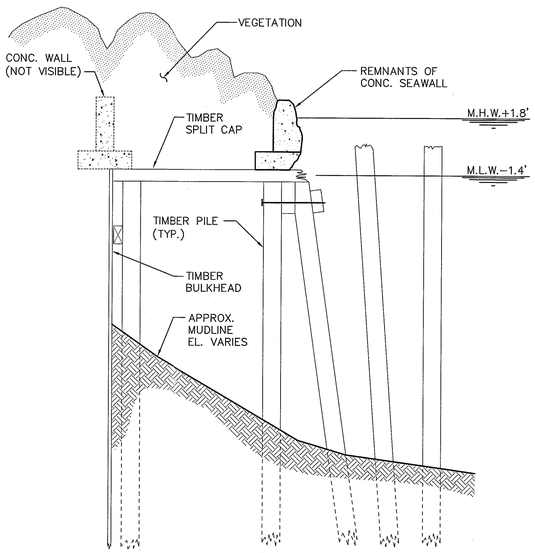
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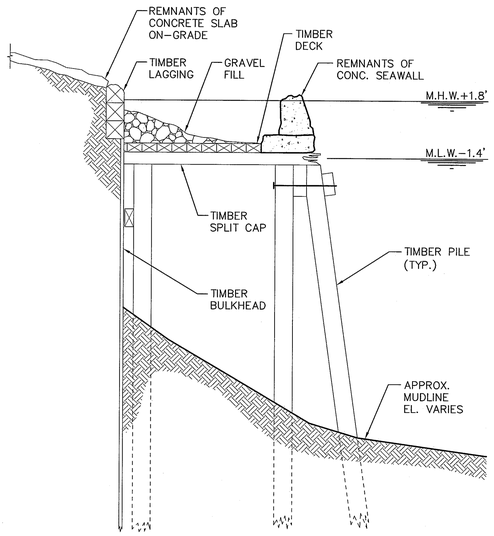
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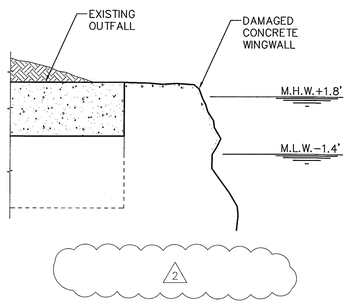
SECTION K–K

NOT TO SCALE



SECTION L–L

NOT TO SCALE



SECTION M–M

NOT TO SCALE

NOTES

1. SEE DRAWING NUMBER W–17 FOR WATERFRONT PROJECT NOTES.
2. FOR LOCATION OF SECTIONS G–G THRU J–J, SEE DRAWING NUMBER W–18.
3. FOR LOCATION OF SECTIONS K–K THRU M–M, SEE DRAWING NUMBER W–19.

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EXISTING SECTIONS
SHEET 2 OF 2

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W-21
Sheet 21 of 29

P:\1998\98042.3\Coast\Task10\Record drawings\W-21.dwg W-21 Rey T. Buzeta Tue, 15 Feb 2011 - 11:42am

E 645000
N 1041500
E 645000
N 1042000
H U D S O N R I V E R
NORTH
EBB
FLOOD
N 1042500
E 645000
E 645000

APPROX. PROPERTY LINE
LIMIT OF PROJECT

ZONE 1 = 381± L.F.
AZ 26 EPOXY-COATED STEEL SHEET PILE BULKHEAD WITH TOE PROTECTION
(SOUTHERN 50'± ZONE 1 IS REVETMENT ONLY)

ZONE 2 = 848± L.F.
RIRAP REVETMENT

ZONE 3 = 658± L.F.
CANTILEVERED AZ 26 EPOXY COATED STEEL SHEET PILE
BULKHEAD WITH TOE PROTECTION

S.H.W. EL.+2.0', M.H.W. EL.+1.8', & M.L.W. EL.-1.4'
ALONG FACE OF BULKHEAD
FUTURE KAYAK LAUNCH FLOAT (BY OTHERS)
PRECAST CONC. BULKHEAD CAP
24"ø HDPE OUTFALL WITH CONCRETE COLLAR INV.=+2.22'
24"ø HDPE OUTFALL WITH BACKFLOW PREVENTER AND PRECAST CONC. HEADWALL INV.=+0.19'
RIPRAP TOE PROTECTION
M.L.W. EL.-1.4'
M.H.W. EL.+1.8'
S.H.W. EL.+2.0'
AA
RIPRAP (TYP.)
24"ø HDPE OUTFALL WITH BACKFLOW PREVENTER AND PRECAST CONC. HEADWALL INV.=+0.20'
EXIST. 36"ø STORMWATER OUTFALL WITH CONC. HEADWALL INV.=-0.60'
S.H.W. EL.+2.0', M.H.W. EL.+1.8', & M.L.W. EL.-1.4' ALONG FACE OF BULKHEAD
PRECAST CONC. BULKHEAD CAP
RIPRAP TOE PROTECTION
AZ 12 STEEL SHEET PILE DEADMAN (UNCOATED)
CAST-IN-PLACE CONCRETE DEADMAN

DeLAVAL PROPERTY

PROPERTY LINE
FEMA FLOOD ZONE "B"
LIMIT OF FEMA ZONE "A4"
PROPERTY LINE
EXISTING GRAVEL ROAD
LIMIT OF FEMA ZONE "A4"
FEMA FLOOD ZONE "B"
RAILROAD TRACKS

MATCHLINE "A" - FOR CONTINUATION, SEE DRAWING No. W-23

NOTES

1. SEE DRAWING NUMBER W-17 FOR WATERFRONT PROJECT NOTES.
2. FOR BULKHEAD PLAN, SEE DRAWING NUMBER W-24.
3. FOR TYPICAL BULKHEAD SECTIONS, SEE DRAWING NUMBER W-25.
4. FOR SECTION AA REVETMENT SECTIONS, SEE DRAWING NUMBER W-28.
5. COORDINATES ARE REFERRED TO THE NEW YORK STATE PLANE SYSTEM, NORTH AMERICAN DATUM FOR 1983 (NAD-83).
6. REFER TO CHA DRAWINGS FOR UPLAND FEATURES NOT SHOWN.

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1	REVISED GRADING		ADS	7/9/07
2	SHEET NUMBER REVISED		ADS	8/6/07
3	POINT COORDINATES ADDED		JVB	5/28/08
4	RECORD DRAWING		JVB	2/11/11

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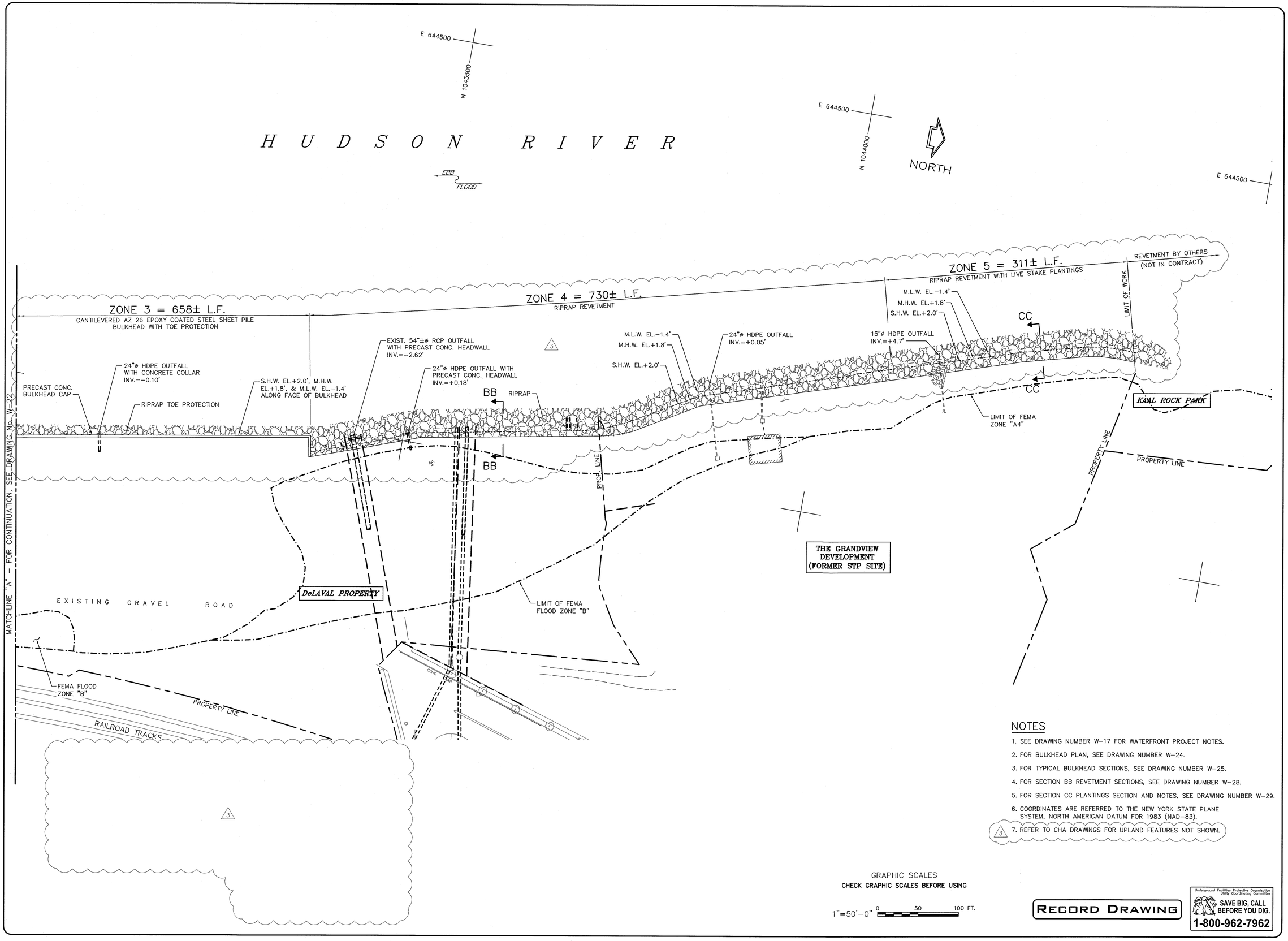
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DeLAVAL PROPERTY
ENVIRONMENTAL RESTORATION
PROGRAM PROJECT

WATERFRONT REPAIR PLAN
SHEET 1 OF 2

Issue Date: 07/17/07 | Project No.: 14357 | Scale: 1"=50'-0"

W-22
Sheet 22 of 29



NOTES

1. SEE DRAWING NUMBER W-17 FOR WATERFRONT PROJECT NOTES.
2. FOR BULKHEAD PLAN, SEE DRAWING NUMBER W-24.
3. FOR TYPICAL BULKHEAD SECTIONS, SEE DRAWING NUMBER W-25.
4. FOR SECTION BB REVETMENT SECTIONS, SEE DRAWING NUMBER W-28.
5. FOR SECTION CC PLANTINGS SECTION AND NOTES, SEE DRAWING NUMBER W-29.
6. COORDINATES ARE REFERRED TO THE NEW YORK STATE PLANE SYSTEM, NORTH AMERICAN DATUM FOR 1983 (NAD-83).
7. REFER TO CHA DRAWINGS FOR UPLAND FEATURES NOT SHOWN.

GRAPHIC SCALES
CHECK GRAPHIC SCALES BEFORE USING
1"=50'-0" 0 50 100 FT.

RECORD DRAWING

Underground Facilities Protective Organization Utility Coordinating Committee
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No.	Submittal / Revision	App'd	By	Date
1	SHEET NUMBER REVISED		ADS	8/6/07
2	POINT COORDINATES ADDED		JVB	3/28/08
3	RECORD DRAWING		JVB	2/11/11

City of Poughkeepsie
62 CIVIC CENTER PLAZA
POUGHKEEPSIE, NEW YORK 12602

STATE OF NEW YORK — JOHN V. BUZZETTA — 075 — LICENSED PROFESSIONAL ENGINEER
02/11/2011

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OCC Project No. 98042.3

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A.I.M.	C.L.M.	S.M.W.

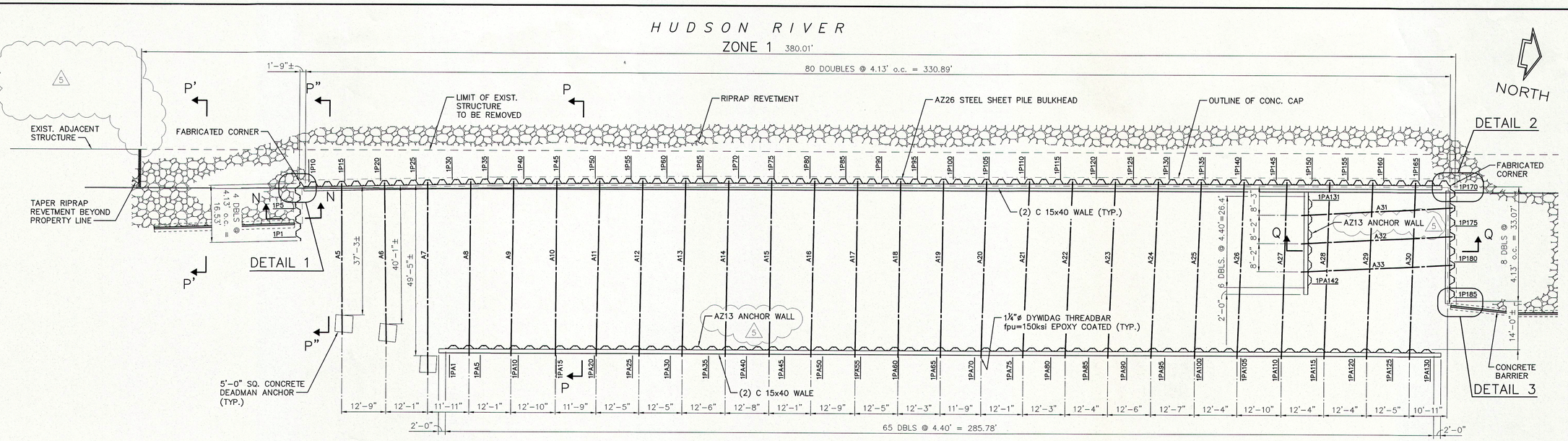
DeLAVAL PROPERTY
ENVIRONMENTAL RESTORATION
PROGRAM PROJECT

WATERFRONT REPAIR PLAN
SHEET 2 OF 2

Issue Date: 07/17/07	Project No.: 14357	Scale: 1"=50'-0"

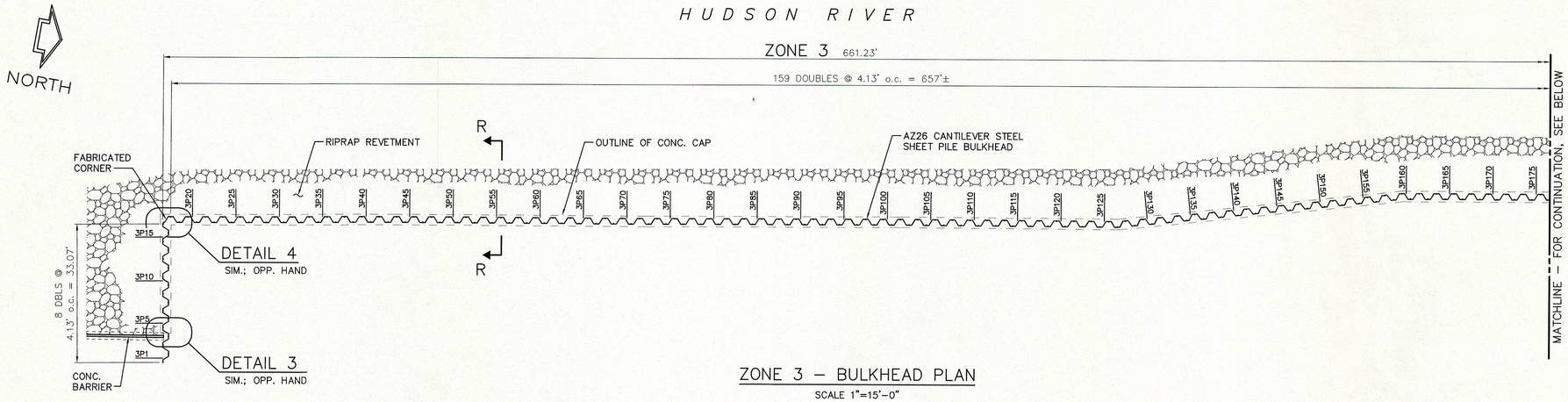
W-23
Sheet 23 of 29

P:\1998\98042.3\Cadd\Task10\Record drawings\W-22.dwg W-23 Rey T. Buzeta Wed, 16 Feb 2011 - 3:43pm



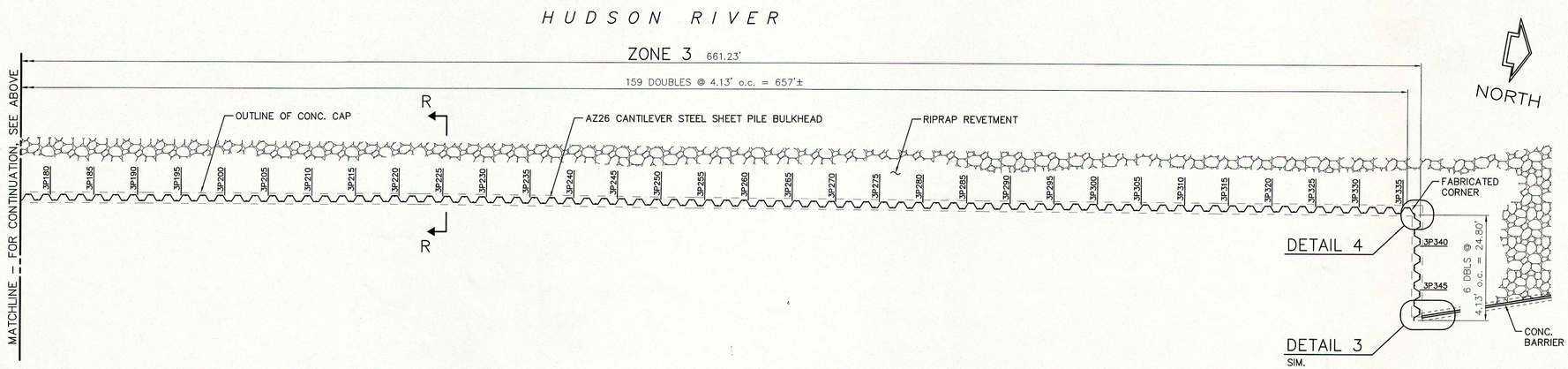
ZONE 1 – BULKHEAD PLAN

SCALE 1"=15'-0"



ZONE 3 – BULKHEAD PLAN

SCALE 1"=15'-0"



ZONE 3 – BULKHEAD PLAN

SCALE 1"=15'-0"

NOTES

1. SEE DRAWING NUMBER W-17 FOR WATERFRONT PROJECT NOTES.
2. FOR SECTIONS N–N THRU R–R, SEE DRAWING NUMBER W-25.
3. FOR DETAILS 1 THROUGH 4, SEE DRAWING NUMBER W-26.
4. FOR CONCRETE ANCHOR BLOCK DETAILS, SEE DRAWING NUMBER W-26.

GRAPHIC SCALES

CHECK GRAPHIC SCALES BEFORE USING

1"=15'-0" 0 15 30 FT.

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1	SHEET NUMBER REVISED		ADS	8/6/07
2	POINT COORDINATES ADDED		JVB	5/28/08
3	RECORD DRAWING		JVB	2/11/11
4	RECORD DRAWING REVISION		JVB	12/7/11
5	RECORD DRAWING REVISION		JVB	4/3/12

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Checked By: S.M.W. | Drawn By: C.L.M. | Designed By: A.I.M.

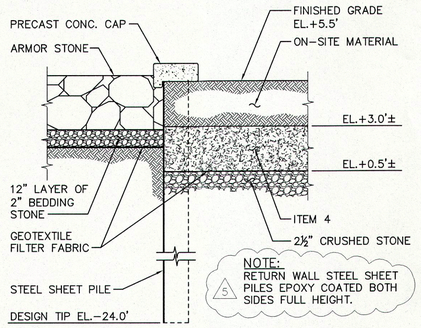
DeLAVAL PROPERTY
ENVIRONMENTAL RESTORATION
PROGRAM PROJECT

ZONES 1 AND 2
BULKHEAD PLAN

Issue Date: 07/17/07 | Project No.: 14357 | Scale: 1"=15'-0"

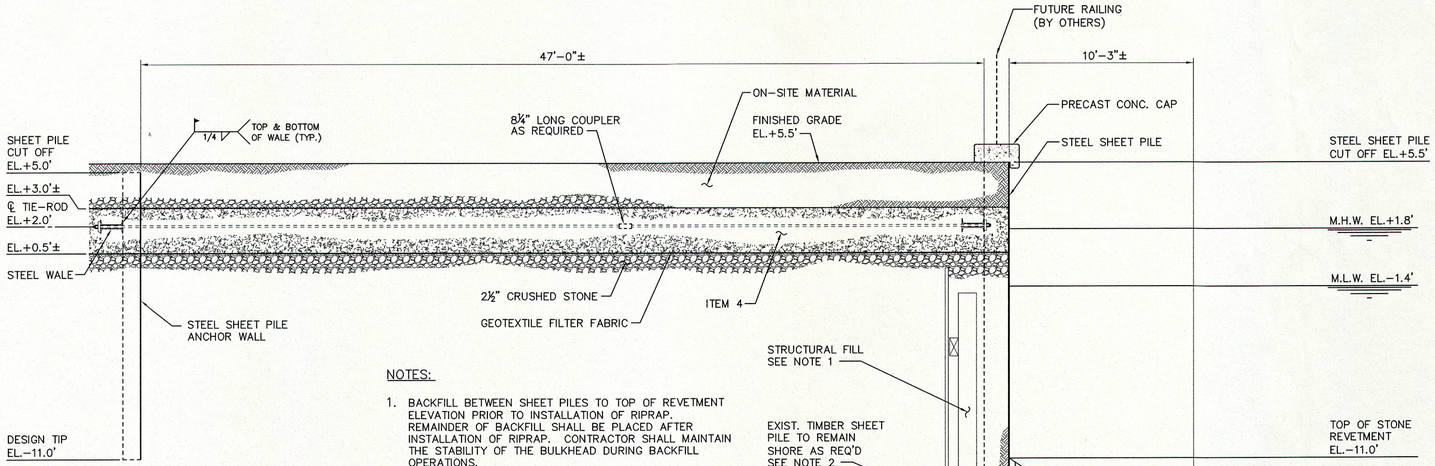
W-24
Sheet 24 of 29

P:\1998\98042_3\Cadd\Task10\Record drawings\W-24.dwg W-24 Rey T. Buzeta Tue, 03 Apr 2012 - 3:35pm



SECTION N–N

SCALE ¼"=1'–0"

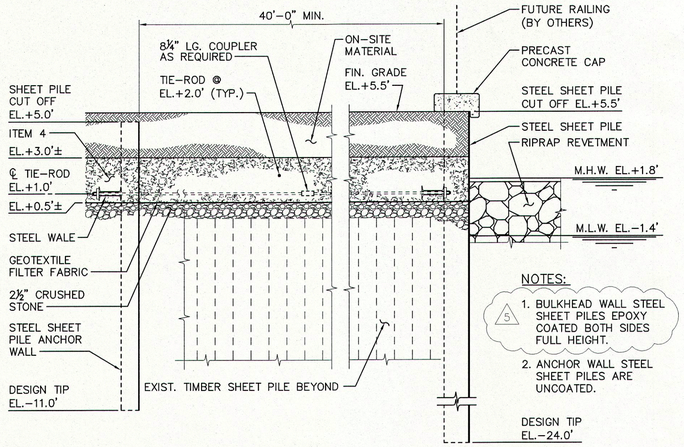


NOTES:

1. BACKFILL BETWEEN SHEET PILES TO TOP OF REVETMENT ELEVATION PRIOR TO INSTALLATION OF RIPRAP. REMAINDER OF BACKFILL SHALL BE PLACED AFTER INSTALLATION OF RIPRAP. CONTRACTOR SHALL MAINTAIN THE STABILITY OF THE BULKHEAD DURING BACKFILL OPERATIONS.
2. CONTRACTOR TO STABILIZE EXISTING TIMBER SHEETS DURING DEMOLITION OF RELIEVING PLATFORM.
3. IF WATER DEPTH AT TOE OF BULKHEAD IS GREATER THAN 10 FEET AT M.L.W., GEOTEXTILE FILTER FABRIC AND BEDDING STONE MAY BE OMITTED.
4. BULKHEAD WALL STEEL SHEET PILES EPOXY COATED BOTH SIDES FULL HEIGHT.
5. ANCHOR WALL STEEL SHEET PILES ARE UNCOATED.

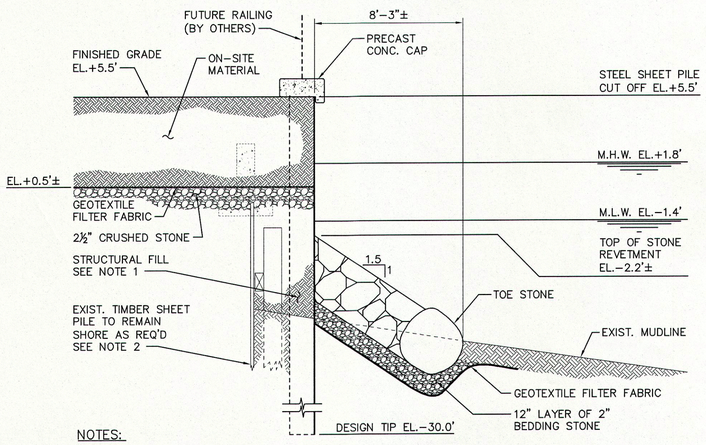
SECTION P–P

SCALE ¼"=1'–0"



SECTION Q–Q

SCALE ¼"=1'–0"

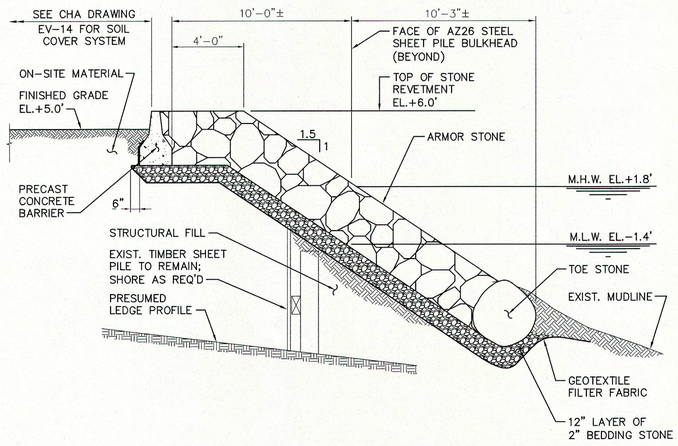


NOTES:

1. BACKFILL BETWEEN SHEET PILES TO TOP OF REVETMENT ELEVATION PRIOR TO INSTALLATION OF RIPRAP. REMAINDER OF BACKFILL SHALL BE PLACED AFTER INSTALLATION OF RIPRAP. CONTRACTOR SHALL MAINTAIN THE STABILITY OF THE BULKHEAD DURING BACKFILL OPERATIONS.
2. CONTRACTOR TO STABILIZE EXISTING TIMBER SHEETS DURING DEMOLITION OF RELIEVING PLATFORM.
3. IF WATER DEPTH AT TOE OF BULKHEAD IS GREATER THAN 10 FEET AT M.L.W., GEOTEXTILE FILTER FABRIC AND BEDDING STONE MAY BE OMITTED.
4. BULKHEAD WALL AND RETURN STEEL SHEET PILING EPOXY COATED BOTH SIDES FULL HEIGHT.

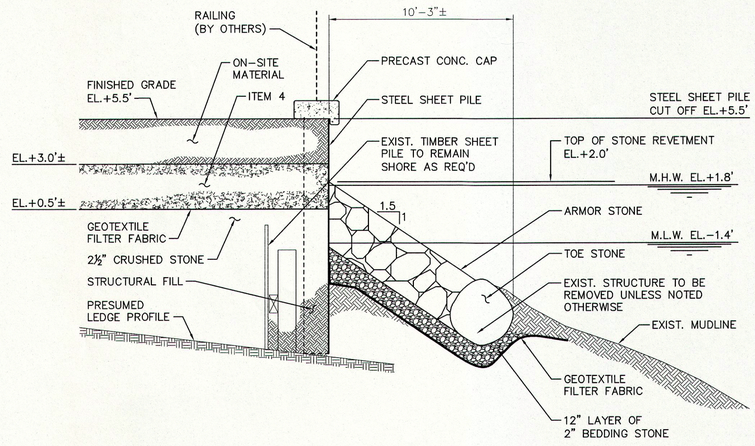
SECTION R–R

SCALE ¼"=1'–0"



SECTION P'–P'

SCALE ¼"=1'–0"



SECTION P"–P"

SCALE ¼"=1'–0"

NOTES

1. SEE DRAWING NUMBER W–17 FOR WATERFRONT PROJECT NOTES.
2. FOR LOCATION OF SECTIONS N–N THRU R–R, SEE DRAWING NUMBER W–24.

GRAPHIC SCALES

CHECK GRAPHIC SCALES BEFORE USING

¼"=1'–0" 0 4 8 FT.

RECORD DRAWING

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No.	Submittal / Revision	App'd	By	Date
1	REVISED SECTION N–N		ADS	7/9/07
2	SHEET NUMBER REVISED		ADS	8/6/07
3	RECORD DRAWING		JVB	2/11/11
4	RECORD DRAWING REVISION		JVB	12/7/11
5	RECORD DRAWING REVISION		JVB	4/3/12

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ENVIRONMENTAL RESTORATION
PROGRAM PROJECT

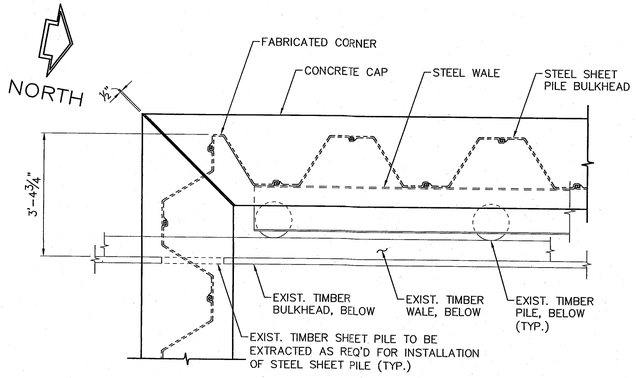
TYPICAL BULKHEAD SECTIONS

Issue Date: 07/17/07 | Project No.: 14357 | Scale: 1/4"=1'-0"

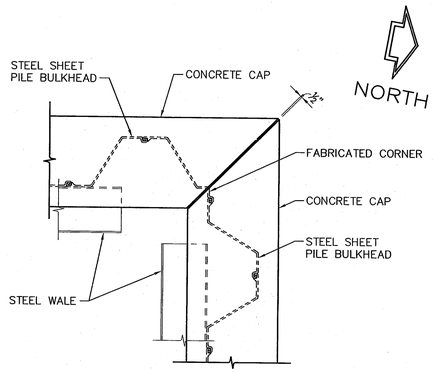
W-25

Sheet 25 of 29

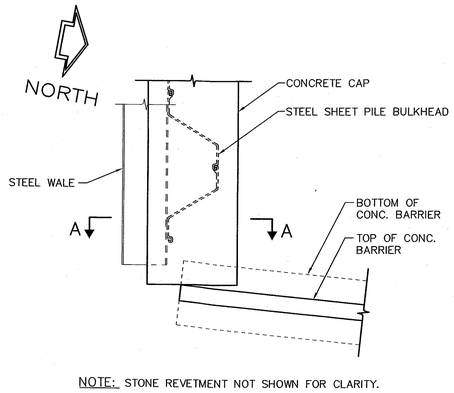
P:\1998\98042.3\Cadd\Task10\Record drawings\W-25.dwg W-25 Rey T Buzeta Wed, 04 Apr 2012 - 8:17am



DETAIL 1
SCALE ½"=1'-0"

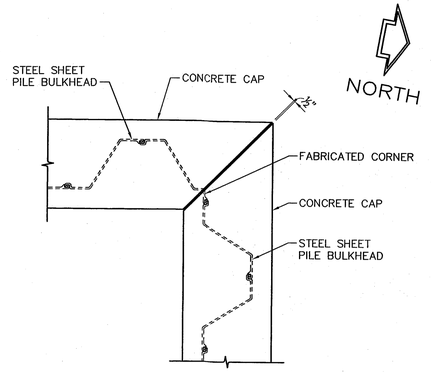


DETAIL 2
SCALE ½"=1'-0"

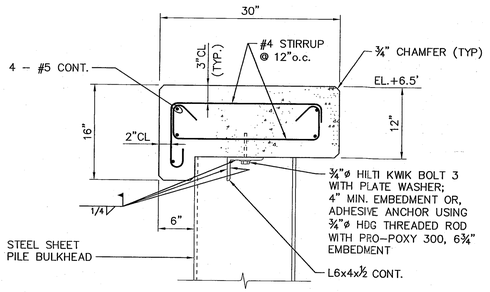


NOTE: STONE REVETMENT NOT SHOWN FOR CLARITY.

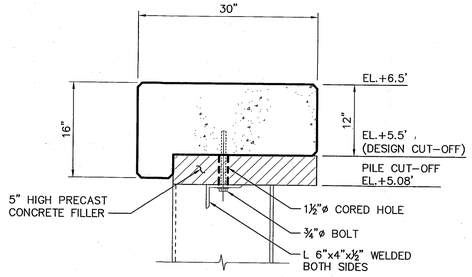
DETAIL 3
SCALE ½"=1'-0"



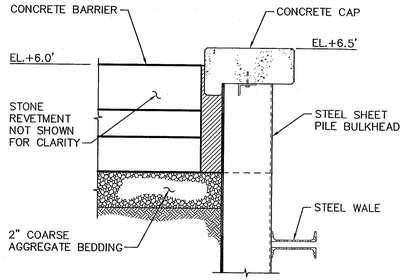
DETAIL 4
SCALE ½"=1'-0"



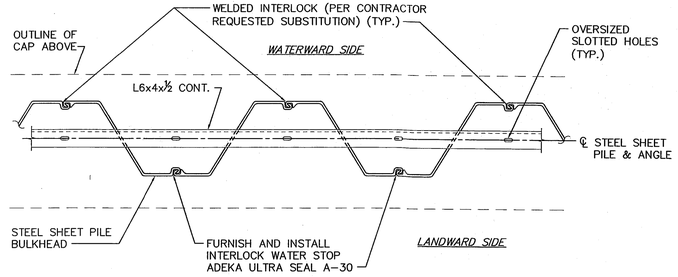
TYPICAL CAP SECTION
SCALE 1"=1'-0"



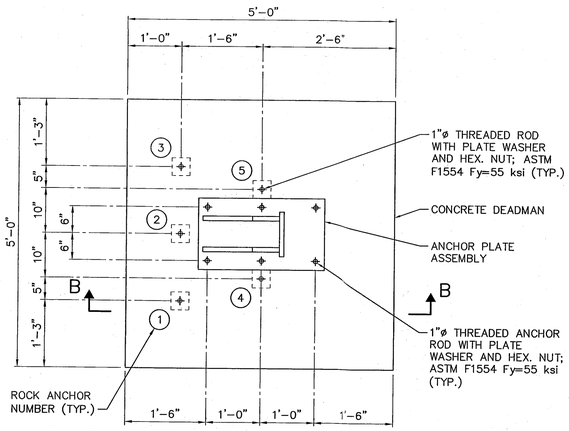
CAP SECTION REPAIR FOR LOW ELEVATION OF TOP OF STEEL SHEET PILE
SCALE 1"=1'-0"



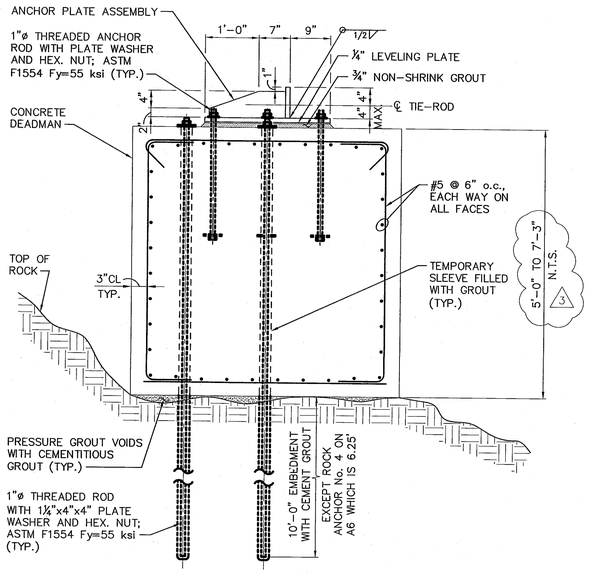
SECTION A–A
SCALE ½"=1'-0"



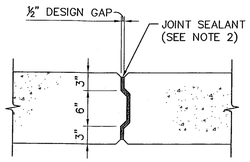
CONCRETE CAP CLIP ANGLE LAYOUT AND WATERSTOP LAYOUT
SCALE ¾"=1'-0"



CONCRETE DEADMAN ANCHOR DETAIL
SCALE ¾"=1'-0"



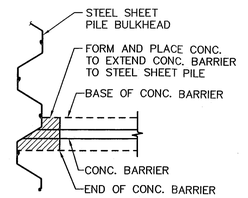
SECTION B–B
SCALE ¾"=1'-0"



NOTES:

1. MINIMUM SPACING OF SHEAR KEYS IS 8'–0" CENTER TO CENTER, MAXIMUM SPACING IS 25'–0" CENTER TO CENTER. CONTRACTOR TO DETAIL SPACING ON SHOP DRAWINGS.
2. JOINTS WERE SEALED WITH SIKAFLEX–2C NS TG AS MANUFACTURED BY SIKA CORPORATION. JOINTS WERE SEALED DUE TO THE CONTRACTORS EXCEEDENCE OF THE SPECIFIED ½" GAP.

TYPICAL CONCRETE CAP SHEAR KEY
SCALE 1"=1'-0"



TYPICAL CLOSURE DETAIL AT STEEL SHEET PILE – CONCRETE BARRIER
SCALE ¼"=1'-0"

NOTES

1. SEE DRAWING NUMBER W–17 FOR WATERFRONT PROJECT NOTES.
2. FOR LOCATION OF DETAILS 1 THROUGH 4, SEE DRAWING NUMBER W–24.

GRAPHIC SCALES
CHECK GRAPHIC SCALES BEFORE USING

¼"=1'–0" 0 4 8 FT.
½"=1'–0" 0 1 4 FT.
¾"=1'–0" 0 1 2 3 FT.
1"=1'–0" 0 1 2 FT.

RECORD DRAWING

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2	RECORD DRAWING		JVB	2/11/11
3	RECORD DRAWING REVISION		JVB	12/7/11

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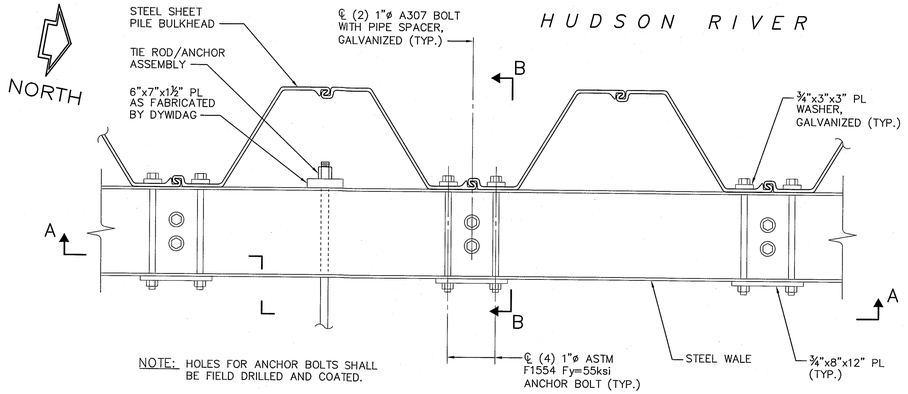
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BULKHEAD SECTIONS AND DETAILS - SHEET 1 OF 2

Issue Date: 07/17/07 — Project No.: 14357 — Scale: 1/2"=1'-0"

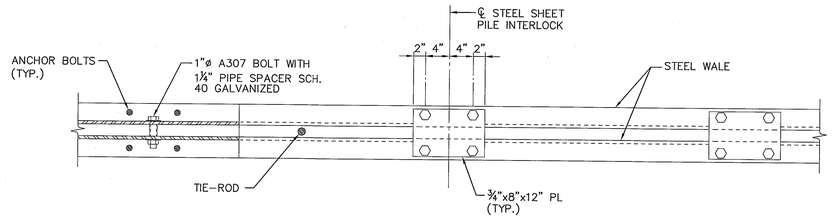
W-26
Sheet 26 of 29

P:\1998\98042.3\Cadd\Task10\Record drawings\W-26.dwg W-26 Hajim H. Ramirez Wed, 07 Dec 2011 - 8:35am



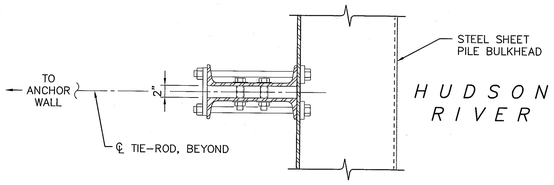
TYPICAL BULKHEAD WALE DETAIL

SCALE 1"=1'–0"



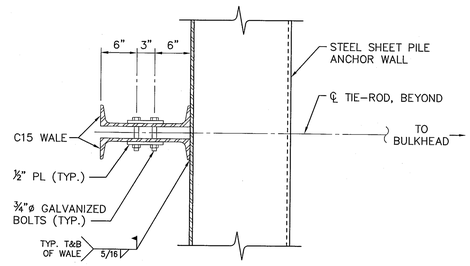
SECTION A–A

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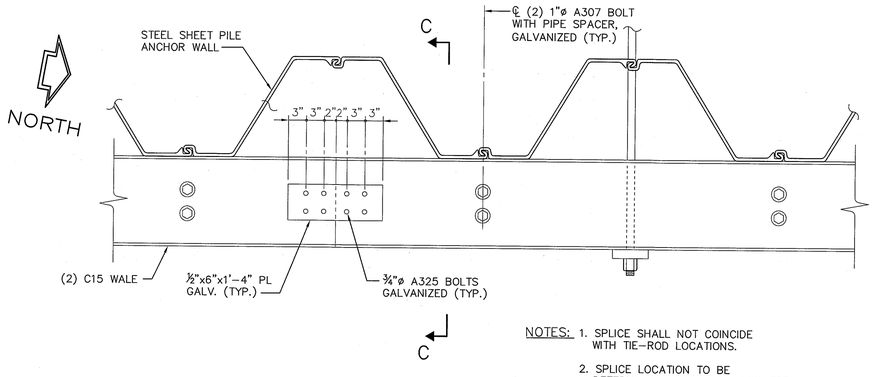
SECTION B–B

SCALE 1"=1'–0"



SECTION C–C

SCALE 1"=1'–0"

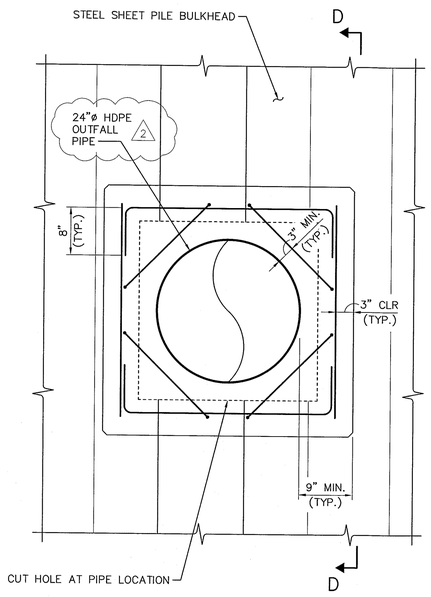


NOTES: 1. SPLICE SHALL NOT COINCIDE WITH TIE–ROD LOCATIONS.

2. SPLICE LOCATION TO BE DETERMINED BY STEEL FABRICATOR.

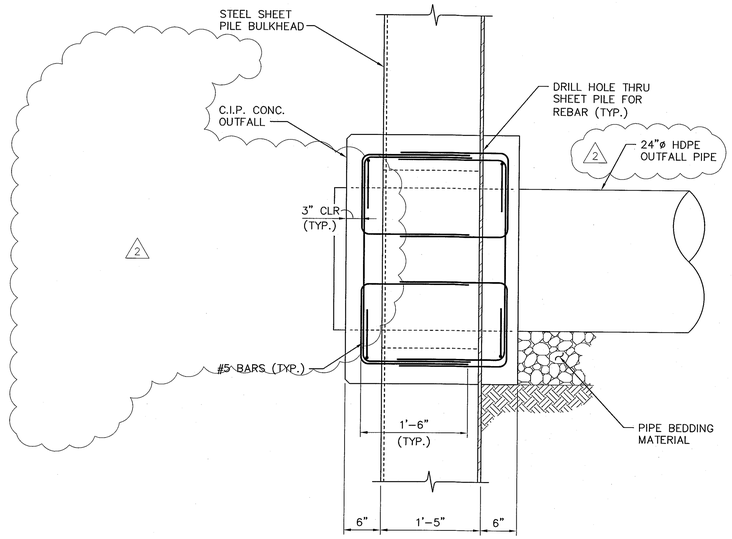
TYPICAL ANCHOR WALL WALE SPLICE DETAIL

SCALE 1"=1'–0"



2 OUTFALL AT BULKHEAD ELEVATION (ZONE 3)

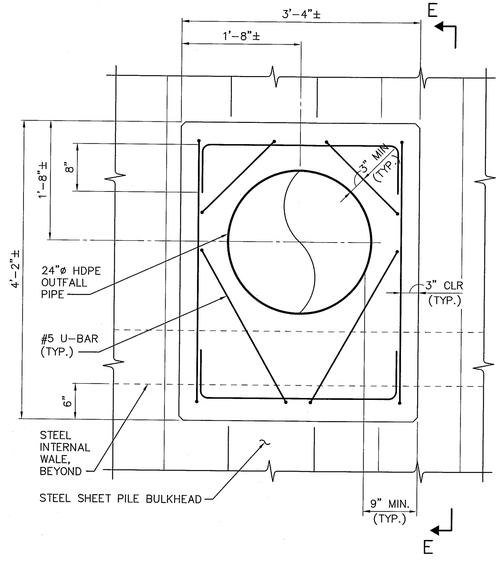
SCALE 1"=1'–0"



NOTE: OUTFALL PIPE SHALL EXTENDED SEAWARD OF BULKHEAD AS REQUIRED IN ORDER TO MEET MANUFACTURER'S RECOMMENDATION FOR INSTALLATION OF BACKFLOW PREVENTER.

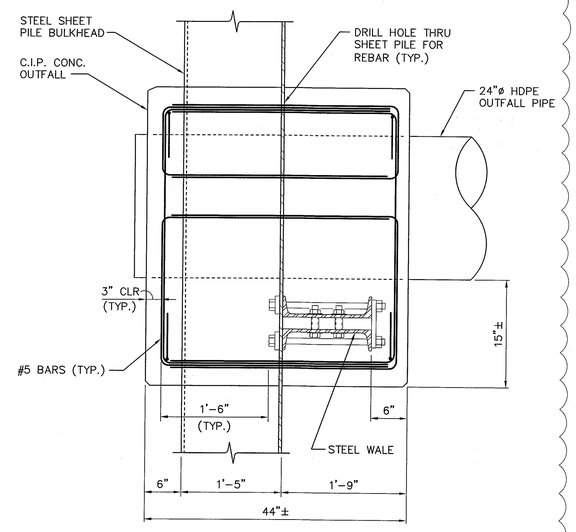
SECTION D–D

SCALE 1"=1'–0"



2 OUTFALL AT BULKHEAD ELEVATION (ZONE 1)

SCALE 1"=1'–0"



2 SECTION E–E

SCALE 1"=1'–0"

GRAPHIC SCALES

CHECK GRAPHIC SCALES BEFORE USING

¾"=1'–0" 0 1 2 3 FT.

1"=1'–0" 0 1 2 FT.

NOTE

SEE DRAWING NUMBER W–17 FOR WATERFRONT PROJECT NOTES.

RECORD DRAWING

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2	RECORD DRAWING		JVB	2/11/11

City of Poughkeepsie
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POUGHKEEPSIE, NEW YORK 12602

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Drawn By: C.L.M.

Designed By: A.J.M.

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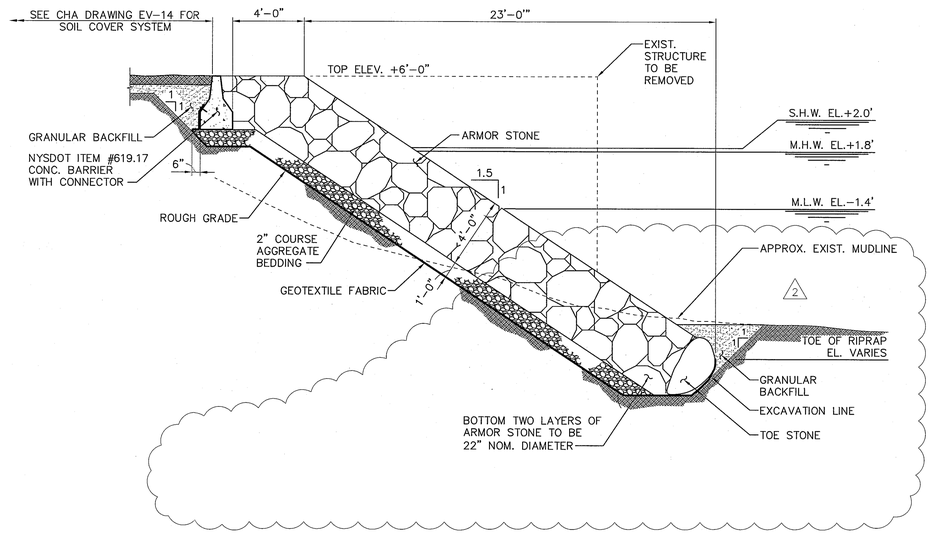
BULKHEAD SECTIONS AND DETAILS - SHEET 2 OF 2

Issue Date: 07/17/07 | Project No.: 14357 | Scale: AS NOTED

W-27

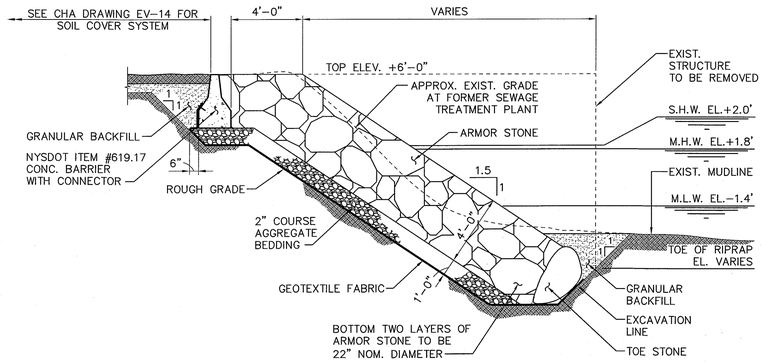
Sheet 27 of 29

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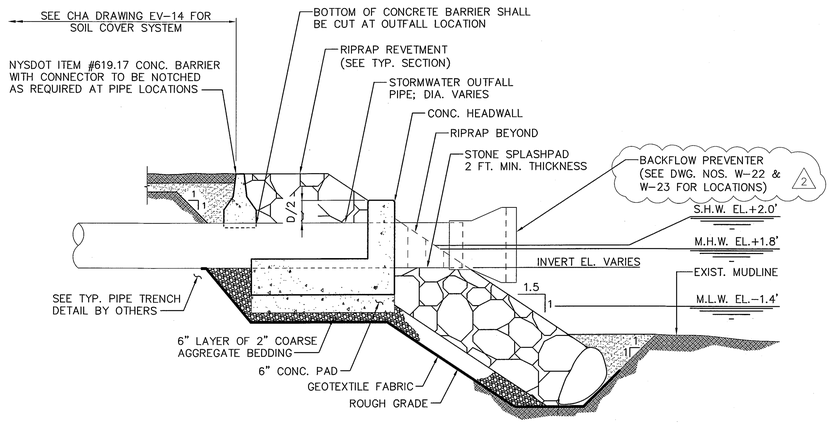
SECTION AA – RIPRAP REVETMENT CROSS-SECTION

SCALE ¼"=1'-0"



SECTION BB – RIPRAP REVETMENT CROSS-SECTION

SCALE ¼"=1'-0"



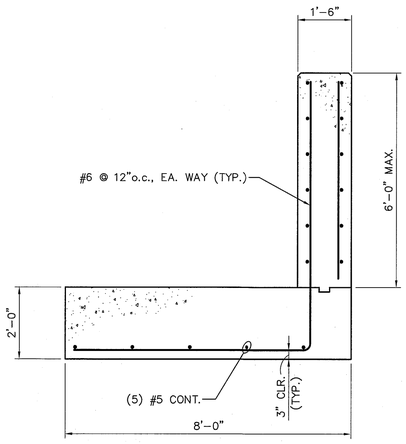
NOTES: 1. D = DIAMETER OF OUTFALL PIPE.

2. PIPE SHALL PROJECT SEAWARD SUCH THAT RIPRAP DOES NOT INTERFERE WITH BACKFLOW PREVENTER.

3. CUFF LENGTH AND PIPE PROJECTION DETERMINED PER BACKFLOW PREVENTER MANUFACTURER'S RECOMMENDATIONS FOR INSTALLATION.

TYPICAL SECTION OUTFALL AT RIPRAP REVETMENT

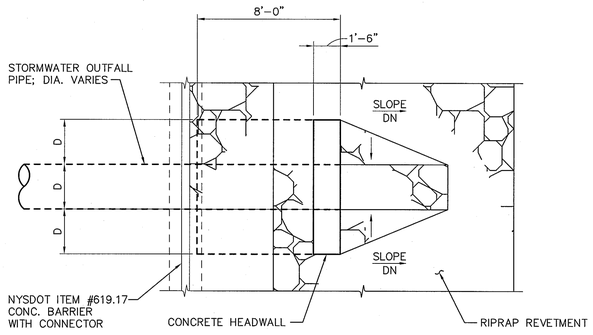
SCALE ¼"=1'-0"



NOTE: OUTFALL PIPE TO BE SET 6" INTO HEADWALL FOOTING. ADJUST WALL REINFORCEMENT AROUND PIPE ACCORDINGLY.

CONCRETE HEADWALL REINFORCEMENT DETAIL

SCALE ½"=1'-0"



NOTES: 1. D = DIAMETER OF OUTFALL PIPE.

2. BACKFLOW PREVENTER NOT SHOWN FOR CLARITY.

TYPICAL PLAN OF OUTFALL AT RIPRAP REVETMENT

SCALE ¼"=1'-0"

NOTE

SEE DRAWING NUMBER W-17 FOR WATERFRONT PROJECT NOTES.

GRAPHIC SCALES

CHECK GRAPHIC SCALES BEFORE USING

¼"=1'-0" 0 4 8 FT.

½"=1'-0" 0 1 4 FT.

RECORD DRAWING

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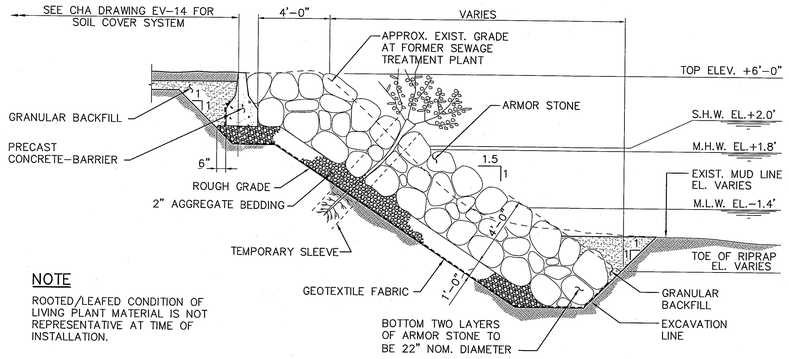
TYPICAL REVETMENT SECTIONS AND DETAILS

Issue Date: 07/17/07 | Project No.: 14357 | Scale: AS NOTED

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Sheet 28 of 29

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NOTE

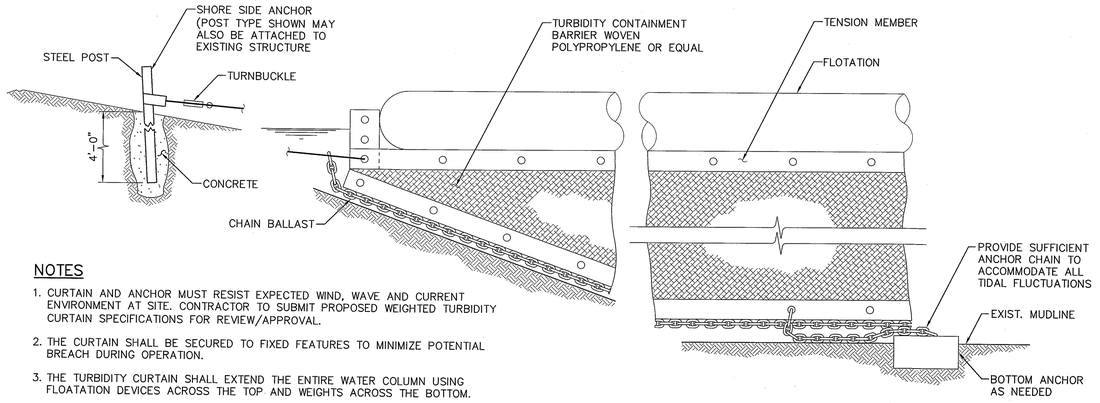
ROOTED/LEAFED CONDITION OF LIVING PLANT MATERIAL IS NOT REPRESENTATIVE AT TIME OF INSTALLATION.

JOINT PLANTING NOTES

1. LIVE STAKES SHALL BE 2 TO 3 INCHES IN DIAMETER.
2. LIVE STAKES SHALL BE 6 TO 8 FEET LENGTH AND PENETRATE THROUGH RIPRAP, BEDDING LAYER AND GEOTEXTILE FABRIC WITH AT LEAST 2 FEET OF PENETRATION INTO UNDERLYING SOIL. TEMPORARY SLEEVING MAY BE USED.
3. LIVE STAKES SHALL BE SPACED AT 4 TO 6 FEET ON CENTER AND ABOVE THE MEAN HIGH WATER LINE.
4. LIVES STAKES SHALL INSTALLED SAME DAY AS HARVESTED IF POSSIBLE, IF SAME DAY INSTALLATION IS NOT POSSIBLE THEN LIVE STAKES MUST BE PROPERLY STORED.
5. LIVE STAKES SHALL BE PLACED PERPENDICULAR TO THE ROCK SLOPE AND HAND TAMPED INTO PLACE.

SECTION CC – RIPRAP REVETMENT WITH JOINT PLANTINGS CROSS-SECTION

¼"=1'-0" 0 4 8 FT.



NOTES

1. CURTAIN AND ANCHOR MUST RESIST EXPECTED WIND, WAVE AND CURRENT ENVIRONMENT AT SITE. CONTRACTOR TO SUBMIT PROPOSED WEIGHTED TURBIDITY CURTAIN SPECIFICATIONS FOR REVIEW/APPROVAL.
2. THE CURTAIN SHALL BE SECURED TO FIXED FEATURES TO MINIMIZE POTENTIAL BREACH DURING OPERATION.
3. THE TURBIDITY CURTAIN SHALL EXTEND THE ENTIRE WATER COLUMN USING FLOATATION DEVICES ACROSS THE TOP AND WEIGHTS ACROSS THE BOTTOM.
4. THE CURTAIN SHALL BE INSPECTED DAILY BEFORE STARTING WORK AND ADJUSTED IF NECESSARY.

WEIGHTED TURBIDITY CURTAIN DETAIL

NOT TO SCALE

NOTE

SEE DRAWING NUMBER W-17 FOR WATERFRONT PROJECT NOTES.

GRAPHIC SCALES

CHECK GRAPHIC SCALES BEFORE USING

¼"=1'-0" 0 4 8 FT.

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TYPICAL REVETMENT SECTIONS AND DETAILS

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Sheet 29 of 29

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APPENDIX E

Manufacturer Data Sheets

Protective & Marine Coatings

MACROPOXY® 646 FAST CURE EPOXY

PART A B58-600 **SERIES**
PART B B58V600 **HARDENER**

Revised 3/11

PRODUCT INFORMATION

4.53

PRODUCT DESCRIPTION

MACROPOXY 646 FAST CURE EPOXY is a high solids, high build, fast drying, polyamide epoxy designed to protect steel and concrete in industrial exposures. Ideal for maintenance painting and fabrication shop applications. The high solids content ensures adequate protection of sharp edges, corners, and welds. This product can be applied directly to marginally prepared steel surfaces.

- Low VOC
- Low odor
- Outstanding application properties
- Meets Class A requirements for Slip Coefficient, 0.36 @ 6 mils / 150 microns dft (Mill White only)
- Chemical resistant
- Abrasion resistant

PRODUCT CHARACTERISTICS

Finish:	Semi-Gloss
Color:	Mill White, Black and a wide range of colors available through tinting
Volume Solids:	72% ± 2%, mixed, Mill White
Weight Solids:	85% ± 2%, mixed, Mill White
VOC (EPA Method 24): mixed	Unreduced: <250 g/L; 2.08 lb/gal Reduced 10%: <300 g/L; 2.50 lb/gal
Mix Ratio:	1:1 by volume

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	**7.0** (175)	**13.5** (338)
Dry mils (microns)	**5.0*** (125)	**10.0*** (250)
~Coverage sq ft/gal (m^2/L)	**116** (2.8)	**232** (5.7)
Theoretical coverage **sq ft/gal** (m^2/L) @ 1 mil / 25 microns dft	**1152** (28.2)	

*May be applied at 3.0-10.0 mils dft as an intermediate coat. Refer to Recommended Systems (page 2). See Performance Tips section also.

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 7.0 mils wet (175 microns):

	@ 35°F/1.7°C	@ 77°F/25°C *50% RH*	@ 100°F/38°C
To touch:	4-5 hours	2 hours	1.5 hours
To handle:	48 hours	8 hours	4.5 hours
To recoat:			
minimum:	48 hours	8 hours	4.5 hours
maximum:	1 year	1 year	1 year
To cure:			
Service:	10 days	7 days	4 days
Immersion:	14 days	7 days	4 days
Pot Life:	10 hours	4 hours	2 hours
Sweat-in-time:	30 minutes	30 minutes	15 minutes

If maximum recoat time is exceeded, abrade surface before recoating. Drying time is temperature, humidity, and film thickness dependent.
Paint temperature must be at least 40°F (4.5°C) minimum.

When used as an intermediate coat as part of a multi-coat system:

Drying Schedule @ 5.0 mils wet (125 microns):

	@ 35°F/1.7°C	@ 77°F/25°C *50% RH*	@ 100°F/38°C
To touch:	3 hours	1 hour	1 hour
To handle:	48 hours	4 hours	2 hours
To recoat:			
minimum:	16 hours	4 hours	2 hours
maximum:	1 year	1 year	1 year

PRODUCT CHARACTERISTICS (CONT'D)

Shelf Life:	36 months, unopened Store indoors at 40°F (4.5°C) to 100°F (38°C).
Flash Point:	91°F (33°C), TCC, mixed
Reducer/Clean Up:	Reducer, R7K15
In California:	Reducer R7K111 or Oxsol 100

PERFORMANCE CHARACTERISTICS

Substrate*: Steel
Surface Preparation*: SSPC-SP10/NACE 2
System Tested*:
1 ct. Macropoxy 646 Fast Cure @ 6.0 mils (150 microns) dft
*unless otherwise noted below

Test Name	Test Method	Results
Abrasion Resistance	ASTM D4060, CS17 wheel, 1000 cycles, 1 kg load	84 mg loss
Accelerated Weathering-QUV[1]	ASTM D4587, QUV-A, 12,000 hours	Passes
Adhesion	ASTM D4541	1,037 psi
Corrosion Weathering[1]	ASTM D5894, 36 cycles, 12,000 hours	Rating 10 per ASTM D714 for blistering; Rating 9 per ASTM D610 per rusting
Nuclear Decontamination	ASTM D4256/ANSI N 5.12	99% Water Wash; 95% Overall
Direct Impact Resistance	ASTM D2794	30 in. lb.
Dry Heat Resistance	ASTM D2485	250°F (121°C)
Exterior Durability	1 year at 45° South	Excellent, chalks
Flexibility	ASTM D522, 180° bend, 3/4" mandrel	Passes
Fuel Contribution	NFPA 259	5764 btu/lb
Humidity Resistance	ASTM D4585, 6000 hours	No blistering, cracking, or rusting
Immersion	1 year fresh and salt water	Passes, no rusting, blistering, or loss of adhesion
Radiation Tolerance	ASTM D4082 / ANSI 5.12	Pass at 21 mils (525 microns)
Pencil Hardness	ASTM D3363	3H
Salt Fog Resistance[1]	ASTM B117, 6,500 hours	Rating 10 per ASTM D610 for rusting; Rating 9 per ASTM D1654 for corrosion
Slip Coefficient, Mill White	AISC Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts	Class A, 0.36
Surface Burning	ASTM E84/NFPA 255	Flame Spread Index 20; Smoke Development Index 35 (at 18 mils or 450 microns)
Water Vapor Permeance	ASTM D1653, Method B	1.16 US perms

Epoxy coatings may darken or discolor following application and curing.

Footnotes:
[1] Zinc Clad II Plus Primer

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

continued on back

Protective & Marine Coatings

MACROPOXY® 646 FAST CURE EPOXY

PART A B58-600 SERIES
PART B B58V600 HARDENER

PRODUCT INFORMATION

4.53

RECOMMENDED USES

- Marine applications
- Fabrication shops
- Pulp and paper mills
- Power plants
- Offshore platforms
- Nuclear Power Plants
- Nuclear fabrication shops
- Refineries
- Chemical plants
- Tank exteriors
- Water treatment plants
- DOE Nuclear Fuel Facilities
- DOE Nuclear Weapons Facilities

- Mill White and Black are acceptable for immersion use for salt water and fresh water, not acceptable for potable water
- Suitable for use in USDA inspected facilities
- Conforms to AWWA D102 OCS #5
- Conforms to MPI # 108
- This product meets specific design requirements for non-safety related nuclear plant applications in Level II, III and Balance of Plant, and DOE nuclear facilities*.

* Nuclear qualifications are NRC license specific to the facility.

RECOMMENDED SYSTEMS

		Dry Film Thickness / ct. Mils	(Microns)
Immersion and atmospheric:			
Steel:			
2 cts.	Macropoxy 646	5.0-10.0	(125-250)
Concrete/Masonry, smooth:			
2 cts.	Macropoxy 646	5.0-10.0	(125-250)
Concrete Block:			
1 ct.	Kem Cati-Coat HS Epoxy Filler/Sealer *as needed to fill voids and provide a continuous substrate*.	10.0-20.0	(250-500)
2 cts.	Macropoxy 646	5.0-10.0	(125-250)
Atmospheric:			
Steel:			
(Shop applied system, new construction, AWWA D102, can also be used at 3 mils minimum dft when used as an intermediate coat as part of a multi-coat system)			
1 ct. 1-2 cts.	Macropoxy 646 Fast Cure Epoxy of recommended topcoat	3.0-6.0	(75-150)
Steel:			
1 ct.	Recoatable Epoxy Primer	4.0-6.0	(100-150)
2 cts.	Macropoxy 646	5.0-10.0	(125-250)
Steel:			
1 ct.	Macropoxy 646	4.0-6.0	(100-150)
1-2 cts.	Acrolon 218 Polyurethane	3.0-6.0	(75-150)
or	Hi-Solids Polyurethane	3.0-5.0	(75-125)
or	SherThane 2K Urethane	2.0-4.0	(50-100)
or	Hydrogloss	2.0-4.0	(50-100)
Steel:			
2 cts.	Macropoxy 646	5.0-10.0	(125-250)
1-2 cts.	Tile-Clad HS Epoxy	2.5-4.0	(63-100)
Steel:			
1 ct.	Zinc Clad II Plus	3.0-6.0	(75-150)
1 ct.	Macropoxy 646	3.0-10.0	(75-250)
1-2 cts.	Acrolon 218 Polyurethane	3.0-6.0	(75-150)
Steel:			
1 ct.	Zinc Clad III HS	3.0-5.0	(75-125)
or	Zinc Clad IV	3.0-5.0	(75-125)
1 ct.	Macropoxy 646	3.0-10.0	(75-250)
1-2 cts.	Acrolon 218 Polyurethane	3.0-6.0	(75-150)
Aluminum:			
2 cts.	Macropoxy 646	5.0-10.0	(125-250)
Galvanizing:			
2 cts.	Macropoxy 646	5.0-10.0	(125-250)

The systems listed above are representative of the product's use, other systems may be appropriate.

SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:

Iron & Steel
- Atmospheric: SSPC-SP2/3
- Immersion: SSPC-SP10/NACE 2, 2-3 mil (50-75 micron) profile
- Aluminum: SSPC-SP1
- Galvanizing: SSPC-SP1

Concrete & Masonry
- Atmospheric: SSPC-SP13/NACE 6, or ICRI No. 310.2, CSP 1-3
- Immersion: SSPC-SP13/NACE 6-4.3.1 or 4.3.2, or ICRI No. 310.2, CSP 1-3

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal		Sa 3	Sa 3	SP 5	1
Near White Metal		Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast		Sa 2	Sa 2	SP 6	3
Brush-Off Blast		Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	C St 2	SP 2	-
	Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	C St 3	SP 3	-
	Pitted & Rusted	D St 3	D St 3	SP 3	-

TINTING

Tint Part A with Maxitoners at 150% strength. Five minutes minimum mixing on a mechanical shaker is required for complete mixing of color.

Tinting is not recommended for immersion service.

APPLICATION CONDITIONS

Temperature:	35°F (1.7°C) minimum, 120°F (49°C) maximum (air and surface) 40°F (4.5°C) minimum, 120°F (49°C) maximum (material) At least 5°F (2.8°C) above dew point
Relative humidity:	85% maximum

Refer to product Application Bulletin for detailed application information.

ORDERING INFORMATION

Packaging:	
Part A:	1 gallon (3.78L) and 5 gallon (18.9L) containers
Part B:	1 gallon (3.78L) and 5 gallon (18.9L) containers
Weight:	12.9 ± 0.2 lb/gal ; 1.55 Kg/L mixed, may vary by color

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Protective & Marine Coatings

MACROPOXY® 646 FAST CURE EPOXY

PART A B58-600 SERIES
PART B B58V600 HARDENER

Revised 3/11

APPLICATION BULLETIN

4.53

SURFACE PREPARATIONS

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Iron & Steel, Atmospheric Service:
Minimum surface preparation is Hand Tool Clean per SSPC-SP2. Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. For better performance, use Commercial Blast Cleaning per SSPC-SP6/NACE 3, blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils / 50 microns). Prime any bare steel within 8 hours or before flash rusting occurs.

Iron & Steel, Immersion Service:
Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10/NACE 2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2-3 mils / 50-75 microns). Remove all weld spatter and round all sharp edges by grinding. Prime any bare steel the same day as it is cleaned.

Aluminum
Remove all oil, grease, dirt, oxide and other foreign material by Solvent Cleaning per SSPC-SP1.

Galvanized Steel
Allow to weather a minimum of six months prior to coating. Solvent Clean per SSPC-SP1 (recommended solvent is VM&P Naphtha). When weathering is not possible, or the surface has been treated with chromates or silicates, first Solvent Clean per SSPC-SP1 and apply a test patch. Allow paint to dry at least one week before testing adhesion. If adhesion is poor, brush blasting per SSPC-SP7 is necessary to remove these treatments. Rusty galvanizing requires a minimum of Hand Tool Cleaning per SSPC-SP2, prime the area the same day as cleaned.

Concrete and Masonry
For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI No. 310.2, CSP 1-3. Surfaces should be thoroughly clean and dry. Concrete and mortar must be cured at least 28 days @ 75°F (24°C). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners. Fill bug holes, air pockets and other voids with Steel-Seam FT910.

Concrete, Immersion Service:
For surface preparation, refer to SSPC-SP13/NACE 6, Section 4.3.1 or 1.3.2 or ICRI No. 310.2, CSP 1-3.

Follow the standard methods listed below when applicable:
ASTM D4258 Standard Practice for Cleaning Concrete.
ASTM D4259 Standard Practice for Abrading Concrete.
ASTM D4260 Standard Practice for Etching Concrete.
ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete.
SSPC-SP 13/Nace 6 Surface Preparation of Concrete.
ICRI No. 310.2 Concrete Surface Preparation.

Previously Painted Surfaces
If in sound condition, clean the surface of all foreign material. Smooth, hard or glossy coatings and surfaces should be dulled by abrading the surface. Apply a test area, allowing paint to dry one week before testing adhesion. If adhesion is poor, or if this product attacks the previous finish, removal of the previous coating may be necessary. If paint is peeling or badly weathered, clean surface to sound substrate and treat as a new surface as above.

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal		Sa 3	Sa 3	SP 5	1
Near White Metal		Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast		Sa 2	Sa 2	SP 6	3
Brush-Off Blast		Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	C St 2	SP 2	-
	Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	C St 3	SP 3	-
	Pitted & Rusted	D St 3	D St 3	SP 3	-

APPLICATION CONDITIONS

Temperature:	35°F (1.7°C) minimum, 120°F (49°C) maximum (air and surface) 40°F (4.5°C) minimum, 120°F (49°C) maximum (material) At least 5°F (2.8°C) above dew point
Relative humidity:	85% maximum

APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer/Clean Up ..... Reducer R7K15
In California..... Reducer R7K111

Airless Spray
Pump..... 30:1
Pressure..... 2800 - 3000 psi
Hose..... 1/4" ID
Tip ..... .017" - .023"
Filter ..... 60 mesh
Reduction..... As needed up to 10% by volume

Conventional Spray
Gun ..... DeVilbiss MBC-510
Fluid Tip ..... E
Air Nozzle..... 704
Atomization Pressure..... 60-65 psi
Fluid Pressure..... 10-20 psi
Reduction..... As needed up to 10% by volume
Requires oil and moisture separators

Brush
Brush..... Nylon/Polyester or Natural Bristle
Reduction..... Not recommended

Roller
Cover ..... 3/8" woven with solvent resistant core
Reduction..... Not recommended

Plural Component Spray ... Acceptable
Refer to April 2010 Technical Bulletin - "Application Guidelines for Macropoxy 646 & Recoatable Epoxy Primer Utilizing Plural Component Equipment"

If specific application equipment is not listed above, equivalent equipment may be substituted.

continued on back

Protective & Marine Coatings

MACROPOXY® 646 FAST CURE EPOXY

PART A	B58-600	SERIES
PART B	B58V600	HARDENER

APPLICATION BULLETIN

4.53

APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Mix contents of each component thoroughly with low speed power agitation. Make certain no pigment remains on the bottom of the can. Then combine one part by volume of Part A with one part by volume of Part B. Thoroughly agitate the mixture with power agitation. Allow the material to sweat-in as indicated prior to application. Re-stir before using.

If reducer solvent is used, add only after both components have been thoroughly mixed, after sweat-in.

Apply paint at the recommended film thickness and spreading rate as indicated below:

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	**7.0** (175)	**13.5** (338)
Dry mils (microns)	**5.0*** (125)	**10.0*** (250)
~Coverage sq ft/gal (m^2/L)	**116** (2.8)	**232** (5.7)
Theoretical coverage **sq ft/gal** (m^2/L) @ 1 mil / 25 microns dft	**1152** (28.2)	

*May be applied at 3.0-10.0 mils dft as an intermediate coat. Refer to Recommended Systems (page 2). See Performance Tips section also.

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 7.0 mils wet (175 microns):

	@ 35°F/1.7°C	@ 77°F/25°C *50% RH*	@ 100°F/38°C
To touch:	4-5 hours	2 hours	1.5 hours
To handle:	48 hours	8 hours	4.5 hours
To recoat:			
minimum:	48 hours	8 hours	4.5 hours
maximum:	1 year	1 year	1 year
To cure:			
Service:	10 days	7 days	4 days
Immersion:	14 days	7 days	4 days

If maximum recoat time is exceeded, abrade surface before recoating.

Drying time is temperature, humidity, and film thickness dependent.

Paint temperature must be at least 40°F (4.5°C) minimum.

Pot Life:	10 hours	4 hours	2 hours
Sweat-in-time:	30 minutes	30 minutes	15 minutes

When used as an intermediate coat as part of a multi-coat system:

Drying Schedule @ 5.0 mils wet (125 microns):

	@ 35°F/1.7°C	@ 77°F/25°C *50% RH*	@ 100°F/38°C
To touch:	3 hours	1 hour	1 hour
To handle:	48 hours	4 hours	2 hours
To recoat:			
minimum:	16 hours	4 hours	2 hours
maximum:	1 year	1 year	1 year

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

CLEAN UP INSTRUCTIONS

Clean spills and spatters immediately with Reducer R7K15. Clean tools immediately after use with Reducer R7K15. In California use Reducer R7K111. Follow manufacturer's safety recommendations when using any solvent.

PERFORMANCE TIPS

Stripe coat all crevices, welds, and sharp angles to prevent early failure in these areas.

When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

Excessive reduction of material can affect film build, appearance, and adhesion.

Do not mix previously catalyzed material with new.

Do not apply the material beyond recommended pot life.

In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with Reducer R7K15. In California use Reducer R7K111.

Tinting is not recommended for immersion service.

Use only Mil White and Black for immersion service.

Insufficient ventilation, incomplete mixing, miscatalyzation, and external heaters may cause premature yellowing.

Excessive film build, poor ventilation, and cool temperatures may cause solvent entrapment and premature coating failure.

Quik-Kick Epoxy Accelerator is acceptable for use. See data page 4.99 for details.

When coating over aluminum and galvanizing, recommended dft is 2-4 mils (50-100 microns).

Refer to Product Information sheet for additional performance characteristics and properties.

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

email: info@foxind.com

FOX INDUSTRIES
ENGINEERED PRODUCTS

FX-764
Hydro-Ester®
Splash Zone and Underwater Paste

www.foxind.com
Fox Industries, Inc. • 3100 Falls Cliff Road • Baltimore, Maryland 21211

DESCRIPTION:

FX-764 Hydro-Ester ® Splash Zone & Underwater Paste is a moisture-insensitive, two-component, 100% solids epoxy-resin system. When mixed at a 1:1 ratio, by volume, this product produces a paste-like material that is ideal for protection or restoration of concrete, steel and timber piles and other structural elements in marine environments above and below the water line.

ADVANTAGES:

- Convenient 1:1 mixing ratio
- Long pot life
- Hand-applied
- Bonds to wet surface
- Resists wave action
- Restores structural integrity
- May be mixed and applied underwater

PHYSICAL PROPERTIES:

Consistency		Paste
Color, Mixed		Standard Gray
(Other colors available upon "special order" request)		
Compressive Strength		
ASTM C-579,	24 hours	4000 psi
Method "B"	72 hours	6400 psi
	7 days	7500 psi
Tensile Strength		
ASTM C-307	7 days	1500 psi
Bond Strength		
ASTM C-882		2000 psi
Shrinkage		No Shrinkage
ASTM C-883		Used with concrete
Pot Life		2 hours @ 70°F
Water Absorption		
ASTM C 413-01		0.32%
Direct In Situ Bond		
(Underwater)		50 psi min
Curing Schedule		
Dry to Touch		36 hours @ 50°F
		24 hours @ 70°F
		16 hours @ 90°F
Minimum Recoat Time		36 hours @ 50°F
		24 hours @ 70°F
		16 hours @ 90°F

MIXING:

Material temperature should be a minimum of 60°F for ease of mixing. Mix white "A" Component & charcoal "B" Component together, by hand, while wearing gloves dampened with water, until a uniform medium gray color is achieved. Do not mix more material than can be used within pot life.

SURFACE PREPARATION:

Remove all deteriorated material, barnacles or other marine growth by mechanical abrasion, water or sand blasting. To avoid contamination, apply **FX-764** to prepared surface as quickly as possible.

APPLICATION:

For best results, apply **FX-764** by hand using tight-fitting rubber or plastic gloves. (Wet gloves with slightly soapy water before working with material.) Press material onto surface and knead into place in maximum lift thickness of approximately 2". Smooth gently by rubbing with gloves using water as a lubricant.

LIMITATIONS:

Do not thin **FX-764**. Since water conditions and content vary greatly, it is recommended that a sample application be made to ensure the intended performance. Do not apply when water or ambient temperature is below 50°F.

COVERAGE:

One (1) gallon of **FX-764** will yield 231 cu. in. and cover 12.8 sq. ft. @ 125 mil thickness, or 1/8".

PACKAGING:

This product is available in two (2) gallon, four (4) gallon and ten (10) gallon units.

SHELF LIFE:

Two (2) years for Components "A" and "B". Store indoors.

CAUTION:

Contains "A" Component contains epoxy resins. "B" Component contains organic amines which are strong sensitizers. WARNING! May cause skin sensitization, burns or other allergic responses. Avoid inhalation of vapor. Use good ventilation, particularly if material is heated. Prevent all contact with skin and eyes. Wear protective clothing, goggles and/or barrier creams. Wash thoroughly after handling. FIRST AID: In case of contact, immediately flush eyes or skin with plenty of water for at least fifteen (15) minutes. Remove contaminated clothing before reuse. Discard contaminated shoes.

FOR INDUSTRIAL USE ONLY. KEEP AWAY FROM CHILDREN. 5/2008

PHONE 410-243-8856 TOLL FREE 888-760-0369 FAX 410-243-2701

Warranty: We warrant our materials to be of good quality and will replace any material proved defective. We believe that the technical information provided is reliable and that materials will perform to your satisfaction. However, we cannot guarantee final results because of the many possible variations in field conditions and application procedures.

ADEKA ULTRA SEAL

A-30

OCM, Inc. Chicago, IL

Sales Information: (847) 955-9700

Contact Local Representative

:

Technical Information :(800) 999-3959

Properties	A-30 Resin	A-30 Catalyst
Appearance	Clear Liquid	Clear Liquid
SP (72° F.)	1.05	1.09
Viscosity (MPa.x/77° F).	2000~3000	300~800
Mixing Ratio (resin:catalyst)	**15:1**	
Pot life 50% RH (70~75 deg.F.)	**1~2 Hours**	
Gel time 50% RH (70~75 deg.F.)	**5~6 Hours**	
Cure time 50% RH (70~75 deg.F.)	**12~18 Hours**	

ADEKA ULTRA SEAL A-30 - Improved waterstop system for sealing sheet pile interlocks prior to driving.

Packaging (2 components - 15:1 ratio) **:**

A-30 Resin 20 Liter (5.3 gallon) pail - Net - 15 kg (14.28 liters - 3.77 gallons)

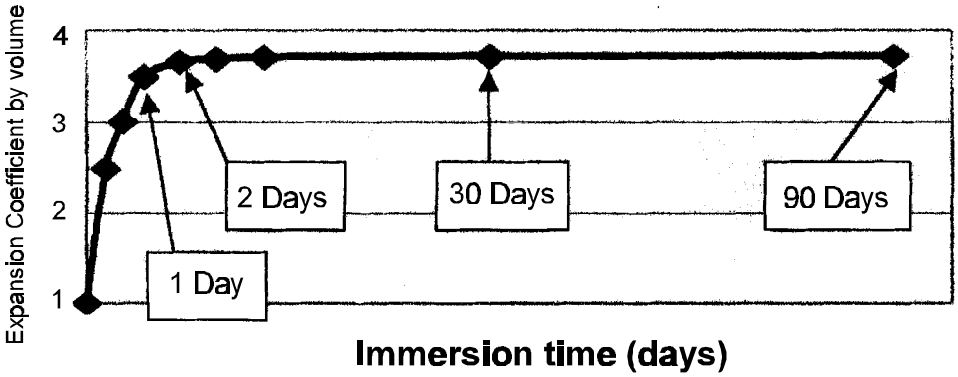
A-30 Hardener 1 Liter (1.06 quart) can - Net - 1 kg (0.92 liters - 0.97 quarts)

Total Net = Resin + Catalyst = 15.20 Liters = 4.0 Gallons

Characteristics:

1. Improved chemical resistance and durability even under alkaline ground water conditions.
2. Easy to use two part urethane system. Packaged in ratio amounts. No measuring necessary.
3. The curing process begins when the two components are mixed (chemical cure). Unlike A-50, curing is not as dependent on temperature.
4. Cured A-30 has excellent adhesive strength.
5. A-30 has a high rate of expansion and will withstand approximately 160 foot hydrostatic head (50 meters).

A-30 Expansion Curve



A-30 APPLICATION PROCEDURES:

Application of A-30 and pile driving procedures are identical with published Adeka Ultra Seal A-50 instructions except for mixing procedures and pot life of mixed material.

Basic Application:

1. Thoroughly clean socket (female) side of the interlock. Remove any rust or dirt from the interlock section. Use wire brush or small sander and air blast to remove any debris. Wipe with solvent if any oil or grease is present.
2. LEVEL PILES AND PLUG ENDS (FOAM WORKS WELL). **MAINTAIN LEVEL UNTIL A-30 IS CURED.**
3. Pour A-30 catalyst (1 liter can) into A-30 resin (5 gallon pail).
4. Mix thoroughly (hand mix by stirring or use power mixer).
5. Pour appropriate amount of A-30 into the level interlock. The amount of A-30 required will vary depending on type of sheet pile. Check with your local representative for recommended coverage.
6. Protect the sheet pile from premature exposure to moisture prior to driving.
7. Drive pile with male or thumb side leading.
8. Drive to final depth at initial driving time. The sheet must be driven to final depth within 2 hours once the pile is in contact with water.

A-30 Cold Temperature Cure Times in Hours

(approximate - not specification)

Temperature Degrees F.	Curing Time Hours
0	168
20	120
30	72
50	36
70	16

Curing time is dependent on environmental conditions and thickness of A-30. Your curing time may vary significantly from above values. Check curing stage before moving sheet piles.

A-30 IS AN IMPROVED VERSION OF A-50

A-30 has good resistance to a number of chemical contaminants. Some chemicals in higher concentrations may affect the performance of A-30. Consult your local Adeka representative before using in a contaminated area. Or call (800) 999-3959 for more information. Visit www.adeka.com for more information.

ADEKA ULTRA SEAL

KM-STRING

OCM, Inc.

Sales Information: (847) 955-9700
Technical Information: (800) 999-3959
Contact Local Representative:

PRODUCT DESCRIPTION:	
PACKAGING INFORMATION: Available in 4~32mm Diameter	
PHYSICAL PROPERTIES:	
Hardness:	**A-33 (JIS K 6253) (ASTM D2240)**
Tensile Strength:	**6 Mpa (JIS K 6251) (ASTM D412)**
Elongation:	**800% (JIS K 6251) (ASTM D412)**
Change Volume:	**170% (In House)**
Specific Gravity:	**1.18 (JIS K 6350) (ASTM D792)**
Vulcanization	**YES**
Hydrophilic Agent	**Urethane Polymer**

*** Property measurements are representative and are not considered as standard values.**

GENERAL DESCRIPTION

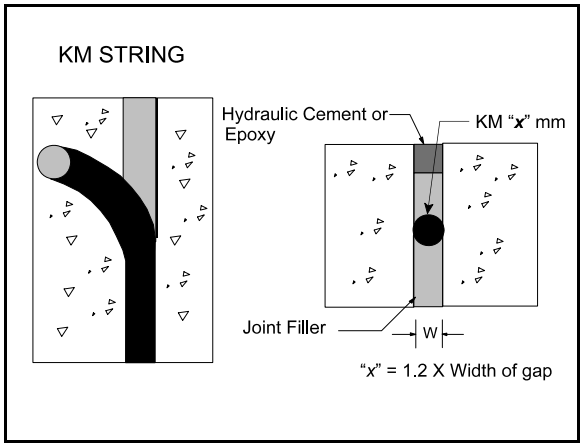
KM String is a chemically modified natural rubber product. A patented process chemically binds a hydrophilic agent to the rubber. This permits the KM String to undergo controlled expansion when in the presence of moisture. This expansion capability provides a "double locking" waterstop. One from rubber's natural resilience and one from the expansion. Any void, within the limits of the product's volume expansion coefficient, will be filled by the expansion of the KM when it is hydrated.

Expansion occurs in all dimensions, diameter and length. Expansion will follow the direction of least resistance. The Volume Expansion Coefficient of 3 times indicates the material will increase 3 times by volume, not 3 times in size. Linear expansion coefficient is approximately 1.45.

KM has excellent durability and resistance to chemicals. It can perform in a wide range of solutions such as salt or cement water. It does not contain any toxic substance or heavy metals and is environmentally safe.

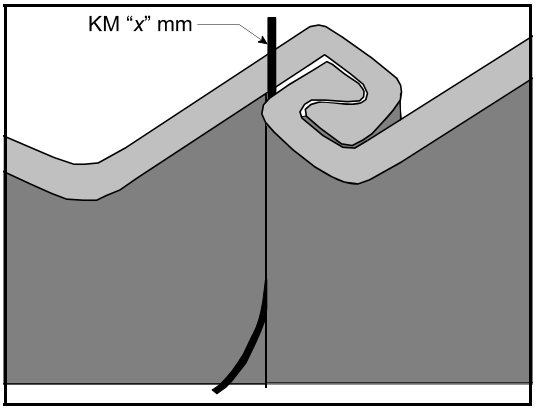
BASIC USE:

Because KM is available in many diameters, it is suitable for waterstopping existing joints of various sizes. The KM string size is determined by the size of the joint. The KM string selected must have a minimum diameter of 1.2 times the joint width. (See Detail No. 1). The string can be easily stretched and inserted into the joint gap with a backer rod insertion tool or a blunt instrument.



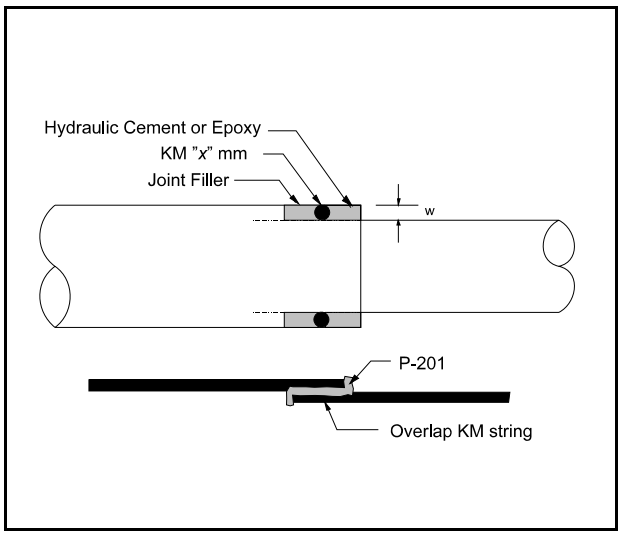
Detail 1

KM is an excellent waterstop for repairing leaks in sheet piles interlocks.
The string size again should be a minimum of 1.2 times the width of the interlock gap. Stretch the string and force into the interlock area. This can be done even if flowing water is present. The natural resilience of the rubber will stop the water and hold the KM in position until expansion has occurred. See detail 2.



Detail 2

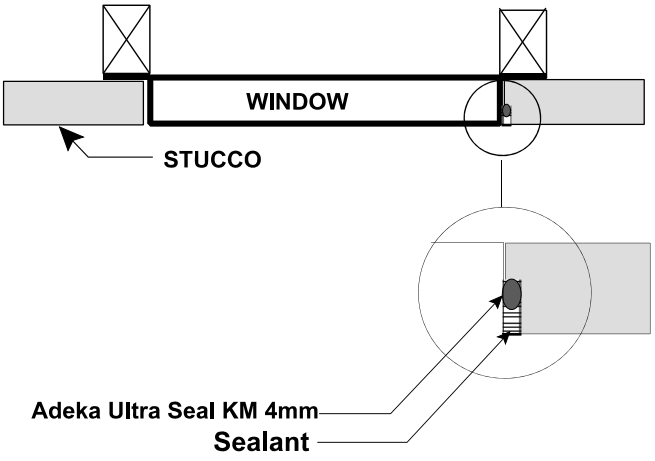
KM string can be used in a variety of applications such as sealing the annular space between two pipes as shown in Detail 3.



Detail 3

Joining two ends of the string can be done by overlapping approximately 2" and applying a bead of P-201 on the overlap area. Note Detail 3.

KM 4mm String can be used to effectively waterproof the joint between a window frame and a stucco exterior (see Detail 4). For more detailed instruction see "Techniques and Comments" newsletter 228. This newsletter is produced by John Bucholtz P.E. Call 408.257.2444 or your local representative for more information.



Detail 4

KM is a versatile waterstop that is easy to install and will remain flexible even when expanded. It will serve as a long lasting positive waterstop.

PACKAGING INFORMATION SELECTED STRING SIZES.

KM 4mm (.15")	**165'/case**	**3.0 lbs**
KM 6mm (.23")	**165'/case**	**4.0 lbs**
KM 8mm (.31")	**99'/case**	**10.1 lbs**
KM 10mm (.39")	**82'/case**	**8.8 lbs**
KM 12mm (.47")	**82'/case**	**11.0 lbs**
KM 14mm (.55")	**66'/case**	**19.8 lbs**
KM 16mm (.62")	**49'/case**	**11.0 lbs**
KM 20mm (.79")	**33'/case**	**12.1 lbs**
KM 24mm (.95")	**33'/case**	**13.2 lbs**

Sizes above 6mm NOT in inventory. Call 800.999.3959 for lead time and price.

*** Other sizes available by special order.**

KM string has good resistance to a number of chemical contaminants. However, some chemicals in higher concentrations may affect the performance of KM. Consult your Adeka Ultra Seal Representative concerning any unusual chemical contaminants or conditions.

Technical assistance is available through the manufacturer and representatives of Adeka Ultra Seal. Contact your local representative for additional information or call (800) 999-3959.

Visit our website at:

www.adeka.com

TNEMEC

PRODUCT DATA SHEET

TNEME-ZINC 90-97 & H90-97

PRODUCT PROFILE

GENERIC DESCRIPTION Aromatic Urethane, Zinc-Rich

COMMON USAGE An advanced technology, two-component, moisture-cured, zinc-rich primer providing extraordinary performance. It's user friendly and rapid curing so chemical- and corrosion-resistant topcoats can be applied the "same-day." Also used for field touch-up of inorganic zinc coating. Application methods, for 90-97 only, include "dry-fall" under certain conditions (see Application). H90-97 is HAPS compliant for use in-shop.

COLORS 90-97 Reddish-gray

ZINC PIGMENT 83% by weight in dried film

SPECIAL QUALIFICATIONS Series 90-97/H90-97 meets **AISC** requirements of Class B surface with a mean slip coefficient no less than 0.50 and a tension creep not in excess of .005 inches (.13mm).
Tneme-Zinc uses a zinc pigment which meets the requirements of **ASTM D 520 Type III** and contains less than .002% lead. This level qualifies it to be classed as "non-lead" (less than 0.06% lead by weight) as defined in Part 1303 of the Consumer Product Safety Act Regulations. Conforms to **SSPC Paint 20, Type II.**

PERFORMANCE CRITERIA Extensive test data available. Contact your Tnemec representative for specific test results.

COATING SYSTEM

TOPCOATS Series 1, 6, 27, 46H-413, 66, L69, L69F, N69, N69F, V69, V69F, 73, 104, 113, 114, 115, 135, 161, 394, 1028, 1029, 1074, 1074U, 1075, 1075U
Note: Certain topcoat colors may not provide one-coat hiding depending on method of application. Contact your Tnemec representative. **Note:** Series 90-97 or H90-97 must be exterior exposed for three days prior to topcoating with Series 1028 or 1029.

SURFACE PREPARATION

Severe Exposure: SSPC-SP10/NACE 2 Near-White Blast Cleaning with a minimum angular anchor profile of 1.5 mils.
Moderate Exposure: SSPC-SP6/NACE 3 Commercial Blast Cleaning with a minimum angular anchor profile of 1.5 mils.

TECHNICAL DATA

VOLUME SOLIDS 63.0 ± 2.0% (mixed)

RECOMMENDED DFT 2.5 to 3.5 mils (65 to 90 microns) per coat.

CURING TIME Without 44-710

Temperature †	To Handle	To Recoat
75°F (24°C)	1 hour	4 hours
65°F (18°C)	1 1/2 hours	5 hours
55°F (13°C)	2 hours	6 hours
45°F (7°C)	2 1/2 hours	7 hours
35°F (2°C)	3 hours	8 hours

† 50% relative humidity. Curing time will vary with surface temperature, humidity and film thickness.
With 44-710: Reference the 44-710 Urethane Accelerator product data sheet.

VOLATILE ORGANIC COMPOUNDS

	Unthinned	Thinned 2.5% (No. 2 or 3 Thinner)	Thinned 10% (No. 2 or 3 Thinner)	Thinned 15% (No. 62 Thinner)
90-97	2.68 lbs/gallon (321 grams/litre)	2.79 lbs/gallon (334 grams/litre)	3.10 lbs/gallon (371 grams/litre)	
H90-97	2.83 lbs/gallon (339 grams/litre)			2.83 lbs/gallon (339 grams/litre)

HAPS

	Unthinned	Thinned 15% (No. 62 Thinner)
H90-97	0.02 lbs/gals solids	0.02 lbs/gals solids

THEORETICAL COVERAGE 1,011 mil sq ft/gal (24.8 m²/L at 25 microns). See APPLICATION for coverage rates.

NUMBER OF COMPONENTS Two: Part A and Part B

PACKAGING Four-Gallon and One-Gallon Kits: Consist of one premeasured container of liquid (Part A) and one premeasured container of powder (Part B). When mixed, yields four gallons (15.1L) or one gallon (3.79L).

NET WEIGHT PER GALLON 23.94 ± 0.60 lbs (10.86 ± .27 kg)

STORAGE TEMPERATURE Minimum 20°F (-7°C) Maximum 110°F (43°C)

TEMPERATURE RESISTANCE Dry (Continuous) 250°F (121°C) Intermittent 300°F (149°C)

SHELF LIFE Part A: 12 months at recommended storage temperature.
Part B: 24 months at recommended storage temperature.

FLASH POINT - SETA 90-97 Part A: 78°F (26°C) H90-97 Part A: 108°F (42°C) Part B: N/A

HEALTH & SAFETY Paint products contain chemical ingredients which are considered hazardous. Read container label warning and Material Safety Data Sheet for important health and safety information prior to the use of this product.
Keep out of the reach of children.

© October 30, 2008 by Tnemec Co., Inc.

Published technical data and instructions are subject to change without notice. The online catalog at www.tnemec.com should be referenced for the most current technical data and instructions or you may contact your Tnemec representative for current technical data and instructions.

TNEME-ZINC | 90-97 & H90-97

APPLICATION

COVERAGE RATES

	Dry Mils (Microns)	Wet Mils (Microns)	Sq Ft/Gal (m²/Gal)
Suggested	3.0 (75)	5.0 (125)	337 (31.3)
Minimum	2.5 (65)	4.0 (100)	404 (37.5)
Maximum	3.5 (90)	5.5 (140)	289 (26.9)

Allow for overspray and surface irregularities. Film thickness is rounded to the nearest 0.5 mil or 5 microns. Application of coating below minimum or above maximum recommended dry film thicknesses may adversely affect coating performance.

MIXING

Always use the entire contents of A and B components. Use an air-driven power mixer and keep material under constant agitation while mixing. Slowly sift powder (Part B) into liquid (Part A).
–Do Not Reverse This Procedure– Adjust mixer speed to break up lumps and mix until the two components are thoroughly blended. Strain through a 35 to 50 mesh (300 to 600 microns) screen before using. For spray application, keep under low RPM agitation to prevent settling. For brush or roller application, stir frequently to prevent settling. Do not use mixed material beyond pot life limits.

THINNING

90-97: For spray, thin up to 10% or 3/4 pint (380 mL) per gallon with No. 2 Thinner if temperatures are below 80°F (27°C). Thin up to 10% or 3/4 pint (380 mL) per gallon with No. 3 Thinner if temperatures are above 80°F (27°C). For brush or roller, thin up to 10% or 3/4 pint (380 mL) with No. 3 Thinner.
H90-97: For air spray, thin up to 15% per gallon with No. 62 Thinner. For airless spray, brush or roller, thin up to 10% per gallon with No. 62 Thinner.

POT LIFE

8 hours at 77°F (25°C) and 50% R.H.
Caution: This product cures with moisture acting as a catalyst. Incorporation of moisture or moisture laden air (humidity) during use will shorten pot life. Avoid continual agitation at high RPM. When feasible keep containers of mixed material covered during use.

APPLICATION EQUIPMENT

Note: When finish coats are white or light colors, best hiding of this dark color primer can be achieved by spray application.

Air Spray

Gun	Fluid Tip	Air Cap	Air Hose ID	Mat'l Hose ID	Atomizing Pressure (1)	Pot Pressure
DeVilbiss JGA †	E	765 or 704	5/16" or 3/8" (7.9 or 9.5 mm)	3/8" or 1/2" (9.5 or 12.7 mm)	40-50 psi (2.8-3.4 bar)	10-20 psi (0.7-1.4 bar)

(1) Atomizing Pressure for H90-97 is 50-70 psi (3.4-4.8 bar).
† (with heavy mastic spring) Low temperatures or longer hoses will require additional pressure. Use pressure pot equipped with an agitator and keep pressure pot at same level or higher than the spray gun. Compressed air must be dry.

Airless Spray

Tip Orifice	Atomizing Pressure (2)	Mat'l Hose ID	Manifold Filter
0.017"-0.021" (430-535 microns) Reversible Tip	2400-3000 psi (165-207 bar)	1/4" or 3/8" (6.4 or 9.5 mm)	60 mesh (250 microns)

(2) Atomizing Pressure for H90-97 is 3500-4500 (241-310 bar).
Use appropriate tip/atomizing pressure for equipment, applicator technique and weather conditions.
Keep material agitated to prevent settling.
Roller: Use 1/4" or 3/8" (6.4 mm or 9.5 mm) synthetic woven nap roller covers. Stir material frequently or keep under agitation to prevent settling.
Brush: Use high quality natural or synthetic bristle brushes.

SURFACE TEMPERATURE

Minimum 35°F (2°C) Maximum 120°F (49°C) Maximum for Brush & Roller 100°F (38°C)
The surface should be dry and at least 5°F (3°C) above the dew point.

AMBIENT HUMIDITY

Minimum 40% Maximum 90%

CLEANUP

Flush and clean all equipment immediately after use with the recommended thinner or xylene.

CAUTION

Dry overspray can be wiped or washed from most surfaces. Satisfactory dry-fall performance depends upon height of work, weather conditions and equipment adjustment. Low temperature is of particular concern. Test for each application as follows: Spray from 15 to 25 feet towards paint container. The material then should readily wipe off. **Note:** Heat can fuse-dry overspray to surfaces. Always clean dry overspray from hot surfaces before fusing occurs. Be aware that surface temperatures can be higher than air temperatures.

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UNITEX™ PRO-POXY 300
PRO-POXY 300 FAST

NON-SAG, INJECTABLE ANCHORING GEL

BENEFITS:

- Permitted for use in wet or damp holes
- Permitted in severe weathering locations
- Freeze-thaw resistant
- Suitable for seismic conditions
- Allowed at close edge distances
- Allowed at shallow embedments
- Low odor
- For both solid and hollow base materials





Also available in bulk

Where other's can't...

PRO-POXY 300
PRO-POXY 300 FAST *can!*

*Above statements per I.C.B.O. E.R. #5000 and/or independent test reports. Available on request.

UNITEX™ PRO-POXY 300 and PRO-POXY

NON-SAG, INJECTABLE ANCHORING GEL

◆ DESCRIPTION

Both PRO-POXY 300 and 300 FAST are high-strength, two component epoxy adhesive anchoring gels. PRO-POXY 300 meets ASTM-C-881, Types I, II, IV, and V, Grade 3, Classes B and C. PRO-POXY 300 FAST meets ASTM-C-881, Types I, II*, IV, V* Grade 3, Classes A, B, and C. They also meet USDA specifications for use in food processing areas.

* Except Gel Time

◆ USAGE

- Chemical anchoring for bolts, dowels, and pins.
- Cap sealing and port setting.
- Pressure-injection of cracks in structural concrete.
- Bonding irregular surfaces.

Appearance: Component A - white Component B - gray
Shelf Life: 2 years in original unopened container
Storage Conditions:
Store at 40°- 95°F (5°- 35°C)
Precondition material to over 73° ± 2°F (23°C)
Cold weather (below 70°F / 21°C): Precondition cartridges slowly to 80-90°F / 27-32° C for easier gunning
Gel Time (60 g mass):
PRO-POXY 300: 35 min at 73° ± 2°F (23°C)
PRO-POXY 300 Fast: 8 min at 73° ± 2°F (23°C)

◆ DIRECTIONS

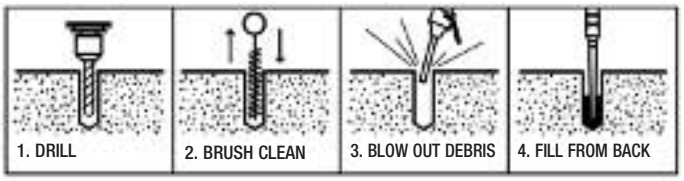
CARTRIDGES: PRO-POXY 300 and 300 FAST may be easily dispensed from cartridges eliminating mixing and measuring. Remove D plugs from small end of cartridge. Slide retaining nut over static mixer. Secure static mixer to cartridge by screwing retaining nut onto cartridge. For easier gunning, the static mixer tip may be cut off to the third notch. Place assembled cartridge into approved pneumatic or hand gun. Extrude epoxy until a uniform gray color is achieved. Do not use epoxy with color streaks. Dispense under a constant uniform pressure. If dispensing is altered, re-establish a uniform gray color prior to continuing. When using a hand gun, release pressure from gun by pressing thumb button at every pause in dispensing. Otherwise, re-establish uniform gray color prior to continuing.

BULK PACKAGED COMPONENTS:
Automatic Dispensing Machines: Only use UNITEX approved positive displacement dispensing machines.

Hand Mixing: Premeasure equal parts by volume of component A and component B in two separate containers. Use a third container to mix the two components together. Do not use one tapered container such as a Dixie paper cup, filling it half full of A and half full of B; the correct ratio (1:1) cannot be achieved due to tapered feature of container. Thoroughly mix for 3 minutes, scraping sides of container until uniform grey color is achieved. Only mix amount of epoxy that can be used within its gel time. Spread mixed epoxy out thin on a hawk to extend gel time. If you pile it up, the gel time will be shortened due to the greater mass and exotherm.

◆ APPLICATION

TO ANCHOR BOLTS, DOWELS, & PINS:
Step 1. Drill holes to proper diameter and length.
Step 2. Clean holes with a nylon brush.
Step 3. Blow concrete dust from hole with oil-free compressed air from back forward.
Step 4. After uniform color is achieved, static mixer should be placed in back of hole. Start extruding epoxy while pulling static mixer out, filling hole 1/2 full. Rotate the bolt slightly as it is inserted to the back of the hole. Refer to tables for annular space, embedment depth, and edge distances.



TO SET PORTS & CAPSEAL CRACKS: Select PRO-POXY 300 or 300 FAST according to the desired gel time. PRO-POXY 300 provides longer working time. PRO-POXY 300 FAST should be selected for cooler weather applications and when faster setup of capseal is desired. Dab a small amount of epoxy to the back of a port and carefully center port over the crack. A centering nail may be helpful. Do not apply so much epoxy to back of port that it could close off the hole. After setting port, carefully butter the shoulder of the port and extend epoxy to 1/2 in / 1.28 cm on either side of the crack. Continue placement of epoxy by buttering crack between ports. To avoid leaks under pressure, the epoxy should be applied to approx. 1/4 in / .64 cm. thick. Do not place epoxy once it starts curing or getting hot or sticky, as this will compromise capseal and cause leaking. Once epoxy is placed, it should not be disturbed during the curing process. Cure time depends on air temperature and mass of epoxy. Normally a minimum of 2 hrs is necessary for PRO-POXY 300 FAST and 4 - 6 hrs for PRO-POXY 300 to fully cure at 73° ± 2°F / 23° C. Capseal must be fully cured prior to injection.

TO BOND IRREGULAR SURFACES: Apply the mixed PRO-POXY 300 or 300 FAST to the prepared substrates. Work into the substrate for positive adhesion. Secure or clamp the bonded surfaces firmly into place until the epoxy has cured. Glue line should not exceed 1/8 in / .32 cm.

◆ PACKAGING

- 8.5 oz / 250 ml cartridge (300 Fast)
- 22 oz / 600 ml cartridge
- 1 gal / 3.8 L units
- 2 gal / 7.6 L units
- 10 gal / 37.9 L units
- 110 gal / 416.4 L units

◆ COVERAGE

- 22 oz / 600 ml cartridge yields 37 cu in / 600 cu cm
- 1 gal / 3.8 L of mixed epoxy yields 231 cu in / 3746 cu cm

(See Estimating Guide for Cartidges on back)

300 FAST

◆ COMPLIANCES

PRO-POXY 300- ASTM-C-881: Types I, II, IV, & V; Grade 3; Classes B & C

PRO-POXY 300 FAST- ASTM-C-881: Types I, II*, IV, V*; Grade 3; Classes A, B, & C *Except Gel Time

V.O.C. Compliant
USDA specifications for use in food processing areas
ICC-ES Report ESR-2621 per AC308
City of Los Angeles, Research Report #25220

D.O.T. Listed
Dade County Approval
NSF/ANSI 61 certified

◆ TECHNICAL DATA

Ultimate Tension Values for Threaded Rod in Concrete *

ANCHOR DIA. (inches)	BIT DIA. (inches)	EMBEDMENT (inches)	ULTIMATE BOND STRENGTH IN CONCRETE (f'c)				ALLOWABLE STEEL STRENGTH (lbs)		
			2500 psi	3000 psi	4000 psi	5500 psi	A36 / A307	A193 B7	300 SERIES STAINLESS
3/8	7/16	1-11/16		5450			2100	4550	3630
3/8	7/16	3-3/8	7300		8250	9200	2110	4550	3630
3/8	9/16	3-3/8	9560				2110	4550	3630
3/8	7/16	5-5/8	10980		11360	11740	2110	4550	3630
1/2	9/16	2-1/4		7495			3750	8100	6470
1/2	9/16	4-1/2	10540		11730	12920	3750	8100	6470
1/2	11/16	4 -1/2	14640				3750	8100	6470
1/2	9/16	7-1/2	14660		17010	19360	3750	8100	6470
5/8	3/4	2-13/16		13665			5870	12655	10130
5/8	3/4	5-5/8	14800		18870	22940	5870	12655	10130
5/8	7/8	5-5/8	23340				5870	12655	10130
5/8	3/4	9-3/8	21560		26260	30960	5870	12655	10130
3/4	7/8	3-3/8		17825			8460	18220	12400
3/4	7/8	6-3/4	22380		25870	29360	8460	18220	12400
3/4	1	6-3/4	29850				8460	18220	12400
3/4	7/8	11-1/4	30320		34340	38360	8460	18220	12400
7/8	1	3-15/16		21390			11500	24800	16860
7/8	1	7-7/8	43280				11500	24800	16860
1	1-1/8	4-1/2		27419			15020	32400	22020
1	1-1/8	9	55650				15020	32400	22020
1-1/4	1-3/8	11-1/4	77860				23480	50610	34420

Shear and Tension Values for Smooth Dowels*

DOWEL DIAMETER (inches)	BIT DIAMETER (inches)	EMBEDMENT (inches)	ULTIMATE BOND STRENGTH (lbs)		ALLOWABLE STEEL STRENGTH	
			TENSION	SHEAR	TENSION	SHEAR
			3000 psi	2500 psi	3000 psi	2500 psi
1/2	9/16	4 1/2	6040	8560	3750	1930
5/8	3/4	5 5/8	6760	13140	5880	3030
3/4	7/8	6 3/4	12000	18920	8460	4360
7/8	1	7 7/8	14220	25720	11500	5930
1	1 1/8	9	23280	33600	15020	7740

*1. The tabulated shear and tension values are for anchors installed in normal weight concrete having reached the designated ultimate compressive strength at the time of installation. Linear interpolation may be used for concrete strengths between those listed.
2. Spacing and edge distance shall be in accordance with appropriate table.
3. Allowable load must be the lesser of the allowable steel strength and that allowable bond strength. Typically, allowable bond strength is equal to the ultimate bond strength divided by the safety factor of 4.
4. Allowable loads may be increased by 33-1/3% for short term loading due to earthquakes or wind.
5. PRO-POXY 300 and PRO-POXY 300 FAST is recognized for installation in water-filled or moist holes, for use in locations subject to severe exterior weathering conditions and for resisting tension and shear loads due to earthquake and wind.

Allowable Shear Values for Threaded Rod in 2000 psi Concrete*

ANCHOR DIAMETER (inches)	BIT DIAMETER (inches)	EMBEDMENT (inches)	ALLOWABLE STEEL STRENGTH (lbs) A36 / A307	A193 B7	300 SERIES STAINLESS
3/8	7/16	3-3/8	1080	2345	1870
1/2	9/16	4-1/2	1930	4170	3330
5/8	3/4	5-5/8	3030	6520	5220
3/4	7/8	6-3/4	4360	9390	6390
7/8	1	7-7/8	5930	12780	8680
1	1 1/8	9	7740	16690	11340
1-1/4	1-3/8	11-1/4	12100	26070	17730

* See notes on previous page.

Cure Times for Adhesive Anchors*

MINIMUM SUBSTRATE TEMP.	CURE TIME PRO-POXY 300	CURE TIME PRO-POXY 300 FAST	MINIMUM CURE TIME PRO-POXY 300	MINIMUM CURE TIME PRO-POXY 300 FAST
40°F (5°C)	F	48 hrs	F	24 hrs
65°F (18°C)	48 hrs	36 hrs	24 hrs	8 hrs
70°F (21°C)	36 hrs	24 hrs	12 hrs	2.5 hrs
80°F (27°C)	24 hrs	12 hrs	6 hrs	2 hrs
100°F (38°C)	12 hrs	6 hrs	4 hrs	1 hrs

* 1. F indicates PRO-POXY 300 FAST is recommended.
2. Cure Time is time required before epoxy reaches ultimate strength. Minimum Cure Time is minimum time required before the design or allowable load may be applied.
3. Anchors are to be undisturbed during the minimum cure time.

Allowable Anchor Spacing and Edge Distance*

		FULL ANCHOR CAPACITY Critical Distance (C_{cr})	REDUCED ANCHOR CAPACITY Distance (C_{min})	REDUCTION FACTOR
SPACING BETWEEN ANCHORS		24 D	8 D	.90
EDGE DISTANCE:	TENSION LOADS	12 D	see following chart	see following chart
	SHEAR LOADS – THREADED ROD	12 D	4 D	.21
	SHEAR LOADS – SMOOTH DOWELS	12 D	4 D	.21
	SHEAR LOADS – REBAR	16 D	4 D	.15

Edge Distance for Tension Values for Anchors in Concrete*

STUD SIZE (inches)	MINIMUM EDGE DISTANCE (C_{min})	REDUCTION FACTOR
3/8	1-1/2	.70
1/2	1-3/4	.66
5/8	1-3/4	.70
3/4	1-3/4	.70
7/8	3-1/2	.70
1	4	.70
1-1/4	5	.70

* 1. The listed values are the minimum distances required to obtain the load values in the tables above and to the left. D = anchor diameter. When adjacent anchors are different sizes or embedments, use the largest value for D.
2. The listed values are the minimum distances at which the anchor can be installed when load values are adjusted in accordance with reduction factor.
3. Load values in the table are multiplied by the reduction factor when anchors are installed at the minimum spacing listed. Use linear interpolation for spacing between critical and minimum distances. Multiple reduction factors for more than one spacing or edge distance are calculated separately and multiplied.

Shear and Tension Values for Reinforcing Steel*

ANCHOR DIAMETER (inches)	BIT DIAMETER (inches)	EMBEDMENT (inches)	TENSION ULTIMATE BOND STRENGTH (lbs) CONCRETE STRENGTH (f'_c) 2500 psi	4000 psi	5500 psi	ALLOWABLE STEEL STRENGTH TENSION OR SHEAR (lbs) Grade 40	Grade 60
# 3	1/2	3 3/8	7080	9050	11020	2200	2640
# 4	5/8	4 1/2	12300	14730	17160	4000	4800
# 5	3/4	5 5/8	16000	18810	21620	6200	7440
# 6	1	6 3/4	39035			8800	10560
# 7	1 1/8	7 7/8	36740			12000	14400
# 8	1 1/4	9	42670			15600	18720

* See notes on previous page.

NOTE: Values for Threaded Rod in Hollow & Grout Filled Block available on request.



Performing where others can't!

PRO-POXY 300
PRO-POXY 300 FAST



*Consult UNITEX Technical Service for wet hole application.

Estimating Guide for Number of Holes per Cartridge 22 oz / 600 ml

		HOLE DEPTH (inches)																		
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
THREADED ROD IN CONCRETE		NUMBER OF HOLES PER CARTRIDGE																		
ROD SIZE (inches)	HOLE SIZE (inches)																			
3/8	7/16	192	128	96	77	64	55	48	43	39	35	32	30	28	26	24	23	22	21	20
1/2	9/16	136	91	68	55	46	39	34	29	28	25	23	21	19	18	17	16	15	15	14
5/8	3/4	70	47	35	28	24	20	18	16	14	13	12	11	10	10	9	9	8	8	7
3/4	7/8	56	37	28	23	19	16	14	13	11	10	10	9	8	8	7	7	7	6	6
7/8	1	47	31	24	19	16	12	12	11	10	9	8	8	7	7	6	6	6	5	5
1	1-1/8	38	26	19	16	13	11	10	9	8	7	7	6	6	5	5	5	5	4	4
1-1/8	1-1/4	34	23	17	14	12	10	9	8	7	7	6	6	5	5	5	4	4	4	4
1-1/4	1-3/8	29	20	15	12	10	9	8	7	6	6	5	5	5	4	4	4	4	3	3
1-1/2	1-5/8	23	16	12	10	8	7	6	5	5	5	4	4	4	3	3	3	3	3	3
REBAR IN CONCRETE																				
REBAR SIZE (inches)	HOLE SIZE (inches)																			
No. 3	1/2	163	109	82	66	55	47	41	37	33	30	28	26	24	22	21	20	19	18	17
No. 4	5/8	127	85	64	51	43	37	32	29	26	24	22	20	19	17	16	15	15	14	13
No. 5	3/4	103	69	52	41	35	30	26	23	21	19	17	16	15	14	13	12	12	11	11
No. 6	7/8	82	55	41	32	28	24	21	19	17	15	14	13	12	11	11	10	10	9	9
No. 7	1	72	48	36	29	24	21	18	16	15	13	12	11	11	10	9	9	8	8	8
No. 8	1 1/8	62	41	31	25	21	18	16	14	13	12	11	10	9	9	8	8	7	7	7
No. 9	1 3/8	31	21	16	13	11	9	8	7	7	6	6	5	5	4	4	4	4	4	3
No. 10	1 1/2	30	20	15	12	10	9	8	7	6	6	5	5	5	4	4	4	4	4	3
SMOOTH DOWEL IN CONCRETE																				
DOWEL SIZE (inches)	HOLE SIZE (inches)																			
3/4	7/8	83	56	42	34	28	24	21	19	17	15	14	13	12	11	11	10	10	9	9
7/8	1	72	48	36	29	24	21	18	16	15	13	12	11	11	10	9	9	8	8	8
1	1 1/8	61	41	31	25	21	18	16	14	12	11	10	10	9	8	8	8	7	7	6
1 1/4	1 3/8	50	33	25	20	17	14	13	11	10	9	9	8	7	7	7	6	6	6	5
1 1/2	1 5/8	42	28	21	17	14	12	11	10	9	8	7	7	6	6	6	5	5	4	4

◆ LIMITATIONS

- Minimum substrate temperature is 40° F (5° C.)
- Do not thin. Solvents will prevent proper cure.
- Use dried aggregate only.
- Minimum age of concrete must be 3 – 7 days, depending on curing and drying conditions
- PRO-POXY 300 and 300 FAST are vapor barriers after cure.
- Do not allow mixed epoxy to reside in static mixing head or mixer for more than 5 minutes or gelation and blockage may result.
- Per NTSB safety recommendations, the use of adhesive anchors is prohibited in sustained overhead load anchoring applications.

◆ CAUTION

- Component A – Irritant
- Component B – Corrosive
- Product is a strong sensitizer. Use of safety goggles and chemical resistant gloves are recommended.
- Use of a NIOSH/MSHA organic vapor respirator recommended if ventilation is inadequate.
- Avoid breathing vapors.
- Avoid skin contact.

◆ FIRST AID

EYE CONTACT: Flush immediately with water for at least 15 minutes. Contact physician immediately.

RESPIRATORY PROBLEMS: Remove person to fresh air.

SKIN CONTACT: Remove any contaminated clothing. Remove epoxy immediately with a dry cloth or paper towel. Solvents should ***not*** be used as they carry the irritant into the skin. Wash skin thoroughly with soap and water.

CURED EPOXY RESINS ARE INNOCUOUS.

◆ CLEANUP

Uncured material can be removed with citrus cleaner or other approved solvent. Collect with absorbent material. Flush area with water. Dispose of in accordance with local, state, and federal disposal regulations. Cured material can only be removed mechanically.

Disclaimer of Warranties: Neither manufacturer nor seller have any knowledge or control concerning the purchaser's use of the product. No expressed warranty is made by manufacturer or seller with respect to the results of any use of the product or container that the product comes in. No implied warranties including, but not limited to, an implied warranty of merchantability or an implied warranty of fitness for a particular purpose are made with respect to the product. Neither manufacturer nor seller assume any liability for personal injury, loss or damage resulting from the use of the product. In the event that the product shall prove defective, buyer's exclusive remedy shall be as follows: Seller or manufacturer shall, upon request of buyer, replace any quantity of the product which is proven to be defective or shall, at its option, refund the purchase price of the product upon return of the product. Manufacturer shall not be responsible for use of this product in a manner to infringe on any patent held by others.

Contact UNITEX Technical Services for further information or installation instructions.

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2/11 PRINTED IN U.S.A.

Product Data Sheet
Edition 6.2003
Identification no. 525-501
SikaGrout 212

Construction

SikaGrout® 212

High performance, cementitious grout

Description	SikaGrout 212 is a non-shrink, cementitious grout with a unique 2-stage shrinkage compensating mechanism. It is non-metallic and contains no chloride. With a special blend of shrinkage-reducing and plasticizing/water-reducing agents, SikaGrout 212 compensates for shrinkage in both the plastic and hardened states. A structural grout, SikaGrout 212 provides the advantage of multiple fluidity with a single component. SikaGrout 212 meets Corps of Engineers' Specification CRD C-621 and ASTM C-1107 (Grade C).
Where to Use	▪ Use for structural grouting of column base plates, machine base plates, anchor rods, bearing plates, etc. ▪ Use on grade, above and below grade, indoors and out. ▪ Multiple fluidity allows ease of placement: ram in place as a dry pack, trowel-apply as a medium flow, pour or pump as high flow.
Advantages	▪ Easy to use...just add water. ▪ Multiple fluidity with one material. ▪ Non-metallic, will not stain or rust. ▪ Low bleed. ▪ Low heat build-up. ▪ Excellent for pumping: Does not segregate...even at high flow. No build-up on equipment hopper. ▪ Non-corrosive, does not contain chlorides. ▪ Superior freeze/thaw resistance. ▪ Resistant to oil and water. ▪ Meets CRD C-621. ▪ Meets ASTM C-1107 (Grade C). ▪ Shows positive expansion when tested in accordance with ASTM C-827. ▪ SikaGrout 212 is USDA-approved.
Coverage	Approximately 0.44 cu. ft./bag at high flow.
Packaging	6 lb. pail, 6/case, 36/pallet; 50-lb. multi-wall bags; 36 bags/pallet.

Typical Data *(Material and curing conditions @ 73°F (23°C) and 50% R.H.)*

Shelf Life		One year in original, unopened bags.		
Storage Conditions		Store dry at 40°-95°F (4°-35°C). **Condition material to 65°-75°F before using.**		
Color		Concrete gray		
Flow Conditions		**Plastic[1]**	**Flowable[1]**	**Fluid[2]**
Typical Water Requirements:		6 pt.+	6.5 pt.	8.5 pt.
Set Time (ASTM C-266):	**Initial**	3.5-4.5 hr.	4.0-5.0 hr.	4.5-6.5 hr.
	Final	4.5-5.5 hr.	5.5-6.5 hr.	6.0-8.0 hr.
Tensile Splitting Strength, psi (ASTM C-496)				
	28 day	600 (4.1 MPa)	575 (3.9 MPa)	500 (3.4 MPa)
Flexural Strength, psi (ASTM C-293)				
	28 day	1,400 (9.6 MPa)	1,200 (8.2 MPa)	1,000 (6.8 MPa)
Bond Strength, psi (ASTM C-882 modified): Hardened concrete to plastic grout				
	28 day	2,000 (13.7 MPa)	1,900 (13.1 MPa)	1,900 (13.1 MPa)
Expansion % (CRD C-621)	**28 day**	+0.021%	+0.056%	+0.027%
Compressive Strength, psi (CRD C-621)				
	1 day	4,500 (31 MPa)	3,500 (24.1 MPa)	2,700 (18.6 MPa)
	7 day	6,100 (42 MPa)	5,700 (39.3 MPa)	5,500 (37.9 MPa)
	28 day	7,500 (51.7 MPa)	6,200 (42.7 MPa)	5,800 (40 MPa)

[1]CRD C-227: 100-124% (plastic), 124-145% (flowable)

[2]CRD C-611: 10-30 sec efflux time.

Construction

How to Use

Surface Preparation	Remove all dirt, oil, grease, and other bond-inhibiting materials by mechanical means. Anchor bolts to be grouted must be de-greased with suitable solvent. Concrete must be sound and roughened to promote mechanical adhesion. Prior to pouring, surface should be brought to a saturated surface-dry condition.
Forming	For pourable grout, construct forms to retain grout without leakage. Forms should be lined or coated with bond-breaker for easy removal. Forms should be sufficiently high to accommodate head of grout. Where grout-tight form is difficult to achieve, use SikaGrout 212 in dry pack consistency.
Mixing	Mix manually or mechanically. Mechanically mix with low-speed drill (400-600 rpm) and Sika mixing paddle or in appropriately sized mortar mixer. **Product Extension:** For deeper applications, SikaGrout 212 (plastic and flowable consistencies only) may be extended with 25 lbs. of 3/8" pea gravel. The aggregate must be non-reactive, clean, well-graded, saturated surface dry, have low absorption and high density, and comply with ASTM C33 size number 8 per Table 2. Add the pea gravel after the water and SikaGrout 212.
Mixing Procedure	Make sure all forming, mixing, placing, and clean-up materials are on hand. Add appropriate quantity of clean water to achieve desired flow. Add bag of powder to mixing vessel. Mix to a uniform consistency, minimum of 2 minutes. Ambient and material temperature should be as close as possible to 70°F If higher, use cold water; if colder, use warm water.
Application	Within 15 minutes after mixing, place grout into forms in normal manner to avoid air entrapment. Vibrate, pump, or ram grout as necessary to achieve flow or compaction. SikaGrout 212 must be confined in either the horizontal or vertical direction leaving minimum exposed surface. After grout has achieved final set, remove forms, trim or shape exposed grout shoulders to designed profile. SikaGrout 212 is an excellent grout for pumping, even at high flow. For pump recommendations, contact Technical Service. Wet cure for a minimum of 3 days or apply a curing compound which complies with ASTM C-309 on exposed surfaces.
Limitations	▪ Minimum ambient and substrate temperature 45°F and rising at time of application. ▪ Minimum application thickness: 1/2 in. ▪ Maximum application thickness (neat): 2 in. Deeper applications are possible, please contact Sika's technical services department. ▪ Do not use as a patching or overlay mortar or in unconfined areas. ▪ Material must be placed within 15 minutes of mixing. ▪ As with all cement based materials, avoid contact with aluminum to prevent adverse chemical reaction and possible product failure. Insulate potential areas of contact by coating aluminum bars, rails, posts etc. with an appropriate epoxy such as Sikadur Hi-Mod 32.

Caution

Irritant	Suspect carcinogen - contains portland cement and crystalline silica. Skin and eye irritant. Avoid breathing dust. Use only with adequate ventilation. May cause delayed lung injury (silicosis). IARC lists crystalline silica as having sufficient evidence of carcinogenicity in laboratory animals and limited evidence of carcinogenicity in humans. NTP also lists crystalline silica as a suspect carcinogen. Use of safety goggles and chemical resistant gloves is recommended. In case of high dust concentrations or exceedance of PELs, use an appropriate NIOSH approved respirator. Remove contaminated clothing.
First Aid	In case of skin contact, wash thoroughly with soap and water. For eye contact, flush immediately with plenty of water for at least 15 minutes; contact physician immediately. Wash clothing before re-use.
Clean Up	In case of spillage, ventilate area of spill, confine spill, vacuum or scoop into appropriate container. Dispose of in accordance with current applicable local, state and federal regulations. Uncured material can be removed with water. Cured material can only be removed mechanically.

KEEP CONTAINER TIGHTLY CLOSED • KEEP OUT OF REACH OF CHILDREN • NOT FOR INTERNAL CONSUMPTION • FOR INDUSTRIAL USE ONLY

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Prior to each use of any Sika product, the user must always read and follow the warnings and instructions on the product's most current Technical Data Sheet, product label and Material Safety Data Sheet which are available online at www.sikaconstruction.com or by calling Sika's Technical Service Department at 800-933-7452. Nothing contained in any Sika materials relieves the user of the obligation to read and follow the warnings and instruction for each Sika product as set forth in the current Technical Data Sheet, product label and Material Safety Data Sheet prior to product use.

LIMITED WARRANTY: Sika warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Technical Data Sheet if used as directed within shelf life. User determines suitability of product for intended use and assumes all risks. Buyer's sole remedy shall be limited to the purchase price or replacement of product exclusive of labor or cost of labor. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

Visit our website at www.sikaconstruction.com **1-800-933-SIKA NATIONWIDE**

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ISO 9001:2008

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Construction

SikaTop-Armatec® 110 EpoCem®

Bonding agent and anti-corrosive coating

Product Description

SikaTop-Armatec® 110 EpoCem® is a cement-based, epoxy-modified, three-component, anti-corrosion coating and bonding agent.

Uses

Bonding agent for use on concrete, mortar or steel:

- For repairs to concrete using Sika's patching and repair mortars
- For bonding new concrete to old (wet to dry)

Anti-corrosion coating for reinforcing steel:

- For repairs to reinforced concrete where there is corrosion of the steel

Characteristics / Advantages

- Excellent adhesion to steel and concrete
- Acts as an effective barrier against penetration of water and chlorides
- Contains corrosion inhibitors
- Provides an excellent bonding coat for subsequent application of repair mortars (cement and epoxy cement based)
- High degree of mechanical strength
- May be spray applied

Product Data

Form

Appearance / Colours	Liquid and Powder Component A: white liquid Component B: yellowish liquid Component C: light grey powder (Grey when mixed)
Packaging	1,75 Litre pack (Components A+B+C)

Storage

Storage Conditions / Shelf-Life	6 Months in original, unopened container. Store in a dry area between 5°C and 30°C.Protect from direct sunlight.

Technical Data

Chemical Base	Epoxy, Cement & Crystaline free Silica
Density	Mixed: 2,00kg/litre
Layer Thickness	1 – 2 mm

Mechanical Properties

Bond Strength (14 days)	**To concrete:** 2 – 3 N/mm^2	**To steel:** 1 – 2 N/mm^2

Application Details

Consumption / Dosage

Usage	m^2 per litre
Bonding Agent	1,5 – 2,0
Anti-corrosion coating	0,5 – 1,0 per coat

The recommended coverage's should be strictly adhered to.

Substrate Quality

The concrete substrate must be sound and of sufficient compressive strength (min.20 N/mm² (MPa) with a minimum pull off strength of 1.5 N/mm² (MPa).

The surface must be dry and free of all contaminants such as oils, grease, coatings and surface treatments etc.

The substrate must be prepared mechanically to remove cement laitance and achieve a profile open textured surface.

Weak concrete should be removed and surface defects such as honeycombed areas, blowholes and voids must be fully exposed.

Repairs to substrate, filling of blowholes/voids and surface levelling should be carried out using the appropriate product from the Sikafloor®, SikaDur® and SikaGard® range of materials.

Substrate Preparation / Priming

Concrete, mortar and stone:
All surfaces must be clean and sound. Remove all loose materials mechanically, with a wire brush, or by water or sand blasting. The surface may be dry or damp, but it must be free of any standing water.

Steel:
All surfaces must be clean and free from all traces of grease, oil, rust and mill scale.

Application Conditions / Limitations

Substrate Temperature	Min.5°C – Max.30°C.
Ambient Temperature	Min.5°C – Max.35°C.
Substrate Humidity	< 10 %

Application Instructions

Mixing (Ratio/Dosage)

Mix complete kits only

Shake Components A and B vigorously before opening. Pour both liquids into a suitable mixing pan and mix for 30 seconds. Add Component C slowly while mixing with a slow speed drill (set at 250 rpm). Continue mixing for at least 3 minutes, taking care to entrain as little air as possible, until a uniform, lump-free consistency is obtained. **Leave to stand for 5 — 10 minutes** until the mixture exhibits a brushable, slow-dripping consistency.

Application Method / Tools

For use as a bonding agent:

Wet down the prepared substrate until the concrete is fully saturated with water, and then apply a bonding coat not less than 0,5 mm thick, using a paintbrush, roller or suitable spray gun. For best results, work the bonding slurry well into the substrate to ensure complete coverage of all surface irregularities.

Apply the freshly mixed patching mortar or concrete while the SikaTop-Armatec® 110 EpoCem® is still wet.

For use as an anti-corrosion coating:

Apply a coating approximately 1,0 — 2,0 mm thick to the cleaned and derusted reinforcement steel, using a stiff paintbrush, roller or spray gun.

Leave to dry for 2 — 3 hours (at an ambient temperature of 20°C), then apply a second coat of similar thickness.

Leave to dry for a similar period before applying patching mortar to the repair. In the course of application, some of the coating material will inevitably be deposited on the surrounding concrete, but this has no detrimental effect on the finished repair.

Cleaning of Tools

Remove uncured SikaTop-Armatec® 110 EpoCem® from tools and equipment with water immediately after use. Cured material can only be removed mechanically.

Waiting Time / Overcoatability

The maximum waiting times between the application of SikaTop-Armatec® 110 EpoCem® and the subsequent application of a patching mortar or concrete:

Temperature	Time (Hours)
+5°C	20
+10°C	16
+20°C	12
+30°C	8

Notes on Application / Limits

Freshly applied SikaTop-Armatec® 110 EpoCem® should be protected from damp, condensation and water until the repair mortar has been placed.

On no account should water be added to the mix.

Local Restrictions

Please note that as a result of specific local regulations the performances of this product may vary from country to country. Please consult the local Product Data Sheet for the exact description of the application fields.

Health and Safety Information

Protective Measures

During application in closed rooms, pits and shafts, etc. sufficient ventilation must be provided. Keep away from naked flames including welding.

To avoid rare allergic reactions, we recommend the use of protective gloves. Change soiled work cloths and wash hands before breaks and after finishing work.

Local regulations as well as health and safety advice on packaging labels must be observed.

Ecology

Transportation Class

construction

Important Notes	Uncured/unmixed material must be removed according to local regulations. Fully cured material can be disposed of as household waste under agreement with the responsible local authorities. Detailed health and safety information as well as detailed precautionary measures e.g. physical, toxicological and ecological data can be obtained from the Material Safety Data Sheet.
Toxicity	

Legal Notes

The information, and, in particular, the recommendations relating to the application and end-use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The user of the product must test the product's suitability for the intended application and purpose. Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request or access on the Internet under www.sika.co.za.

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3 Contributes LEED Points

PROSPEC®

RCT Rapid Cure Technology

BLENDCRETE

Description

ProSpec® BlendCrete is a one component, polymer modified, cement based concrete and masonry patching compound.

Features

- Fast setting, low slump repair mortar that can be trowelled, shaped and shaved after taking an initial set
- Easy shaping and molding
- One component incorporating water activated polymer system
- Integrated corrosion inhibitor
- Can be applied overhead and vertically without using expensive forming procedures
- Apply from 1/2" to 1" (13 to 25 mm)
- Tenacious bond to substrates
- Interior/exterior
- Portland cement based
- Normal set time of 30 minutes; also available in 15 minute set time
- Available in 3 gray colors and one white color
- Rapid Cure Technology (RCT)™

Uses

- Used interior or exterior, above or below grade, on vertical, overhead and horizontal surfaces
- Suited for patching distressed horizontal, vertical and overhead surfaces including precast products, concrete pipe, curbs, sidewalks, bridges, panels and walls
- Used to fill honeycombs, form tie rise holes, spalls or irregularities due to misaligned forms or unconsolidated concrete

Technical Data

Working Time	
15 minutes at 70° F (21° C)	
Set Time ASTM C 191 @ 70° F (21° C)	
Initial set	Approx. 20 min.
Final set	Approx. 30 min.
Compressive Strength ASTM C 928	
1 hour	1,925 psi (13.3 MPa)
3 hours	3,340 psi (23.0 MPa)
1 day	4,885 psi (33.7 MPa)
7 days	5,845 psi (40.3 MPa)
28 days	6,500 psi (44.8 MPa)

Freeze/Thaw Resistance ASTM C 666 Method “B”	
After 300 cycles	1% loss due to slight scaling; no spalling

Average Scaling Resistance (ASTM C 672-98)		
No. of cycles	Rating	Condition of surface
25	0	No scaling visible

Shear Bond Strength ASTM C 882	
1 day	1,035 psi (7.1 MPa)
7 days	1,650 psi (11.4 MPa)
Flexural Strength ASTM C 348	
1 day	1,142 psi (7.9 MPa)
28 days	1,180 psi (8.1 MPa)

Test results obtained under controlled laboratory conditions.
Reasonable variations can occur due to atmospheric and job site conditions.

PROSPEC®

BLENDCRETE

Preparation

Adjoining surfaces must be sound, clean, free of loose or damaged concrete, dust, dirt and other contaminants that will interfere with bond. Completely expose and clean all reinforcing steel, ensuring a minimum clearance of 3/4" (19 mm) behind reinforcing steel.

Perform reinforcing steel preparation in accordance with ICRI Technical Guidelines No. 03730. For best results patch area edges should be saw cut to a depth of 1/2" (13 mm). Abrade concrete to obtain a rough surface promoting adhesion. The area should be saturated surface dry (SSD) with no standing water on the surface. The use of a vigorously scrubbed application of a no slump bond coat of BlendCrete or a bonding agent like ProSpec Acrylic Additive is recommended. This should be applied to all surfaces coming into contact with the patch. Do not allow bond coat to dry prior to the placement of the BlendCrete.

Refer to

- ICRI Guide No. 03732 Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays

Mixing

BlendCrete requires 4 to 5 quarts (3.8 to 4.7 L) of water per 50 lbs. (22.7 kg) of powder. Mix only the amount of material that can be placed in 15 minutes. Pour the required amount of potable water into a clean mixing container, then add the measured amount of BlendCrete while continuing to mix and blend thoroughly for 1-2 minutes to a lump free putty like consistency. Small amounts of BlendCrete can be mixed using a trowel or a 1/2" drill (400-600 r.p.m.) and paddle.

Extended Mix: To fill areas deeper than 2" (51 mm), add 15 lbs. (6.8 kg) of clean saturated surface dry 3/8" (10 mm) pea gravel to 50 lbs. (22.7 kg) of BlendCrete™. First mix the BlendCrete as outlined, then add the pea gravel and mix for 60 seconds. Total mixing time is not to exceed 2-3 minutes.

Do not over water, re-temper or over mix. Clean out the mixing container thoroughly after each batch to avoid getting hardened mortar into the next batch.

Application

Immediately apply the fresh mortar into the entire surface, forcing BlendCrete firmly into the previously prepared area insuring full contact with all bonding surfaces. Slightly overfill the area. After initial set, using a trowel, shave BlendCrete to the desired final profile, shaving the patch from the center towards the bond edge at the existing surfaces. A wet spray may be used for final shaping. In deeper areas additional lifts can be made after the original patch has reached initial set. Score and roughen the original lift layer to improve bond between applications. BlendCrete can be placed in lifts up to 1" (25 mm) on vertical and overhead applications by holding the mortar in place until initial set has occurred.

PROSPEC®

BLENDCRETE

Clean Up

Use water to clean all tools immediately after use.

Best Performance

- Do not bridge moving cracks, control or expansion joints
- Protect from conditions that cause early water loss: such as wind, sunlight, heat, etc.
- The minimum applications thickness is 1/2" (12 mm)
- Do not overwork, re-temper, over water or add admixtures

Colors

#0 Dark gray

#2 Medium gray

#3 Light gray

Also available in white

Curing

Cure in accordance with American Concrete Institute procedure number 308. Protect patch from high temperature, high wind, low humidity, and direct sun causing rapid drying, by covering with wet burlap or plastic for up to 24 hours. A water based curing compound can also be used.

Do not apply to frozen or frost covered areas. The minimum ambient and surface temperatures should be 40° F (4° C) at time of application. Hot weather and conditions above 80° F (27° C) will reduce working time and accelerate set, while cold temperatures below 60° F (16° C) will have a retarding effect.

Refer to

- ACI 305 Standard on Hot Weather Concreting
- ACI 306 Standard on Cold Weather Concreting
- ACI 308 Standard Practice for Curing Concrete

Coverage

One 50 lb. (22.7 kg) bag yields approximately 0.48 $ft.^3$ (0.01 m^3)
With the addition of 15 lbs. (6.8 kg) of 3/8" (10 mm) pea gravel yield is approximately 0.60 $ft.^3$ (0.02 m^3)

Packaging

50 lbs. (22.7 kg) moisture resistant bag

Storage

Always keep in a cool dry place unexposed to sunlight.

Shelf Life

One year when stored properly in original unopened container.

PROSPEC®

BLENDCRETE

Caution

KEEP OUT OF REACH OF CHILDREN AND ANIMALS. WARNING!

Contains Portland cement and silica sand. May irritate eyes and skin. Avoid contact with eyes or prolonged contact with skin. In case of contact, flush thoroughly with water. The wearing of gloves and safety goggles is recommended.

In case of eye contact, flood eyes with potable water and call physician. DO NOT RUB EYES.

Do not take internally. Crystalline silica sand may cause serious lung problems. Avoid breathing dust and wear a respirator in dusty areas.

Consult Material Safety Data Sheet for further information.

First Aid

Inhalation: Remove to fresh air

Eye Contact: Irrigate eye with water or consult physician if irritation persists.

Skin Contact: Washed exposed skin area with soap and water; consult a physician if irritation persists.

Ingestion: Immediately consult a physician.

LIMITED 1 YEAR WARRANTY FROM DATE OF MANUFACTURE: Bonsal American warrants that this product and the materials used therein meet or exceed the applicable standards listed and enforced at the time of manufacture. Bonsal American will replace any product or part which proves defective due to quality of ingredients used or due to the manufacturing process itself. This Warranty shall apply only if the product is used in strict accordance with applicable specifications and instructions provided by Bonsal American for its use, and Bonsal American shall not be liable otherwise. Replacement of any defective product, or, at Bonsal Americans option, refund of the purchase of any defective product shall be the buyer's sole remedy under this Warranty, and Bonsal American shall in no event be liable for any damages in excess of the purchase price of the defective product. BONSAL AMERICAN SHALL IN NO EVENT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES INCLUDING LOSS OF PROFITS OF ANY KIND. Product demonstrations are done for illustrative purposes only and do not constitute a warranty or warranty alteration of any kind. This Warranty constitutes the sole warranty given by Bonsal American in connection with this product. No modification of this Warranty in favor of any buyer shall be valid unless given in writing and signed by an officer of Bonsal American. Bonsal American has authorized no person to make or give any other warranties or representation, oral or written on its behalf. IN PARTICULAR, THERE ARE NO IMPLIED WARRANTIES, INCLUDING WITHOUT EXCEPTION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

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Construction

Sika Boom®

Expanding Polyurethane Foam

Product Description

Sika Boom® is a polyurethane-based fast curing expanding foam.

Uses

- Filling gaps and voids that occur around the home and during building construction
- Blocking out dust, noise, draft and vermin
- Installation of window and doorframes
- Insulation of pipes

Characteristics / Advantages

- HCFC Free
- Can be cut, sanded and over painted
- Can be used when held upside down
- Suitable for use outside
- Has excellent adhesion to most substances
- Quick and easy gap filler
- Reaches difficult access areas that need to be filled

Product Data

Form		
Appearances / Colours	Foam	Light Yellow
Packaging	250, 500 and 750ml aerosol	

Storage

Storage Conditions / Shelf-Life	9 months shelf life if stored in an unopened packaging at between +18°C and +22°C and in a dry place.

Technical Data

Chemical Base	Polyurethane
Density	~ 22 kg / m³
Skinning Time	About 10 minutes at 23 °C
Curing Rate	5 – 10 hours depending on atmospheric temperature and humidity.

Vertical stability in gap	Stable ↑ 100 cm ↔ 5 cm
Service temperature	-30 °C to +80 °C
Flammability Class	B3 (DIN 4102)

Mechanical Properties

Mechanical Strength	> 9 N/cm²
Foam yield in litres	750ml – 39 ± 3 500ml – 26 ± 3 250ml – 12 ± 2
Dimensional stability	± 7 %

Application Details

Substrate Quality	Clean and dry, homogeneous, free from grease, dust and loose particles. Paint, laitance and other poorly adhering particles must be removed. Standard construction rules must be observed.
Substrate Preparation / Priming	The substrate must be free of dust, grease, oil and surface contaminants. The surface should be pre-moistened with water before application to ensure that: (a) The foam cures at an optimum rate (b) Secondary foam expansion is prevented.

Application Conditions / Limitations

Substrate Temperature	Min. 5°C max. 30°C
Ambient Temperature	Min. 5°C max. 35°C
Substrate Humidity	< 5 %
Relative Air Humidity	< 80 %

Application Instructions

Application Method / Tools	Screw the nozzle onto the can. Shake can thoroughly (approximately 20 times) before use. Apply foam by pointing nozzle into area to be filled and depressing. It can be applied valve up or down. Foam will dispense rapidly and will expand 2 to 3 times its size as it comes out of the can. Varying the pressure on the adaptor can regulate the quantity of foam dispensed.
Cleaning of Tools	Remove fresh spots of foam immediately using acetone. Cured foam can only be removed mechanically.
Notes on Application / Limitations	All data for 23°C and 50 % r.h. and non-aged foam. For yield and reactivity 85 % h.r. is necessary (humidify!). Special uses have to be tested in advance. For aged foam no. 8 is up to 30 % lower. Sika Boom® does not adhere to Teflon, polythene, silicone or grease. For special uses, test Sika Boom® in advance. Cutting time is about 25 minutes. Aged material can yield up to 30 % less than the specified value.

construction

Local Restrictions	Please note that as a result of specific local regulations the performances of this product may vary country to country. Please consult the local Product Data Sheet for the exact description of the application fields.

Health and Safety Information

Protective Measures	To avoid rare allergic reactions, we recommend the use of protective gloves. Change soiled work cloths and wash hands before breaks and after finishing work. Local regulations as well as health and safety advice on packaging labels must be observed.
Ecology	
Transportation Class	
Important Notes	Residues of material must be removed according to local regulations. Fully cured material can be disposed of as household waste under agreement with the responsible local authorities. Detailed health and safety information as well as detailed precautionary measures e.g. physical, toxicological and ecological data can be obtained from the Material Safety Data Sheet.
Toxicity	

Legal Notes

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Construction

Sikaflex®-2c NS

Two-component, non-sag, polyurethane elastomeric sealant

Description	Sikaflex-2c NS is a 2-component, premium-grade, polyurethane-based, elastomeric sealant. It is principally a chemical cure in a non-sag consistency. Meets ASTM C-920, Type M, Grade NS, Class 25, use T, NT, M, G, A, O, I and Federal Specification TT-S-00227E, Type II, Class A. Tested in accordance with ASTM C-1382 for use in EIFS Systems.
Where to use	■ Intended for use in all properly designed working joints with a minimum depth of 6 mm. ■ Ideal for vertical and horizontal applications. ■ Placeable at temperatures as low as 4°C. ■ Adheres to most substrates commonly found in construction. ■ An effective sealant for use in Exterior Insulation Finish Systems (EIFS). ■ Submerged environments, such as canal and reservoir joints.
Advantages	■ Capable of ±50% joint movement. ■ Chemical cure allows the sealant to be placed in joints exceeding 12.5 mm in depth. ■ High elasticity with a tough, durable, flexible consistency. ■ Exceptional cut and tear resistance. ■ Exceptional adhesion to most substrates without priming. ■ Available in 40 architectural colors. ■ Color uniformity assured via Color-pak system. ■ Available in pre-pigmented Limestone Gray (no Color-pak needed). ■ Non-sag even in wide joints. ■ Easy to mix. ■ Paintable with water-, oil-, and rubber-base paints. ■ ANSI/NSF 61 approval for contact with potable water. ■ Jet fuel resistant
Packaging	1.5 US gal/unit (5.68 ltr) Color-pak is purchased separately. Limestone Gray color available prepigmented.

Typical Data *(Material and curing conditions 23°C (73°F) and 50%R.H.)*

Shelf life	One year in original, unopened containers.		
Storage conditions	Store dry at 4° to 35°C (40° to 95°F). **Condition material to 18° to 24°C before using.**		
Colors	A wide range of architectural colors are available. Special colors available on request.		
Application temperature	4° to 35°C, ambient and substrate temperatures. Sealant should be installed when joint is at midrange of its anticipated movement.		
Service range	-40° to 75°C (-40° to 170°F).		
Curing rate (ASTM C-679)	Tack-Free Time Final Cure	6 - 8 hrs. 3 days	
Application life	3 - 4 hrs.		
Tear strength	ASTM D-624	0.8 kg/mm	
Shore A hardness	ASTM D-2240	25 ± 5	
Tensile properties (ASTM D-412) **Tensile strength at break** **Tensile elongation** **100% modulus**	 0.83 N/mm^2 500% 0.48 N/mm^2		
Adhesion in peel (FedSpec.TT-S-00227E)	**Substrate** Concrete	**Peel Strength** 25 lb.	**% Adhesion Loss** Zero
Weathering resistance	Excellent		
Chemical resistance	Good resistance to water, diluted acids, diluted alkalines, and residential sewage. Consult Technical Service for specific data.		

How To Use

Surface Preparation

All joint-wall surfaces must be clean, sound, and frost-free. Joint walls must be free of oils, grease, curing compound residues, and any other foreign matter that might prevent bond. Ideally this should be accomplished by mechanical means. Bond breaker tape or backer rod must be used in bottom of joint to prevent bond.

Priming

Priming is typically not necessary. Most substrates only require priming if sealant will be subjected to water immersion after cure. Testing should be done, however, on questionable substrates, to determine if priming is needed. Consult Technical Service or Sikaflex Primer Technical Data Sheet for additional information on priming.

Mixing

Pour entire contents of Component 'B' into pail of Component 'A'. Add entire contents of Color-pak into pail and mix with a low-speed drill (400 - 600 rpm) and Sikaflex paddle.* Mix for 3 - 5 minutes to achieve a uniform color and consistency. Scrape down sides of pail periodically. Avoid entrapment of air during mixing. When mixing in cold weather (<10°C), do not force the mixing paddle to the bottom of the pail. After adding Component 'B' and Color-pak into Component 'A', mix the top 1/2 to 3/4 of the pail during the first minute of mixing. After scraping down the sides of the pail, mix again for another minute. The paddle should reach the bottom of the pail between the first and second minute of mixing. Scrape down the sides of the pail a second time and then mix for an additional 2 - 3 minutes until the sealant is well blended.

Color-pak must be used with tint base. For pre-pigmented Limestone base, just mix with low speed drill and Sikaflex paddle (no Color-pak needed).

Application

Recommended application temperatures 4° to 35°C. Pre-conditioning units to approximately 20°C is necessary when working at extremes. Move pre-conditioned units to work areas just prior to application. Apply sealant only to clean, sound, dry, and frost-free substrates. Sikaflex-2c should be applied into joints when joint slot is at mid-point of its designed expansion and contraction.

To place, load directly into bulk gun or use a follower plate loading system. Place nozzle of gun into bottom of joint and fill entire joint. Keeping the nozzle deep in the sealant, continue with a steady flow of sealant preceding nozzle to avoid air entrapment. Also, avoid overlapping of sealant since this also entraps air. Tool as required. Joint dimension should allow for 6 mm minimum and 12.5 mm inch maximum thickness for sealant. Proper design is 2 : 1 width to depth ratio.

Limitations

- The ultimate performance of Sikaflex-2c NS depends on good joint design and proper application.
- Minimum depth in working joint is 6 mm.
- Maximum expansion and contraction should not exceed 50% of average joint width.
- Do not cure in the presence of curing silicones.
- Avoid contact with alcohol and other solvent cleaners during cure.
- Allow 3-day cure before subjecting sealant to total water immersion.
- Avoid exposure to high levels of chlorine. (Maximum level is 5 ppm).
- Do not apply when moisture vapor transmission exists since this can cause bubbling within the sealant.
- Avoid over-mixing sealant.
- Light color shades tend to yellow over time when exposed to ultraviolet rays.
- Light colors can yellow slightly if exposed to direct gas fired heating elements prior to the formation of initial skin.
- When overcoating: an on-site test is recommended to determine actual compatibility.
- The depth of sealant in horizontal joints subject to traffic is 12.5 mm.
- In horizontal joints exposed to vehicular or foot traffic, "TG" additive is recommended. See Sikaflex-2c NS TG data sheet for specific details.

Caution	**Component 'A'; Irritant** - Avoid contact. Product is a skin, respiratory and eye irritant. Use of safety goggles and chemical resistant gloves recommended. Use of a NIOSH approved respirator required if PELs are exceeded. Use with adequate ventilation. **Component 'B'; Combustible; Sensitizer; Irritant** - Contains Xylene. Keep away from heat, sparks and open flame. Use with adequate ventilation. Product is a respiratory and skin sensitizer. Avoid contact. Product is an eye, skin, and respiratory irritant. Use of safety goggles and chemical resistant gloves recommended. Use of a NIOSH approved respirator required if PELs are exceeded.
First aid	In case of skin contact, wash thoroughly with soap and water. For eye contact, flush immediately with plenty of water for at least 15 minutes; contact physician. For respiratory problems, remove to fresh air. Wash clothing before reuse. Discard contaminated shoes.
Clean up	Uncured material can be removed with approved solvent. Cured material can only be removed mechanically. For spillage, collect, absorb, and dispose of in accordance with current, applicable local, state, and federal regulations.
Legal Notes	The information, and, in particular, the recommendations relating to the application and end-use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The user of the product must test the product's suitability for the intended application and purpose. Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.

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SPEED CRETE® BLUE LINE

Fast Setting Underwater Cement Based Patching Material

Description

SPEED CRETE BLUE LINE is a proprietary formulation of blended portland cements, finely processed selected aggregates, and specific chemical additives designed to provide a fast set, particularly for underwater use. SPEED CRETE BLUE LINE undergoes a chemical "hyper hydration" and produces a very stable, low permeable, cementitious matrix, when combined with the correct amount of water.

Primary Applications

- Underwater and below grade repairs
- Vertical, overhead and horizontal restoration
- Outstanding material for repair of dams, piers, reservoirs, pilings, seawalls, tunnels, sewer pipe and other underwater surfaces

Features/Benefits

- Rapid set
- Initial set in 3 to 5 minutes
- Underwater cure
- High strength
- Durable
- Used, without forming, at no slump consistency
- Can be “shaved” to desired contour

Technical Information

Material Properties at 75°F (24°C)

Compressive Strength psi (MPa) ASTM C 109
24 hours 3,500 (24.1)
7 days.....5,460 (37.6)
28 days.....6,015 (41.5)

Set Time Gilmore ASTM C 266
Initial .....3 to 5 min
Final.....20 min

Tensile Strength psi (MPa) ASTM C 190
7 day avg.....315 (2.2)
28 day avg.....410 (2.8)

Flexural Strength psi (MPa) ASTM C 78
28 day avg.....964 (6.6)

Shear Bond Strength psi (MPa) ASTM C 1042
24 hour avg .....921(6.3)
7 day avg.....1,268 (8.7)

Freeze Thaw Durability Factor ASTM C 666
300 cycles 98.05%

Shrinkage ASTM C 157
Initial 7 days .....-0.053%
Final 28 days.....-0.160%
Expansion initial 7 days 0.047%
Final 28 days.....0.104%

Scaling Resistance ASTM C 672
25 cycles ..... 0% loss

Chlorides ASTM D 1411 ..... 0.01%

Packaging

SPEED CRETE BLUE LINE is packaged in 50 lb (22.7 kg) poly-lined bags, and 50 lb (22.7 kg) pails.

Shelf Life

1 year in original, unopened package.

Coverage/Yield

Approximately 0.5 ft^3 (0.01 m^3).

Directions for Use

Surface Preparation: Concrete surfaces must be structurally sound, free of loose or deteriorated concrete and free of dust, dirt, paint, efflorescence, oil and all other contaminants. Mechanically abrade the surface to achieve a surface profile equal to CSP 6 - 7 in accordance with ICRI Guideline 310.2. Properly clean profiled area. **Priming:** Clean and prime exposed steel above water with DURALPREP AC. Concrete that is and will remain above water throughout the repair should be primed with a spray or brush coat of DURALPREP AC. Alternately, a Saturated Surface Dry (SSD) concrete surface can be primed with a scrub coat of SPEED CRETE BLUE LINE. The repair must be made before the scrub coat dries out.

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An RPM Company

Mixing: SPEED CRETE BLUE LINE will require approximately 5 to 5.5 quarts (4.7 to 5.26 L) of potable water per 50 lb (22.7 kg) bag or pail to achieve the proper mix consistency. Pour the measured amount of water into a clean container. Add the measured amount of SPEED CRETE BLUE LINE, and thoroughly mix for no more than 60 seconds to a stiff, no slump, putty-like consistency. Because of fast initial set time, do not mix more than 50 lbs (22.7 kg) at a time. Mix small quantities of SPEED CRETE BLUE LINE in a clean pail with a hand trowel.

Application: To ensure complete bond with the entire surface, force the SPEED CRETE BLUE LINE firmly into the Saturated Surface Dry area by hand or with a trowel. Underwater applications may be smoothed or finished by hand. For out-of-water applications, slightly overfill the patch, and following initial set, shave the material to conform to the contour of the surrounding surface. Always shave SPEED CRETE BLUE LINE toward the common bonding edge between the patching material and the existing surface. Cure the material using standard curing practices. For additional information, contact your local EUCLID CHEMICAL representative.

Clean-Up

Clean application tools and mixing equipment with water immediately following use. Hardened SPEED CRETE BLUE LINE is difficult to remove.

Precautions/Limitations

- Covered storage away from all moisture.
- Mix no more than 60 seconds.
- Use only potable water with SPEED CRETE BLUE LINE.
- Mix to a stiff, putty-like, no slump consistency.
- Do not re-temper or add sand to SPEED CRETE BLUE LINE.
- Minimum application 3/4” (19 mm), maximum application, 3” (7.62 cm) per lift.
- Do not overwork or overtrowel patching material.
- Do not featheredge SPEED CRETE BLUE LINE.
- Clean mixing equipment between batches.
- In all cases, consult the Material Safety Data Sheet before use.

Rev. 10.09

WARRANTY: The Euclid Chemical Company (“Euclid”) solely and expressly warrants that its products shall be free from defects in materials and workmanship for one (1) year from the date of purchase. Unless authorized in writing by an officer of Euclid, no other representations or statements made by Euclid or its representatives, in writing or orally, shall alter this warranty. EUCLID MAKES NO WARRANTIES, IMPLIED OR OTHERWISE, AS TO THE MERCHANTABILITY OR FITNESS FOR ORDINARY OR PARTICULAR PURPOSES OF ITS PRODUCTS AND EXCLUDES THE SAME. If any Euclid product fails to conform with this warranty, Euclid will replace the product at no cost to Buyer. Replacement of any product shall be the sole and exclusive remedy available and buyer shall have no claim for incidental or consequential damages. Any warranty claim must be made within one (1) year from the date of the claimed breach. Euclid does not authorize anyone on its behalf to make any written or oral statements which in any way alter Euclid’s installation information or instructions in its product literature or on its packaging labels. Any installation of Euclid products which fails to conform with such installation information or instructions shall void this warranty. Product demonstrations, if any, are done for illustrative purposes only and do not constitute a warranty or warranty alteration of any kind. Buyer shall be solely responsible for determining the suitability of Euclid’s products for the Buyer’s intended purposes.

DURALPREP A.C.

Bonding Agent and Anti-Corrosion Coating for Reinforcement

Description

DURALPREP A.C. is a three component, pre-proportioned, water based epoxy modified portland cement bonding agent and anti-corrosion coating. DURALPREP A.C. is used as a bonding agent for placing fresh concrete to existing concrete and for repair and restoration of concrete surfaces. DURALPREP A.C. contains a unique migratory corrosion inhibitor which protects reinforcement when used as an anti-corrosion coating for steel. DURALPREP A.C. has a long open time, is non flammable, VOC compliant, and does not form a water vapor barrier after cure.

Primary Applications

- Bonding agent for fresh concrete to existing concrete
- Concrete repairs with cement or epoxy mortars
- Anti-corrosion coating for steel reinforcement
- Exterior or interior
- On grade or above grade applications

Features/Benefits

- Can contribute to LEED points
- Long open time
- Migratory corrosion inhibitor

Technical Information

Material Properties @ 75°F (24°C), 50% R.H.	
Mix ratio (A:B:C:)	1 gal: (3.8L) 1 gal: (3.8L) 36 lbs (16.3 kg)
Color	Concrete Gray
Pot Life:	30 to 45 mins.
Contact Time	Up to 24 hours depending on ambient temperature
Initial Set (ASTM C 266)	2 to 3 hrs
Bond Strength (ASTM C 882), 7 days:	psi (MPa)
1 hr open time	2,480 (17.1)
24 hr open time	2,700 (18.6)

Compressive Strength (ASTM C 109)	psi (MPa)
3 days	>5,100 (35.2)
7 days	>7,300 (50.3)
28 days	>10,000 (68.9)
Flexural Strength (ASTM C 348)	
28 days:	> 1,280 (8.8)
Splitting Tensile Strength (ASTM C 496)	
28 days	>600 (4.1)
Water Vapor Permeability (ASTM E 96)	0.16 grains/ft² hr.

Values presented are typical and not necessarily referenced to create specifications

Packaging

DURALPREP A.C. is packaged in 3.75 gal (14.2 L) kits and 2/1 gal (3.8 L) units/case.

Shelf Life

1 year in original, unopened package.

Coverage

One 3.75 gal (14.2 L) kit of DURALPREP A.C. will cover approximately 250 ft² (23.2m²). One 1 gal (3.8L) unit will cover approximately 65 ft²(6 m²).

Bonding Agent	60 to 80 ft²/gal (1.47 to 1.96 m²/L)
Anti-Corrosion Coating	60 to 80 ft²/gal/coat (1.47 to 1.96 m²/L)

Note: Coverage rates are approximate, and for estimating purposes only. Test the area prior to application to determine effective coverage rates. Surface temperature, porosity, and texture will determine actual material requirements.

Directions for Use

Surface Preparation: The surface must be structurally sound, dry, free of grease, oils, curing compounds, efflorescence, laitance and any other contaminants that would interfere with adhesion. All previous coatings on the substrate must be removed. **Concrete:** Smooth, precast and formed concrete surfaces must be cleaned, roughened and made absorptive by mechanical abrasion. All coatings must be removed completely to provide an absorptive surface. Remove excess moisture, drips and puddles from the surface. The surface should be saturated surface dry (SSD) with no standing water prior to application. **Steel:** All oils, greases, dirt, old coatings or chemical contaminates must be removed. All steel surfaces should be blasted to a “NEAR WHITE” metal finish using clean dry blasting media.

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Mixing: Mix one full kit at a time. DURALPREP A.C. must be mechanically mixed with a slow speed motor and mixing blade to thoroughly disperse all ingredients. A 1/2" (13mm) drill motor and a "Jiffy" mixer may be used. Premix each containers (Parts A & B). Pour the Component A and Component B into a clean container. Start mixer and mix at slow speed for 30 to 45 seconds. Do not aerate the mix. While mixing gradually, add all of the Part C powder into the mixed liquid to produce a smooth lump free consistency. Mix thoroughly for approximately 3 minutes.

Application: Air and surface temperature must be above 45°F (7°C) and rising. Maximum temperature should not exceed 90°F (32°C). The approximate working life is 30 to 45 minutes depending on the temperature. **Bonding Agent:** Apply DURALPREP A.C. to the SSD surface using a stiff bristle brush or spray equipment. Allow to cure 30 minutes before placing concrete. DURALPREP A.C. has an open time of from 30 min to 24 hrs at 75°F (24°C). **Anti-Corrosion Coating:** Coat the exposed reinforcing steel, making sure to coat the underside portion of the steel. Apply two coats at 20 mils each by brush or spray, allowing 3 to 6 hours between applications. Place fresh mortar or concrete within the open time of the second coat of DURALPREP A.C. 30 min to 24 hrs at 75°F (24°C).

Clean-Up

Clean tools and equipment with water immediately following use. Clean drips with water while still wet. Dried DURALPREP A.C. will require mechanical abrasion for removal.

Precautions/Limitations

- Mix only one full kit at a time.
- Do not mix for longer than 3 minutes.
- Do not allow components to freeze.
- Do not apply at temperatures below 45°F (7°C), or above 90°F (32°C).
- Do not add water to mix.
- Maximum open time: 12 hours @ 90°F (32°C), 24 hours @ 75°F (24°C), 30 hours @ 45°F (7°C).
- Store at temperatures between 65°F and 80°F (18°C to 27°C).
- Protect from freezing.
- Do not use Component A or B if it has frozen.
- Protect from moisture.
- In all cases, consult the Material Safety Data Sheet before use.

WARRANTY: The Euclid Chemical Company ("Euclid") solely and expressly warrants that its products shall be free from defects in materials and workmanship for one (1) year from the date of purchase. Unless authorized in writing by an officer of Euclid, no other representations or statements made by Euclid or its representatives, in writing or orally, shall alter this warranty. EUCLID MAKES NO WARRANTIES, IMPLIED OR OTHERWISE, AS TO THE MERCHANTABILITY OR FITNESS FOR ORDINARY OR PARTICULAR PURPOSES OF ITS PRODUCTS AND EXCLUDES THE SAME. If any Euclid product fails to conform with this warranty, Euclid will replace the product at no cost to Buyer. Replacement of any product shall be the sole and exclusive remedy available and buyer shall have no claim for incidental or consequential damages. Any warranty claim must be made within one (1) year from the date of the claimed breach. Euclid does not authorize anyone on its behalf to make any written or oral statements which in any way alter Euclid's installation information or instructions in its product literature or on its packaging labels. Any installation of Euclid products which fails to conform with such installation information or instructions shall void this warranty. Product demonstrations, if any, are done for illustrative purposes only and do not constitute a warranty or warranty alteration of any kind. Buyer shall be solely responsible for determining the suitability of Euclid's products for the Buyer's intended purposes.

SURE-GRIP HIGH PERFORMANCE GROUT™

NON-SHRINK, NON-METALLIC HIGH EARLY STRENGTH GROUT

PRODUCT DESCRIPTION

Sure-Grip High Performance Grout is a ready to use, non shrink, non corrosive, non metallic grout formulated and produced with the highest quality raw materials available. It is a cement based grout designed to deliver a high rate of flow with excellent density (for dynamic loads) and a high compressive strength quickly – 5000 psi in one day – and at 28 days, up to 10,000 psi! Sure-Grip High Performance early strength means an earlier project completion time and less downtime for machines. It is designed to provide an effective load bearing surface through non shrink properties. It contains no chlorides or other components that cause corrosion, or bleeding.

PURPOSE

Sure-Grip High Performance Grout is an ideal product for interior or exterior grouting of architectural and structural precast concrete components, structural column base plates, machinery bases, anchoring bolts, cable anchorages, dowels, bearing pads, keyway joints, crane rails etc. Sure-Grip High Performance Grout is used in power plants, steel mills, paper mills, oil refineries, food plants, sewage and water treatment plants or anywhere a high quality engineered grout is required.

ADVANTAGES

- High compressive strength quickly – 5,000 psi in one day
- Less downtime for machines/finish projects sooner
- High ultimate compressive strength – 10,000 psi in 28 days
- Non metallic/non corrosive
- High density
- Low water requirements
- High fluidity/pourable/pumpable
- Resistant to heat and thermal shock
- Interior/exterior applications
- Approved by numerous state DOTs

MEETS SPECIFICATIONS

- Corps of Engineers Specification for non-shrink grout: CRD-C 621, Grades A,B and C
- ASTM C-1107 Specification for non-shrink grout Grades A, B and C
- ASTM C-827 – Sure-Grip Grout yielded a controlled positive expansion

Test Results – ASTM C-1107

Compressive Strength (PSI)

	@ 1 Day		@ 7 Days		@ 28 Days	
Fluidity	PSI	MPa	PSI	MPa	PSI	MPa
Flowable	5000	34.5	8000	55.1	10,000	68.9
Fluid	3500	24.1	6500	44.8	8500	58.6

APPLICATION INSTRUCTIONS

Surface Preparation: Thoroughly clean all contact surfaces. Existing concrete should be strong and sound. Surface should be roughened to insure bond. Metal base plates should be clean and free of oil and other contaminants. Maintain contact areas between 45°F (7°C) and 90°F (32°C) before grouting and during curing period. For hot and cold weather applications, contact Dayton Superior. Thoroughly wet concrete contact area 24 hours prior to grouting, keep wet and remove all surface water just prior to placement. If 24 hours is not possible, then saturate with water for at least 4 hours. Seal forms to prevent water or grout loss. On the placement side, provide an angle in the form high enough to assist in grouting and to maintain head pressure on the grout during the entire grouting process. Forms should be at least 1" (2.5 cm) higher than the bottom of the base plate.

Mixing:

A mechanical mixer with rotating blades like a mortar mixer is best. Small quantities can be mixed with a drill and paddle. When mixing less than a full bag, always first agitate the bag thoroughly so that a representative sample is obtained. Place approximately 3/4 of the anticipated mix water into the mixer and add the grout mix, adding the minimum additional water necessary to achieve desired consistency. For hot weather conditions (greater than 85°F [29°C]) mix with cold water (approximately 40°F [4°C]). For cold weather conditions (less than 50°F [10°C]) mix with warm water (approximately 90°F [29°C]).

Water Requirements:

Desired Mix	Water Per 50 lb. Bag (22.7 kg)
Flowable	3.25 quarts (3.1L)
Fluid	4.00 quarts (3.81L)

Mix for a total of five minutes to ensure uniform consistency. For placements greater than 3" (7.6 cm), up to 25 lbs. (11.3 kg) of washed pea gravel 3/8" (1 cm.) maximum size must be added to each 50 lb. (22.7 kg) bag

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SURE-GRIP HIGH PERFORMANCE GROUT™

CONTINUED

of grout. The approximate working time (pot life) is 30 minutes. This will vary with ambient conditions.

Placement:
Grout should be placed to avoid entrapped air pockets. Grout should not be over worked which causes segregation. Provide vent holes where necessary. Forms must be sealed to prevent water or grout loss. When possible, grout bolt holes first. Placement and consolidation should be continuous for any one section of the grout. When nearby equipment causes vibration of the grout, such equipment should be shut down for a period of 24 hours (@73°F, 23°C).

Finishing and Curing:
Forms may be removed when grout is completely self supporting. Cut away where grout excessively restricts movement of steel, i.e., edges of base plates, etc. For best results, grout should extend downward at a 45° angle from the lower edge of the steel base plates or similar structures. Exposed grout surfaces should be cured. Dayton Superior recommends using the J-11-W, Cure & Seal WB (J-18) or a wet cure for 3 days. Maintain the temperature of the grout and contact area at 45°F (7°C) to 90°F (32°C) for a minimum of 24 hours.

APPROXIMATE YIELD
.42 cu. ft/per 50 lb. bag (.011 m3 /22.7 kg)
.57 cu. ft/per 50 lb. (.015m3 /22.7 kg) extended with 25 lbs. (11.3 kg) of washed 3/8" (1 cm) pea gravel.

PACKAGING

ITEM #	PACKAGING	WEIGHT LB./ (KG)
67440	BAG	5O (22.7)
67441	PAIL	5O (22.7)
122964	SUPERSACK	3000 (1361)

STORAGE
Store in a cool, dry area free from direct sunlight. Shelf life of unopened bags, when stored in a dry facility is 12 months. Excessive temperature differential and /or high humidity can shorten the shelf life expectancy.

CLEAN-UP
Use clean water. Hardened material will require mechanical removal methods.

LIMITATIONS
Do not re-temper after initial mixing. Do not add other cements or additives. Setting time for the High Performance Grout will slow during cold weather [less than 50°F (10°C)] and speed up during hot weather [greater than 80°F (27°C)]. Prepackaged material segregates while in the bag, thus when mixing less than a full bag it is recommended to first agitate the bag to assure it is blended prior to sampling.

WARNING
Skin is sensitive to cement. Wearing protective gloves and goggles is recommended. Avoid contact with eyes. Avoid prolonged contact with skin. Contains Portland cement. Wash exposed skin promptly with water. May cause skin irritation as well as cement burns. In case of eye contact, flush eyes repeatedly with clean water and contact a physician. Harmful if ingested. Read MSDS before using product.

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WARRANTY
Dayton Superior Corporation ("Dayton") warrants for 12 months from the date of manufacture or for the duration of the published product shelf life, whichever is less, that at the time of shipment by Dayton, the product is free of manufacturing defects and conforms to Dayton's product properties in force on the date of acceptance by Dayton of the order. Dayton shall only be liable under this warranty if the product has been applied, used, and stored in accordance with Dayton's instructions, especially surface preparation and installation, in force on the date of acceptance by Dayton of the order. The purchaser must examine the product when received and promptly notify Dayton in writing of any non-conformity before the product is used and no later than 30 days after such non-conformity is first discovered. If Dayton, in its sole discretion, determines that the product breached the above warranty, it will, in its sole discretion, replace the non-conforming product, refund the purchase price or issue a credit in the amount of the purchase price. This is the sole and exclusive remedy for breach of this warranty. Only a Dayton officer is authorized to modify this warranty. The information in this data sheet supersedes all other sales information received by the customer during the sales process. THE FOREGOING WARRANTY SHALL BE EXCLUSIVE AND IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER WARRANTIES OTHERWISE ARISING BY OPERATION OF LAW, COURSE OF DEALING, CUSTOM, TRADE OR OTHERWISE.

Dayton shall not be liable in contract or in tort (including, without limitation, negligence, strict liability or otherwise) for loss of sales, revenues or profits; cost of capital or funds; business interruption or cost of downtime, loss of use, damage to or loss of use of other property (real or personal); failure to realize expected savings; frustration of economic or business expectations; claims by third parties (other than for bodily injury), or economic losses of any kind; or for any special, incidental, indirect, consequential, punitive or exemplary damages arising in any way out of the performance of, or failure to perform, its obligations under any contract for sale of product, even if Dayton could foresee or has been advised of the possibility of such damages. The Parties expressly agree that these limitations on damages are allocations of risk constituting, in part, the consideration for this contract, and also that such limitations shall survive the determination of any court of competent jurisdiction that any remedy provided in these terms or available at law fails of its essential purpose.

DAYTON® SUPERIOR

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FIVE STAR® GROUT

High Performance Precision Non-Shrink Grout

PRODUCT DESCRIPTION

Five Star® Grout is the industry's leading cement-based, nonmetallic, non-shrink grout for supporting machinery and equipment. It is formulated with Air Release technology that combines high performance with the greatest reliability. When tested in accordance with ASTM C 827, Five Star® Grout exhibits positive expansion. Five Star® Grout meets the performance requirements of ASTM C 1107-02 Grades A, B and C, ASTM C 1107-07, and CRD-C 621-93 specifications for non-shrink grout over a wide temperature range, 40°F - 90°F (4°C - 32°C).

ADVANTAGES

- Air release technology per ACI 351.1 R
- 95% Effective Bearing Area (EBA) is typically achieved following proper grouting procedures
- Provides placement versatility: pour, pump or dry pack
- 45 minute working time
- Permanent support for machinery requiring precision alignment
- Does not contain gas generating additives, such as aluminum powder
- Non-shrink from the time of placement

USES

- Grouting of machinery and equipment to maintain precision alignment
- Non-shrink grouting of structural steel and precast concrete
- Grouting of anchors and dowels
- Support of tanks and vessels

PACKAGING AND YIELD

Five Star® Grout is packaged in heavy-duty, polyethylene lined bags and is available in 50 lb (22.7 kg) units yielding approximately 0.5 cubic feet (14.1 liters), or 100 lb (45.4 kg) units yielding approximately 1.0 cubic foot (28.3 liters) of hardened material at maximum water content.

SHELF LIFE

One year in original unopened packaging when stored in dry conditions; high relative humidity will reduce shelf life.

TYPICAL PROPERTIES AT 70°F (21°C)		
Early Height Change, ASTM C 827	0.0 to 4.0%	
Hardened Height Change, ASTM C 1090	0.0 to 0.3%	
Effective Bearing Area	95%	
Bond Strength, ASTM C 882, 28 Days	2,000 psi (13.8 MPa)	
Pull-out Strength, Tension, #5 threaded bar, 7 Days	2,400 psi (16.6 MPa)	
Compressive Strength, ASTM C 942 (C109 Restrained)	Minimum Water psi (MPa)	Maximum Water psi (MPa)
1 Day	4,000 (27.6)	2,500 (17.3)
3 Days	5,500 (38.0)	3,500 (24.1)
7 Days	6,500 (44.9)	5,000 (34.5)
28 Days	8,000 (55.2)	6,500 (44.9)
Working Time at 70°F (21°C)	45 minutes	

The data shown above reflects typical results based on laboratory testing under controlled conditions. Reasonable variations from the data shown may result. Test methods are modified where applicable.

PLACEMENT GUIDELINES

1. **SURFACE PREPARATION:** All surfaces in contact with Five Star® Grout shall be free of oil, grease, laitance and other contaminants. Concrete must be clean, sound and roughened to ensure a good bond. Soak concrete surfaces for 8 to 24 hours prior to application with liberal quantities of potable water, leaving the concrete saturated and free of standing water.
2. **FORMWORK:** Formwork shall be constructed of rigid non-absorbent materials, securely anchored, liquid-tight and strong enough to resist forces developed during grout placement. The clearance between formwork and baseplate shall be sufficient to allow for a headbox. The clearance for remaining sides shall be one to two inches (25 - 50 mm). Areas where bond is not desired must be treated with form oil, paste wax or similar material. Isolation joints may be necessary depending on pour dimensions. Contact the Five Star Products, Inc. Engineering and Technical Center for further information.
3. **MIXING:** Mix Five Star® Grout thoroughly for approximately four to five minutes to a uniform consistency with a mortar mixer (stationary barrel with moving blades). A drill and paddle mixer is acceptable for single bag mixes. For optimum performance, maintain grout at ambient temperatures between 40°F and 90°F (4°C and 32°C). Use heated or chilled water to help adjust working time. Mix Five Star® Grout with 7 - 11 quarts potable water per 100 lb. bag (3-1/2 to 5-1/2 quarts per 50 lb. bag). Do not exceed maximum recommended amount of mixing water as stated on the package or add an amount that will cause segregation. Working time is approximately 45 minutes at 70°F (21°C). Follow printed instructions on the package. Always add mixing water first to mixer followed by grout.
4. **PLACEMENT PROCEDURES:** Five Star® Grout may be dry packed, poured or pumped into place. Minimum placement thickness for Five Star® Grout is 1 inch (25 mm). For pours over 6 inches (150 mm) in depth Five Star® Grout should be extended with a clean, damp coarse aggregate meeting the requirements of ASTM C 33. Refer to the Five Star Products, Inc. Technical Bulletin "Cement Grout Aggregate Extension" for guidelines.
5. **POST-PLACEMENT PROCEDURES:** Five Star® Grout shall be wet cured for a minimum of three days, or coated with an approved curing compound meeting the requirements of ASTM C 309 after a minimum 24 hour wet cure. In-service operation may begin immediately after the required grout strength has been reached.

NOTE: PRIOR TO APPLICATION, READ ALL PRODUCT PACKAGING THOROUGHLY. *For more detailed placement procedures, refer to Design-A-Spec™ installation guidelines or call the Five Star Products, Inc. Engineering and Technical Service Center at (800) 243-2206.*

CONSIDERATIONS

- If temperatures of equipment and surfaces are not between 40°F and 90°F (4°C and 32°C) at time of placement, refer to Design-A-Spec™ for cold and hot weather grouting procedures, or call the Five Star Products, Inc. Engineering and Technical Service Center at (800) 243-2206.
- Never exceed the maximum water content as stated on the bag or add an amount that will cause segregation. Construction practices dictate concrete foundation should achieve its design strength before grouting.

CAUTION

Contains cementitious material and crystalline silica. International Agency for Research on Cancer has determined that there is sufficient evidence for the carcinogenicity of inhaled crystalline silica to humans. Take appropriate measures to avoid breathing dust. Avoid contact with eyes and contact with skin. In case of contact with eyes, immediately flush with plenty of water for at least 15 minutes. Immediately call a physician. Wash skin thoroughly after handling. Keep product out of reach of children. **PRIOR TO USE, REFER TO MATERIAL SAFETY DATA SHEET**.

For worldwide availability, additional product information and technical support, contact your local Five Star® distributor, local sales representative, or you may call the Five Star Products, Inc. Engineering and Technical Service Center at (800) 243-2206.

WARRANTY: "FIVE STAR PRODUCTS, INC. (FSP) PRODUCTS ARE MANUFACTURED TO BE FREE OF MANUFACTURING DEFECTS AND TO MEET FSP'S CURRENT PUBLISHED PHYSICAL PROPERTIES WHEN APPLIED IN ACCORDANCE WITH FSP'S DIRECTIONS AND TESTED IN ACCORDANCE WITH ASTM AND FSP STANDARDS. HOWEVER, SHOULD THERE BE DEFECTS OF MANUFACTURING OF ANY KIND, THE SOLE RIGHT OF THE USER WILL BE TO RETURN ALL MATERIALS ALLEGED TO BE DEFECTIVE, FREIGHT PREPAID TO FSP, FOR REPLACEMENT. THERE ARE NO OTHER WARRANTIES BY FSP OF ANY NATURE WHATSOEVER, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IN CONNECTION WITH THIS PRODUCT. FSP SHALL NOT BE LIABLE FOR DAMAGES OF ANY SORT, INCLUDING PUNITIVE, ACTUAL, REMOTE, OR CONSEQUENTIAL DAMAGES, RESULTING FROM ANY CLAIMS OF BREACH OF CONTRACT, BREACH OF ANY WARRANTY, WHETHER EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR FROM ANY OTHER CAUSE WHATSOEVER. FSP SHALL ALSO NOT BE RESPONSIBLE FOR USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT HELD BY OTHERS."

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http://www.FiveStarProducts.com

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APPENDIX F

Monitoring Well Construction Logs

WELL CONSTRUCTION LOG

PROJECT & LOCATION:	DeLeval ERP Project, Poughkeepsie, NY
CLIENT:	City of Poughkeepsie
CONTRACTOR:	NYEG Drilling, LLC

BORING NO.

WELL NO. MW-1

PROJECT NO.: 14357.1013.31000

SHEET NO.: 1 OF 1

ELEVATION:

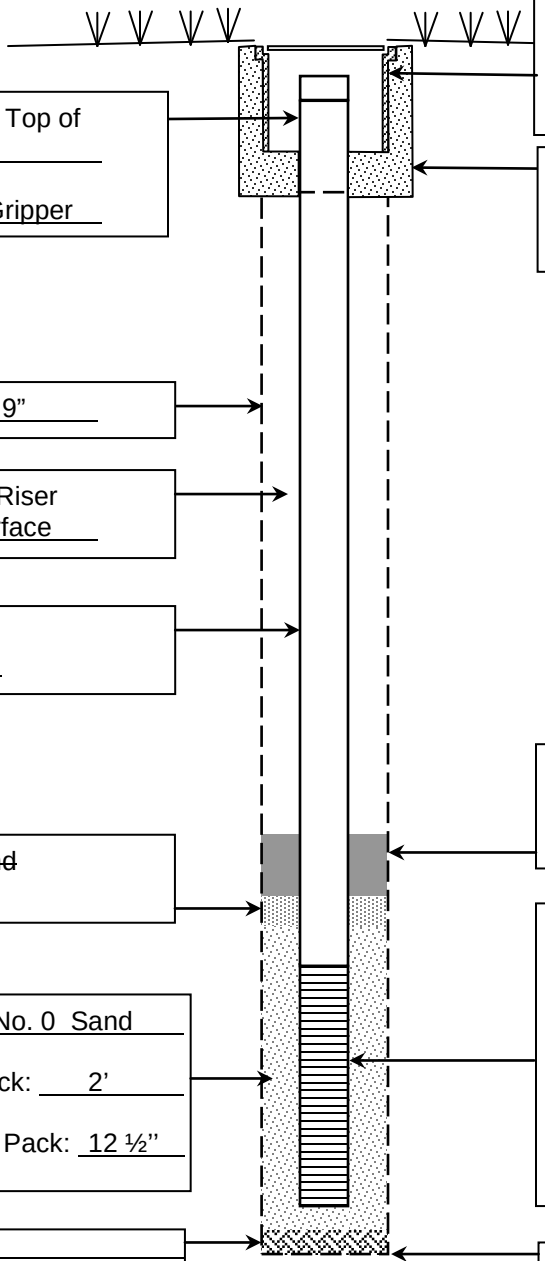
START DATE: 11/16/11 TIME: 11:00am

FINISH DATE: 11/16/11 TIME: 11:30am

DRILLER: Doug Thoma

INSPECTOR: J. Herrick

Note: Installed 3'4" – 4" sch. 40 PVC pipe over 2" riser for protection (backfilled with bentonite).



Type of Protective Casing: Flush Mount Curb Box To Be Installed by Site Contractor
Inside Dia. Of Casing: _____
Depth Below Ground of Casing: _____

Depth Above Ground to Top of Riser Pipe: 2'
Type of Cap: Locking Gripper

Type of Surface Seal: Concrete
Thickness of Surface Seal: _____

Diameter Borehole: 9"

Type of Backfill Around Riser Pipe: Bentonite to Surface

Inside Diameter of Riser Pipe: 2" PVC

Type of Bentonite Seal: Chips
Depth to Top of Bentonite Seal: Ground Surface

~~Depth to Top of Fine Sand Choke~~: _____

Type of Screen: Slotted
Screen Diameter: 2"
Screen Slot Size: 0.010"
Depth to Top of Screen: 2 ½'
Depth to Bottom of Screen: 12 ½'

Type of Sand Pack: No. 0 Sand
Depth to Top of Sand Pack: 2'
Depth to Bottom of Sand Pack: 12 ½"

~~Backfill (if any)~~: _____

Depth to Bottom of Borehole: 12 ½'

PROJECT NUMBER: 14357.1013.31000 12/5/11

DeLeval ERP Project
SUBSURFACE LOG
HOLE NUMBER MW-1

LOCATION: City of Poughkeepsie, NY

CLIENT: City of Poughkeepsie

CONTRACTOR: NYEG Drilling, Inc.

DRILLER: D. Thoma INSPECTOR: J. Herrick

START DATE and TIME: 11/16/2011 10:20:00 AM

FINISH DATE and TIME: 11/16/2011 11:00:00 AM

SURFACE ELEV: CHECKED BY: SMS

DRILL FLUID: None DRILLING METHOD: 4 1/4" HSA

WATER LEVEL OBSERVATIONS	DATE	TIME	READING TYPE	WATER DEPTH (ft)	CASING BOTTOM (ft)	HOLE BOTTOM (ft)
	11-16-11	10:40 AM	During Drilling	8	10	12

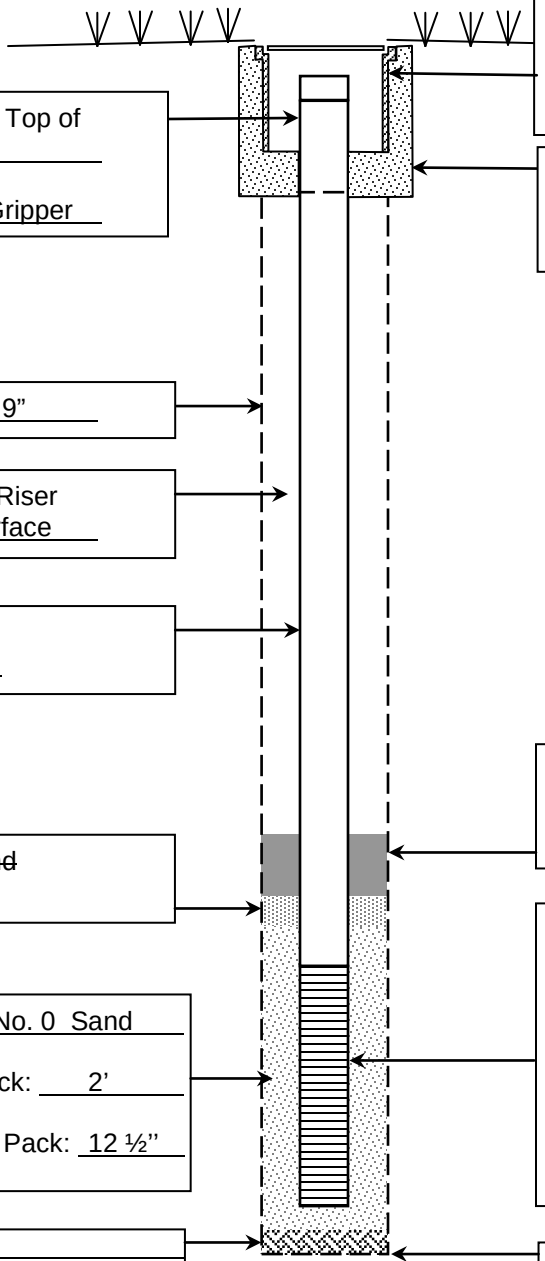
SAMP./CORE NUMBER	SAMP. ADV. (ft) LEN. CORE (ft)	RECOVERY (ft)	Blows Per 6" on Split Spoon Sampler	"N" Value or RQD%	DEPTH (Feet)	DESCRIPTION AND CLASSIFICATION	ELEVATION (Feet)	Remarks on Character of Drilling, Water Return, etc.	WATER LEVELS AND/OR WELL DATA
S-1	2	0.6	3-3-3-6	6		**f.m.c. SAND**, Some f.c. Gravel, little silt, trace brick, gray, loose, moist **(FILL)**		Hnu = 0.0 ppm	
S-2	2	0.5	3-6-7-7	13		**f.m.c. SAND**, Some f.c. Gravel, little silt, trace wood, gray, m. compact **(FILL)**		Hnu = 0.0 ppm	
S-3	2	1	12-10-10-12	20	5	**f.c. GRAVEL**, Some f.m.c. Sand, little slag, little silt, trace wood, gray, m. compact, moist **(FILL)**		Hnu = 0.0 ppm	
S-4	2	0.5	3-4-5-5	9		**f.c. GRAVEL**, Some f.m.c. Sand, little silt, gray, loose, wet **(FILL)**		Hnu = 0.0 ppm	▽
S-5	2	0.8	3-6-6-4	12	10	**f.c. GRAVEL**, Some Silt, trace f.m.c. sand, gray, m. compact, saturated **(FILL)**		Hnu = 0.6 ppm, slight petroleum odor, slight sheen on water in sample spoon.	
S-6	2	0.4	6-6-5-5	11		**Similar Soil (FILL)**		Hnu = 0.4 ppm, slight petroleum odor, slight sheen on water in sample spoon.	
					15	End of Boring at 12 ft			
					20				

SUBSURFACE LOG 14357.1013 LOGS.GPJ UPDATEDCHA.GDT 12/9/11

WELL CONSTRUCTION LOG

PROJECT & LOCATION: DeLeval ERP Project, Poughkeepsie, NY	BORING NO.
CLIENT: City of Poughkeepsie	WELL NO. MW-2
CONTRACTOR: NYEG Drilling, LLC	PROJECT NO.: 14357.1013.31000
	SHEET NO.: 1 OF 1
	ELEVATION:
	START DATE: 11/9/11 TIME: 11:45am
	FINISH DATE: 11/9/11 TIME: 12:30am
	DRILLER: Doug Thoma
	INSPECTOR: J. Herrick

Note: Installed 4 ½' – 4" sch. 40 PVC pipe over 2" riser for protection (backfilled with bentonite).



Type of Protective Casing: Flush Mount Curb Box To Be Installed by Site Contractor
Inside Dia. Of Casing: _____
Depth Below Ground of Casing: _____

Depth Above Ground to Top of Riser Pipe: 2 ½'
Type of Cap: Locking Gripper

Type of Surface Seal: Concrete
Thickness of Surface Seal: _____

Diameter Borehole: 9"

Type of Backfill Around Riser Pipe: Bentonite to Surface

Inside Diameter of Riser Pipe: 2" PVC

Type of Bentonite Seal: Chips
Depth to Top of Bentonite Seal: Ground Surface

~~Depth to Top of Fine Sand Choke~~: _____

Type of Screen: Slotted
Screen Diameter: 2"
Screen Slot Size: 0.010"
Depth to Top of Screen: 2 ½'
Depth to Bottom of Screen: 12 ½'

Type of Sand Pack: No. 0 Sand
Depth to Top of Sand Pack: 2'
Depth to Bottom of Sand Pack: 12 ½"

~~Backfill (if any)~~: _____

Depth to Bottom of Borehole: 12 ½'

DeLeval ERP Project
SUBSURFACE LOG
HOLE NUMBER MW-2

PROJECT NUMBER: 14357.1013.31000 12/5/11

LOCATION: City of Poughkeepsie, NY
CLIENT: City of Poughkeepsie
CONTRACTOR: NYEG Drilling, Inc.
DRILLER: D. Thoma INSPECTOR: J. Herrick
START DATE and TIME: 11/9/2011 10:30:00 AM
FINISH DATE and TIME: 11/9/2011 11:30:00 AM
SURFACE ELEV: CHECKED BY: SMS

DRILL FLUID: None DRILLING METHOD: 4 1/4" HSA

WATER LEVEL OBSERVATIONS	DATE	TIME	READING TYPE	WATER DEPTH (ft)	CASING BOTTOM (ft)	HOLE BOTTOM (ft)
	11-9-11	11:00 AM	During Drilling	5		12

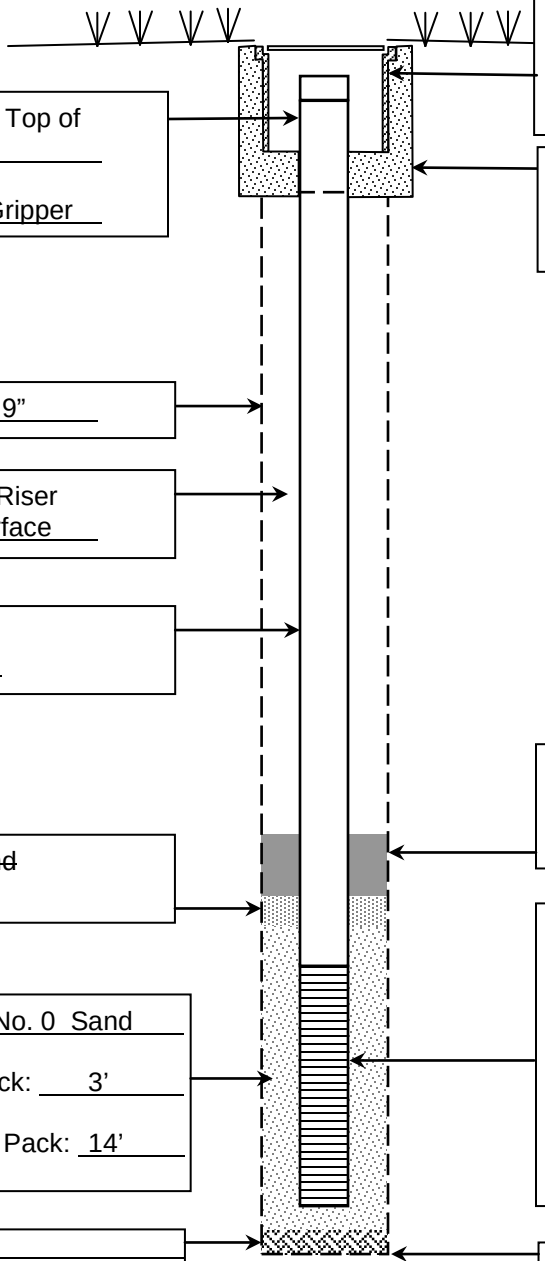
SAMP./CORE NUMBER	SAMP. ADV. (ft) LEN. CORE (ft)	RECOVERY (ft)	Blows Per 6" on Split Spoon Sampler	"N" Value or RQD%	DEPTH (Feet)	DESCRIPTION AND CLASSIFICATION	ELEVATION (Feet)	Remarks on Character of Drilling, Water Return, etc.	WATER LEVELS AND/OR WELL DATA
S-1	2	1	6-2-3-4	5		**SILT**, Some f.c. Gravel, trace concrete, trace coal, trace wood, brown, loose, moist **(FILL)**		Hnu = 0.0 ppm, no visual observations	
S-2	2	0.8	6-4-4-7	8		**SILT**, Some f.m.c. Gravel, little f.m.c. sand, trace brick, trace concrete, brown, loose, moist **(FILL)**		Hnu = 0.0 ppm, no visual observations	
S-3	2	1.4	2-3-3-3	6	5	**SILT**, Some f.c. Gravel, Some f. Sand, brown/black, loost, wet **(FILL)**		Hnu = 0.0 ppm, no visual observations	▽
S-4	2	0.8	11-7-7-8	14		**f.c. GRAVEL**, Some Brick, little f.m.c. sand, little silt, brown, m. compact, saturated **(FILL)**		Hnu = 0.0 ppm, no visual observations	
S-5	2	1.5	7-5-5-4	10	10	becomes loose **(FILL)**		Hnu = 0.0 ppm, no visual observations	
S-6	2	1	5-2-1-1	3		**f.c. GRAVEL**, Some Silt, little f.m.c. sand, brown, v. loose, saturated **(FILL)**		Hnu = 0.0 ppm, no visual observations	
						SILT, Some Clay, gray, v. loose, saturated **(FILL)**			
					15	End of Boring at 12 ft			
					20				

SUBSURFACE LOG 14357.1013 LOGS.GPJ UPDATEDCHA.GDT 12/9/11

WELL CONSTRUCTION LOG

PROJECT & LOCATION: DeLeval ERP Project, Poughkeepsie, NY	BORING NO.
CLIENT: City of Poughkeepsie	WELL NO. MW-3
CONTRACTOR: NYEG Drilling, LLC	PROJECT NO.: 14357.1013.31000
	SHEET NO.: 1 OF 1
	ELEVATION:
	START DATE: 11/10/11 TIME: 8:45am
	FINISH DATE: 11/10/11 TIME: 9:15am
	DRILLER: Doug Thoma
	INSPECTOR: J. Herrick

Note: Installed 3'4" – 4" sch. 40 PVC pipe over 2" riser for protection (backfilled with bentonite).



Type of Protective Casing: Flush Mount Curb Box To Be Installed by Site Contractor
Inside Dia. Of Casing: _____
Depth Below Ground of Casing: _____

Depth Above Ground to Top of Riser Pipe: 2'
Type of Cap: Locking Gripper

Type of Surface Seal: Concrete
Thickness of Surface Seal: _____

Diameter Borehole: 9"

Type of Backfill Around Riser Pipe: Bentonite to Surface

Inside Diameter of Riser Pipe: 2" PVC

Type of Bentonite Seal: Chips
Depth to Top of Bentonite Seal: 1'

~~Depth to Top of Fine Sand Choke~~: _____

Type of Screen: Slotted
Screen Diameter: 2"
Screen Slot Size: 0.010"
Depth to Top of Screen: 4'
Depth to Bottom of Screen: 14'

Type of Sand Pack: No. 0 Sand
Depth to Top of Sand Pack: 3'
Depth to Bottom of Sand Pack: 14'

~~Backfill (if any):~~ _____

Depth to Bottom of Borehole: 14'

PROJECT NUMBER: 14357.1013.31000 12/5/11

DeLeval ERP Project
SUBSURFACE LOG
HOLE NUMBER MW-3

LOCATION: City of Poughkeepsie, NY

CLIENT: City of Poughkeepsie

CONTRACTOR: NYEG Drilling, Inc.

DRILLER: D. Thoma INSPECTOR: J. Herrick

START DATE and TIME: 11/10/2011 7:20:00 AM

FINISH DATE and TIME: 11/10/2011 8:45:00 AM

SURFACE ELEV: CHECKED BY: SMS

DRILL FLUID: None DRILLING METHOD: 4 1/4" HSA

WATER LEVEL OBSERVATIONS	DATE	TIME	READING TYPE	WATER DEPTH (ft)	CASING BOTTOM (ft)	HOLE BOTTOM (ft)
	11-16-11	8:00 AM	Static	8		14

SAMP./CORE NUMBER	SAMP. ADV. (ft) LEN. CORE (ft)	RECOVERY (ft)	Blows Per 6" on Split Spoon Sampler	"N" Value or RQD%	DESCRIPTION AND CLASSIFICATION	Remarks on Character of Drilling, Water Return, etc.
S-1	2	1.3	4-15-26-16	41	**SILT**, Some f.m.c. Sand, little f.c. gravel, brown, compact, moist **(FILL)** **f.c. GRAVEL**, little concrete, little brick, brown/black, compact, moist **(FILL)**	Hnu = 0.0 ppm
S-2	2	1.8	22-36-42-44	78	**f.c. GRAVEL**, little concrete, little brick, little f.m.c. sand, little silt, brown/black, v. compact, moist **(FILL)**	Hnu = 0.0 ppm
S-3	2	1.6	22-27-21-8	48	**SILT**, Some f.c. Gravel, trace brick, brown/black, compact, moist **(FILL)**	Hnu = 0.0 ppm
S-4	2	2	18-22-20-20	42	**SILT**, little f.c. gravel, little wood, trace f.m.c. sand, trace brick, brown/black, compact, wet **(FILL)**	Hnu = 0.0 ppm
S-5	2	1.3	12-8-13-11	21	**f.c. GRAVEL**, Some Shale Fragments, trace f.m.c. sand, trace silt, brown/black, m. compact, saturated **(FILL)**	Hnu = 0.0 ppm
S-6	2	0.8	6-9-9-7	18	**f.c. GRAVEL**, Some f.m.c. Sand, little silt, brown/black, m. compact, saturated **(FILL)**	Hnu = 3.8 ppm, slight petroleum odor, no visual observations.
S-7	2	1.3	4-6-6-8	12	**f.c. GRAVEL**, Some Slag, little f.m.c. sand, little silt, brown/black, m. compact, saturated **(FILL)**	Hnu = Peak at 19ppm, petroleum odor noted, black coloration of soil sample and oil sheen noted on free water in the sample spoon.
					End of Boring at 14 ft	

DEPTH (Feet): 5, 10, 15, 20

ELEVATION (Feet)

WATER LEVELS AND/OR WELL DATA

SUBSURFACE LOG 14357.1013 LOGS.GPJ UPDATEDCHA.GDT 12/9/11

WELL CONSTRUCTION LOG

PROJECT & LOCATION:	DeLeval ERP Project, Poughkeepsie, NY
CLIENT:	City of Poughkeepsie
CONTRACTOR:	NYEG Drilling, LLC

BORING NO.

WELL NO. MW-4

PROJECT NO.: 14357.1013.31000

SHEET NO.: 1 OF 1

ELEVATION:

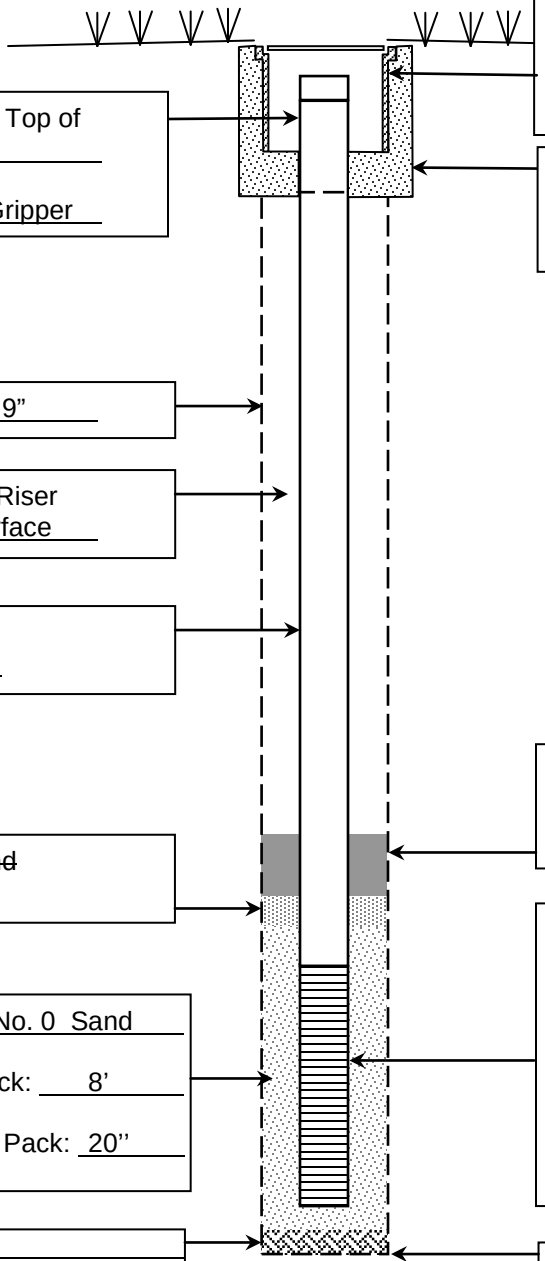
START DATE: 11/9/11 TIME: 3:20pm

FINISH DATE: 11/9/11 TIME: 4:15pm

DRILLER: Doug Thoma

INSPECTOR: J. Herrick

Note: Installed 3'4" – 4" sch. 40 PVC pipe over 2" riser for protection (backfilled with bentonite).



Type of Protective Casing: Flush Mount Curb Box To Be Installed by Site Contractor
Inside Dia. Of Casing: _____

Depth Below Ground of Casing: _____

Depth Above Ground to Top of Riser Pipe: 2'

Type of Cap: Locking Gripper

Type of Surface Seal: Concrete

Thickness of Surface Seal: _____

Diameter Borehole: 9"

Type of Backfill Around Riser Pipe: Bentonite to Surface

Inside Diameter of Riser Pipe: 2" PVC

Type of Bentonite Seal: Chips
Depth to Top of Bentonite Seal: 6'

~~Depth to Top of Fine Sand Choke~~: _____

Type of Screen: Slotted

Screen Diameter: 2"

Screen Slot Size: 0.010"

Depth to Top of Screen: 10'

Depth to Bottom of Screen: 20'

Type of Sand Pack: No. 0 Sand

Depth to Top of Sand Pack: 8'

Depth to Bottom of Sand Pack: 20''

~~Backfill (if any):~~ _____

Depth to Bottom of Borehole: 20'

PROJECT NUMBER: 14357.1013.31000 12/5/11

DeLeval ERP Project
SUBSURFACE LOG
HOLE NUMBER MW-4

LOCATION: City of Poughkeepsie, NY

CLIENT: City of Poughkeepsie

CONTRACTOR: NYEG Drilling, Inc.

DRILLER: D. Thoma INSPECTOR: J. Herrick

START DATE and TIME: 11/9/2011 1:45:00 PM

FINISH DATE and TIME: 11/9/2011 3:20:00 PM

SURFACE ELEV: CHECKED BY: SMS

DRILL FLUID: None

DRILLING METHOD: 4 1/4" HSA

WATER LEVEL OBSERVATIONS	DATE	TIME	READING TYPE	WATER DEPTH (ft)	CASING BOTTOM (ft)	HOLE BOTTOM (ft)
	11-9-11	3:00 PM	During Drilling	14		20

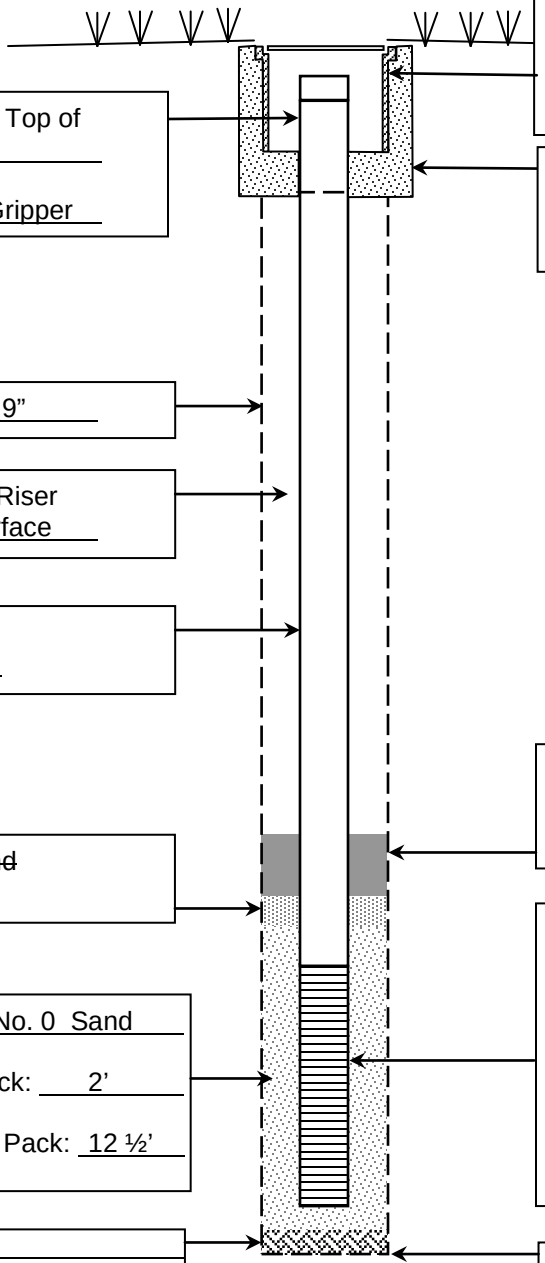
SAMP./CORE NUMBER	SAMP. ADV. (ft) LEN. CORE (ft)	RECOVERY (ft)	Blows Per 6" on Split Spoon Sampler	"N" Value or RQD%	SAMPLE	DEPTH (Feet)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEVATION (Feet)	Remarks on Character of Drilling, Water Return, etc.	WATER LEVELS AND/OR WELL DATA
S-1	2	0.8	6-7-13-10	20				**SILT**, Some f.c. Gravel, trace organics, brown, m. compact, moist **(FILL)**		Hnu = 0.0 ppm	
S-2	2	1.7	13-13-13-17	26				**SILT**, Some f.c. Gravel, little brick, trace organics, brown/gray, m. compact, moist **(FILL)**		Hnu = 0.0 ppm	
S-3	2	1.8	19-16-14-13	30		5		**SILT**, Some f.c. Gravel, little concrete, little brick, trace f.m.c. sand, brown/black, m. compact, moist **(FILL)**		Hnu = 0.0 ppm	
S-4	2	1.1	13-8-8-7	16				**SILT**, Some f.c. Gravel, little f.m.c. sand, little concrete, trace wood, brown/black, m. compact, moist **(FILL)**		Hnu = 0.0 ppm	
S-5	2	1.3	3-4-4-5	8				becomes loose **(FILL)**		Hnu = 0.0 ppm	
S-6	2	1.2	3-4-6-12	10		10		**SILT**, Some f.c. Gravel, trace f.m.c. sand, trace brick, black, loose, moist **(FILL)** **f.m.c. SAND**, brown, loose, moist **(FILL)**		Hnu = 0.0ppm	
S-7	2	1.6	9-9-11-13	20				becomes m. compact **(FILL)** **SLAG**, black, m. compact, wet **(FILL)** **SILT**, trace f. sand, brown/gray, m. compact, saturated **(FILL)**		Hnu = 0.0ppm	▽
S-8	2	1.2	3-2-2-3	4		15		**SLAG**, trace brick, v. loose, saturated **(FILL)**		Hnu = 0.0ppm	
S-9	2	1.3	3-3-4-10	7				**SLAG**, Some Brick, loose, saturated **(FILL)**		Hnu = 0.0ppm	
S-10	2	1	6-5-6-5	11				**f.m.c. SAND**, trace silt, trace shells, m. compact, saturated **(FILL)** **f. SAND**, Some Silt, m. compact, saturated **(FILL)**		Hnu = 0.0ppm	
						20		End of Boring at 20 ft			

SUBSURFACE LOG 14357.1013 LOGS.GPJ UPDATEDCHA.GDT 12/9/11

WELL CONSTRUCTION LOG

PROJECT & LOCATION: DeLeval ERP Project, Poughkeepsie, NY	BORING NO.
CLIENT: City of Poughkeepsie	WELL NO. MW-5
CONTRACTOR: NYEG Drilling, LLC	PROJECT NO.: 14357.1013.31000
	SHEET NO.: 1 OF 1
	ELEVATION:
	START DATE: 11/9/11 TIME: 8:45am
	FINISH DATE: 11/9/11 TIME: 9:45am
	DRILLER: Doug Thoma
	INSPECTOR: J. Herrick

Note: Installed 4 ½' – 4" sch. 40 PVC pipe over 2" riser for protection (backfilled with bentonite).



Type of Protective Casing: Flush Mount Curb Box To Be Installed by Site Contractor
Inside Dia. Of Casing: _____
Depth Below Ground of Casing: _____

Depth Above Ground to Top of Riser Pipe: 2 ½'
Type of Cap: Locking Gripper

Type of Surface Seal: Concrete
Thickness of Surface Seal: _____

Diameter Borehole: 9"

Type of Backfill Around Riser Pipe: Bentonite to Surface

Inside Diameter of Riser Pipe: 2" PVC

Type of Bentonite Seal: Chips
Depth to Top of Bentonite Seal: Ground Surface

~~Depth to Top of Fine Sand Choke~~: _____

Type of Screen: Slotted
Screen Diameter: 2"
Screen Slot Size: 0.010"
Depth to Top of Screen: 2 ½'
Depth to Bottom of Screen: 12 ½'

Type of Sand Pack: No. 0 Sand
Depth to Top of Sand Pack: 2'
Depth to Bottom of Sand Pack: 12 ½'

~~Backfill (if any)~~: _____

Depth to Bottom of Borehole: 12 ½'

DeLeval ERP Project
SUBSURFACE LOG
HOLE NUMBER MW-5

PROJECT NUMBER: 14357.1013.31000 12/5/11

LOCATION: City of Poughkeepsie, NY
CLIENT: City of Poughkeepsie
CONTRACTOR: NYEG Drilling, Inc.
DRILLER: D. Thoma INSPECTOR: J. Herrick
START DATE and TIME: 11/9/2011 7:30:00 AM
FINISH DATE and TIME: 11/9/2011 8:40:00 AM
SURFACE ELEV: CHECKED BY: SMS

DRILL FLUID: None DRILLING METHOD: 4 1/4" HSA

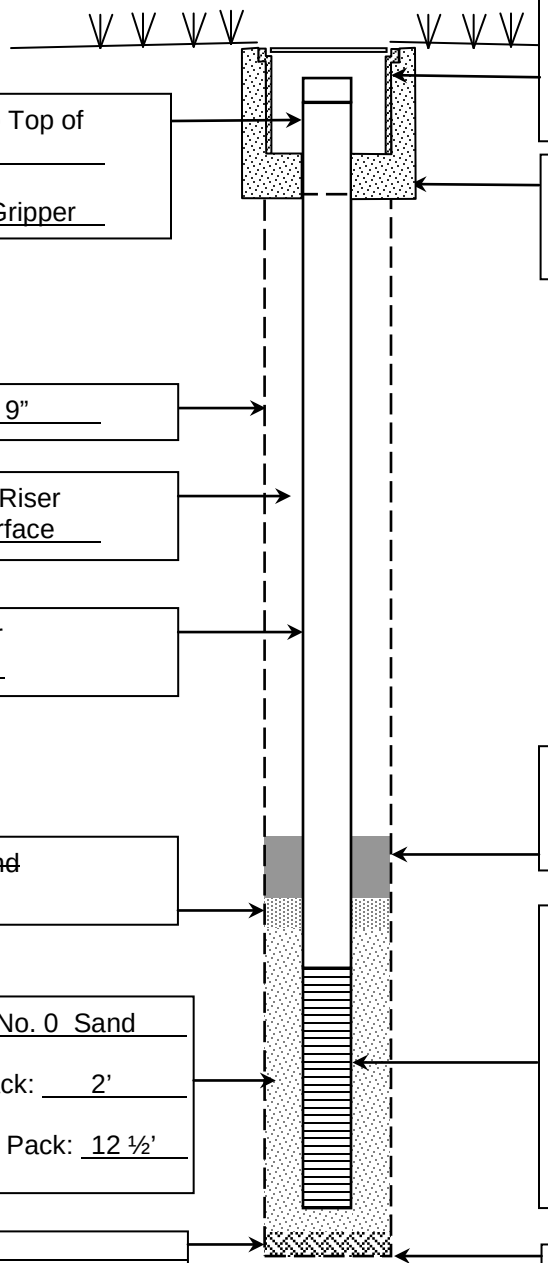
WATER LEVEL OBSERVATIONS	DATE	TIME	READING TYPE	WATER DEPTH (ft)	CASING BOTTOM (ft)	HOLE BOTTOM (ft)
	11-9-11	8:00 AM	During Drilling	4		12

SAMP./CORE NUMBER	SAMP. ADV. (ft) LEN. CORE (ft)	RECOVERY (ft)	Blows Per 6" on Split Spoon Sampler	"N" Value or RQD%	DEPTH (Feet)	DESCRIPTION AND CLASSIFICATION	ELEVATION (Feet)	Remarks on Character of Drilling, Water Return, etc.	WATER LEVELS AND/OR WELL DATA
S-1	2	0.7	4-3-3-5	6		**f.c. GRAVEL**, Some Silt, little bricks, brown, loose, moist **(FILL)**		Hnu = 0.0 ppm	
S-2	2	1.2	5-5-9-16	14		**f.c. GRAVEL**, trace silt, brown, m. compact, moist **(FILL)** **SILT**, Some f.c. Gravel, trace brick, brown, m. compact, moist **(FILL)** **WOOD (FILL)**		Hnu = 0.0 ppm	▽
S-3	2	0	13-5-2-2	7	5				
S-4	2	1.3	11-12-12-12	24		**SILT**, Some f.c. Gravel, little f.m.c. sand, trace wood, black, m. compact, wet **(FILL)**		Hnu = 0.6 ppm, Slight petroleum odor, no visual observations.	
S-5	2	0.9	5-6-10-11	16		**SILT**, Some f.c. Gravel, black, m. compact, saturated **(FILL)**		Hnu = 0.0 ppm	
S-6	2	1.3	8-22-12-14	34	10	becomes compact **(FILL)**		Hnu = 0.3 ppm, Slight petroleum odor, no visual observations.	
						End of Boring at 12 ft			
					15				
					20				

WELL CONSTRUCTION LOG

PROJECT & LOCATION: DeLeval ERP Project, Poughkeepsie, NY	BORING NO.
CLIENT: City of Poughkeepsie	WELL NO. MW-6
CONTRACTOR: NYEG Drilling, LLC	PROJECT NO.: 14357.1013.31000
	SHEET NO.: 1 OF 1
	ELEVATION:
	START DATE: 11/8/11 TIME: 1:50pm
	FINISH DATE: 11/8/11 TIME: 2:45pm
	DRILLER: Doug Thoma
	INSPECTOR: J. Herrick

Note: Installed 4 ½' – 4" sch. 40 PVC pipe over 2" riser for protection (backfilled with bentonite).



Type of Protective Casing: Flush Mount Curb Box – To be installed by Site Contractor
Inside Dia. Of Casing: _____
Depth Below Ground of Casing: _____

Depth Above Ground to Top of Riser Pipe: 2 ½'
Type of Cap: Locking Gripper

Type of Surface Seal: Concrete
Thickness of Surface Seal: _____

Diameter Borehole: 9"

Type of Backfill Around Riser Pipe: Bentonite to Surface

Inside Diameter of Riser Pipe: 2" PVC

Type of Bentonite Seal: Chips
Depth to Top of Bentonite Seal: Ground Surface

~~Depth to Top of Fine Sand Choke~~: _____

Type of Screen: Slotted
Screen Diameter: 2"
Screen Slot Size: 0.010"
Depth to Top of Screen: 2 ½'
Depth to Bottom of Screen: 12 ½''

Type of Sand Pack: No. 0 Sand
Depth to Top of Sand Pack: 2'
Depth to Bottom of Sand Pack: 12 ½'

~~Backfill (if any)~~: _____

Depth to Bottom of Borehole: 12 ½''

PROJECT NUMBER: 14357.1013.31000 12/5/11

DeLeval ERP Project
SUBSURFACE LOG
HOLE NUMBER MW-6

LOCATION: City of Poughkeepsie, NY

CLIENT: City of Poughkeepsie

CONTRACTOR: NYEG Drilling, Inc.

DRILLER: D. Thoma INSPECTOR: J. Herrick

START DATE and TIME: 11/8/2011 1:50:00 PM

FINISH DATE and TIME: 11/8/2011 2:45:00 PM

SURFACE ELEV: CHECKED BY: SMS

DRILL FLUID: None DRILLING METHOD: 4 1/4" HSA

WATER LEVEL OBSERVATIONS	DATE	TIME	READING TYPE	WATER DEPTH (ft)	CASING BOTTOM (ft)	HOLE BOTTOM (ft)
	11-8-11	2:45 PM	Completion	4		

SAMP./CORE NUMBER	SAMP. ADV. (ft) LEN. CORE (ft)	RECOVERY (ft)	Blows Per 6" on Split Spoon Sampler	"N" Value or RQD%	SAMPLE	DEPTH (Feet)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEVATION (Feet)	Remarks on Character of Drilling, Water Return, etc.	WATER LEVELS AND/OR WELL DATA
S-1	2	0.9	5-5-5-3	10				**SILT**, Some f.c. Gravel, trace organics, brown, loose, moist **(FILL)**		Hnu = 0.0 ppm	
S-2	2	1	3-5-2-2	7				**SILT**, Some f.c. Gravel, gray, loose, moist **(FILL)**		Hnu = 0.0 ppm	
S-3	2	0.5	3-6-4-3	10		5		**f.c. GRAVEL**, trace silt, loose, saturated **(FILL)**		Hnu = 0.0 ppm	
S-4	2	0.5	4-4-4-4	8				**f.c. GRAVEL**, trace silt, trace brick, loose, saturated **(FILL)**		Hnu = 0.0 ppm	
S-5	2	1	6-3-6-6	9		10		**f.c. GRAVEL**, little f.m.c. sand, trace bricks, trace silt, loose, saturated **(FILL)**		Hnu = 0.0 ppm	
S-6	2	1	9-3-3-3	6				**Similar Soil (FILL)** **SILT**, trace f.c. gravel, brown, loose, saturated **(FILL)**		Hnu = 0.0ppm	
S-7	2	0.5	4-2-4-4	6		15		**f.c. GRAVEL**, trace silt, loose, saturated **(FILL)**		Hnu = 0.0ppm	
						20		End of Boring at 14 ft			

SUBSURFACE LOG 14357.1013 LOGS.GPJ UPDATEDCHA.GDT 12/9/11

WELL CONSTRUCTION LOG

PROJECT & LOCATION:	DeLeval ERP Project, Poughkeepsie, NY
CLIENT:	City of Poughkeepsie
CONTRACTOR:	NYEG Drilling, LLC

BORING NO.

WELL NO. MW-7

PROJECT NO.: 14357.1013.31000

SHEET NO.: 1 OF 1

ELEVATION:

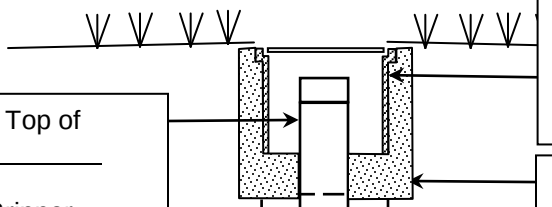
START DATE: 11/8/11 TIME: 11:40am

FINISH DATE: 11/8/11 TIME: 12:05pm

DRILLER: Doug Thoma

INSPECTOR: J. Herrick

Note: Installed 3'4" – 4" sch. 40 PVC pipe over 2" riser for protection (backfilled with bentonite).



Type of Protective Casing: Flush Mount Curb Box – To be installed by Site Contractor
Inside Dia. Of Casing: _____
Depth Below Ground of Casing: _____

Depth Above Ground to Top of Riser Pipe: 2'
Type of Cap: Locking Gripper

Type of Surface Seal: Concrete
Thickness of Surface Seal: _____

Diameter Borehole: 9"

Type of Backfill Around Riser Pipe: Bentonite to Surface

Inside Diameter of Riser Pipe: 2" PVC

Type of Bentonite Seal: Chips
Depth to Top of Bentonite Seal: 2'

~~Depth to Top of Fine Sand Choke~~: _____

Type of Screen: Slotted
Screen Diameter: 2"
Screen Slot Size: 0.010"
Depth to Top of Screen: 6'
Depth to Bottom of Screen: 16'

Type of Sand Pack: No. 0 Sand
Depth to Top of Sand Pack: 4'
Depth to Bottom of Sand Pack: 16'

~~Backfill (if any):~~ _____

Depth to Bottom of Borehole: 16''

PROJECT NUMBER: 14357.1013.31000 12/5/11

DeLeval ERP Project
SUBSURFACE LOG
HOLE NUMBER MW-7

LOCATION: City of Poughkeepsie, NY
CLIENT: City of Poughkeepsie
CONTRACTOR: NYEG Drilling, Inc.
DRILLER: D. Thoma INSPECTOR: J. Herrick
START DATE and TIME: 11/8/2011 9:00:00 AM
FINISH DATE and TIME: 11/8/2011 11:30:00 AM
SURFACE ELEV: CHECKED BY: SMS

DRILL FLUID: None DRILLING METHOD: 4 1/4" HSA

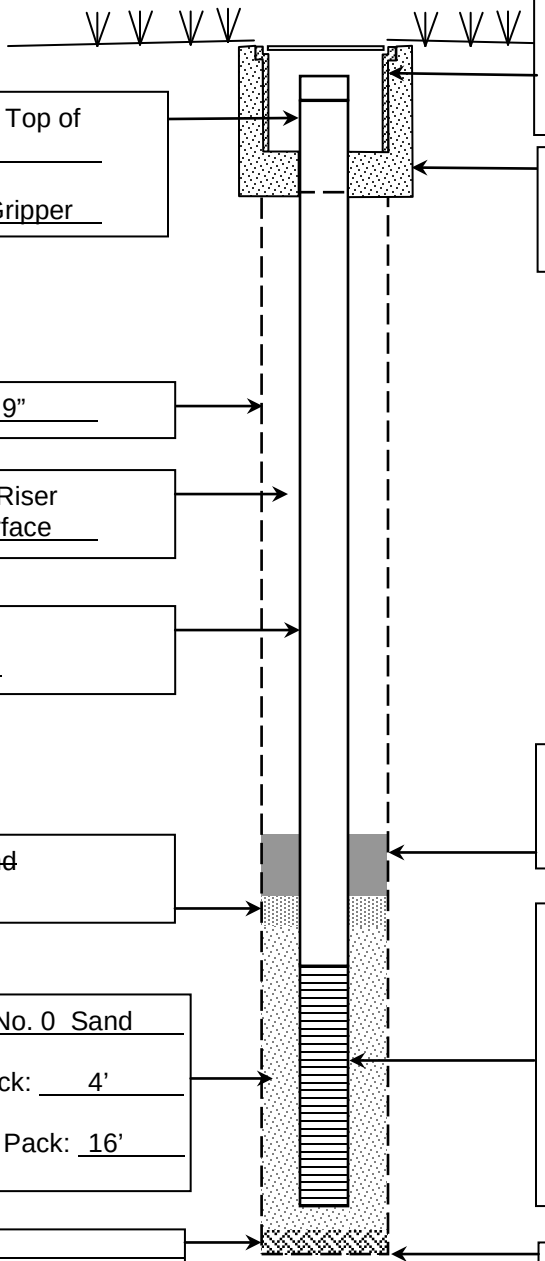
WATER LEVEL OBSERVATIONS	DATE	TIME	READING TYPE	WATER DEPTH (ft)	CASING BOTTOM (ft)	HOLE BOTTOM (ft)
	11-8-11	12:00 PM	Completion	9.3		16

SAMP./CORE NUMBER	SAMP. ADV. (ft) LEN. CORE (ft)	RECOVERY (ft)	Blows Per 6" on Split Spoon Sampler	"N" Value or RQD%	SAMPLE	DEPTH (Feet)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEVATION (Feet)	Remarks on Character of Drilling, Water Return, etc.	WATER LEVELS AND/OR WELL DATA
								SUBBASE, Crusher Run			
S-1	2	1.4	8-8-8-8	16						Hnu = 0.0 ppm	
								SILT, little f.m.c. sand, trace f.c. gravel, trace brick, compact, moist **(FILL)**			
S-2	2	1.8	12-17-18-22	35						Hnu = 0.0 ppm	
								SILT, little f.c. gravel, little f.m.c. sand, trace brick, trace slag, m. compact, moist **(FILL)**			
S-3	2	1.7	10-13-17-22	30		5				Hnu = 0.0 ppm	
								becomes v. compact **(FILL)**			
S-4	2	2	23-37-42-43	79						Hnu = 0.0 ppm	
								SILT, little f.c. gravel, little f.m.c. sand, trace brick, trace slag, m. compact, wet **(FILL)**			
S-5	2	2	15-22-10-16	32						Hnu = 0.0 ppm	▽
						10		**f.c. GRAVEL**, pieces of shale, m. compact, saturated **(FILL)**			
S-6	2	0.7	10-12-17-16	29						Hnu = 0.0ppm	
								No Recovery **(FILL)**			
S-7	2	0	16-16-12-10	28						No Recovery	
								f.c. GRAVEL, v. loose, saturated **(FILL)**			
S-8	2	1.6	3-2-2-2	4		15		**SILT**, trace clay, gray, v. loose, saturated **(FILL)**		Hnu = 0.0ppm	
								End of Boring at 16 ft			
						20					

WELL CONSTRUCTION LOG

PROJECT & LOCATION: DeLeval ERP Project, Poughkeepsie, NY	BORING NO.
CLIENT: City of Poughkeepsie	WELL NO. MW-8
CONTRACTOR: NYEG Drilling, LLC	PROJECT NO.: 14357.1013.31000
	SHEET NO.: 1 OF 1
	ELEVATION:
	START DATE: 11/8/11 TIME: 8:00am
	FINISH DATE: 11/8/11 TIME: 8:40am
	DRILLER: Doug Thoma
	INSPECTOR: J. Herrick

Note: Installed 3'4" – 4" sch. 40 PVC pipe over 2" riser for protection (backfilled with bentonite).



Type of Protective Casing: Flush Mount Curb Box To Be Installed by Site Contractor
Inside Dia. Of Casing: _____
Depth Below Ground of Casing: _____

Depth Above Ground to Top of Riser Pipe: 2'
Type of Cap: Locking Gripper

Type of Surface Seal: Concrete
Thickness of Surface Seal: _____

Diameter Borehole: 9"

Type of Backfill Around Riser Pipe: Bentonite to Surface

Inside Diameter of Riser Pipe: 2" PVC

Type of Bentonite Seal: Chips
Depth to Top of Bentonite Seal: 2'

~~Depth to Top of Fine Sand Choke~~: _____

Type of Screen: Slotted
Screen Diameter: 2"
Screen Slot Size: 0.010"
Depth to Top of Screen: 6'
Depth to Bottom of Screen: 16'

Type of Sand Pack: No. 0 Sand
Depth to Top of Sand Pack: 4'
Depth to Bottom of Sand Pack: 16'

~~Backfill (if any):~~ _____

Depth to Bottom of Borehole: 16''

PROJECT NUMBER: 14357.1013.31000 12/5/11

DeLeval ERP Project
SUBSURFACE LOG
HOLE NUMBER MW-8

LOCATION: City of Poughkeepsie, NY

CLIENT: City of Poughkeepsie

CONTRACTOR: NYEG Drilling, Inc.

DRILLER: D. Thoma INSPECTOR: J. Herrick

START DATE and TIME: 11/7/2011 2:00:00 PM

FINISH DATE and TIME: 11/8/2011 8:00:00 AM

SURFACE ELEV: CHECKED BY: SMS

DRILL FLUID: None DRILLING METHOD: 4 1/4" HSA

WATER LEVEL OBSERVATIONS	DATE	TIME	READING TYPE	WATER DEPTH (ft)	CASING BOTTOM (ft)	HOLE BOTTOM (ft)
	11-8-11	7:50 AM	24 Hours	11	10	10

SAMP./CORE NUMBER	SAMP. ADV. (ft) LEN. CORE (ft)	RECOVERY (ft)	Blows Per 6" on Split Spoon Sampler	"N" Value or RQD%	SAMPLE	DEPTH (Feet)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEVATION (Feet)	Remarks on Character of Drilling, Water Return, etc.	WATER LEVELS AND/OR WELL DATA
								SUBBASE, Crusher Run **(FILL)**			
S-1	2	0.9	3-3-4-17	7				**BRICK (FILL)**		Hnu = 0.0 ppm	
								f.c. GRAVEL (FILL)			
S-2	2	0.8	5-2-2-5	4				**f. SAND**, Some Silt, little f. gravel, trace glass, trace brick, trace organics, v. loose, moist **(FILL)**		Hnu = 0.0 ppm	
S-3	2	0.9	7-7-20-22	27		5		**f.c. GRAVEL**, Some Silt, trace f.m.c. sand, brown, m. compact. moist **(FILL)**		Hnu = 0.0 ppm	
S-4	2	0.8	38-18-5-5	23				**f.c. GRAVEL**, Some Silt, brown, m. compact, moist **(FILL)**		Hnu = 0.0 ppm	
								f.c. GRAVEL, Some Silt, gray, m. compact, moist **(FILL)**			
S-5	2	1.3	4-4-3-3	7				**Clayey SILT**, Some f.c. Gravel, gray, m. stiff, moist **(FILL)**		Hnu = 0.0 ppm	
								Clayey SILT, gray, m. stiff, moist **(FILL)**			
						10		**Silty CLAY**, trace f. gravel. trace f.m.c. sand, gray, v. stiff, moist **(FILL)**			▽
S-6	2	0.8	8-13-6-5	19						Hnu = 0.0 ppm	
								becomes hard, wet **(FILL)**			
S-7	1.3	0.8	8-34-50/0.3	R				**SHALE**, pieces of shale **(FILL)**		Hnu = 0.0 ppm	
								SILT, trace clay, gray. stiff, wet **(FILL)**			
S-8	2	0.9	3-4-5-3	9		15					
								End of Boring at 16 ft			
						20					

WELL CONSTRUCTION LOG

PROJECT & LOCATION:	DeLeval ERP Project, Poughkeepsie, NY
CLIENT:	City of Poughkeepsie
CONTRACTOR:	NYEG Drilling, LLC

BORING NO.

WELL NO. MW-9

PROJECT NO.: 14357.1013.31000

SHEET NO.: 1 OF 1

ELEVATION:

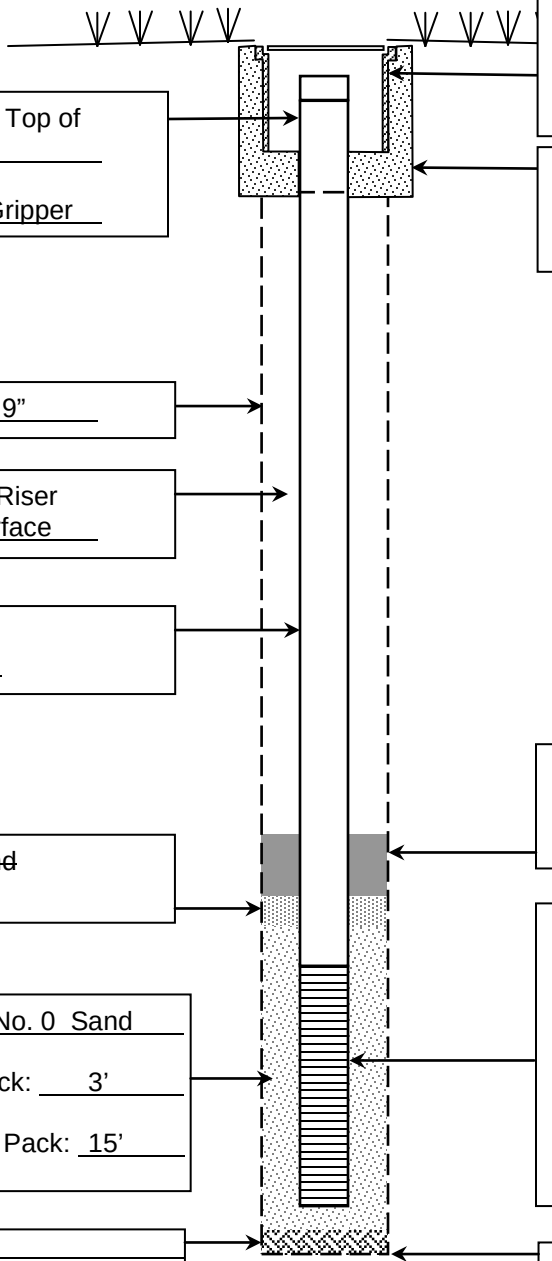
START DATE: 11/7/11 TIME: 12:55pm

FINISH DATE: 11/7/11 TIME: 1:45pm

DRILLER: Doug Thoma

INSPECTOR: J. Herrick

Note: Installed 3'4" – 4" sch. 40 PVC pipe over 2" riser for protection (backfilled with bentonite).



Type of Protective Casing: Flush Mount Curb Box – To be installed by Site Contractor

Inside Dia. Of Casing: _____

Depth Below Ground of Casing: _____

Depth Above Ground to Top of Riser Pipe: 2'

Type of Cap: Locking Gripper

Type of Surface Seal: Concrete

Thickness of Surface Seal: _____

Diameter Borehole: 9"

Type of Backfill Around Riser Pipe: Bentonite to Surface

Inside Diameter of Riser Pipe: 2" PVC

Type of Bentonite Seal: Chips

Depth to Top of Bentonite Seal: 1'

~~Depth to Top of Fine Sand Choke~~: _____

Type of Screen: Slotted

Screen Diameter: 2"

Screen Slot Size: 0.010"

Depth to Top of Screen: 5'

Depth to Bottom of Screen: 15'

Type of Sand Pack: No. 0 Sand

Depth to Top of Sand Pack: 3'

Depth to Bottom of Sand Pack: 15'

~~Backfill (if any)~~: _____

Depth to Bottom of Borehole: 15'

PROJECT NUMBER: 14357.1013.31000 12/5/11

DeLeval ERP Project
SUBSURFACE LOG
HOLE NUMBER MW-9

LOCATION: City of Poughkeepsie, NY
CLIENT: City of Poughkeepsie
CONTRACTOR: NYEG Drilling, Inc.
DRILLER: D. Thoma INSPECTOR: J. Herrick
START DATE and TIME: 11/7/2011 10:45:00 AM
FINISH DATE and TIME: 11/7/2011 12:55:00 PM
SURFACE ELEV: CHECKED BY: SMS

DRILL FLUID: None DRILLING METHOD: 4 1/4" HSA

WATER LEVEL OBSERVATIONS	DATE	TIME	READING TYPE	WATER DEPTH (ft)	CASING BOTTOM (ft)	HOLE BOTTOM (ft)
	11-7-11	11:00 AM	During Drilling	7		

SAMP./CORE NUMBER	SAMP. ADV. (ft) LEN. CORE (ft)	RECOVERY (ft)	Blows Per 6" on Split Spoon Sampler	"N" Value or RQD%	SAMPLE	DEPTH (Feet)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEVATION (Feet)	Remarks on Character of Drilling, Water Return, etc.	WATER LEVELS AND/OR WELL DATA
								SUBBASE, Crusher Run			
S-1	2	1.2	2-3-3-5	6				**SILT**, trace f. gravel, trace f.m.c. sand, gray, loose, moist **(FILL)**		Hnu = 0.0 ppm	
										Hnu = 0.0 ppm	
								Similar Soil (FILL)			
S-2	2	1.4	12-5-5-10	10				**SHALE**, pieces of shale **(FILL)**		Hnu = 0.0 ppm	
								BRICK (FILL)		Hnu = 0.0 ppm	
								SHALE, pieces of shale **(FILL)**			
S-3	2	1.4	12-27-15-17	42		5				Hnu = 0.0 ppm	
								SILT, trace f. gravel, trace f.m.c. sand, compact, moist **(FILL)**		Hnu = 0.0 ppm	
								SILT, gray/black, v. stiff, moist **(FILL)**			
S-4	2	1.3	12-8-8-7	16				becomes wet **(FILL)**		Hnu = 0.0 ppm Petroleum odor at approximately 7.0', dark colored silt.	▽
								SILT, Some f. Sand, gray/green, m. stiff, wet **(FILL)**		Hnu - 0.0 ppm	
S-5	2	1.6	3-3-3-30	6				**SHALE**, pieces of shale **(FILL)**		Hnu = 0.0ppm, Slight petroleum odor	
						10		**SHALE**, pieces of shale **(FILL)**		Hnu = 0.0ppm	
								SILT, Some f. Gravel, brown, stiff, wet **(FILL)**			
S-6	2	1.4	18-6-6-7	12				**f.c. GRAVEL**, Some f.m.c. Sand, m. compact, wet **(FILL)**		Hnu = 0.0ppm	
								becomes compact **(FILL)**		Hnu = 0.0ppm	
S-7	2	1.8	11-9-24-12	33						Hnu = 0.0ppm	
S-8	0.4		50/0.4	R				**Silty CLAY**, Some f. Gravel, gray, hard, wet **(FILL)**		Hnu = 0.0ppm	
						15		**SHALE**, pieces of shale **(FILL)**		Hnu = 0.0ppm	
								End of Boring at 14.4 ft			
						20					

APPENDIX G

Monitoring Well Sampling Log

CHA	**Well Sampling/ Development Log**	**Sample/Well Designation:**
Project Name: *DeLaval ERP Project*		Logged By:
Project Location: C/O Poughkeepsie, NY		Date:
Project Number:		Screen Length: 10

Purge Information:

(1) Depth to Bottom of Well: _____ ft. (from TOC)

(2) Depth to Water: _____ ft. (from TOC)

(3) Column of Water: _____ ft. [(1) – (2)]

(4) Well Riser Diameter: 2 in.

(5) Volume Conversion: 0.163 gal./ft. (see below)

(6) 1 Well Volume: _____ gal. [(3) x (5)]

Method of Purging: ☐ WaTerra ☐ Bailer ☐ Submersible ☐ Other: _____

Volume Conversion: (gal./ft.)

2" = 0.163 4" = 0.653 6" = 1.469 8" 2.611 10" = 4.08

Field Analysis:

Volume Purged (gal.)										
Time										
ORP/EH (mV)										
pH										
Cond. (MS/CM)										
Turbidity (NTU)										
D.O. (mg/L)										
Temperature (°C)										

Total Volume Purged: _____ gal. Total Purge Time: _____

Sampling Information:

Sampling Method: _____

No. of Bottles: _____

Sampling Time: _____

Sample Analyses: _____

Comments:

APPENDIX H

NYSDEC Well Decommissioning Policy

CP-43:Groundwater Monitoring Well Decommissioning Policy

New York State Department of Environmental Conservation

DEC POLICY

Issuing Authority: Commissioner Alexander B. Grannis

Date Issued: November 3, 2009	**Latest Date Revised:**

I. Summary:

Groundwater monitoring wells provide essential access to the subsurface for scientific and engineering investigations (including monitoring wells installed for leak detection purposes). To a degree, every monitoring well is an environmental liability because of the potential to act as a conduit for pollution to reach the groundwater. To limit the environmental risk, a groundwater monitoring well must be properly decommissioned when its effective life has been reached. This document provides procedures to satisfactorily decommission groundwater monitoring wells in New York State. This policy also pertains to other temporary wells such as observation wells, test wells, de-watering wells and other small diameter, non-potable water wells. It does not pertain to water supply wells.

II. Policy:

Environmental monitoring wells should be decommissioned when:

1. they are no longer needed and re-use by another program is not an option; or
2. the well's integrity is suspect or compromised.

The method for decommissioning will be determined based upon well construction and environmental parameters. The method selected must be designed to protect groundwater and implemented according to current best engineering practices while following all applicable federal, state and local regulations. *Groundwater Monitoring Well Decommissioning Procedures* shall be maintained as an addendum to this policy.

This policy is applicable to all New York State Department of Environmental Conservation (DEC) programs that install, utilize and maintain monitoring wells for the study of groundwater, except monitoring wells for landfills regulated under 6 NYCRR Part 360 decommissioned in accordance with those regulations [*see* 6 NYCRR 360-2.11(a)(8)(vi)] and wells installed under the Oil, Gas and Solution Mining Law, Environmental Conservation Law Article 23. There is no specific time frame to dictate when to decommission a well; timing is dependent upon the use and condition of the well

and shall be determined on an individual basis. Best professional judgment must be exercised when using the decommissioning procedures. Outside of DEC use, this policy is mandatory when incorporated into the specifications of a state contract, an Order on Consent or a permit. In all other situations, it shall serve as guidance.

III. Purpose and Background:

This document establishes a monitoring well decommissioning policy and provides technical guidance. Synonyms for well decommissioning include “plugging,” “capping” and “abandoning. For consistency, only the term “decommissioning” is used within this document.

Unprotected, neglected and improperly abandoned monitoring wells are a serious environmental liability. They can function as a pollution conduit for surface contaminants to reach the subsurface and pollute our groundwater. They also can cause unwanted mixing of groundwater, which degrades the overall water quality within an aquifer. Improperly constructed, poorly maintained or damaged monitoring wells can yield anomalous poor data that can compromise the findings of an environmental investigation or remediation project. Unneeded or compromised monitoring wells should be properly decommissioned in order to prevent harm to our groundwater.

Since 1980, the DEC has installed, directed or overseen the installation of thousands of monitoring wells throughout New York for various state and federal programs, such as Superfund, solid waste, Resource Conservation and Recovery Act (RCRA), spill response, petroleum bulk storage and chemical bulk storage. This guidance addresses the environmental liability associated with this aging network of wells.

Within its boring zone, a successfully decommissioned well prevents the following:

1. Migration of existing or future contaminants into an aquifer or between aquifers;
2. Migration of existing or future contaminants within the vadose zone;
3. Potential for vertical or horizontal migration of fluids in the well or adjacent to the well; and
4. Any change in the aquifer yield and hydrostatic head, unless due to natural conditions.

Monitoring well construction in New York varies considerably with factors such as age of the well, local geology and either the presence or absence of contamination. The predominant type of monitoring well in New York is the shallow, watertable monitoring well constructed of polyvinyl chloride plastic (PVC). The best method for decommissioning should be selected to suit the conditions and circumstances. Each decommissioning situation is to be evaluated separately using this guidance before a method is chosen and implemented.

IV. Responsibility:

The Division of Environmental Remediation (DER) is responsible for updating this policy and the *Groundwater Monitoring Well Decommissioning Procedures* (addendum) in consultation with the Division of Solid and Hazardous Materials (DSHM) and the Division of Water (DOW). Compliance with the guidance does not relieve any party of the obligation to properly decommission a monitoring well. Oversight responsibility will be carried out by the DEC Regional Engineer.

V. Procedure:

Groundwater Monitoring Well Decommissioning Procedures, the addendum to this policy, provides guidance on proper decommissioning of monitoring wells in New York State.

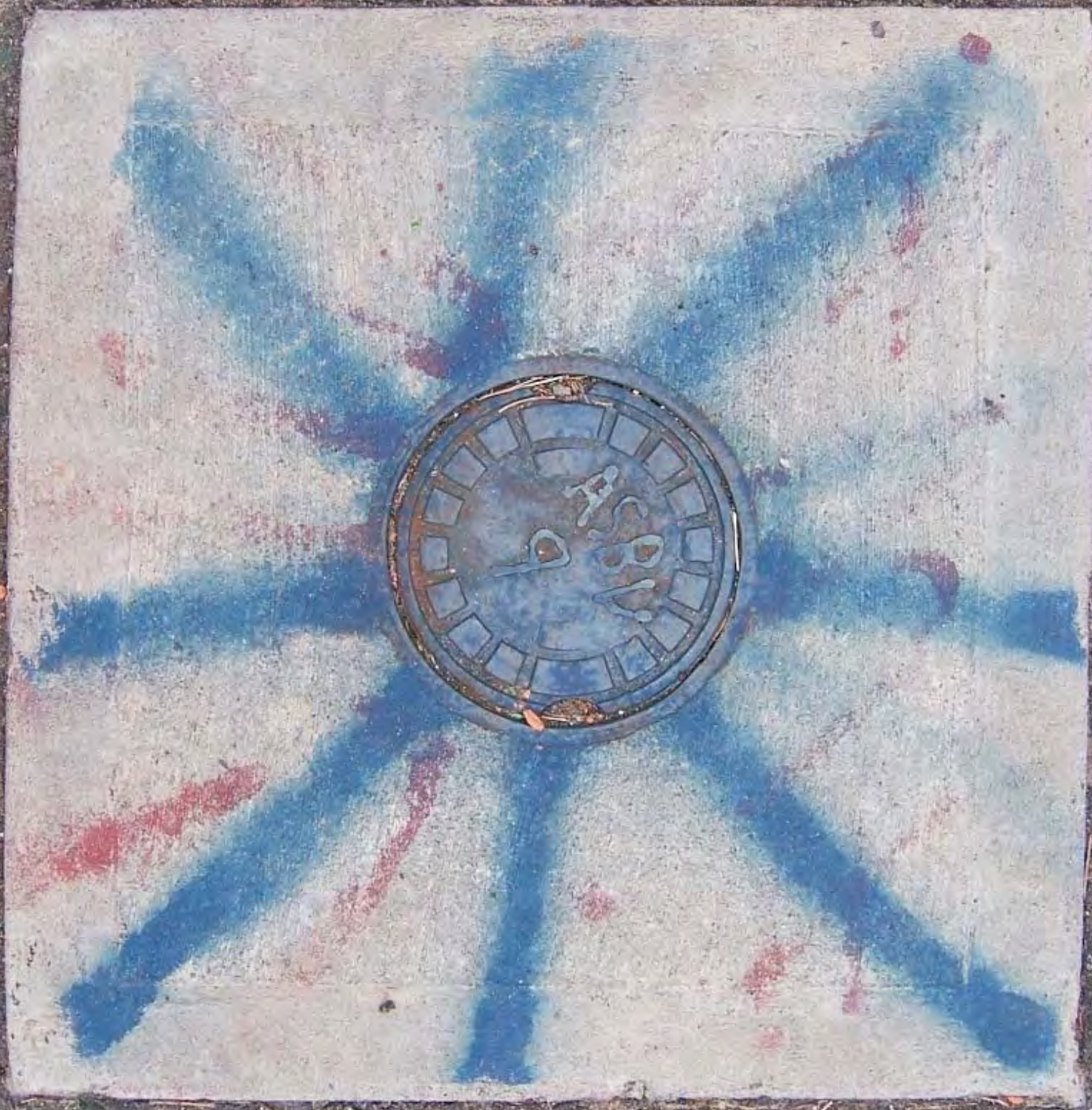
VI. Related References:

- Groundwater Monitoring Well Decommissioning Procedures, October 1986. Prepared by Malcolm Pirnie, Inc. for the New York State Department of Environmental Conservation, Division of Environmental Remediation.
- Standard Guide for the Decommissioning of Ground Water Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities, ASTM D 5299-99. American Society for Testing and Materials (ASTM). Philadelphia. 2005.
- 6 NYCRR Part 360 Solid Waste Management Facilities, New York State Department of Environmental Conservation, Division of Solid and Hazardous Materials.
- Specifications for Abandoning Wells and Boreholes in Unconsolidated Materials, New York State Department of Environmental Conservation, Region 1 - Water Unit, undated.
- Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells, EPA 600/4-89/034, United States Environmental Protection Agency (EPA).

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Final - August 2009

GROUNDWATER MONITORING WELL DECOMMISSIONING PROCEDURES



New York State Department of Environmental Conservation
Division of Environmental Remediation

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INTRODUCTION

This document, *Groundwater Monitoring Well Decommissioning Procedures*, is the addendum to CP-43, Groundwater Monitoring Well Decommissioning Policy, which provides acceptable procedures to be used as guidance when decommissioning monitoring wells in New York State. Please note that this document does not address some site-specific special situations that may be encountered in the field. Compliance with the procedures set forth in this document does not relieve any party of the obligation to properly decommission a monitoring well.

Unprotected, neglected and improperly abandoned monitoring wells are a serious environmental liability. They can function as a pollution conduit for surface contaminants to reach the subsurface and pollute our groundwater. They also can cause unwanted mixing of groundwater, which degrades the overall water quality within an aquifer. Improperly constructed, poorly maintained or damaged monitoring wells can yield anomalous poor data that can compromise the findings of an environmental investigation or remediation project. Unneeded or compromised monitoring wells should be properly decommissioned in order to prevent harm to our groundwater.

Previous versions of this guidance have been issued since 1995. Originally developed as a specification for well decommissioning at Love Canal, the procedures were rewritten to make them applicable across the state. From an engineering standpoint, the guidance has changed very little. Most situations do not require a complex procedure.

If you have any questions, please contact Will Welling at (518) 402-9814.

Sincerely,



Gerald J. Rider, Jr., P.E.
Chief, Remedial Section D
Remedial Bureau E
Division of Environmental Remediation

1.0 PREPARATION

If an unneeded monitoring well remains in good usable condition, an alternative to decommissioning might be the reuse by another agency program. DEC encourages reuse in situations where a well will continue to be used and cared for responsibly.

When reuse is not an option, the first step in the well decommissioning process is to review all pertinent well construction information. One must know the well depth and construction details. GPS coordinates and permanent labeling (if available) will be useful in confirming the well to be decommissioned. An inspection must be performed prior to decommissioning in order to verify the construction and condition of each well. Specific details and subsurface conditions form the basis for decisions throughout the decommissioning process.

Well Details

1. Is the well a single stem riser (all one diameter)?
2. Is the well a simple overburden well (no penetration into bedrock)?
3. Does the well riser consist of telescoping diameters of pipe which decrease with depth?
4. Is the well seal compromised (leaking, inadequate or damaged)?
5. If the well is PVC, is it 25 feet or shallower and not grouted into rock?
6. Can the riser be pulled and is removal of the well desired?
7. Is the well a bedrock well?
8. If the monitoring well is a bedrock well, does it have an open hole?
9. Is there a well assembly (riser and screen) installed within the bedrock hole?

Subsurface Conditions

10. Is the soil contaminated?
11. Does the well penetrate a confining layer?
12. If the well penetrates a confining layer, might overdrilling or casing pulling cause contamination to travel up or down through a break in the confining layer?
13. Does the screened interval cross multiple water-bearing zones?

For additional collection and verification of information, the "Monitoring Well Field Inspection Log" (Figure 1) can be used during a field inspection. After the well has been located and the information gathered, one is ready to select the decommissioning procedure in accordance with Section 2.

Special conditions, such as access problems, well extensions through capped and covered non-Part 360 landfills and seasonal weather patterns affecting construction, should be assessed in the planning stage. Decommissioning work requiring the use of heavy vehicular equipment on landfill caps should be scheduled during dry weather (if possible) so as to minimize damage to the cover. If work must be performed during the spring, winter or inclement weather, special measures to reduce ruts should be employed to maintain the integrity of a completed landfill cover system. As an example, placement of plywood under vehicular equipment can eliminate deep ruts that would require repair.

2.0 DECOMMISSIONING METHODS

The primary rationale for well decommissioning is to remove any potential groundwater pathway. A secondary rationale, often important to the property owner or owner of the well, is to physically remove the well. Removed well materials may be recycled and will not interfere with future construction excavation. The previous versions of these decommissioning procedures have stressed that physical removal of the well by pulling is preferable to leaving casing in the ground. Due to the added effort, expense and risk involved with pulling, the decision of whether to pull or not should be a separate consideration aside from selecting the sealing procedure.

One should select a decommissioning procedure that takes into account the geologic and hydrogeologic conditions at the well site; the presence or absence of contamination in the groundwater; and original well construction details. The selection process for well decommissioning procedures is provided by the flow chart, Figure 2. Answers to the questions

in the preceding section are the input for this flow chart. The four primary well decommissioning methods are:

1. Grouting in-place;
2. Perforating the casing followed by grouting in-place;
3. Grouting in-place followed by casing pulling;
4. Over-drilling and grouting with or without a temporary casing.

In a complex situation, one or more decommissioning procedures may be used for different intervals of the same well.

The remainder of Section 2 discusses the well decommissioning methods and the selection process. Refer to Figure 2 for a flow chart diagram of the complete procedure selection process. The DEC Project Manager has the discretion to deviate from the flow chart, (Figure 2), based on site conditions and professional judgment.

2.1 Grouting In-Place

Grouting in-place is the simplest and most frequently used well decommissioning method and grouting itself is the essential component of all the decommissioning methods. The grout seals the borehole and any portion of the monitoring well that may be left in the ground. Because dirt and foreign objects can fall into an open well, whenever possible a well should be sealed first with grout before attempting subsequent decommissioning steps.

For the purpose of these decommissioning procedures, the well seal is defined as the bentonite seal above the sand pack. Aside from obvious channeling by in-flowing surface water around the well, an indication of the well seal integrity may be obtained through review of the boring logs and/or a comparison of groundwater elevations if the well is part of a cluster. Any problems noted on the boring logs pertaining to the well seal, such as bridging of bentonite pellets or running sands, or disparities between field notes (if available) and the well log would indicate the potential for a poor (compromised) well seal.

If the well seal is not compromised and there is no confining layer present, a single-stem, 2-inch PVC, monitoring well can be satisfactorily decommissioned by grouting it in-place. If the seal is compromised, casing perforation may be called for as discussed in Section 2.2.

As discussed in Section 2.4 and its sub-sections, this method is specified for the bedrock portion of a well, and is used for decommissioning small diameter cased wells. Grouting in-place involves filling the casing with grout to a level of five feet below the land surface, cutting the well casing at the five-foot depth, and removing the top portion of the casing and associated well materials from the ground. The casing must be grouted according to the procedures in Section 6. In addition, the upper five feet of the borehole is filled to land surface and restored according to the procedures described in Section 7.

For open-hole bedrock wells, the procedure involves filling the opening with grout to the top of rock according to the procedures in Section 5. A thicker grout may be required to fill any bedrock voids. If excessive grout is being lost down-hole, consider grouting in stages to reduce the pressure caused by the height of the grout column.

The standard mix with the maximum amount of allowable water will be required to penetrate the well screen and sand pack when a well assembly has been installed within a bedrock hole. For an assembly such as this, the grout should be mixed thinly enough to penetrate the slots and sand pack. The grout mixes are discussed in Sections 6.1 and 6.2.

2.2 Casing Perforating/Grouting In-Place

Casing perforation followed by grouting in-place is the preferred method to use if there is poor documentation of the grouting of the well annulus, or the annulus was allowed to be back-filled with cuttings. The grout will squeeze through the perforations to seal any porous zones along the outside of the casing. The procedure involves puncturing, cutting or splitting the well casing and screen followed by grouting the well. A variety of commercial equipment is available for perforating casings and screens in wells with four-inch or larger inside diameters. Due to the diversity of applications, experienced contractors must recommend a specific technique based on site-specific conditions. A minimum of four rows of perforations several inches long around the circumference of the pipe and a minimum of five perforations per linear foot of casing or screen is recommended (American Society for Testing and Materials, Standard D 5299-99, 1999). After the perforating is complete, the borehole must be grouted according to the procedures in Section 6 and the upper five feet of borehole restored according to the procedures in Section 7.

2.3 Casing Pulling

Casing pulling should be used in cases where the materials of the well assembly are to be recycled, or the well assembly must be removed to clear the site for future excavation or re-development. Casing pulling is an acceptable method to use when no contamination is present; contamination is present but the well does not penetrate a confining layer; and when both contamination and a confining layer are present but the contamination cannot cross the confining layer. Additionally, the well construction materials and well depth must be such that pulling will not break the riser. When contamination is likely to cross the confining layer during pulling, a temporary casing can be used. See Section 2.4.

Casing pulling involves removing the well casing by lifting. Grout is to be added during pulling; the grout will fill the space once occupied by the material being withdrawn. An acceptable procedure to remove casing involves puncturing the bottom of the well or using a casing cutter to cut away the screen, grouting, using jacks to free casing from the hole, and lifting the casing out by using a drill rig, backhoe, crane, or other suitable equipment. Additional grout must be added to the casing as it is withdrawn. Grout mixing and placement procedures are provided in Section 6. In wells or well points in which the bottom cannot be punctured, the casing or screened interval will be perforated or cut away prior to being filled with grout. This procedure should be followed for wells installed in collapsible formations or for highly contaminated wells.

At sites in which well casings have been grouted into the top of bedrock, the casing pulling procedure should not be attempted unless the casing can be first cut or freed from the rock.

2.4 Over-Drilling

Over-drilling is the technique used to physically remove an entire monitoring well, its sand pack and the old grout column and fill. In situations where PVC screens and risers are expected to sever and removal of all well materials is required, over-drilling will be required. Over-drilling is called for when a riser can't be pulled and it penetrates a confining layer. Compared to the other procedures, over-drilling is the least common method of well decommissioning.

A "temporary casing" may be necessary when extraordinary conditions are present, such as a high concentration of mobile contaminants in the overburden, depth to water is shallow, there is poor construction documentation or shoddy construction practices. The approach involves installing a large diameter steel casing around the outside of the well followed by drilling / pulling /grouting within this casing. The casing is withdrawn at the end of pulling, grouting and (perhaps) drilling. If the confining layer is less than 5 feet thick, the casing should be installed to the top of the confining layer. Otherwise, it is installed to a depth of 2 feet below the top of the confining layer. After the outer casing has been set, the well can be removed and grouted through pulling if possible or removed and grouted by drilling inside the casing.

Over-drilling is used where casing pulling is determined to be unfeasible, or where installation of a temporary casing is necessary to prevent cross-contamination, such as when a confining layer is present and contamination in the deeper aquifer could migrate to the upper aquifer as the well is pulled. The over-drilling method should:

- Follow the original well bore;
- Create a borehole of the same or greater diameter than the original boring; and
- Remove all of the well construction materials.

In over-drilling the difficulty lies in keeping the augers centered on the old well as the bit is lowered; it will tend to wander off. As a precaution, the well column should be filled with grout before over-drilling. Then without allowing the grout to dry, the driller proceeds with over-drilling the well. Grouting first guarantees that if the drill wanders off the old well and the effort is less than 100% successful, the remaining well portion will at least have been grouted. There are many methods for over-drilling. Please note that the following methods are not suitable for all types of casing, and the advice of an experienced driller should be sought.

- Conventional augering (i.e., a hollow stem auger fitted with a pilot bit). The pilot bit will grind the well construction materials, which will be brought to the well surface by the auger.
- A conventional cable tool rig to advance "temporary" casing having a larger diameter than the original boring. The cable tool kit is advanced within the casing to grind the well construction materials and soils, which are periodically removed with large diameter bailer. This method is not applicable to bedrock wells.

- An over-reaming tool with a pilot bit nearly the same size as the inside diameter of the casing and a reaming bit slightly larger than the original borehole diameter. This method can be used for wells with steel casings.

- A hollow-stem auger with outward facing carbide cutting teeth having a diameter two to four inches larger than the casing.

Prior to over-drilling, the bottom of the well should be perforated or cut away, and the casing filled with grout as with casing removal by pulling.

In all cases above, over-drilling should advance beyond the original bore depth by a distance of half a foot to ensure complete removal of the construction materials. Oversight attention should be focused on the drill cuttings, looking for fragments of well materials. Absence of these indicators is a sign that the drill has wandered off the well. If wandering is suspected, having previously filled the well with grout, the remaining portion which cannot be over-drilled can be considered grouted in-place. When the over-drilling is complete, grout should be tremied within the annular space between the augers and well casings. The grout level in the borehole should be maintained as the drilling equipment and well materials are sequentially removed. As with all the other methods, the upper five feet of borehole should be restored according to the procedures in Section 7.

3.0 SELECTION PROCESS AND IMPLEMENTATION

The decommissioning procedure selection flow chart, Figure 2, is to be used to select decommissioning methods. The selection process first identifies the basic monitoring well type. There are only two types of monitoring wells described in this guidance, overburden wells and bedrock wells. Bedrock wells typically have an overburden portion which in the selection process is to be treated as an overburden well. Techniques are specified for wells based upon their type and the other physical conditions present. Decommissioning techniques called for by the selection process have their practical limits; construction details dictate when a well stem can be pulled without breaking and when it cannot be pulled. The DEC project manager has the discretion to deviate from the flow chart, (Figure 2), based on site conditions, budgetary concerns and professional judgment. The remainder of this section will discuss types of monitoring wells in various settings along with recommended decommissioning techniques.

3.1 Bedrock Wells

Referring to Figure 2 and Section 2.1, if the well extends into bedrock, the rock hole portion of the well is to be grouted in-place to the top of the rock. The grout mix, however, may vary according to the conditions. A thicker grout may be required to fill voids and a thinner grout may be necessary to penetrate well screen and sand pack. Refer to the grout mixture specifications given in Section 6.1 and 6.2.

Prior to grouting, the depth of the well will be measured to determine if any silt or debris has plugged the well. If plugging has occurred, all reasonable attempts to clear it should be made before grouting. The borehole will then be tremie grouted according to Section 6.4 from the bottom of the well to the top of bedrock to ensure a continuous grout column.

After the rock hole is grouted, the overburden portion of the well is decommissioned using appropriate techniques described below. If the bedrock extends to the ground surface, grouting can extend to the ground surface or to slightly below so that the site can be restored as appropriate in accordance with Section 7.

3.2 Uncontaminated Overburden Wells

For overburden wells and the overburden portion of bedrock wells, the first factor in determining the decommissioning method is whether the overburden portion of the well exhibits contamination, as determined through historical groundwater and/or soil sampling results. If the overburden is uncontaminated, the next criteria considers whether the well penetrates a confining layer. In the case that the overburden portion of the well does not penetrate a confining layer, the casing can either be tremie-grouted and pulled or tremie grouted and left in place. As a general rule, PVC wells greater than 25-feet deep should not be pulled unless site-specific conditions or other factors indicate that the well can be pulled without breaking. If the well cannot be pulled, the well should be grouted in-place as accordance with Sections 2.1 and 2.2.

If a non-telescoped overburden well penetrates a confining layer, the casing should be removed by pulling (if possible) in accordance with Section 2.3. If the casing cannot be removed by pulling, the well should be grouted in-place or where complete removal is required, removed by over-drilling. Over-drilling will be based upon the site-specific conditions and requirements. If pulling is attempted and fails (i.e., a portion of the riser breaks) the remaining portion of the well should be removed by using the conventional augering procedure identified in Section 2.4. Note that if the riser is broken during pulling, it is highly unlikely that the driller will be able to target it to over-drill it. This is the reason why all wells should be grouted first. In all cases, after the well construction materials have been removed to the extent possible, the borehole will be grouted in accordance with Section 6 and the upper five feet will be restored in accordance with Section 7.

3.3 Contaminated Overburden Monitoring Wells/Piezometers

Contamination in the overburden plays a role in the selection process. Any contamination present in the overburden must not be allowed to spread as a result of the decommissioning construction. For wells and piezometers suspected or known to be contaminated with light non-aqueous phase liquid (LNAPL) and/or dense non-aqueous phase liquid (DNAPL), often referred to as “product,” the decision to decommission the well should be reviewed. Such gross contamination is a special condition and requires design of the decommissioning procedure. If decommissioning is determined to be the proper course of action, measurement of the non-aqueous phase liquid volume will be determined and this liquid will be removed.

If an overburden well (or the overburden portion of a bedrock well) is contaminated with LNAPL, DNAPL and /or dissolved fractions as indicated by historical sampling results, one must evaluate the potential for contamination to cross an overburden confining layer (if one exists) during decommissioning. A rock or soil horizon of very low permeability is known as a confining layer. Contamination in the overburden lying above a confining layer is a significant condition to recognize. To prevent mobile contaminants from crossing a confining layer during pulling or over-drilling, a temporary casing should be installed to isolate the work zone. One should follow the procedure selection flow chart. Some contaminated conditions call for over-

drilling or a specially designed procedure.

A well in contaminated overburden may be grouted in-place as long as the grout fully seals the well and boring zone. If a well in contaminated overburden was constructed allowing formation collapse as annular backfill or if the well has a compromised well seal, one must either physically remove the well or thoroughly perforate the riser and grout it in-place.

If physical removal of the well is required and the overburden contaminants are likely to be dragged upward or downward during decommissioning, a temporary casing should be used to seal off the construction work zone. Casing pulling and overdrilling can be safely accomplished within the temporary casing. Section 2.4 discusses the temporary casing technique.

3.4 Telescoped Riser

If the riser is telescoped in one or more outer casings, the decommissioning approach depends upon the integrity of the well seal. If there is no evidence that the well seal integrity is compromised, the riser should be grouted in-place in accordance with Sections 2.1 or 2.2 and the upper 5 feet of the well surface should be restored in accordance with Section 7. If indications are that the well seal is not competent, it will be necessary to design and implement a special procedure to perforate and grout or remove the well construction materials. The presence and configuration of the outer casing(s) will be specific in the individual wells and will be a key factor in the decommissioning approach. The special procedure must mitigate the potential for cross-contamination during removal of the well construction materials.

4.0 LOCATING AND SETTING-UP ON THE WELL

Prior to mobilizing to decommission a monitoring well, one should notify the property owner and/or other interested parties including the governing regulatory agency. It is advisable that when at the well location, one should review the proposed well decommissioning procedure. Verify well locations and identification by their identifying markers and GPS coordinates. Lastly, verify the depth of each well with respect to depth recorded on the well construction log.

5.0 REMOVING THE PROTECTIVE CASING

Most monitoring wells installed in non-traffic locations are finished with an elevated, protective casing (guard pipe) and a concrete rain pad. Wells at gasoline stations, usually being in high-traffic areas, are typically finished with a flush-mount, curb box and protective 8" dia steel inspection plate rather than a stick-up riser. The curb box is usually easily removed from around the flush-mount well before pulling or over-drilling. In the case of stick-up wells, the riser pipe may be bonded to the guard pipe and rain pad. When the protective casing and concrete pad of a stick-up monitoring well are "yanked out," a PVC riser will typically break off at the bottom of the guard pipe several feet below grade. Once this happens, it may become impossible to center a drill rig upon the well. The riser may become splintered and structurally unstable for pulling. Unless grouted first, the well may fill with dirt. Before pulling a casing or over-drilling a well, a method must be devised for removing these protective surface pieces without jeopardizing the remaining decommissioning effort.

Generally, unless the protective casing is loose and can be safely lifted off by hand, *one*

should fill the monitoring well with grout before removing the outer protective casing. This will ensure that the well is properly sealed regardless of any problems later when removing the protective casing. Remove the protective casing or road box vault initially only if the stick-up or vault will interfere with subsequent down-hole work which must be done before grouting. This down-hole work may include puncturing, perforating or cutting the screen or riser. But as a general procedure don't remove the protective casing or road box until after initial grouting is complete.

The procedure for removing the protective casing of a well depends upon the decommissioning method specified for the monitoring well. The variety of protective casings available preclude developing a specific removal procedure but often one can simply break up the concrete seal surrounding the casing and jack or hoist the protective casing out of the ground. A check should be made during pulling to ensure that the inner well casing is not being hoisted with the protective casing. If this occurs, the well casing should be cut off after the base of the protective casing is lifted above the land surface. At well locations where the riser has been extended, the burial of a previous concrete pad may require the excavation of soil to the top of the concrete pad to remove the well.

Steel well casing should be removed approximately five feet below the land surface so as to be below the frost line and out of the way of any subsequent shallow digging. The upper five feet of casing and the protective casing can be removed in one operation if a casing cutter is used.

Waste handling and disposal must be consistent with the methods used for the other well materials unless an alternate disposal method can be employed (i.e., steam cleaning followed by disposal as non-hazardous waste).

6.0 SELECTING, MIXING, AND PLACING GROUT

This section gives recipes for the “standard grout mixture” and the thicker “special grout mixture.” Mixing and placing grout is also discussed in this section. The goal of well decommissioning is to eliminate the capability of water to travel up or down within the volume of the former well and its boring. Success depends upon the correct grout mixture and placement where it is needed. There are two types of grout mixes that may be used to seal monitoring wells: a standard mix and a special mix. Both mixes use Type 1 Portland cement and four percent bentonite by weight. However, the special mix uses a smaller volume of water and is used in situations where excessive loss of the standard grout mix is possible (e.g., highly-fractured bedrock or coarse gravels).

6.1 Standard Grout Mixture

For most boreholes, the following standard mixture will be used:

- One 94-pound bag Type I Portland cement;
- 3.9 pounds powdered bentonite; and
- 7.8 gallons potable water.

Slightly more water may be used in order to penetrate a sand pack when a well screen transects multiple flow zones. This mixture results in a grout with a bentonite content of four percent by weight and will be used in all cases except in boreholes where excessive use of grout is anticipated. In these cases a special thicker mixture will be used.

6.2 Special Mixture

In cases where excessive use of grout is anticipated, such as high permeability formations and highly fractured or cavernous bedrock formations, the following special mixture will be used:

- one 94-pound bag type I Portland cement;
- 3.9 pounds powdered bentonite;
- 1 pound calcium chloride; and
- 6.0-7.8 gallons potable water (depending on desired thickness).

The special mixture results in a grout with a bentonite content of four percent by dry weight. It is thicker than the standard mixture because it contains less water. This grout is expected to set faster than the Standard Grout Mixture due to the added calcium chloride. The least amount of water that can be added for the mixture to be readily pumpable is 6 gallons per 94-pound bag of cement.

6.3 Grout Mixing Procedure

To begin the grout-mixing procedure, calculate the volume of grout required to fill the borehole. If possible, the mixing basin should be large enough to hold all of the grout necessary for the borehole.

Mix grout until a smooth, homogeneous mixture is achieved. Grout can be mixed manually or with a mechanized mixer. Colloidal mixers should not be used as they tend to excessively decrease the thickness of the grout for the above recipes.

6.4 Grout Placement

This guidance requires that grout be placed in the well from the bottom to the top by means of a "tremie." A tremie is a pipe, a hose or a tube extending from the grout supply to the bottom of the well. The tremie delivers the grout all the way down through the water column without its being diluted and mixed with the water that may be present in the well. The tremie pipe or tube is withdrawn as (or after) the well is filled with grout.

Using the tremie, grout is placed in the borehole filling from the bottom to the top. Two-inch and larger wells should use tremie tubing of not less than 1-inch diameter. Smaller diameter wells will call for a smaller tremie pipe. Grout will then be pumped in until the grout appears at the land surface (when grouting open holes in bedrock, the grout level only needs to reach above the bedrock surface). Any groundwater displaced during grout placement, if known to be contaminated, will be contained for proper disposal.

At this time the rate of settling should be observed. If grouting the well in place, the well

casing remains in the hole. But if the decommissioning method has involved down-hole tools such as hollow-stem augers or temporary casing for overdrilling, these will be removed from the hole. As each section is removed, grout will be added to keep the level between 0 and 5 feet below grade. If the grout level drops below the land surface to an excessive degree, an alternate grouting method must be used. One possibility is to grout in stages; i.e., the first batch of grout is allowed to partially cure before a second batch of grout is added.

As previously described in Section 5.0, the outer protective casing "stick-up" should be removed only after a well has been properly filled with grout. This will ensure that the well is properly sealed regardless of any breakage which may occur when removing the stick-up. It is important to reiterate that when either casing pulling or over-drilling are required, due to the uncertainty of successfully pulling a well or over-boring a well, we insist that the driller tremie grout the well first. Then without allowing the grout to dry, the driller proceeds with pulling the casing or over-drilling the well.

Upon completion of grouting, ensure that the final grout level is approximately five feet below land surface. A ferrous metal marker will be embedded in the top of the grout to indicate the location of the former monitoring well. Lastly, a fabric "utility" marking should be placed one foot above the grout so an excavator can see it clearly.

7.0 BACKFILLING AND SITE RESTORATION

The uppermost five feet of the borehole at the land surface should be filled with material physically similar to the natural soils. The surface of the borehole should be restored to the condition of the area surrounding the borehole. For example, concrete or asphalt will be patched with concrete or asphalt of the same type and thickness, grassed areas will be seeded, and topsoil will be used in other areas. All solid waste materials generated during the decommissioning process must be disposed of properly.

8.0 DOCUMENTATION

A form which may be used in the field to record the decommissioning construction is included as Figure 3. Additional documentation may be required by a DEC project manager and samples are included in Appendix A. Programs within the DEC that maintain geographic data on monitoring wells strive to keep that data up to date. Owners of these data sets must be notified when a well is decommissioned. Historical groundwater quality data is linked to monitoring well locations so when a well is decommissioned, existing GIS data must be updated to reflect that fact but the coordinate location in the GIS database should not be eliminated. A metal detector may not be able to detect a deeply buried marker so if this locator is important for future utility runs or foundations, a map should be submitted to the property owner and the town engineer showing the decommissioned well locations. Global Positioning System (GPS) coordinates should be indicated on this map. Lastly, whatever documentation is produced should be provided to the property owner, the DEC, and all other parties involved.

9.0 FIELD OVERSIGHT

Over-drilling requires careful observation to detect whether the drill has wandered off the well. Grout preparation and tremie work should be carefully observed. The successful implementation of a decommissioning work plan depends upon proper direction, observation and oversight. Methods to be employed must be clearly worked through and all parties must understand what they have to do before going into the field. Flexibility is allowed where necessary but the work effort must be thorough and effective to protect our groundwater.

10.0 RELATED REFERENCES

- *Groundwater Monitoring Well Decommissioning Procedures*, October 1986. Prepared by Malcolm Pirnie, Inc., for the New York State Department of Environmental Conservation, Division of Environmental Remediation.

- American Society for Testing and Materials, A.S.T.M. D 5299-99, Standard Guide for the Decommissioning of Ground Water Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities. A.S.T.M.. Philadelphia. 2005.

- New York State Department of Environmental Conservation, Division of Solid and Hazardous Materials, 6 NYCRR Part 360, Solid Waste Management Facilities.

- New York State Department of Environmental Conservation, Region I - Water Unit, Specifications for Abandoning Wells and Boreholes in Unconsolidated Materials, undated.

- United States Environmental Protection Agency, The Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells, EPA 600/4-89/034.

FIGURES

FIGURE 1 - MONITORING WELL FIELD INSPECTION LOG

FIGURE 2 - DECOMMISSIONING PROCEDURE SELECTION

FIGURE 3 - WELL DECOMMISSIONING RECORD

APPENDICES

APPENDIX A - REPORTS

APPENDIX A1 - INSPECTOR'S DAILY REPORT

APPENDIX A2 - PROBLEM IDENTIFICATION REPORT

APPENDIX A3 - CORRECTIVE MEASURES REPORT

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FIGURE 1

MONITORING WELL FIELD INSPECTION LOG

FIGURE 1

SITE NAME:

SITE ID.: _____
INSPECTOR: _____
DATE/TIME: _____
WEll ID.: _____

MONITORING WELL FIELD INSPECTION LOG
NYSDEC WELL DECOMMISSIONING PROGRAM

	YES	NO
WELL VISIBLE? (If not, provide directions below)		
WELL I.D. VISIBLE?		
WELL LOCATION MATCH SITE MAP? (if not, sketch actual location on back).....		

WELL I.D. AS IT APPEARS ON PROTECTIVE CASING OR WELL: .....

	YES	NO
SURFACE SEAL PRESENT?		
SURFACE SEAL COMPETENT? (If cracked, heaved etc., describe below)		
PROTECTIVE CASING IN GOOD CONDITION? (If damaged, describe below)		

HEADSPACE READING (ppm) AND INSTRUMENT USED..... _____
TYPE OF PROTECTIVE CASING AND HEIGHT OF STICKUP IN FEET (If applicable) _____
PROTECTIVE CASING MATERIAL TYPE: ..... _____
MEASURE PROTECTIVE CASING INSIDE DIAMETER (Inches): ..... _____

	YES	NO
LOCK PRESENT?		
LOCK FUNCTIONAL?		
DID YOU REPLACE THE LOCK?		
IS THERE EVIDENCE THAT THE WELL IS DOUBLE CASED? (If yes,describe below)		
WELL MEASURING POINT VISIBLE?		

MEASURE WELL DEPTH FROM MEASURING POINT (Feet): ..... _____
MEASURE DEPTH TO WATER FROM MEASURING POINT (Feet): ..... _____
MEASURE WELL DIAMETER (Inches): ..... _____
WELL CASING MATERIAL: ..... _____
PHYSICAL CONDITION OF VISIBLE WELL CASING: ..... _____
ATTACH ID MARKER (if well ID is confirmed) and IDENTIFY MARKER TYPE ..... _____
PROXIMITY TO UNDERGROUND OR OVERHEAD UTILITIES..... _____

DESCRIBE ACCESS TO WELL: (Include accessibility to truck mounted rig, natural obstructions, overhead power lines, proximity to permanent structures, etc.); ADD SKETCH OF LOCATION ON BACK, IF NECESSARY.

DESCRIBE WELL SETTING (For example, located in a field, in a playground, on pavement, in a garden, etc.) AND ASSESS THE TYPE OF RESTORATION REQUIRED.

IDENTIFY ANY NEARBY POTENTIAL SOURCES OF CONTAMINATION, IF PRESENT (e.g. Gas station, salt pile, etc.):

REMARKS:

FIGURE 2

DECOMMISSIONING PROCEDURE SELECTION

NYSDEC Monitoring Well Decommissioning Procedure Selection

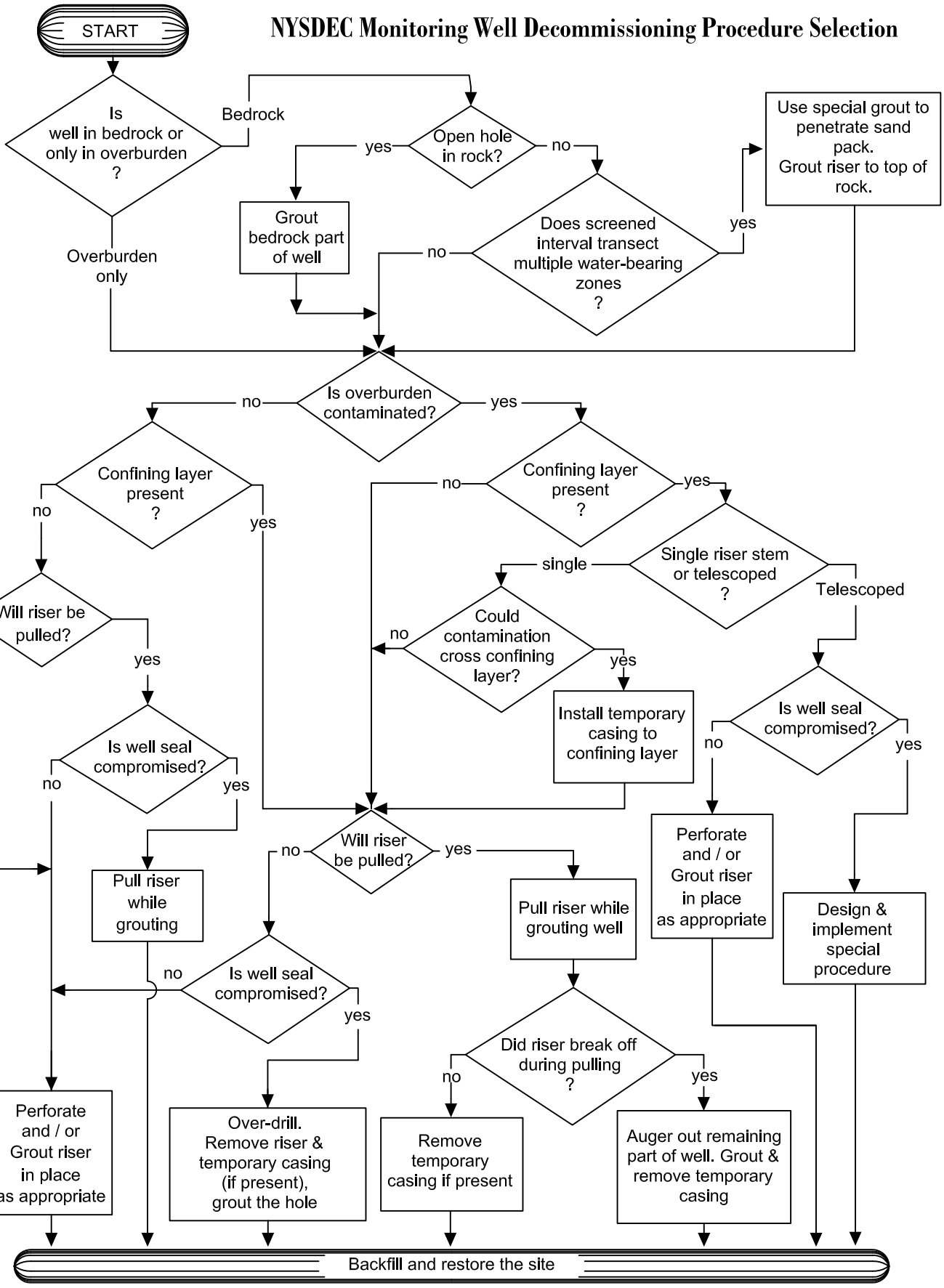


FIGURE 2

FIGURE 3

WELL DECOMMISSIONING RECORD

FIGURE 3

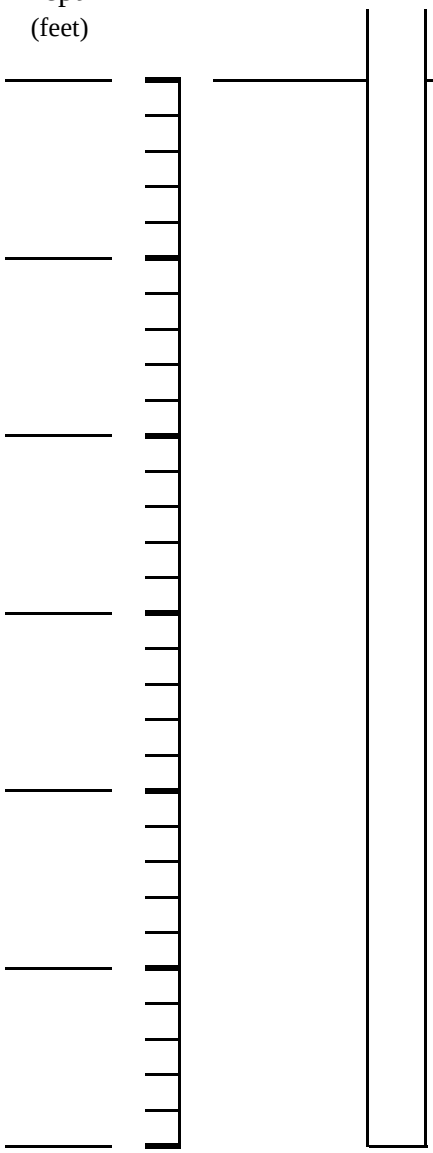
WELL DECOMMISSIONING RECORD

Site Name:	Well I.D.:
Site Location:	Driller:
Drilling Co.:	Inspector:
	Date:

DECOMMISSIONING DATA
(Fill in all that apply)

OVERDRILLING	
Interval Drilled	
Drilling Method(s)	
Borehole Dia. (in.)	
Temporary Casing Installed? (y/n)	
Depth temporary casing installed	
Casing type/dia. (in.)	
Method of installing	
CASING PULLING	
Method employed	
Casing retrieved (feet)	
Casing type/dia. (in)	
CASING PERFORATING	
Equipment used	
Number of perforations/foot	
Size of perforations	
Interval perforated	
GROUTING	
Interval grouted (FBLS)	
# of batches prepared	
For each batch record:	
Quantity of water used (gal.)	
Quantity of cement used (lbs.)	
Cement type	
Quantity of bentonite used (lbs.)	
Quantity of calcium chloride used (lbs.)	
Volume of grout prepared (gal.)	
Volume of grout used (gal.)	

WELL SCHEMATIC*



COMMENTS:

* Sketch in all relevant decommissioning data, including: interval overdrilled, interval grouted, casing left in hole, well stickup, etc.

Drilling Contractor

Department Representative

APPENDIX A - REPORTS

APPENDIX A1 - INSPECTOR'S DAILY REPORT

APPENDIX A2 - PROBLEM IDENTIFICATION REPORT

APPENDIX A3 - CORRECTIVE MEASURES REPORT

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Appendix A1

Inspector's Daily Report

CONTRACTOR:
ADDRESS:

TELEPHONE:
LOCATION _____ FROM _____ TO _____
WEATHER _____ TEMP _____ A.M. _____ P.M. _____ DATE _____

CONTRACTOR'S WORK FORCE AND EQUIPMENT											
DESCRIPTION	*H*	*#*	*DESCRIPTION*	*H*	*#*	*DESCRIPTION*	*H*	*#*	*DESCRIPTION*	*H*	*#*
Field Engineer						Equipment			Front Loader Ton		
Superintendent			Ironworker			Generators			Bulldozer		
						Welding Equip.					
Laborer Foreman			Carpenter								
Laborer									Backhoe		
Operating Engineer			Concrete Finisher								
Carpenter						Paving Equip. & Roller					
						Air compressor					

SEE REVERSE SIDE FOR SKETCH YES ☐ NO ☐ _____

WORK PERFORMED: _____

PAY ITEMS

CONTRACT		STA		DESCRIPTION	QUANTITY	REMARKS
Number	ITEM	FROM	TO			

TEST PERFORMED: _____
PICTURES TAKEN: _____

VISITORS: _____

QA PERSONNEL
SIGNATURE _____

REPORT NUMBER _____
SHEET _____ Of _____

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PROBLEM IDENTIFICATION REPORT

Date _____

Day | Su | M | T | W | Th | F | Sa |

Project _____ Job Number _____

Contractor _____

Subject _____

Sky/Precip.	Clear	Partly Cloudy	Cloudy	Rainy	Snow
TEMP.	<32F	32-40F	40-70F	70-80F	80-90F
WIND	No	Light	Strong		
HUMIDITY	Dry	Mod.	Humid		

PROBLEM DESCRIPTION Reference Daily Report Number 1: _____

PROBLEM LOCATION - REFERENCE TEST RESULTS AND LOCATION (Note: Use sketches on back of form as appropriate):

PROBABLE CAUSES: _____

SUGGESTED CORRECTIVE MEASURES: _____

APPROVALS:

QA ENGINEER: _____

PROJECT MANAGER: _____

Distribution:
1. Project Manager
2. Field Office
3. File
4. Owner

QA Personnel
Signature: _____

MEETINGS HELD AND RESULTS

REMARKS

REFERENCES TO OTHER FORMS

SKETCHES

SAMPLE LOG

SAMPLE NUMBER

APPROXIMATE LOCATION OF STOCKPILE

NUMBER OF STOCKPILE

DATE OF COLLECTION

CLIMATIC CONDITIONS

FIELD OBSERVATION

SHEETS OF

CORRECTIVE MEASURES REPORT

Date _____

Project _____ Job Number _____

Day | Su | M | T | W | Th | F | Sa |

Contractor _____

Subject _____

Sky/Precip.	Clear	Partly Cloudy	Cloudy	Rainy	Snow
TEMP.	<32F	32-40F	40-70F	70-80F	80-90F
WIND	No	Light	Strong		
HUMIDITY	Dry	Mod.	Humid		

CORRECTIVE MEASURES TAKEN (Reference Problem Identification Report No.): _____

RETESTING LOCATION: _____

SUGGESTED METHOD OF MINIMIZING RE-OCCURRENCE: _____

SUGGESTED CORRECTIVE MEASURES: _____

APPROVALS:

QA ENGINEER: _____

PROJECT MANAGER: _____

Distribution:

1. Project Manager
2. Field Office
3. File
4. Owner

QA Personnel
Signature: _____

APPENDIX I

Site-Wide Inspection Form

SITE-WIDE INSPECTION CHECKLIST

Report No.	
Date:	Time:

Site Name: DeLaval ERP Site	NYSDEC Site No. B00190-3
Address: 202-204 Rinalidi Blvd, Poughkeepsie, NY, 12601	Project No.
Inspector(s):	Weather:
	Temp.: Hi Low
Type of Inspection: ☐ Routine ☐ Post Severe Condition	Time Low Tide:

SOIL COVER SYSTEM INSPECTION

ITEM/CONDITION	TRUE	FALSE	N/A	COMMENTS
There is no evidence of erosion of cover soils/materials from Site surface.	☐	☐	☐	
There is no evidence of depressions in cover materials.	☐	☐	☐	
There is no evidence of significant cracks in cover materials.	☐	☐	☐	
There is no evidence of exposed or damaged demarcation barrier.	☐	☐	☐	
There is no evidence of vapors or odors emanating from the Site.	☐	☐	☐	

VEGETATIVE INSPECTION

ITEM/CONDITION	TRUE	FALSE	N/A	COMMENTS
Vegetation is well established over greenspace areas.	☐	☐	☐	
There is no evidence of stressed vegetation.	☐	☐	☐	
There is no evidence of bare or thin vegetative cover.	☐	☐	☐	
There is no evidence of overgrowth or areas that need to be mowed.	☐	☐	☐	
There is no evidence of recent areas of excavation or disturbed areas.	☐	☐	☐	

VECTOR INSPECTION

ITEM/CONDITION	TRUE	FALSE	N/A	COMMENTS
No vectors or vector activity (e.g. tracks, droppings, dens, etc.) were observed.	☐	☐	☐	
There was no evidence of damage to the soil cover system due to vector activity.	☐	☐	☐	

DRAINAGE SYSTEM INSPECTION

ITEM/CONDITION	TRUE	FALSE	N/A	COMMENTS
There is no evidence of erosion around drainage structures.	☐	☐	☐	
There is no evidence of settlement of drainage structures	☐	☐	☐	
Manhole covers present & in good condition.	☐	☐	☐	
There is no evidence of siltation, debris, or other restrictions in the manholes.	☐	☐	☐	
There are no exposed or damaged weep hole extension along retaining wall.	☐	☐	☐	
The backflow preventers in the 36-inch outfall manhole are present/functional.	☐	☐	☐	

SITE-WIDE INSPECTION CHECKLIST

Report No.	
Date:	Time:

BULKHEAD INSPECTION				
ITEM/CONDITION	**TRUE**	**FALSE**	**N/A**	**COMMENTS**
There is no evidence of significant movement or deflections of bulkheads.	☐	☐	☐	
There is no evidence of damage to the sheet piles through impacts from boats, ice, etc.	☐	☐	☐	
There is no evidence of leaks from interlocks.	☐	☐	☐	
There is no evidence of significant coating damage.	☐	☐	☐	
There is no evidence of significant corrosion.	☐	☐	☐	
There is no significant damage to the precast caps (e.g. cracks, spalling, etc.).	☐	☐	☐	
There is no evidence of scour, erosion, cracks, or settlement behind the bulkheads.	☐	☐	☐	
There is no evidence of a loss of toe protection stone from the front of the bulkheads (to extent visible at surface).	☐	☐	☐	
There is no visible evidence of sheen in the vicinity of the bulkheads.	☐	☐	☐	
There is no evidence of significant damage to the stormwater outfalls or associated concrete collars.	☐	☐	☐	
There is no evidence of flow restriction at the outfalls	☐	☐	☐	
There is no evidence of sheen emanating from the outfalls	☐	☐	☐	
REVETMENT INSPECTION				
ITEM/CONDITION	**TRUE**	**FALSE**	**N/A**	**COMMENTS**
There are no large voids or evidence of significant stone loss in revetment areas.	☐	☐	☐	
There is no evidence of significant settlement of the revetment sections.	☐	☐	☐	
The concrete headwalls are in-place and in good condition.	☐	☐	☐	
There is no evidence of flow restriction at the outfalls	☐	☐	☐	
There is no evidence of sheen emanating from the outfalls	☐	☐	☐	
MONITORING WELL INSPECTION				
ITEM/CONDITION	**TRUE**	**FALSE**	**N/A**	**COMMENTS**
The monitoring wells are in generally good condition.	☐	☐	☐	
Well caps are installed on the wells.	☐	☐	☐	
Locks present and secured.	☐	☐	☐	
SITE ACCESSIBILITY INSPECTION				
ITEM/CONDITION	**TRUE**	**FALSE**	**N/A**	**COMMENTS**
Site accessible and passable.	☐	☐	☐	

SITE-WIDE INSPECTION CHECKLIST

Report No.	
Date:	Time:

INSTITUTIONAL CONTROL INSPECTION

ITEM/CONDITION	TRUE	FALSE	N/A	COMMENTS
The Site continues to be utilized for commercial and passive recreational uses only.	☐	☐	☐	
There is no evidence of groundwater extraction and/or use on Site.	☐	☐	☐	

ADDITIONAL NOTES & OBSERVATIONS

Signature:	Total Inspection Time:

APPENDIX J

SSD Systems Operation & Maintenance Manuals

Note:

At the time of the preparation of this SMP, no sub-slab depressurization systems had been at the Site. As such systems are installed, the operation and maintenance manuals for each system (particularly the blower units) will be appended here.

APPENDIX K

SSD System Inspection Form

SUB-SLAB DEPRESSURIZATION SYSTEM CHECKLIST

Report No.	
Date:	Time:

Inspector(s):	Project No.
	Weather:
Type of Inspection: ☐ Routine ☐ Post Severe Condition	Temp.: Hi Low

FAN/BLOWER SYSTEM INSPECTION

ITEM/CONDITION	TRUE	FALSE	N/A	COMMENTS
The blower unit is operational,	☐	☐	☐	
There is no excessive noise emanating from the blower.	☐	☐	☐	
There is no excessive vibration emanating from the blower.	☐	☐	☐	
The blower unit is not excessively hot to the touch.	☐	☐	☐	
The blower unit housing is clean and in good condition.	☐	☐	☐	

SYSTEM PRESSURE INSPECTION

ITEM/CONDITION	TRUE	FALSE	N/A	COMMENTS
Vacuum gauge on inlet piping in good condition and shows negative pressure is being applied to sub-slab.	☐	☐	☐	
Pressure gauge on discharge piping in good condition and shows positive pressure being exhausted from blower.	☐	☐	☐	
Pressures are within acceptable normal range for system.	☐	☐	☐	Pressure Reading: ____ inches H_2O
When required, pressure field extension testing demonstrates continued sub-slab communication.	☐	☐	☐	

ELECTRICAL/ALARM INSPECTION

ITEM/CONDITION	TRUE	FALSE	N/A	COMMENTS
No observable electrical component damage.	☐	☐	☐	
All electrical disconnects/switches tested and functional.	☐	☐	☐	
Alarm sounds when blower power disconnected and pressure falls below alarm set point.	☐	☐	☐	

PIPING SYSTEM INSPECTION

ITEM/CONDITION	TRUE	FALSE	N/A	COMMENTS
All above-grade piping in good condition and free of cracks or other damage.	☐	☐	☐	
All pipe supports undamaged and functional.	☐	☐	☐	
In-line mufflers/silencers installed and functioning properly.	☐	☐	☐	
Discharge piping above roof undamaged and free of obstructions.	☐	☐	☐	
All labels present and legible	☐	☐	☐	

SUB-SLAB DEPRESSURIZATION SYSTEM CHECKLIST

Report No.	
Date:	Time:

CONCRETE SLAB/PIPING SYSTEM INSPECTION

ITEM/CONDITION	TRUE	FALSE	N/A	COMMENTS
All visible pipe penetrations appear properly sealed (e.g. not air leak noise).	☐	☐	☐	
There are no new significant, observable floor cracks or penetrations that may breach the floor tightness and effectiveness of the system.	☐	☐	☐	

ADDITIONAL NOTES & OBSERVATIONS

Signature:	Total Inspection Time:

