REMEDIAL ACTION WORK PLAN

FOR

DOWCRAFT, SOUTH DOW STREET SITE
SITE NO. 907020
65 SOUTH DOW STREET
FALCONER, CHAUTAUQUA COUNTY, NEW YORK

Prepared by:

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FEBRUARY 2020

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APPENDICES

ACRONYM LIST

ASP	Analytical Services Protocol
BGS	Below Ground Surface
BGS	Below Ground Surface
BSA	Buffalo Sewer Authority
CAMP	Community Air Monitoring Plan
COC	Contaminants of Concern
CPP	Citizen Participation Plan
CRA	Conestoga-Rovers & Associates
DER	Department of Environmental Remediation
DNAPL	Dense Non-aqueous Phase Liquid
DUSR	Data Usability and Summary Report
EDD	Electronic Data Deliverable
ELAP	Environmental Laboratory Accreditation Program
HASP	Health and Safety Plan
IRM	Interim Remedial Measures
JCC	Jamestown Container Company
MS/MSD	Matrix Spike / Matrix Spike Duplicate
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OM&M Plan	Operation, Monitoring and Maintenance Plan
PAH	Polycyclic Aromatic Hydrocarbons
PID	Photo-ionization Detector
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
ROD	Record of Decision
SCO	Soil Cleanup Objectives

SITE	65 SOUTH DOW STREET, FALCONER, NEW YORK
SSDS	SUB-SLAB DEPRESSURIZATION SYSTEM
SVOC	SEMI-VOLATILE ORGANIC COMPOUNDS
TCE	TRICHLOROETHENE
U.S. EPA	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
VOC	VOLATILE ORGANIC COMPOUNDS

1 INTRODUCTION

This Remedial Action Work Plan (RAWP) provides a description of the procedures that will be implemented to characterize the nature and extent of groundwater contamination at the 65 South Dow Street (the Site) and the proposed method to address that contamination. This RAWP has been prepared in accordance with New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation "Technical Guidance for Site Investigation and Remediation" (DER-10). To effectively characterize the environmental conditions, this RAWP discusses the following:

- Current and historic site conditions
- Contaminants of concern and the extent of the contamination
- Pre-treatment investigation activities
- Quality controls and protocols for analytical sampling
- Proposed remedial measures
- Health and safety procedures to protect site workers and the local community

From 1939 to 1999, Dowcraft manufactured steel partitions. As part of this manufacturing process, a vapor degreaser was used which included the use of chemicals such as trichloroethylene (TCE).

Previous environmental investigations have detected a TCE plume in the area of the former Dowcraft Site. TCE contamination is located within two sand/gravel layers separated by a silt/clay lens. According to previous environmental reports, the area of former degreaser pit (area of groundwater monitoring wells PW-3 and PW-3R) is a likely source area for the TCE plume. The plume originates from the degreaser area and has affected groundwater in the upper and lower sand/gravel layers. The plume extends from the degreaser area to the north, under the existing Jamestown Container Companies (JCC) building and up to the area of the Chadakoin River. This is an area of approximately one acre. Previous investigations have calculated, the rate of movement as approximately 2 to 3 feet per year to the north. Sampling in the River has not shown any impact to date.

The 2003 Record of Decision of the Site selected in-situ chemical dechlorination using potassium permanganate as the approved remedy. However, for this RAWP, C&S proposes using a combination of abiotic in-situ chemical reduction using zero valent iron and biological enhanced dechlorination to treat the groundwater over a longer timeframe than is possible with potassium permanganate and to reduce the potential for daughter products to form.

1.1 Site Description

The former Dowcraft Site is located at 65 South Dow Street in Falconer, New York and occupies approximately 2.2 acres of land situated immediately east of South Dow Street and approximately 100 feet south of the Chadakoin River. The Jamestown Container manufacturing building is situated between the Site and the Chadakoin River.

Figure 1 shows the location of the Site.

1.2 Site History

The property was first developed in 1890 as a woolen mill until 1939 when it was converted into a factory which manufactured steel partitions used for offices. As part of this manufacturing process, a vapor degreaser was used which included the use of chemicals such as trichloroethene (TCE). This work continued until 1999 when the facility was closed, a portion of the Site was demolished, and the property was sold to Jamestown Container Companies (JCC).

Figure 1 presents historic site features.

The Site was the subject of environmental investigations in the early 1990s, at which time contaminated groundwater was discovered on site. An interim remedial measure (IRM) was subsequently put in place in 1994 which consisted of groundwater extraction and treatment. In 2000, the use of additional groundwater remediation technologies was approved by the NYSDEC which involved in-situ chemical oxidation of TCE through the injection of potassium permanganate into the overburden groundwater. In 2003, a Record of Decision (ROD) was approved that selected the following remedy:

In-situ groundwater treatment through chemical oxidation, by injection of potassium permanganate dissolved in water, through existing well points into the shallow overburden groundwater table;

- Overburden groundwater monitoring to verify the effectiveness of the treatment;
- Institutional controls to prevent the use of groundwater as a source of potable water; and
- Annual certification to NYSDEC to certify that institutional controls remain in place.

Conestoga-Rovers & Associates (CRA) conducted nine injection treatments between May 2000 and July 2006, totaling 21,500 pounds of potassium permanganate. Previous injection treatments were successful in oxidizing some TCE; however, the concentrations of TCE in the source area remain high.

<u>2014 and 2015 In-situ Remedial Activities</u>

In May 2013, C&S was asked to re-evaluate the environmental conditions of the Site. On July 2013, baseline groundwater monitoring was conducted to determine the changes, if any, in TCE concentrations since 2006 (**Table 1**). Based on the findings of this work, a Corrective Measures Work Plan was submitted to the NYSDEC on May 2, 2014. C&S proposed additional in-situ chemical oxidation (ISCO) injections and the installation of a

potassium permanganate treatment fence. This work was conducted on December 1 through 9, 2014.

Ten borings were each injected with approximately 33 gallons ISCO solution containing approximately 400 pounds of ISCO material. As the solution was pumped into the subsurface, the drill rods were lifted at a rate designed to inject a consistent amount of materials between 5 and 30 feet below grade. A total of 4,024.12 pounds of potassium permanganate was injected into the TCE plume.

Within the lower sand/gravel layer, the area adjacent to PW-3R contains the highest concentrations of TCE. To address these concentrations, a treatment fence was installed to reduce source loading into downgradient groundwater zones. The treatment fence consisted of 1.5 foot long tubes of paraffin wax mixed with potassium permanganate installed in selected monitoring wells and in the subsurface. A 36-foot treatment fence was installed next to the northwest corner of the building. A total of ten borings to 40 feet below grade were drilled to facilitate the installation of the treatment fence. A potassium permanganate cylinder was dropped down the drill casing. Four feet of casing was removed allowing the bore hole to collapse and another cylinder was placed in series until a total of 5 cylinders were installed (a vertical treatment thickness of approximately 7.5 feet in each boring).

Groundwater monitoring conducted in June 2019 indicates that TCE and its daughter compounds were reduced by previous remedial actions; however, some rebounding contaminant concentrations have been encountered in some monitoring wells. Groundwater sampling suggests the effectiveness of potassium permanganate injections and cylinders may be waning.

1.3 Site Geography, Geology, and Hydrogeology

Site geology consists of fill material overlying two sand/gravel layers separated by a silt/clay lens. Fill material consists of a mixed matrix of sand, cinders, silt, gavel, brick, concrete, coal, slag and metal. The fill unit ranges in thickness from two to over 14 feet with an average thickness of eight feet.

The upper sand/gravel layer ranges from 10 to 20 feet in thickness. Underlying the upper sand/gravel layer is a silt/clay lens that ranges from four to eight feet in thickness. The lower sand/gravel layer is 10 to 18 feet thick. Underlying the lower sand layer is a second silt/clay layer that starts approximately 43 feet below ground surface (bgs). This unit is estimated to be 60 feet in thickness according to regional geology.

The average depth to groundwater is 10 feet bgs within the upper sand/gravel layer. Groundwater flow within the upper sand/gravel layer is to the north-northeast at approximately 2.7 feet per year. **Figure 2-1, 2-2 and 2-3** presents geologic cross sections of the Site. The silt/clay layer overlying the lower sand/gravel layer is acting as an aquitard for deeper groundwater and is creating a semi-confined aquifer.

2 SUMMARY OF ENVIRONMENTAL CONDITIONS

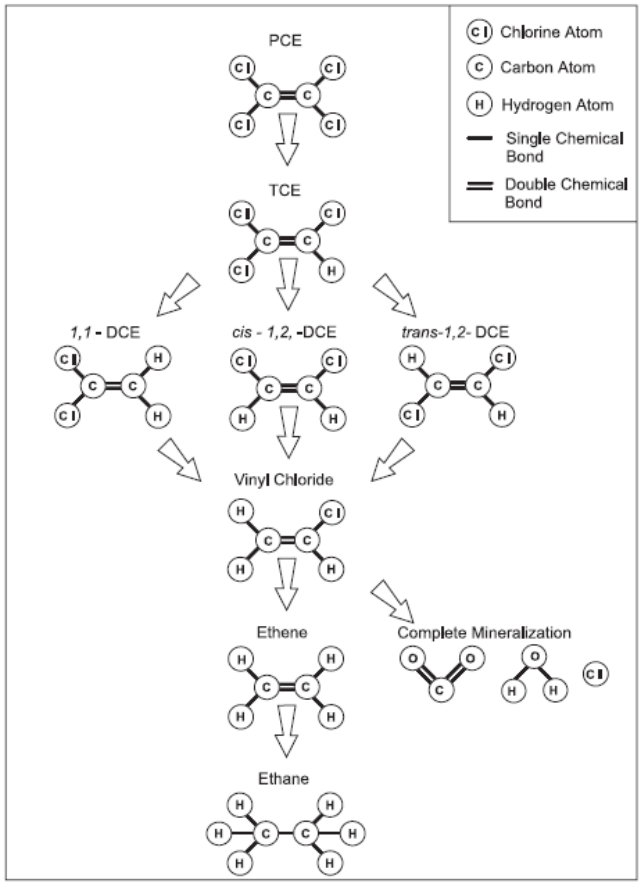
2.1 Nature and Extent of Contamination

Chlorinated solvents, primarily, trichloroethene and its daughter compounds, were identified as the contaminants of concern (COC) for this Site. TCE is a man-made volatile organic compound used for degreasing metal and electronic parts. Remedial considerations for TCE include its low solubility value and heavy molecular weight. TCE is in a class of chemicals called dense non-aqueous phase liquids (DNAPL) that sink through the water column until they encounter an impermeable barrier.

Groundwater contaminant plumes with TCE can undergo a process of reductive dechlorination, during which chlorine atoms are stripped from TCE and daughter compounds are produced. The rate of dechlorination can vary based on:

- Amount of TCE in the subsurface;
- Amount of organic material present in the subsurface; and
- Type and concentration of electron acceptors available in the system.

The process of TCE reductive dechlorination is shown below:



According to previous environmental reports, the area of former degreaser pit (area of groundwater monitoring wells PW-3 and PW-3R) is a likely source area for the COC plume. The plume originates from the degreaser area and has affected groundwater in the upper and lower sand/gravel layers. The plume extends from the degreaser area to the north, under the JCC building and up to the area of the Chadakoin River. This is an area of approximately one acre. The rate of movement is approximately 2 to 3 feet per year to the north.

Table 1 presents the 2013 baseline groundwater monitoring data. **Table 2** presents data from past post-potassium permanganate treatment groundwater monitoring events.

3 OBJECTIVES, SCOPE AND RATIONALE

The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

3.1 Record of Decision

As stated in the 2003 ROD, the remedial goals selected for this Site are:

- Treat the source area of groundwater contamination by oxidative de-chlorination of the contaminants in place;
- Prevent exposure of human receptors to contaminated groundwater in the sand and gravel unit under Site;
- Prevent or mitigate, to the maximum extent practicable, COC migration via groundwater so that releases from the underlying sand and gravel unit to the Chadakoin River do not exceed applicable standards, criteria and guidance;
- Prevent or mitigate, to the maximum extent practicable, the migration of contaminated groundwater to off-site areas;
- Restore on-Site groundwater in the sand and gravel unit to the maximum extent practicable which will not result in exceedances of applicable standards, criteria and guidance; and
- Monitor the groundwater in a manner to verify the effectiveness of the remedial actions.

3.2 Standards, Criteria, and Guidance

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The standards, criteria and guidance (SCGs) that will be, or will likely be, directly applicable to the site's remediation include those listed below. A more complete listing of SCGs can be found at:

http://www.dec.ny.gov/regulations/61794.html

- Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375 – Environmental Remediation Programs
- 6 NYCRR Part 364 - Waste Transporters
- 6 NYCRR Part 700-706 - Water Quality Regulations for Surface Waters and Groundwater
- 6 NYCRR Part 750-757 - Implementation of NPDES Program in New York State
- 6 NYCRR Part 608 - Use and Protection of Waters

- 6 NYCRR Part 663 - Freshwater Wetlands Permit Requirements
- 6 NYCRR Part 664 - Freshwater Wetlands Maps and Classifications
- 12 NYCRR Part 56 - Asbestos
- NYSDEC guidance document "DER-10 – Technical Guidance for Site Investigation and Remediation", dated May 2010, as updated by its errata sheet
- NYSDEC guidance document "CP-51: Soil Cleanup Guidance Policy", dated October 2010 (CP-51)
- NYSDEC Division of Water (DOW) Technical and Operational Guidance Series (TOGS)
- NYSDEC DOW guidance document "Technical and Operational Guidance Series (TOGS) 1.1.1 - Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations", including its errata sheets and addenda
- NYSDEC DOW guidance document "New York State Standards and Specifications for Erosion and Sediment Control", dated November 2016
- NYSDEC Division of Fish and Wildlife (DFW) guidance document "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites", dated October 1994
- NYSDEC DFW guidance document "Screening and Assessment of Contaminated Sediment", dated June 2014
- New York State Department of Health (NYSDOH) guidance document "Guidance for Evaluating Soil Vapor Intrusion in New York", dated October 2006, as updated
- Title 29 of the Code of Federal Regulation (CFR) Part 1910.120 - Hazardous Waste Operations and Emergency Response
- Title 33 of the United States Code 466 Section 404 - Clean Water Act
- 33 CFR Parts 320 -330 - Regulatory Programs of the Corps of Engineers

4 DESCRIPTION OF REMEDIAL ACTION

The following steps will be implemented to address the known contamination within the subsurface material at the Site:

- Pre-treatment investigation using a Membrane Interface Probe/Hydraulic Profile Tool (MiHPT);
- Injection of micro zero-valent iron (MZVI) with other biological amendments within the source area surrounding PW-3R; and
- Installing a downgradient permeable reactive barrier using injected MZVI.

This section of the work plan will identify the steps to be taken to remediate the Site.

4.1 Pre-Treatment Subsurface Investigation

Prior to any drilling, a qualified sub-consultant will be retained to perform a geophysical survey to identify subsurface utilities. The survey will be conducted across the Site.

The geophysical survey may include the use of an electromagnetic metal detector; ground conductivity (quad-phase); magnetic susceptibility (in-phase); and/or ground penetrating radar (GPR). The survey line spacing will be appropriate for the particular unit in use at the time.

The remedial action requires a refined understanding of horizontal and vertical extent of the contaminant plume. Targeting specific pockets of contamination within the source area and identifying the plume's current downgradient extent is critical to cost effectively treating the Site. The MiHPT is a combination probe collecting MIP and HPT information in the same push.

The MIP is an in-situ logging tool that measures the relative concentration of volatile organic compounds with depth in soil and groundwater. The MIP probe is advanced at a rate of 1 foot per minute. The MIP probe continuously logs data from several sensors including: photo ionization detector (PID); flame ionization detector (FID); halogen specific detector (XSD) and a sensor for measuring electrical conductivity.

The HPT is a logging tool that measures the pressure required to inject a flow of water into the soil as the probe is advanced into the subsurface.

A detailed discussion of the MiHPT is provided in **Appendix A.**

For this investigation, 12 to 14 borings will be advanced to a depth of 40 feet below ground surface. The borings will be placed along a transect that cuts through the approximate center of the contaminant plume. Several perpendicular offshoots will be used to further determine the extent of the contaminant plume. In addition, five confirmation soil borings will be advanced adjacent to the MiHPT borings. Soil and groundwater samples will be collected from the confirmatory borings at various depths. Sample results will be compared to the MiHPT data for quality assurance. **Figure 3** presents the proposed MiHPT boring transects.

4.2 Treatment Area

According to previous environmental reports, the area of former degreaser pit (area of groundwater monitoring wells PW-3 and PW-3R) is a likely source area for the contaminant plume. The plume originates from the degreaser area and has affected groundwater in the upper and lower sand/gravel layers. The plume extends from the degreaser area to the north, under the JCC building and up to the area of the Chadakoin River. This is an area of approximately one acre. The rate of movement is approximately 2 to 3 feet per year to the north. Sampling in the River has not shown any impact to date.

Figure 4 shows the assumed extent of the contaminant plume to date. Based on the results of the MiHPT this conceptual model of the contaminant plume may change.

4.3 Remedial Approach

The remedial method suggested by the ROD is chemical oxidation using potassium permanganate (KMnO4). Permanganate is a common oxidant and has demonstrated effectiveness in oxidizing chlorinated solvents such as TCE.

C&S recommends using a treatment approach that combines both biological enhanced reductive dechlorination (ERD) and abiotic in-situ chemical reduction (ISCR) using zero-valent iron. Zero valent iron and biological enhanced dechlorination will treat the groundwater over a longer timeframe that is possible with potassium permanganate and reduce the potential for daughter products to form.

ERD products include 3-D Microemulsion and Bio-Dechlor INOCULM Plus. 3-D Microemulsion provides a controlled release of lactic, organic and fatty acids for the steady production of hydrogen needed for anaerobic biodegradation. The self-distributing features of 3-D Microemulsion combined with its longevity (several years) allow for sufficient coverage with minimal pore volume displacement thereby minimizing application costs. The addition of Bio-Dechlor INOCULM Plus insures that the correct anaerobic microbes are applied to the treatment area.

Micro zero-valent iron (MZVI), provides conditions for abiotic reduction via the formation of iron sulfides, oxides and hydroxides, while also maintaining strong reducing conditions in the treatment area for an extended timeframe. This will foster rapid abiotic reduction of chlorinated solvents while reducing the potential for daughter product formation.

4.3.1 Source Area

A solution of 3-D Microemulsion, MZVI and water will be directly injected into the soil in 26 borings within the source area around PW-3R.

Injection points will be spaced every ten feet within a row and ten feet between each row. At this time, a 2,550 square foot area is assumed to be the extent of the source area (**Figure 5**). An injection point layout plan will be prepared after the extent of the plume is investigated further.

ERD/ISCR product and water will be mixed according to manufacturer's specifications (**Appendix B**). Source area treatment will inject the following:

- 4,400 pounds of 3-D Microemulsion
- 3,500 pounds of S-MZVI
- 44 liters of Bio-Dechlor INOCULM Plus

The treatment solution will be applied evenly in each injection point from 10 to 40 ft bgs

4.3.2 Permeable Reactive Barrier

A solution of 3-D Microemulsion, MZVI and water will be directly injected into the soil/groundwater in 33 borings adjacent to ESI-3, PW-1 and ESI-6. The barrier will be installed perpendicular to groundwater flow. The downgradient barrier will treat contaminated groundwater as it moves thought the formation toward the Chadakoin River.

Injection points will be spaced every six feet within a row and ten feet between each row. At this time, a barrier length of 100 feet is assumed (**Figure 5**). An injection point layout plan will be prepared after the extent of the plume is investigated further.

ISCR product and water will be mixed according to manufacturer's specifications (**Appendix B**). Source area treatment will inject the following:

- 4,000 pounds of 3-D Microemulsion
- 3,000 pounds of S-MZVI
- 26 liters of Bio-Dechlor INOCULM Plus

The treatment solution will be applied evenly in each injection point from 10 to 40 feet bgs.

4.3.3 Storage of ERD and ISCR Chemicals

ISCR products will be shipped directly to the Site and stored in conditions in accordance with the manufacturer's specifications. All products will be used for this treatment.

Decontamination of equipment, storage, personal protection, and other related safety concerns will be completed in accordance with vendor recommendations. Product information sheets are presented in **Appendix B**.

5 POST-TREATMENT MONITORING PLAN

Groundwater sampling conducted after the treatment will be conducted in accordance with the approved March 2018 Operation, Maintenance and Monitoring Work Plan. This section of the Work Plan includes:

- Groundwater Monitoring
- Sampling Program
- Laboratory Analysis

5.1 Groundwater Monitoring

A groundwater monitoring program has been designed to provide the data necessary to demonstrate the effectiveness of the treatment program. Groundwater monitoring will be conducted on an annual basis following the procedures in the March 2018 Operation, Maintenance and Monitoring Work Plan.

5.1.1 Monitoring Well Network

The Site contains a total of 23 monitoring wells installed in November 1990, November 1991, and April 1992. The monitoring wells below have been shown to be directly within the contaminant plume.

ESI - 1	ESI - 11
ESI - 2	ESI - 12
ESI - 3	ESI - 13R
ESI - 6	PW - 1
ESI - 7	PW - 3R
ESI - 10	

It should be noted that PW-2 has been previously sampled by other consultants; however, during groundwater monitoring conducted by C&S on July 2, 2013, PW-2 could not be developed and sampled because piping was located in the well that could not be removed. Monitoring well ESI-6 is located within six feet of PW-2 and was developed and sampled as a substitute for PW-2.

5.1.2 Groundwater Monitoring

To characterize groundwater conditions at the Site, 11 existing monitoring wells will be sampled annually. The groundwater samples will be analyzed for Target Compound List (TCL) VOCs. The locations of the monitoring wells to be sampled are shown in **Figure 6**.

Groundwater sampling will be conducted using low-flow purging and sampling techniques. Before purging the well, water levels will be measured using an electric water level sounder capable of measuring to the 0.01-foot accuracy. Peristaltic or bladder pumps using manufacturer-specified tubing will be used for purging and sampling groundwater.

Calibration, purging and sampling procedures will be performed as specified by the USEPA1 for low-flow sampling. Decontamination will be conducted after each well is sampled to reduce the likelihood of cross contamination. Calibration times, purging volumes, water levels and field measurements will be recorded in a field log.

Purge fluids will be treated with activated carbon prior to being allowed to infiltrate the ground surface of the Site.

[1] U.S. EPA Region 1 Low Stress (low-flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, January 19, 2010.

6 QUALITY ASSURANCE AND QUALITY CONTROL PROTOCOLS

To ensure that suitable and verifiable data results are obtained from the information collected at the Site, quality assurance procedures are detailed in this section.

6.1 Sampling Methods, Analytical Procedures and Documentation

6.1.1 Sampling Methods

Sampling procedures will be conducted in accordance with the NYSDEC *Sampling Guidelines and Protocols Manual*. Collection of representative samples will include the following procedures:

- Ensuring that the sample taken is representative of the material being sampled;
- Using proper sampling, handling and preservation techniques;
- Properly identifying the collected samples and documenting their collection in field records;
- Maintaining chain-of-custody; and
- Properly preserving samples after collection.

Water Sampling

Groundwater sampling will be conducted in accordance with USEPA guidance for low-flow purging and sampling, as described in **Section 5**.

Water samples will be collected in 40 ml vial and immediately placed on ice. The water will be analyzed for VOC on a standard turnaround time.

In addition to collecting VOC samples for laboratory analysis, groundwater chemistry will be continuously monitored during sample collection. Groundwater chemistry will be monitored for the following:

- pH;
- Turbidity;
- Oxidation Reduction Potential;
- Specific Conductance;
- Dissolved Oxygen; and
- Temperature

QA/QC Sampling

Duplicate samples will be collected from a minimum of 5% of the locations, and will be selected randomly. Additionally, Quality Assurance/Quality Control (QA/QC) samples will be collected, and the following describes the minimum number of groundwater QA/QC samples.

- Trip blank – 1 per shipment
- Blind Duplicate – 1 per monitoring event
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) – 1 MS / 1 MSD per monitoring event

6.1.2 Analytical Procedures

Laboratory Analysis

Laboratory analysis will be conducted by a third-party laboratory that is accredited by the NYSDOH Environmental Laboratory Accreditation Program (ELAP). Laboratory analytical methods will include the most current NYSDEC Analytical Services Protocol (ASP).

Soil and groundwater samples sent to a certified laboratory will be analyzed in accordance with EPA SW-846 methodology for the following contaminants:

- VOCs (EPA Method 8260);

Category B deliverable will be requested to be used in a third-party data validation.

Data Usability

Data Usability Summary Report (DUSR) will be performed by a third-party data consultant using the most recent methods and criteria from the U.S. EPA. The DUSR will assess all sample analytical data, blanks, duplicates and laboratory control samples and evaluate the completeness of the data package.

6.1.3 Documentation

Custody Procedures

As outlined in NYSDEC *Sampling Guidelines and Protocols,* a sample is in custody under the following conditions:

- It is in your actual possession;
- It is in your view after being in your physical possession;
- It was in your possession and then you locked or sealed it up to prevent tampering; or
- It is in a secure area.

The environmental professional will maintain all chain-of-custody documents that will be completed for all samples that will leave the Site to be tested in the laboratory.

7 HEALTH AND SAFETY

To verify the safety of the workers and the local community during the performance of the work, monitoring practices of the work environment will be in place during all phases of activities. A Health and Safety Plan (HASP) was prepared that details procedures for maintaining safe working conditions and minimizing the potential for exposure to contaminated material. The HASP is provided in **Appendix C**.

8 REPORTING

Based on the results of the work described above, one report will be prepared to describe the methodologies and results of the remedial approach. The portions of the report will describe:

- Investigative methods;
- Observations and findings;
- Inspection/monitoring observations of the remedial measures; and
- Analytical results.

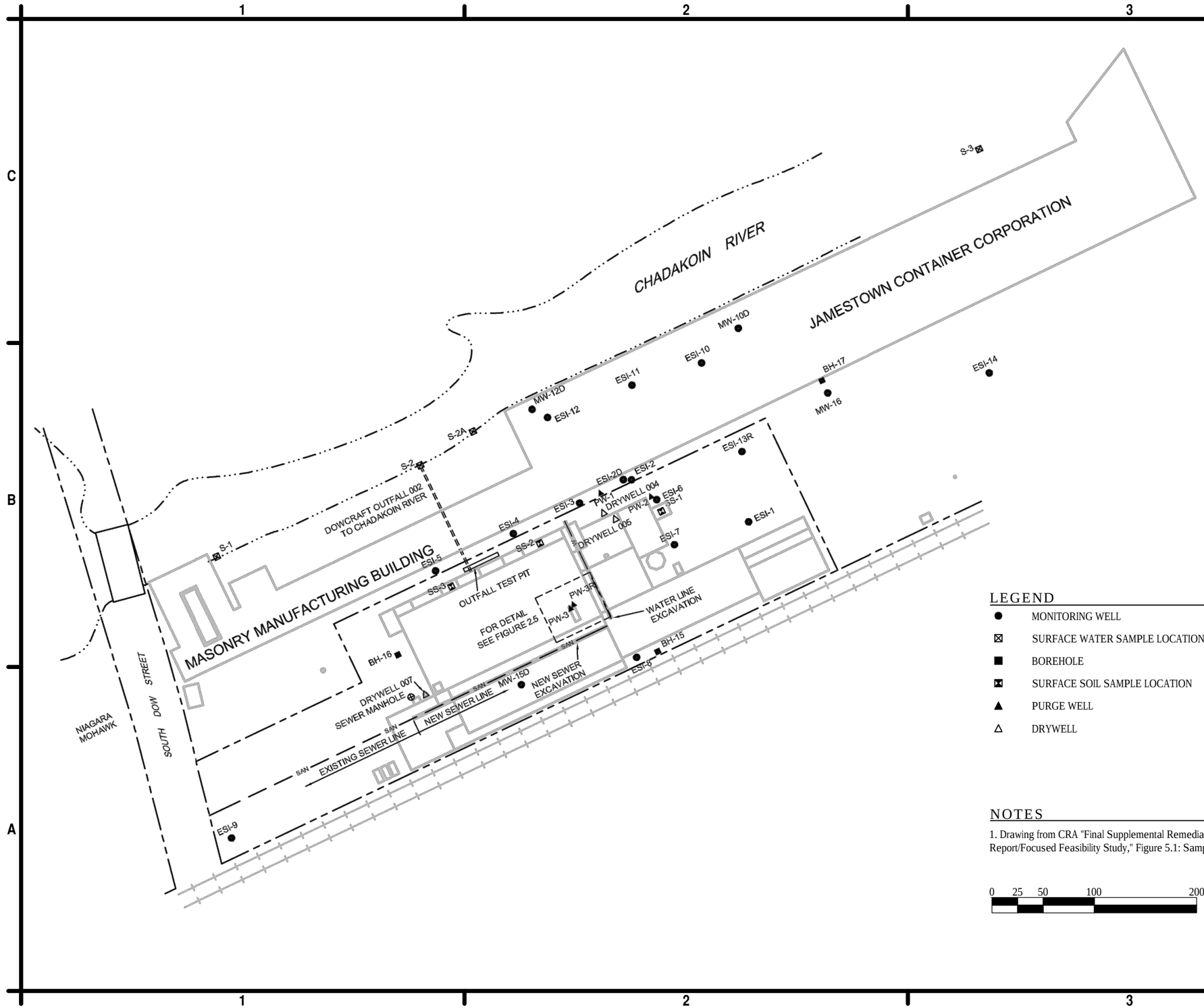
The documents will be submitted to the NYSDEC for review and approval.

9 SCHEDULE

Below is an anticipated schedule of milestones for the remediation of the Site.

Anticipated Date	Milestone
Early February 2020	Remedial Action Work Plan Submission
Early March 2020	Work Plan Approved
Late March 2020	Pre-treatment Investigation
Late April 2020	ERD/ISCR Treatment
Late July 2020	Post-treatment Groundwater Monitoring
Mid August 2020	Injection/Groundwater Monitoring Report Submission
Early September 2020	Discuss Injection/Groundwater Monitoring Report with DEC
Late November 2020	Periodic Review Report Submission
Late December 2020	Periodic Review Report Acceptance by DEC

FIGURES



LEGEND

- MONITORING WELL
- SURFACE WATER SAMPLE LOCATION
- BOREHOLE
- SURFACE SOIL SAMPLE LOCATION
- PURGE WELL
- DRYWELL

NOTES

1. Drawing from CRA "Final Supplemental Remedial Investigation Report/Focused Feasibility Study," Figure 5.1: Sample Locations, 2001.

0 25 50 100 200 FEET

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N

FORMER DOWCRAFT FACILITY
GROUNDWATER REMEDIATION
FALCONER, NEW YORK

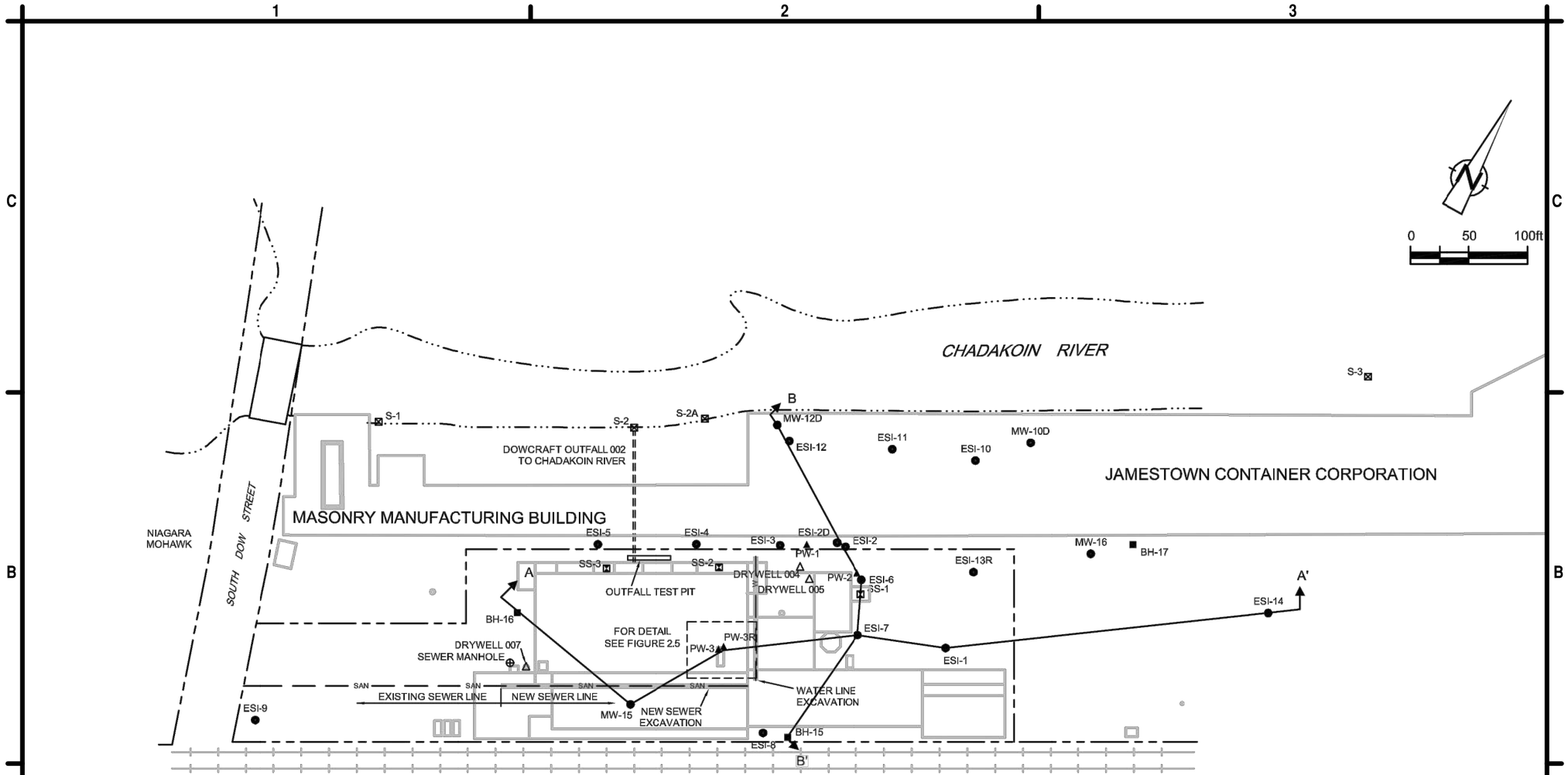
MARK	DATE	DESCRIPTION
REVISIONS		

PROJECT NO:	N30.001.001
DATE:	JUNE 6, 2016
DRAWN BY:	C. MARTIN
DESIGNED BY:	C. MARTIN
CHECKED BY:	D. RIKER

HISTORIC AND EXISTING SITE FEATURES

FIGURE 1

F:\Project\N30 - Jamestown Container\N30001001 - Jamestown Container\Environmental\CADD-GIS\Sheet Files\FIGURE 1 HISTORIC AND EXISTING SITE FEATURES.dwg



LEGEND

ESI-8 ●	MONITORING WELL
S-2 ⊠	SURFACE WATER SAMPLE LOCATION
BH-15 ■	BOREHOLE
SS-3 ⊠	SURFACE SOIL SAMPLE LOCATION
PW-3 ▲	PURGE WELL
DRYWELL 007 △	DRYWELL

NOTES

1. Drawing from CRA "Final Supplemental Remedial Investigation Report/Focused Feasibility Study," Figure 5.1: Sample Locations, 2001.

05020-00(010)GN-NF009 JUN 18/2001

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FALCONER, NEW YORK

MARK	DATE	DESCRIPTION

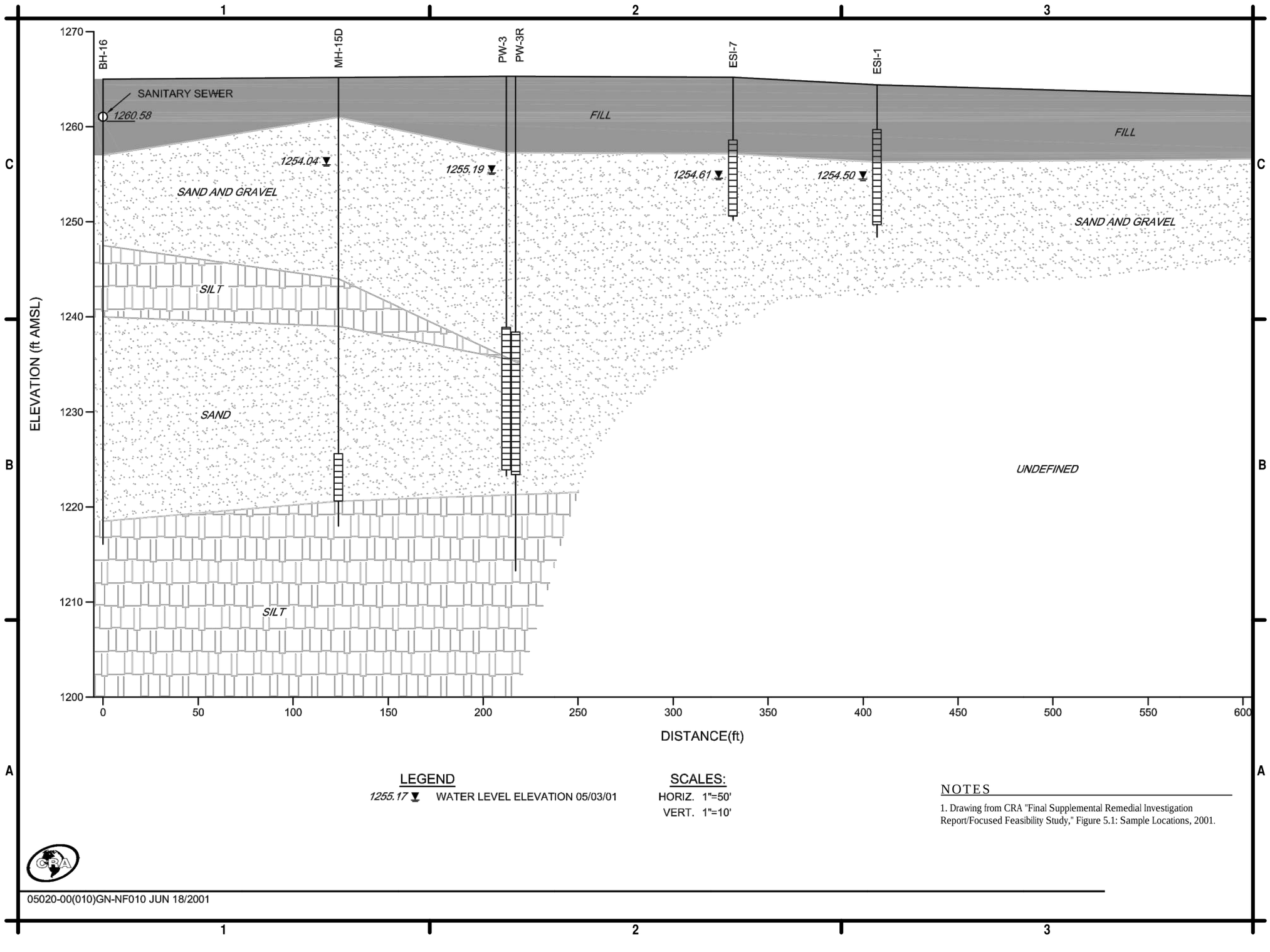
REVISIONS

PROJECT NO:	N30.001.001
DATE:	FEBRUARY 10, 2020
DRAWN BY:	C. MARTIN
DESIGNED BY:	C. MARTIN
CHECKED BY:	

GEOLOGIC CROSS SECTION KEY MAP

FIGURE 2-1

F:\Project\N30 - Jamestown Container\N30001001 - Jamestown Container\Environmental\CADD-GIS\Sheet Files\CROSS-SECTION 1.dwg



LEGEND

1255.17 ▼ WATER LEVEL ELEVATION 05/03/01

SCALES:

HORIZ. 1"=50'
VERT. 1"=10'

NOTES

1. Drawing from CRA "Final Supplemental Remedial Investigation Report/Focused Feasibility Study," Figure 5.1: Sample Locations, 2001.

05020-00(010)GN-NF010 JUN 18/2001

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FORMER DOWCRAFT FACILITY
GROUNDWATER REMEDIATION
FALCONER, NEW YORK

MARK	DATE	DESCRIPTION

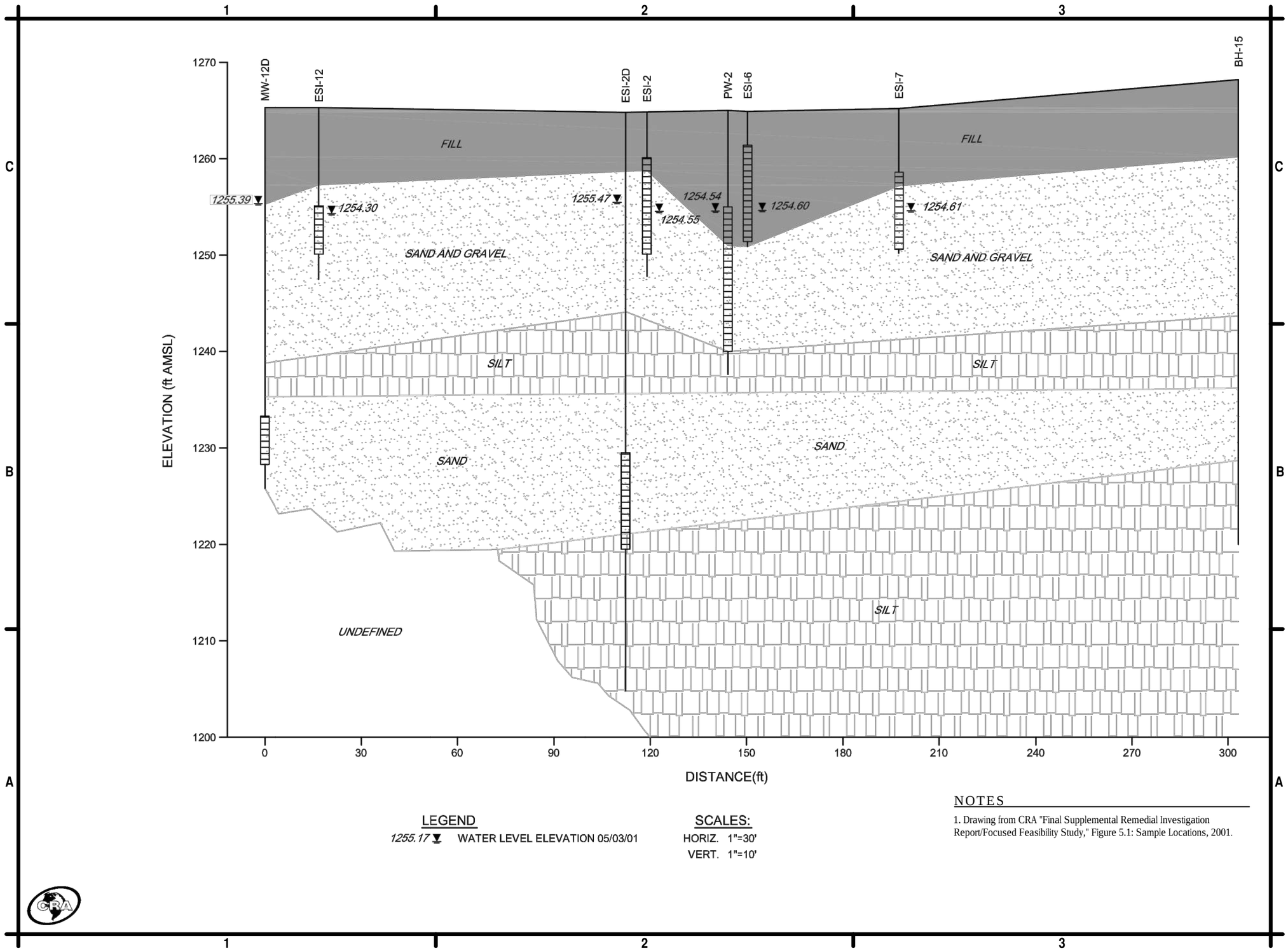
REVISIONS

PROJECT NO:	N30.001.001
DATE:	FEBRUARY 10, 2020
DRAWN BY:	C. MARTIN
DESIGNED BY:	C. MARTIN
CHECKED BY:	

GEOLOGIC CROSS SECTION A-A'

FIGURE 2-2

F:\Project\N30 - Jamestown Container\N30001001 - Jamestown Container\Environmental\CADD-GIS\Sheet Files\CROSS-SECTION 2.dwg



LEGEND

1255.17 ▼ WATER LEVEL ELEVATION 05/03/01

SCALES:

HORIZ. 1"=30'

VERT. 1"=10'

NOTES

1. Drawing from CRA "Final Supplemental Remedial Investigation Report/Focused Feasibility Study," Figure 5.1: Sample Locations, 2001.

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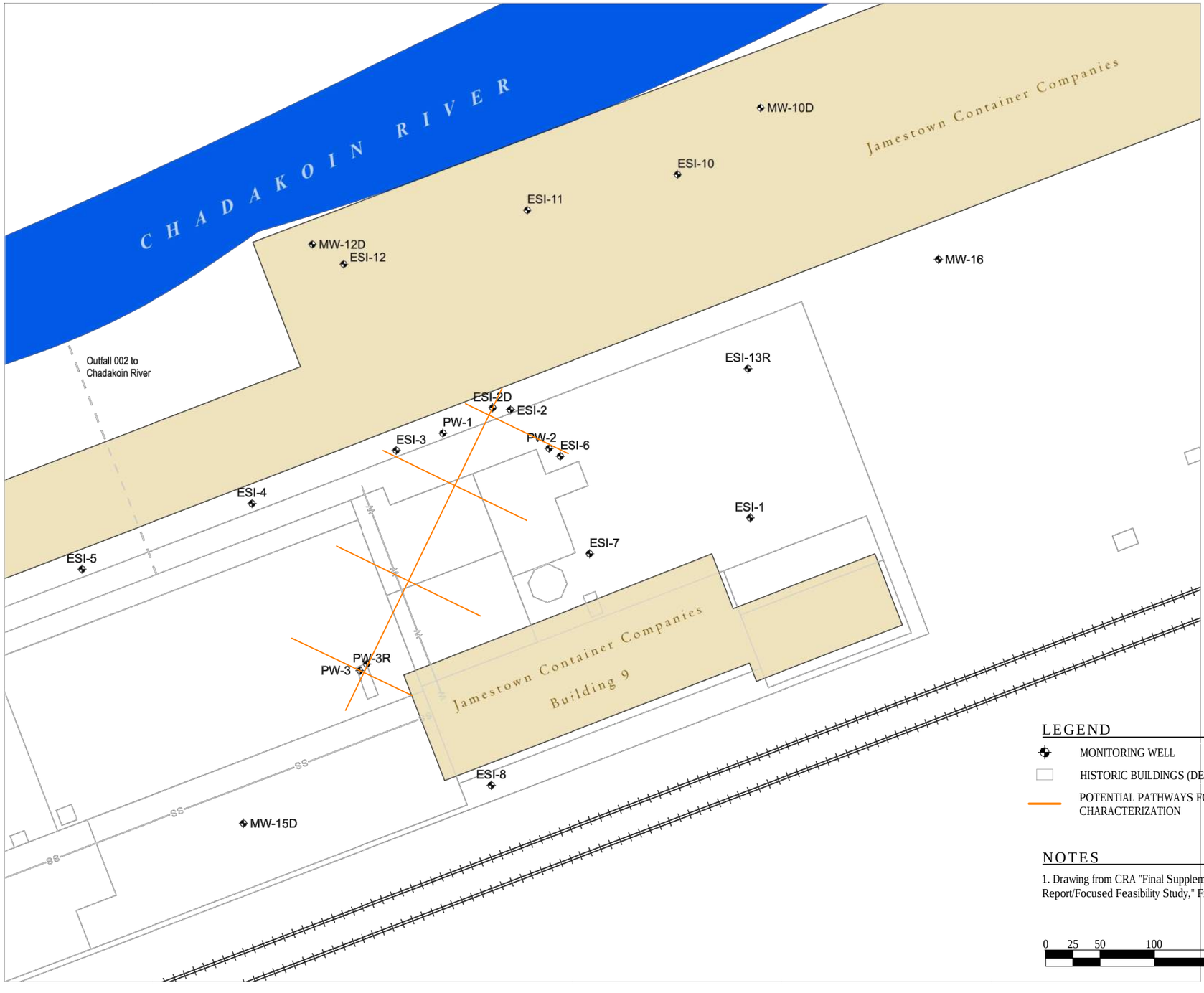
GEOLOGIC CROSS SECTION B-B'

FIGURE 2-3

F:\Project\N30 - Jamestown Container\N30001001 - Jamestown Container\Environmental\CADD-GIS\Sheet Files\CROSS-SECTION 3.dwg



LEGEND

- MONITORING WELL
- HISTORIC BUILDINGS (DEMOLISHED)
- POTENTIAL PATHWAYS FOR HIGH RESOLUTION SITE CHARACTERIZATION

NOTES

1. Drawing from CRA "Final Supplemental Remedial Investigation Report/Focused Feasibility Study," Figure 5.1: Sample Locations, 2001.

0 25 50 100 200 FEET

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GROUNDWATER REMEDIATION
FALCONER, NEW YORK

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REVISIONS

PROJECT NO:	N30.001.001
DATE:	FEBRUARY 10, 2020
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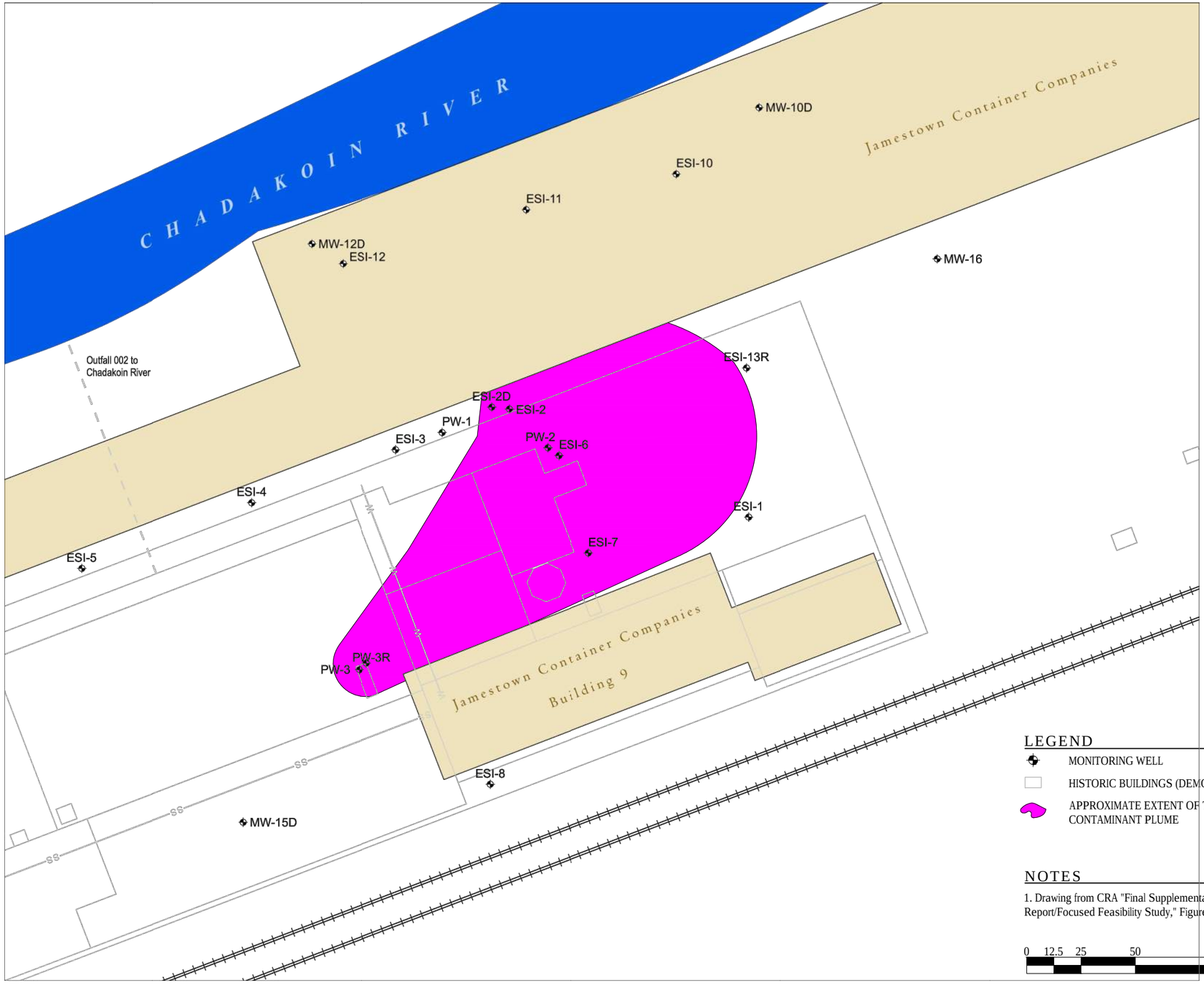
MEMBRANE INTERFACE PROBE / HYDRAULIC INTERFACE PROBE INVESTIGATION PLAN

FIGURE 3

F:\Project\N30 - Jamestown Container\N30001001 - Jamestown Container\Environmental\CADD-GIS\Sheet Files\MIP PLAN.dwg



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MARK	DATE	DESCRIPTION
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PROJECT NO:	N30.001.005
DATE:	FEBRUARY 5, 2020
DRAWN BY:	C. MARTIN
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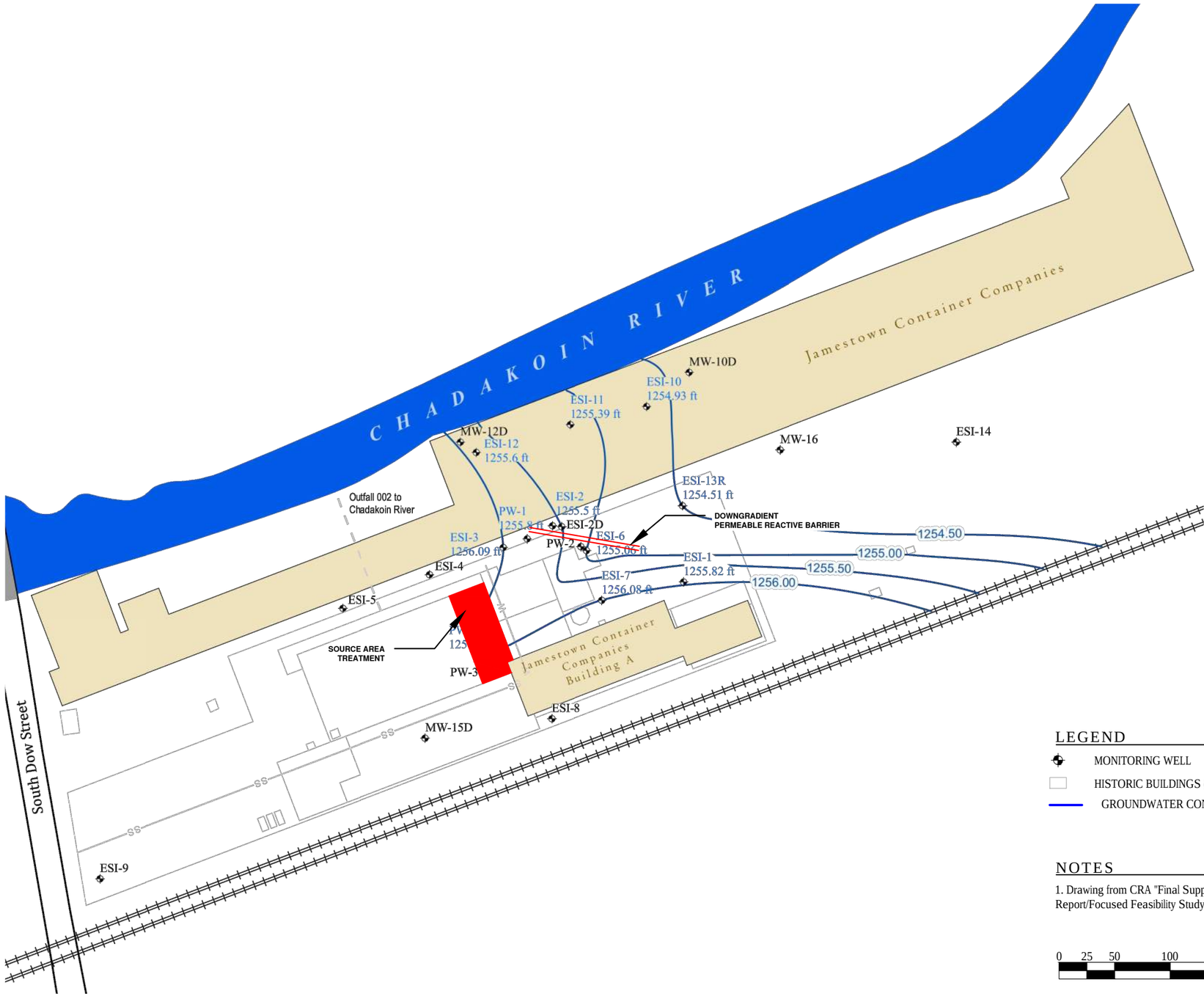
GROUNDWATER CONTAMINANT PLUME

FIGURE 4

F:\Project\N30 - Jamestown Container\N30001001 - Jamestown Container\Environmental\CADD-GIS\Sheet Files\CONTAMINANT PLUME.dwg



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MARK	DATE	DESCRIPTION
REVISIONS		

PROJECT NO:	N30.001.001
DATE:	FEBRUARY 10, 2020
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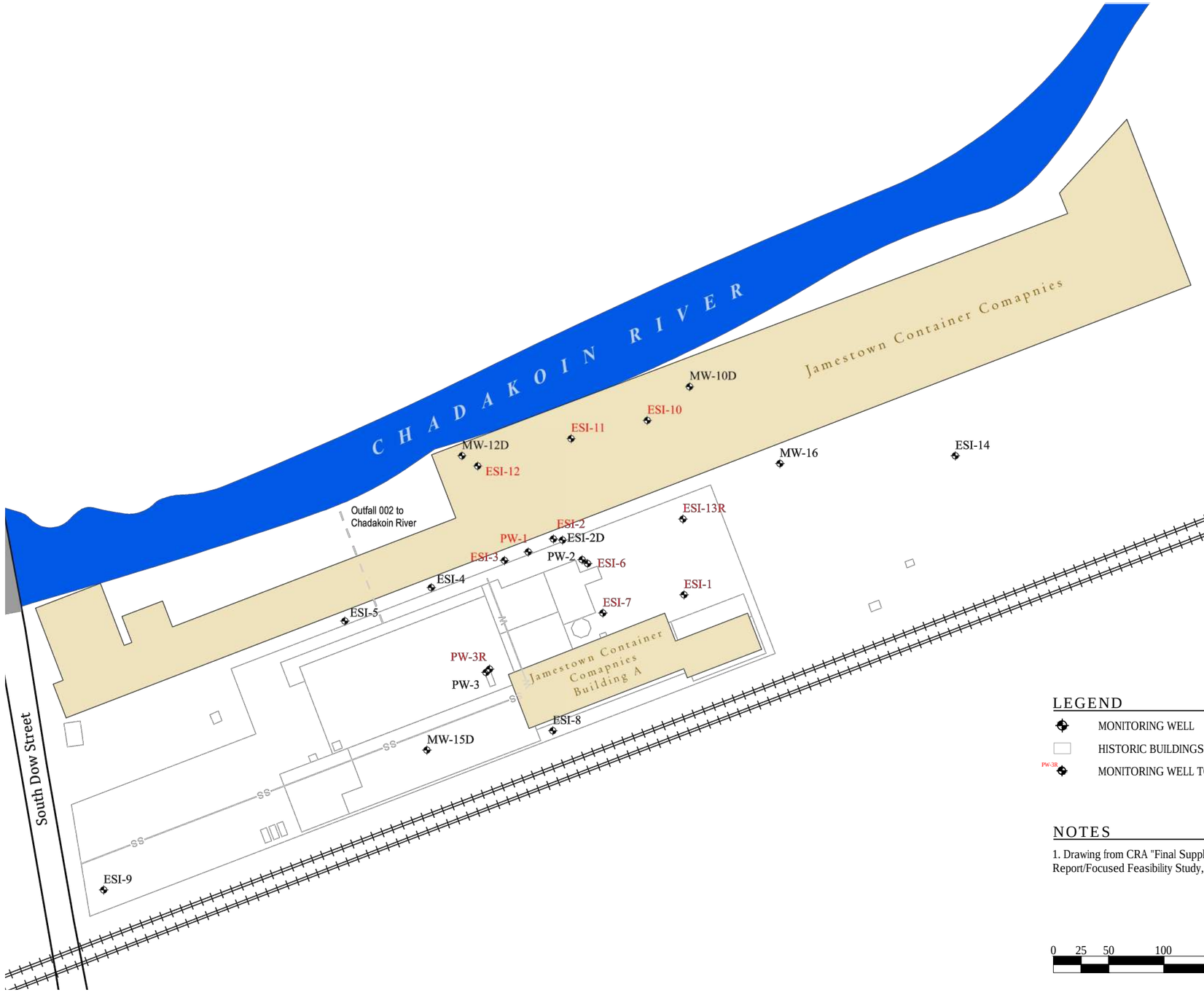
DESIGNED BY:	C. MARTIN
CHECKED BY:	

ISCR TREATMENT PLAN

FIGURE 5

F:\Project\N30 - Jamestown Container\N30001001 - Jamestown Container\Environmental\CADD-GIS\Sheet Files\ISCR Treatment Plan.dwg



LEGEND

- MONITORING WELL
- HISTORIC BUILDINGS (DEMOLISHED)
- PW-3R MONITORING WELL TO BE SAMPLED

NOTES

1. Drawing from CRA "Final Supplemental Remedial Investigation Report/Focused Feasibility Study," Figure 5.1: Sample Locations, 2001.

0 25 50 100 200 FEET

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MARK	DATE	DESCRIPTION

REVISIONS

PROJECT NO:	N30.001.001
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GROUNDWATER MONITORING

FIGURE 6

f:\Projects\n30 - jamestown container\n300001001 - jamestown container\environmental\CADD-GIS\Sheet Files\FIGURE 2 GROUNDWATER MONITORING.dwg

TABLES

TABLE 1: JULY 2013 GROUNDWATER ANALYTICAL RESULTS - VOLATILE ORGANIC CONMPOUNDS
FORMER DOWCRAFT FACILITY

Sample Location	NYSDEC Standards & Guidance Values	ESI - 1	ESI - 2	ESI - 3	ESI - 6	ESI - 7	ESI - 10	ESI - 11	ESI - 12	ESI - 13R	PW - 1	PW - 3R
Sample Date		2-Jul-13	2-Jul-13	2-Jul-13	2-Jul-13	2-Jul-13	2-Jul-13	2-Jul-13	2-Jul-13	2-Jul-13	2-Jul-13	2-Jul-13
Matrix		Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/l	ug/l	ug/l	ug/l
Contaminant												
Volatile Organic Compounds												
Acetone	50	<10.0	<10.0	<10.0		<10.0	<10.0	<10.0				13
Benzene	1	<0.70	<0.70	<0.70		<0.70	<0.70	<0.70				0.88 J
Carbon disulfide	N/S	<2.0	1.3	<2.0		<2.0	<2.0	<2.0				5.0
1,1-Dichloroethane	5	<2.0	<2.0	<2.0		<2.0	<2.0	<2.0				5.5
1,2-Dichloroethane	0.6	<2.0	<2.0	<2.0		<2.0	<2.0	<2.0				1.2
1,1-Dichloroethene	5	<2.0	2.8	<2.0	1.6	<2.0	0.34 J	<2.0				48
cis-1,2-Dichloroethene	5	1.1	1,900	<2.0	230	1.9	160	39	48	2.7	2.7	27,000 DL
trans-1,2-Dichloroethene	5	<2.0	13	<2.0	1.2	<2.0	1.6	<2.0				500 E
1,2-Dichloropropane	1	<2.0	<2.0	<2.0		<2.0	<2.0	<2.0				2.2
Ethylbenzene	5	<2.0	<2.0	<2.0		<2.0	<2.0	<2.0				0.77 J
Methylene Chloride	5	<5.0	<5.0	<5.0		<5.0	<5.0	<5.0				1.3
4-Methyl-2-pentanone	N/S	<5.0	<5.0	<5.0		<5.0	<5.0	<5.0				2.6 J
Tetrachloroethene	5	<2.0	0.55 J	<2.0	0.88 J	<2.0	<2.0	<2.0				18
1,1,2-Trichloroethane	1	<2.0	<2.0	<2.0		<2.0	<2.0	<2.0				2.8
Trichloroethene	5	8.2	98	6.3	230	21	18	4.2	92	8.9	11	97000 DL
Toluene	5	<2.0	<2.0	<2.0		<2.0	<2.0	<2.0				18
Vinyl chloride	2	<2.0	800	<2.0	73	<2.0	11	75				6300 DL
Xylene (total)	5	<2.0	<2.0	<2.0		<2.0	<2.0	<2.0				4.8
Total VOCs		**9.3**	**2815.65**	**6.3**	**536.68**	**22.9**	**190.94**	**118.2**	**140**	**11.6**	**13.7**	**130924**

Notes

1) Shaded areas indicate concentration exceeds NYSDEC T.O.G.S 1.1.1 Ambient Water Quality Standards

2) < = not detected - below Method Detection Limit.

3) J = The analyte was positively identified but, the number indicates an estimated value. Detected concentration is less than the contract required quanititation limit but is greater than zero.

4) N/S = No Standard

TABLE 2: GROUNDWATER ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS
FORMER DOWCRAFT FACILITY FALCONER, NEW YORK

Location ID	NYSDEC Groundwater Standards & Guidance Values	ESI-1		ESI-1		ESI-1		ESI-1		ESI-1		ESI-1		ESI-1		ESI-1		ESI-1 (DUP)		ESI-2		ESI-2		ESI-2		ESI-2		ESI-2		ESI-2		ESI-2		ESI-2	
Sample Matrix		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG	
Date Sampled		12/02/2014		04/21/2015		11/03/2015		04/25/2016		10/20/2016		06/07/2017		05/07/2018		06/26/2019		06/26/2019		12/02/2014		04/22/2015		11/03/2015		04/25/2016		10/21/2016		06/08/2017		05/08/2018	ug/l	06/26/2019	ug/l
Units		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l					
1,1,1-Trichloroethane	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U	--	U
1,1-Dichloroethane	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U	--	U
1,1-Dichloroethene	5.0 ug/l	--	U	--	U,*	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U,*	**12**		--	U	--	U			--	U	**3.7**	**J**
1,2-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	WELL CAP DAMAGED. SAMPLE NOT COLLCETED.		--	U	--	U
1,2-Dichloroethane	0.6 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U	--	U
1,3-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U	--	U
1,4-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U	--	U
Bromoform	50.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U	--	U
Dibromochloromethane	50.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U	--	U
Acetone	50.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	**2.2**	**J**	**3.2**	**J**	--	U	--	U	--	U	--	U	--	U			--	U	--	U
Benzene	1.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U	--	U
Carbon Tetrachloride	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U,*	--	U	--	U	--	U	--	U			--	U	--	U
Chlorobenzene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U	--	U
Chloroform	7.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U	--	U
Cis-1,2-Dichloroethylene	5.0 ug/l	--	U	**4.4**		--	U	--	U	--	U	--	U	--	U	**0.73**	**J**	**0.83**	**J**	**E**		**740**		**4400**	**E**	**5290**		**592**				**480**		**1400**	
Ethylbenzene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U	--	U
Methylene Chloride	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	**7.9**	**J**	--	U	--	U	--	U			--	U	--	U
Tetrachloroethylene (PCE)	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	**J**		--	U	--	U	--	U	--	U			--	U	--	U
Toluene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U	--	U
Trans-1,2-Dichloroethene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U	**19**		--	U	--	U			**27**		**18**	**J**
Trichloroethylene (TCE)	5.0 ug/l	**8.9**		**15**		**12**		**4.89**		**6.52**		**3.68**		**4.4**		**10**		**10**		**E**		**110**		**1100**	**E**	**1260**		**303**				**450**		**690**	
Vinyl Chloride	2.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	**E**		**130**		**320**		**289**		--	U			--	U	**120**	
Xylenes	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U			--	U	--	U
TOTAL VOCs		8.9		19.4		12		4.89		6.52		3.68		4.4		12.39		12.39				988		6151		6,839		895		--		957		2,228.00	

TABLE 2: GROUNDWATER ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS
FORMER DOWCRAFT FACILITY FALCONER, NEW YORK

Location ID	Sample Matrix	Date Sampled	Units	NYSDEC Groundwater Standards & Guidance Values	ESI-3 WG		ESI-3 WG		ESI-3 WG		ESI-3 WG		ESI-3 WG		ESI-3 WG		ESI-3 WG		ESI-6 WG		ESI-6 WG		ESI-6 WG		ESI-6 WG		ESI-6 WG		ESI-6 WG		ESI-6 WG		ESI-6 WG	
					10/21/2014		04/22/2015		11/02/2015		04/25/2016		10/20/2016		06/07/2017		05/08/2018		06/26/2019		10/29/2014		04/22/2015		11/02/2015	ug/l	04/25/2016		10/21/2016		06/08/2017		05/08/2018		06/26/2019	
					ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l	
1,1,1-Trichloroethane				5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,1-Dichloroethane				5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,1-Dichloroethene				5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	**1.6**		U	--	U	**3.9**		--	U	--	U	--	U	--	U	--	U
1,2-Dichlorobenzene				3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,2-Dichloroethane				0.6 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,3-Dichlorobenzene				3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,4-Dichlorobenzene				3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Bromoform				50.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	**1.2**	**J**
Dibromochloromethane				50.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Acetone				50.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	**3.4**	**J**	--	U	--	U	--	U	--	U	--	U	**2.4**	**J**	**7.7**			
Benzene				1.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Carbon Tetrachloride				5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U,*	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Chlorobenzene				5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Chloroform				7.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Cis-1,2-Dichloroethylene				5.0 ug/l	--	U	--	U	--	U	--	U	**1.4**	**J**	--	U	--	U	--	U	**210**	**E**	**1100**		**1000**	**E**	**322**		**626**		**181**		**5.3**		**80**	
Ethylbenzene				5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Methylene Chloride				5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	**10**	**J**	--	U	--	U	--	U	--	U	--	U	--	U
Tetrachloroethylene (PCE)				5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	**1.1**		--	U	**5.8**		--	U	--	U	--	U	**1.4**		**1.6**	
Toluene				5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Trans-1,2-Dichloroethene				5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	**2.2**		--	U	**4**		--	U	**11.1**	**J**	--	U	--	U	**1.2**	**J**
Trichloroethylene (TCE)				5.0 ug/l	**4.8**		**2.5**		**4.8**		**1.06**	**J**	**6.99**		--	U	**0.3**		**0.8**		**200**	**E**	**810**		**1500**	**E**	**924**		**1060**		**431**		**40**		**200**	**E**
Vinyl Chloride				2.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	**160**	**E**	**100**	*,^	**68**		**21.7**		--	U	--	U	--	U	--	U	--	U
Xylenes				5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
TOTAL VOCs					4.8		2.5		4.8		1.06		8.39		--		0.3		4.2		575.22		2,020		3,281.70		1,267.70		1,697.10		612		49.1		204	

TABLE 2: GROUNDWATER ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS
FORMER DOWCRAFT FACILITY FALCONER, NEW YORK

Location ID		ESI-7		ESI-7		ESI-7		ESI-7		ESI-7		ESI-7		ESI-7		*ESI-4*		ESI-10		ESI-10		ESI-10		ESI-10		ESI-10		ESI-10		ESI-10		ESI-10	
Sample Matrix		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG	
Date Sampled		10/21/2014		04/21/2015		11/02/2015		04/25/2016		10/20/2016		06/08/2017		05/07/2018		06/26/2019 ug/l * Well ESI-7 was paved over, Well		10/29/2014		04/21/2015		11/03/2015		04/26/2016		10/20/2016		06/07/2017		05/07/2018		06/25/2019	
Units		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l				ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		
NYSDEC Groundwater Standards & Guidance Values																															
1,1,1-Trichloroethane	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,1-Dichloroethane	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,1-Dichloroethene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		**0.61**	**J**	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,2-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,2-Dichloroethane	0.6 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,3-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,4-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Bromoform	50.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	**3.01**		--	U	--	U
Dibromochloromethane	50.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Acetone	50.0 ug/l	--	U	--	U	--	U	--	U	**6.89**	**J**	**10.1**		--	U	--		--	U	**8.5**	**J**	**5.9**	**J**	**7.16**	**J**	**7.11**	**J**	--	U	--	U	**9.6**	
Benzene	1.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Carbon Tetrachloride	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Chlorobenzene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Chloroform	7.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Cis-1,2-Dichloroethylene	5.0 ug/l	**78**		**25**		**12**		**8.3**		**25**		**5.15**		**30**		--		**240**	**E**	--	U	--	U	--	U	--	U	--	U	--	U	**61**	
Ethylbenzene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Methylene Chloride	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Tetrachloroethylene (PCE)	5.0 ug/l	**0.39**	**J**	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	**0.22**	**J**
Toluene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Trans-1,2-Dichloroethene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		**2.5**		--	U	--	U	--	U	--	U	--	U	--	U	**0.8**	**J**
Trichloroethylene (TCE)	5.0 ug/l	**150**	**E**	**78**		**57**		**43**		**106**		**21**		**52**		--		**62**		--	U	--	U	--	U	--	U	--	U	**0.94**		**84**	
Vinyl Chloride	2.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		**37**		--		--	U	--	U	--	U	--	U	--	U	--	U
Xylenes	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
TOTAL VOCs		208.39		103		69		51.2		137.36		36.35		82		--		352.11		8.5		5.9		7.16		7.11		3.01		0.94		155.62	

TABLE 2: GROUNDWATER ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS
FORMER DOWCRAFT FACILITY FALCONER, NEW YORK

	Location ID	ESI-11		ESI-11		ESI-11		ESI-11		ESI-11		ESI-11		ESI-11		ESI-11		ESI-12		ESI-12		ESI-12		ESI-12		ESI-12		ESI-12		ESI-12		ESI-12	
	Sample Matrix	WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG	
	Date Sampled	10/29/2014		04/21/2015		11/03/2015		04/26/2016		10/20/2016		06/07/2017		05/07/2018		06/25/2019		10/22/2014		04/21/2015		11/03/2015		04/26/2016		10/21/2016		06/07/2017		05/08/2018		06/25/2019	
	Units	ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l	
NYSDEC Groundwater Standards & Guidance Values																																	
1,1,1-Trichloroethane	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,1-Dichloroethane	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,1-Dichloroethene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,2-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,2-Dichloroethane	0.6 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,3-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,4-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Bromoform	50.0 ug/l	--	U	--	U	--	U	--	U	--	U	**4.78**		--	U	**2.4**		--	U	--	U	--	U	--	U	--	U	**14.5**		--	U	**2.8**	
Dibromochloromethane	50.0 ug/l	--	U	--	U	--	U	--	U	--	U	**1.09**		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Acetone	50.0 ug/l	--	U	**3.9**	**J**	**7**	**J**	**32.4**		--	U	--	U	**2.6**	**J**	**24**		--	U	--	U	**5.6**	**J**	**5.85**	**J**	**6.19**	**J**	--	U	**3**	**J**	**19**	
Benzene	1.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Carbon Tetrachloride	5.0 ug/l	--	U,*	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Chlorobenzene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Chloroform	7.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Cis-1,2-Dichloroethylene	5.0 ug/l	**76**		--	U	--	U	--	U	--	U	--	U	--	U	--	U	**71**		**1.2**		--	U	--	U	--	U	--	U	--	U	--	U
Ethylbenzene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	UM	--	UM	--	U
Methylene Chloride	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Tetrachloroethylene (PCE)	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	**0.48**	**J**	**0.54**	**J**	--	U	--	U	--	U	--	U	--	U	--	U
Toluene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	UM	--	UM	--	U
Trans-1,2-Dichloroethene	5.0 ug/l	**2**	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	UM	--	UM	--	U
Trichloroethylene (TCE)	5.0 ug/l	**55**		--	U	--	U	--	U	--	U	--	U	--	U	--	U	**140**	**E**	**10**		--	U	--	U	--	U	--	UM	--	UM	--	U
Vinyl Chloride	2.0 ug/l	**24**		--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	UM	--	UM	--	U
Xylenes	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
TOTAL VOCs		157		3.9		7		32.4		--		5.87		2.6		26.4		221.48		11.74		5.6		5.85		6.19		14.5		3		21.8	

TABLE 2: GROUNDWATER ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS
FORMER DOWCRAFT FACILITY FALCONER, NEW YORK

	Location ID	ESI-13R		ESI-13R		ESI-13R		ESI-13R		ESI-13R		ESI-13R		ESI-13R		ESI-13R		PW-1		PW-1		PW-1		PW-1		PW-1		PW-1		PW-1		PW-1	
	Sample Matrix	WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG		WG	
	Date Sampled	10/21/2014		04/21/2015		11/02/2015		04/25/2016		10/20/2016		06/07/2017		05/08/2018		06/26/2019		10/21/2014		04/21/2015		11/02/2015		04/25/2016		10/20/2016		06/08/2017		05/08/2018		06/26/2019	
	Units	ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l	
NYSDEC Groundwater Standards & Guidance Values																																	
1,1,1-Trichloroethane	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,1-Dichloroethane	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,1-Dichloroethene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,2-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,2-Dichloroethane	0.6 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,3-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,4-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Bromoform	50.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Dibromochloromethane	50.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Acetone	50.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	**2.4**	**J**	--	U	--	U	--	U	--	U	--	U	**8.09**	J	--	U	**2.8**	**J**
Benzene	1.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Carbon Tetrachloride	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Chlorobenzene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Chloroform	7.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Cis-1,2-Dichloroethylene	5.0 ug/l	**18**		**18**		**8.3**		**7.51**		**9.41**		--	U	**1.3**		**1**	**J**	**1.9**		**8.8**		**2.4**		**5.03**		**7.14**		**3.88**		--	U	--	U
Ethylbenzene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Methylene Chloride	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Tetrachloroethylene (PCE)	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Toluene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Trans-1,2-Dichloroethene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Trichloroethylene (TCE)	5.0 ug/l	**22**		**46**		**19**		**21**		**13**		**7.4**		**7.3**		**18**		**15**		**3.3**		**11**		**6.96**		**22.1**		**8.39**		**0.84**		**1.8**	
Vinyl Chloride	2.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Xylenes	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
TOTAL VOCs		40		64		27.3		28.51		28.28		7.37		8.6		21.4		16.9		12.1		13.4		11.99		29.24		20.36		0.84		4.6	

TABLE 2: GROUNDWATER ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS
FORMER DOWCRAFT FACILITY FALCONER, NEW YORK

	Location ID	PW-3R		PW-3R		PW-3R		PW-3R		PW-3R		PW-3R		PW-3R		PW-3R	
	Sample Matrix	WG		WG		WG		WG		WG		WG		WG		WG	
	Date Sampled	10/29/2014		04/22/2015		11/03/2015		04/26/2016		10/21/2016		06/08/2017		05/08/2018		06/26/2019	
	Units	ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l	
NYSDEC Groundwater Standards & Guidance Values																	
1,1,1-Trichloroethane	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,1-Dichloroethane	5.0 ug/l	5.1		4.0		--	U	--	U	--	U	--	U	--	U	--	U
1,1-Dichloroethene	5.0 ug/l	--	U	--	U,*	--	U	--	U	--	U	--	U	--	U	--	U
1,2-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,2-Dichloroethane	0.6 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,3-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
1,4-Dichlorobenzene	3.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Bromoform	50.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Dibromochloromethane	50.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Acetone	50.0 ug/l	12		16		--	U	11.3	J	12.3	J	--	U	9		19	J
Benzene	1.0 ug/l	0.61	J	0.53	J	--	U	--	U	--	U	--	U	--	U	--	U
Carbon Tetrachloride	5.0 ug/l	--	U,*	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Chlorobenzene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Chloroform	7.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Cis-1,2-Dichloroethylene	5.0 ug/l	21		1.6		140		242		1450		1,990		70		1200	
Ethylbenzene	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Methylene Chloride	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Tetrachloroethylene (PCE)	5.0 ug/l	--	U	--	U	--	U	--	U	--	U	--	U	--	U	--	U
Toluene	5.0 ug/l	8.1		6.9		8.0	J	4.90		--	U	--	U	4.6		7.3	J
Trans-1,2-Dichloroethene	5.0 ug/l	39		--	U	--	U	--	U	--	U	10.2		2.2		20	J
Trichloroethylene (TCE)	5.0 ug/l	0.79	J	--	U	--	U	17.2		84.4		229		--	U	--	U
Vinyl Chloride	2.0 ug/l	1800	E	120	E	790	^,F1	134		751		861		110		2200	E
Xylenes	5.0 ug/l	2.3	U	1.1	J	--	U	--	U	--	U	--	U	1.1	J	--	U
TOTAL VOCs		2,609.30		147.71		938		409.4		2285.4		3,090.20		199		3,446.30	

TABLE NOTES

WG - Groundwater

ug/l - micrograms per liter

S.U. - Standard Unit

Qualifier Key

J - Result is less than the Reporting Limit but greater than or equal to the Method Detection Limit and the concentration is an approximate value.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

I - The lower value for the two columns has been reported due to obvious interference.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

A - Spectra identified as "Aldol Condensation Product".

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

H- The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

F - Denotes a parameter for which Paradigm does not carry cerification, the results for which should therefore only be used where ELAP certification is required, such as personal exposure assessment.

RE - Analytical results are from sample re-extraction.

R - Analytical results are from sample re-analysis.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

U - Not detected at the reported detection limit for the sample.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

S - Analytical results are from modified screening analysis.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field

* - Indicates any recoveries outside associated acceptance windows. Surrogate ouliers in samples are presumed matrix effects. LCS demonstrates method compliance unless otherwise noted.

< - Analyzed for but not detected at or above the quantitation limit

1 - Indicates data from primary column used for QC calculation.

TABLE NOTES

WG - Groundwater
ug/l - micrograms per liter
S.U. - Standard Unit

Qualifier Key
J - Result is less than the Reporting Limit but greater than or equal to the Method Detection Limit and the concentration is an approximate value.
NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

I - The lower value for the two columns has been reported due to obvious interference.
G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.
A - Spectra identified as "Aldol Condensation Product".
E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
H- The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
F - Denotes a parameter for which Paradigm does not carry cerification, the results for which should therefore only be used where ELAP certification is required, such as personal exposure assessment.
RE - Analytical results are from sample re-extraction.
R - Analytical results are from sample re-analysis.
D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
P - The RPD between the results for the two columns exceeds the method-specified criteria.
U - Not detected at the reported detection limit for the sample.
M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
S - Analytical results are from modified screening analysis.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
* - Indicates any recoveries outside associated acceptance windows. Surrogate ouliers in samples are presumed matrix effects. LCS demonstrates method compliance unless otherwise noted.
< - Analyzed for but not detected at or above the quantitation limit
1 - Indicates data from primary column used for QC calculation.

APPENDICES

APPENDIX A

MIHPT INFORMATION

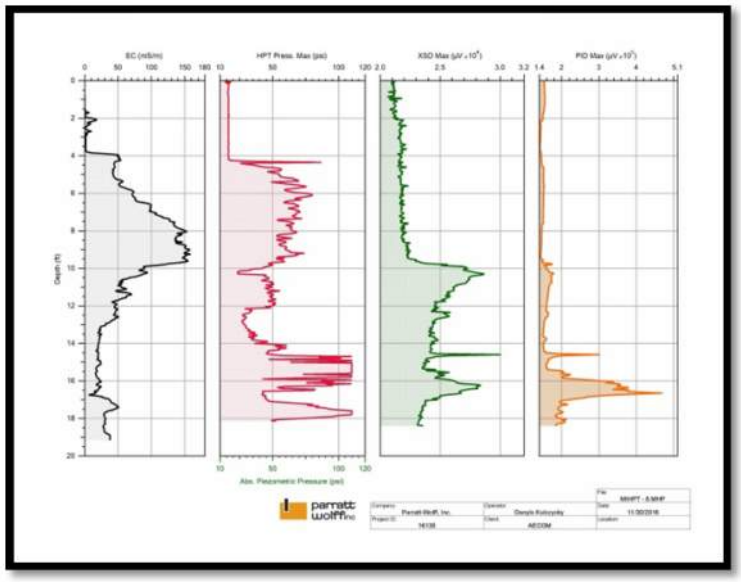
Technical Proposal

MiHpt/LL MiHpt Logging & Confirmation DPT Soil & GW Sampling

Jamestown Container Corporation

Falconer, NY

Parratt-Wolff, Inc. Proposal No. P19827



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Attachments:

A. **DIRECT IMAGE & DIRECT PUSH TOOLING**

B. **QUALIFICATIONS & PROJECT TEAM**

C. **LICENSE AND CERTIFICATION**

D. **EQUIPMENT SPECIFICATIONS**

ATTACHMENT A: DIRECT SENSING & DIRECT PUSH TOOLING

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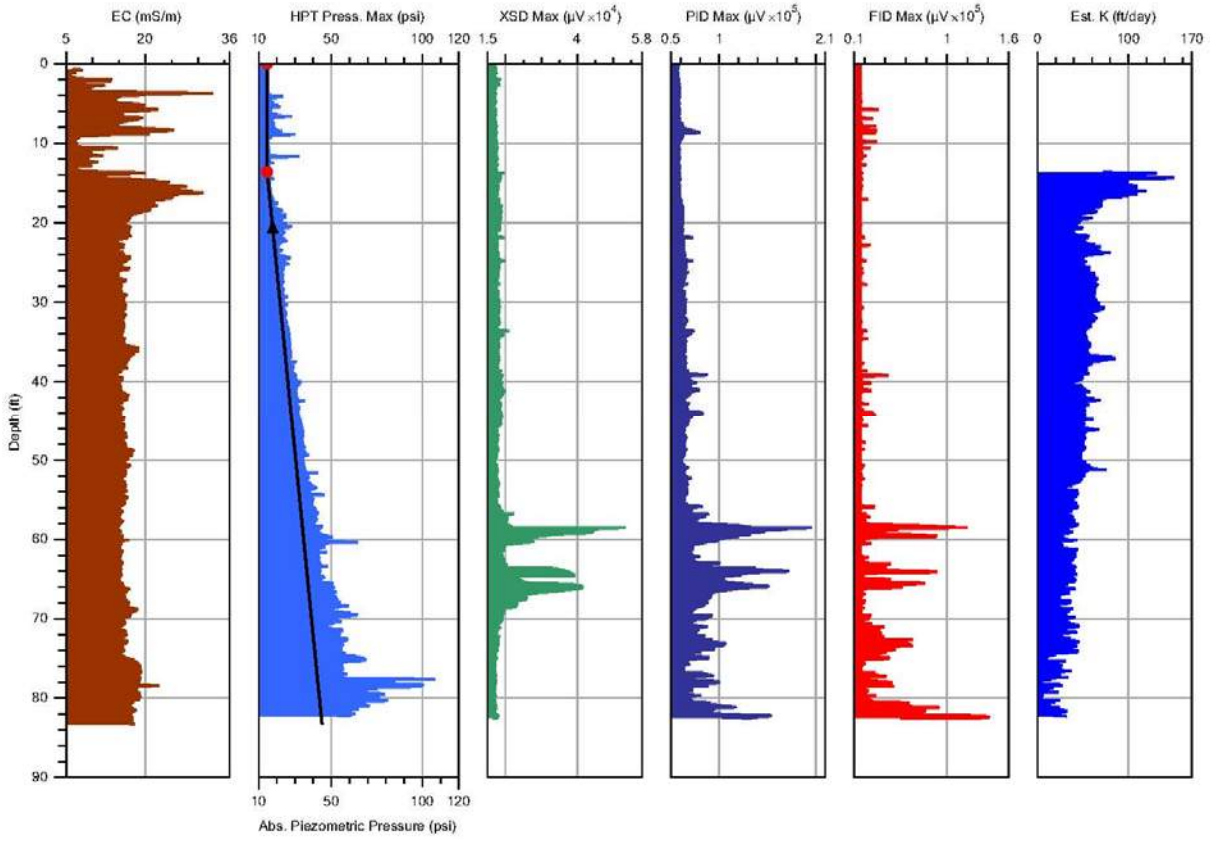
MiHpt and Low Level MiHpt System Description

Membrane Interface Probe/Hydraulic Profile Tool (MiHPT)

The MiHPT is a combination probe collecting MIP and HPT information in the same push. Obtaining an understanding of soil conductance (EC) and permeability (HPT) along with the contaminant information (MIP) provides further insight into migration pathways. The MiHPT is advanced at a rate of 1 ft/min and stopped at each dissipation test interval.



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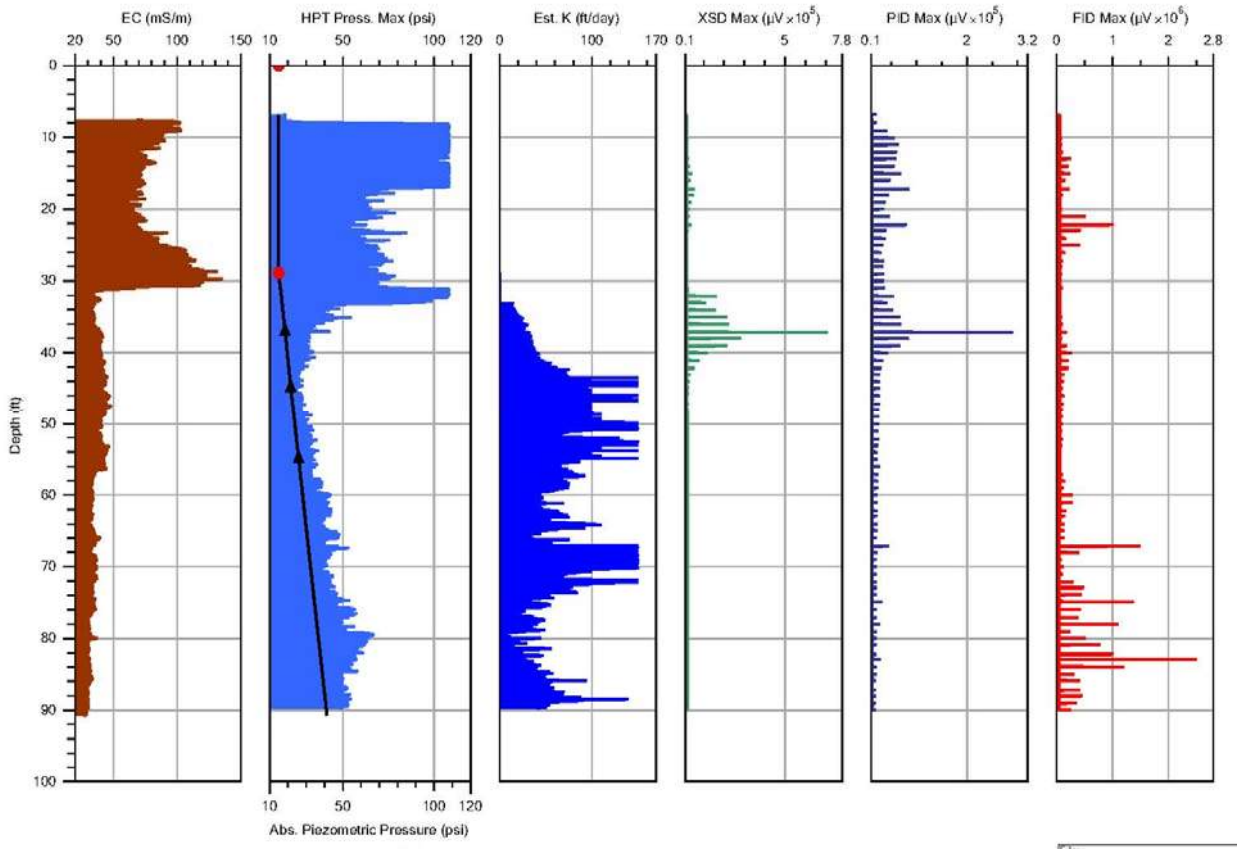
Low Level MIP or MiHPT (LL MIP/MIHPT)

The LL MIP pulse flow controller provides a tenfold increase in detection response when compared with traditional MIP logging. The LL MIP methods allows for the possibility to delineate VOC plumes to well below 100 ppb. Although the standard MIP is still required in areas of ample signal the LL MIP improves detector response and allows for logging beyond the practical limits of traditional MIP. The LL MIP utilizes a pulse flow controller to shut off carrier flow to the trunkline and MIP membrane. With the carrier flow shut off VOC's continue to accumulate behind the MIP membrane through a concentration gradient. During sample collection (no flow time) the carrier gas baseline is maintained to the GC and detectors through a secondary nitrogen flow. When trunkline carrier gas flow is resumed the contaminant mass (peak) built up behind the MIP membrane during no flow time is transported to the GC and detectors providing a peak detector response. Due to the method of sample collection the probe advancement rate is reduced.



Membrane Interface Probe (MIP)

The MIP is an in-situ logging tool that measures the relative concentration of volatile organic compounds (VOCs) with depth in soil and groundwater. The MIP probe is advanced at a rate of 1 ft/min (1ft/15sec with a 45sec residence time at each 1ft interval). The MIP probe consists of several system components. The MIP membrane is a semipermeable membrane mounted on a heated block attached to the probe. As the probe is advanced VOC's are emitted from soil and groundwater and diffused across the MIP membrane through a concentration gradient between the contaminated soil and the clean nitrogen carrier gas. Heating the probe accelerates the diffusion process and as the probe is advanced in soil a thermocouple maintains the heated block at approximately 120°C. A constant nitrogen carrier gas flow is swept behind the heated membrane at a rate of 35-45 mL/m collecting samples diffused across the MIP membrane and returning them to the surface gas chromatograph (GC) detectors for analysis.

The SRI MODEL 310 GC is equipped with a Photo Ionization Detector (PID), Flame Ionization Detector (FID), and an OI Analytical Model 5360 Halogen Specific Detector (XSD). The MIP trunkline return gas is sent through the non-destructive PID and then split between the FID and XSD detectors. Compounds at sufficient concentrations of approximately 1 ppm or higher will produce a significant electrical signal for compound analysis when using the conventional MIP system. **Note: Lower compound concentrations will produce significant electrical signal while logging with the Low Level MIP system..

The PID responds to compounds whose ionization potential is below 10.6 eV, including aromatics and molecules with carbon double bonds. The FID responds to any molecule with a carbon-hydrogen bond. All compounds will be detected by the FID in high enough mass however the FID is preferred for general hydrocarbon detection, giving an indication of total hydrocarbons present. The XSD is a halogen specific detector with a high detector sensitivity to low levels of halogen-containing (CL, Br, F) compounds. **Note: The XSD has replaced the previously used ECD on new MIP GC's due to a larger linear range, more uniform response to halogens and the lack of a radioactive element.

Electrical Conductivity (EC)

Electrical Conductivity is a measure of the soils ability to conduct an electrical current as a low level electrical current is passed through soils between an electrically isolated dipole array on the MIP probe. The EC dipole of the MIP probe is oriented below the MIP membrane. Conductivity is measured in millisiemens per meter (mS/m). In general, a high conductivity reading indicates a finer grain size typical of silts and clays while a low conductivity reading indicates a coarser grain size typical of sands and gravels. Heterogeneous soils such as till can provide a wide range of EC readings making it crucial for the operator to reference the HPT pressures for soil stratigraphic analysis. EC can provide false positives when soil and groundwater are impacted by ionic plumes or metal objects in the subsurface.

Hydraulic Profile Tool (HPT)

The HPT is a logging tool that measures the pressure required to inject a flow of water into the soil as the probe is advanced into the subsurface. The injection pressure is an excellent indicator of formation permeability. Additionally hydrostatic pressure can be measured during dissipation testing where flow to the probe is shut off from the pump and back pressures are allowed to dissipate fully into the formation. Dissipation testing allows the development of an absolute piezometric pressure profile for the log along with a prediction of the water table. Static water level in combination with HPT pressures are used to calculate estimated hydraulic conductivity with depth. The HPT probe is advanced at a rate of 2cm/sec or approximately 4 ft/min stopping for each dissipation test interval.

MiHpt Quality Assurance/Quality Control Testing

Quality assurance testing of each of the sensors on the probe and GC is conducted before and after each log to validate the equipment is capable of generating good data. The MIP tool is tested using a chemical response test to ensure the system is providing ample signal to known chemical concentrations. For Low Level MiHpt logging response testing is conducted using the Low Level Pulse flow controller. The EC sensor is tested using the EC dipole test with low and high readings typical of EC values of the soil. The HPT sensor is tested using the HPT reference test which confirms the sensors ability to accurately measure a 6" column of water and provides an accurate measurement of atmospheric pressure.

MIP Chemical Response Test

Chemical response testing is a quality assurance measure that takes place before and after each log proving the integrity of the detector system is intact. Response testing is conducted by inverting a 40 mL vial of a working standard solution over the heated MIP membrane for 45 seconds to match the residence time at each 1 foot interval of probe advancement. The detector response is recorded on a time scale along with the contaminant trip time. Trip time is input into the computer system to accurately log response with depth. The electrical response is compared to baseline noise and should be able to provide at least a 5:1 baseline to noise ratio. The compound used as a working standard for chemical response testing should be similar in nature to the site contaminant of concern in concentrations similar to known site contaminant concentrations.

EC Dipole Test

The EC dipole test is a conductivity test performed prior to and following each log to ensure proper system response. The EC dipole of the MiHpt probe is tested using an EC test jig with a low (brass) side and high (stainless steel) side. Target conductivity readings for brass and stainless steel are 55 mS/m and 290 mS/m respectively. In order for the probe to pass EC dipole testing the actual brass and stainless steel conductivity measurement must be ± 10% of target conductivity.

HPT Reference Test

HPT reference testing is done to ensure that the HPT pressure sensor is in working order and to evaluate the condition of the HPT injection screen. The HPT reference test calculates atmospheric pressure which is required to obtain static water level readings and determine estimated K values post log.

To conduct HPT reference testing the HPT probe end is inserted into the HPT reference tube and pressures are recorded with a 6-inch drop in water level with and without HPT flow. Ideally, the pressure difference between the top and bottom values will be 0.22 psi. The system will pass the HPT reference test if the actual pressure change is 0.22 psi ± 10% with no flow.

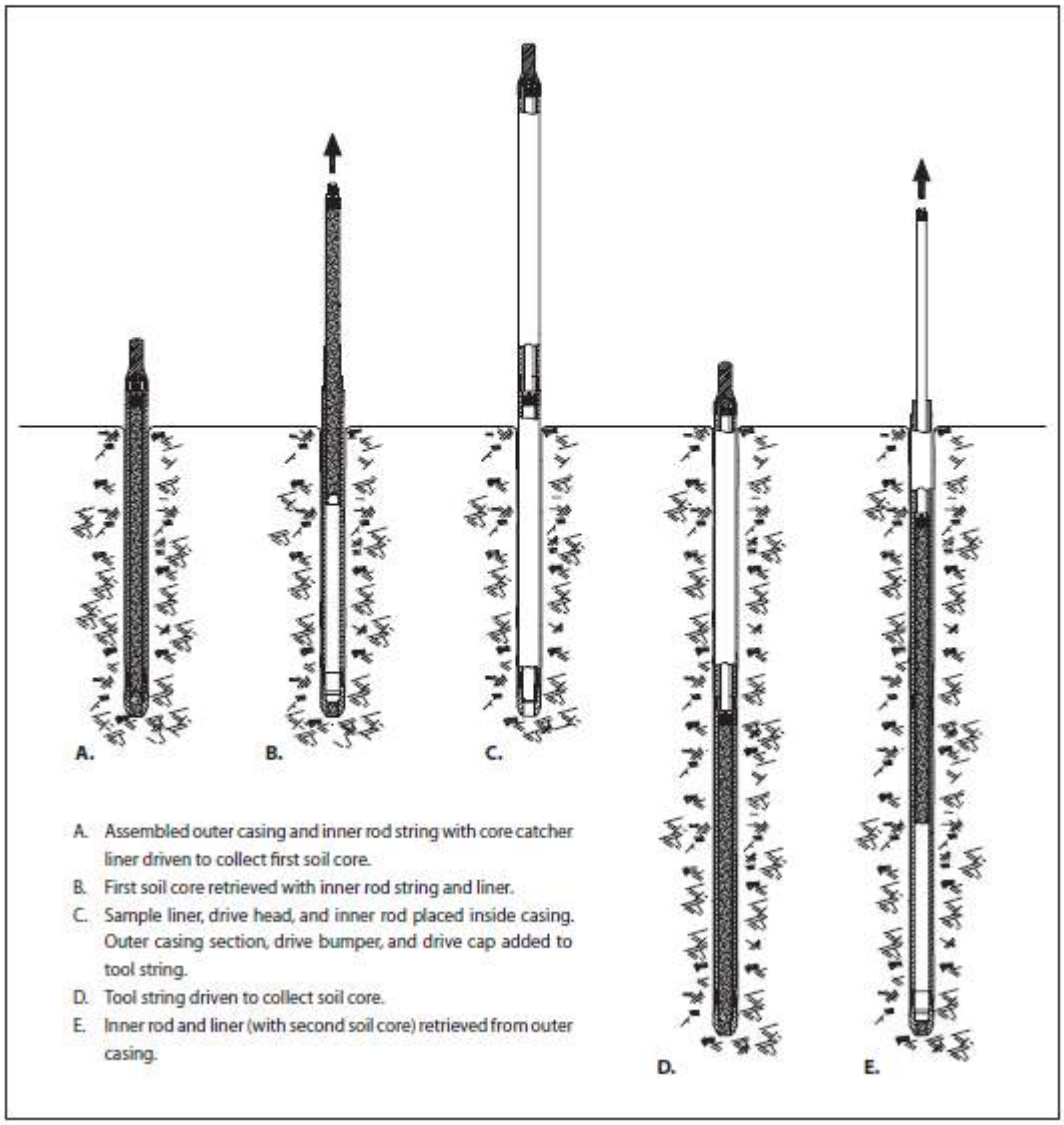
GEOPROBE® DT22 DUAL TUBE SOIL SAMPLING SYSTEM

CONTINUOUS CORE SOIL SAMPLER

STANDARD OPERATING PROCEDURE

Technical Bulletin No. MK3140

PREPARED: November, 2006
REVISED: January, 2011



A. Assembled outer casing and inner rod string with core catcher liner driven to collect first soil core.
B. First soil core retrieved with inner rod string and liner.
C. Sample liner, drive head, and inner rod placed inside casing. Outer casing section, drive bumper, and drive cap added to tool string.
D. Tool string driven to collect soil core.
E. Inner rod and liner (with second soil core) retrieved from outer casing.

OPERATION OF THE DUAL TUBE 22 SOIL SAMPLING SYSTEM

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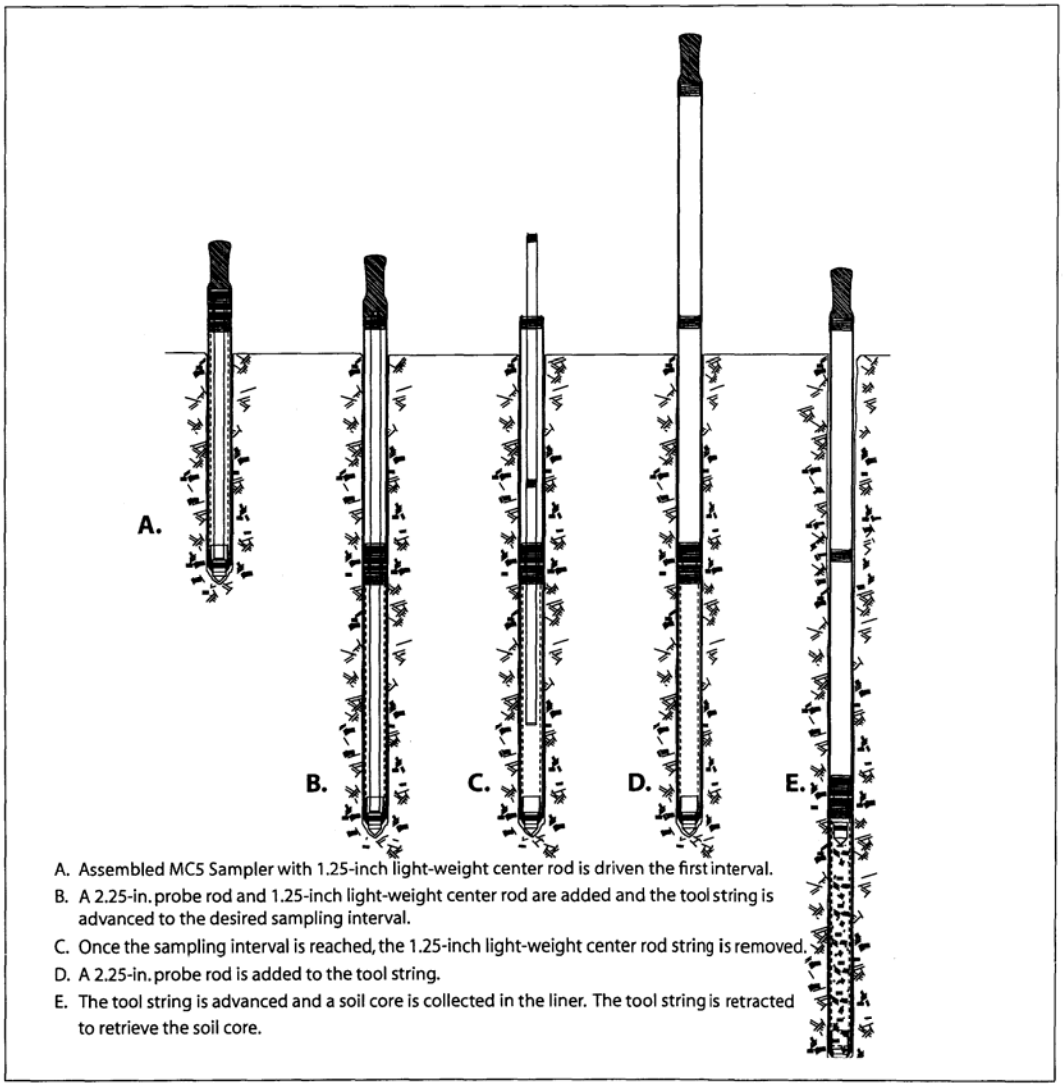
GEOPROBE® MACRO-CORE® MC5
1.25-INCH LIGHT-WEIGHT CENTER ROD SOIL SAMPLING SYSTEM

STANDARD OPERATING PROCEDURE

Technical Bulletin No. MK3139

PREPARED: January, 2011



A. Assembled MC5 Sampler with 1.25-inch light-weight center rod is driven the first interval.
B. A 2.25-in. probe rod and 1.25-inch light-weight center rod are added and the tool string is advanced to the desired sampling interval.
C. Once the sampling interval is reached, the 1.25-inch light-weight center rod string is removed.
D. A 2.25-in. probe rod is added to the tool string.
E. The tool string is advanced and a soil core is collected in the liner. The tool string is retracted to retrieve the soil core.

OPERATION OF THE MACRO-CORE® MC5 SOIL SAMPLING SYSTEM

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ATTACHMENT B: QUALIFICATIONS & PROJECT TEAM

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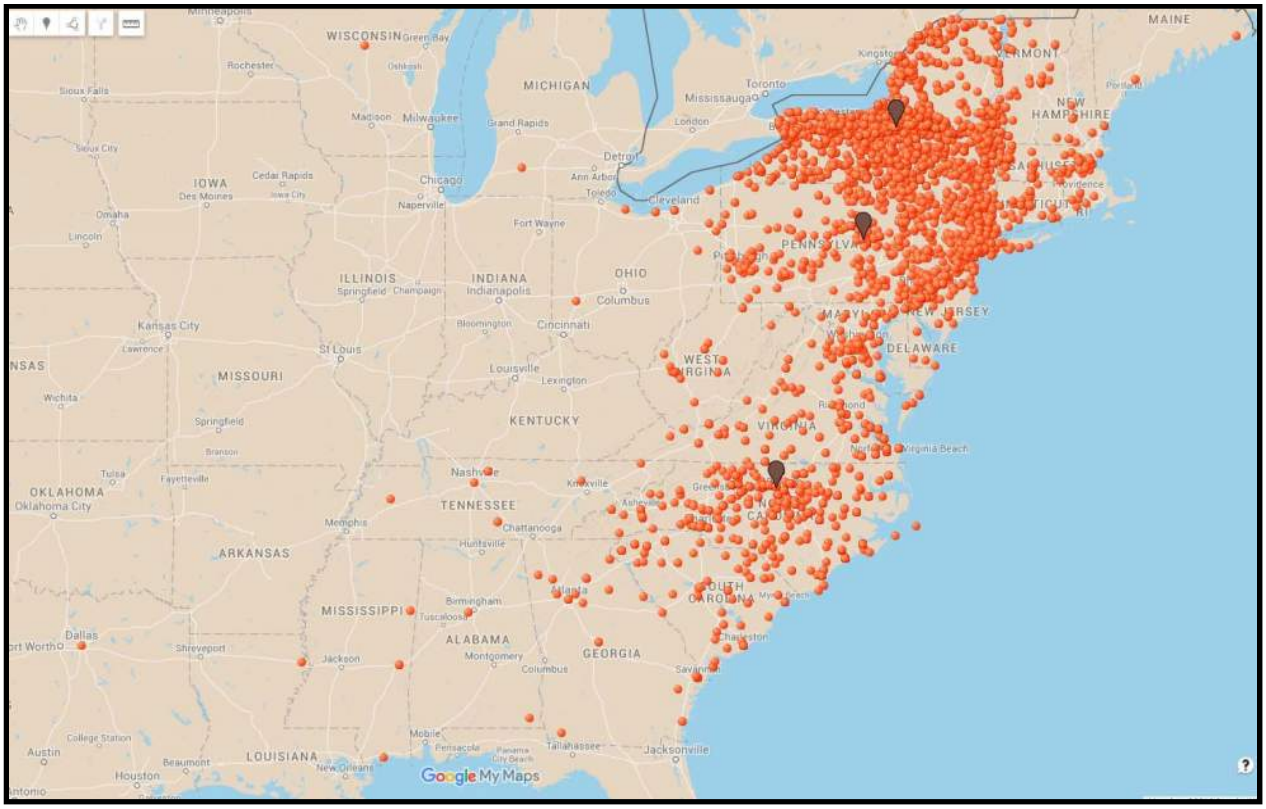
PARRATT WOLFF QUALIFICATIONS & PROJECT TEAM

Parratt-Wolff, Inc. (PWI) was founded in 1969 in Syracuse, New York to provide geotechnical and environmental drilling services to the northeastern United States. Since then we have grown to a company of approximately 55 employees, with 36 major pieces of field equipment and three offices. Our growth is the result of consistent management, dedicated field professionals and the repeat business of our many satisfied clients. Our current service area stretches from Maine to Puerto Rico and as far west as Ohio.

Parratt Wolff: Office Locations and Project Sites



CAPABILITIES SUMMARY

Direct-push (Geoprobe) soil, groundwater and soil gas sampling
Geoprobe's Direct Imaging with MIP/HPT/OIP and EC tooling
Hollow stem auger 3 " I.D. to 10" I.D
Fluid rotary 3" to 14" O.D.
Flush joint steel casing, 2" I.D. to 8" I.D.
Wireline rock coring, NQ through PQ-sizes
Air hammer drilling, 4" O.D. to 8" O.D.
Well installations, 3/4" I.D. to 12" I.D.
Packer pressure testing and discrete water sampling
Downhole camera and borehole geophysical logging
Well development, rehabilitation with chemicals and pumping tests
Machine dug test pits
Injection of ORC, HRC and similar products
Installation of pumps and remediation systems
Experience with working on water using our own float or from subcontracted barges

CURRENT EQUIPMENT LIST

Drilling Equipment - 37 Major Pieces of Equipment

1 Boart Longyear LS-250 track mounted sonic rig
3 Geoprobe 7822DT ATV mounted direct push/rotary drill rigs
1 Geoprobe 6620DT ATV mounted direct push/rotary drill rig
1 Geoprobe 6712DT ATV mounted direct push/rotary drill rig
1 Four-wheel drive tractor-mounted direct-push sampling rigs
5 Ingersoll-Rand A300 truck-mounted combination direct-push/rotary drill rigs
1 Ingersoll-Rand A200 truck-mounted combination direct-push/rotary drill rig
5 CME 55 truck-mounted rotary drill rigs
3 CME 75 truck-mounted rotary drill rigs
1 CME 850X crawler-mounted direct-push/rotary drill rig
2 CME 850 crawler-mounted rotary drill rigs
1 CME 55 crawler-mounted rotary drill rig
1 CME 550 all-terrain carrier mounted rotary drill rig
1 Diedrich D-90 all-terrain carrier-mounted combination direct-push/rotary drill rig
2 Diedrich D-50 truck/skid-mounted rotary drill rigs
1 Acker ACE skid-mounted rotary drill rig
1 Beaver hydraulic portable rotary drill rig
2 tripod-mounted drills, 1 monopod drill
1 pump hoist truck

Vacuum Excavation Equipment

1 VACTOR HXX Paradigm vac-truck/air knife unit
2 Vacmasters System 4000 vac-trucks/air knife units
1 Pacific Tec vac-trailer/air knife unit

PROJECT TEAM:

Danylo Kulczycky
Project Manager/HRSC Operations Manager

EDUCATION:

B.A. – Environmental Studies, Bucknell University, 2007

REGISTRATIONS:

- Certified Well Driller with Monitoring Well Endorsement (NGWA)
- Licensed Well Driller – New York & New Jersey

SPECIAL TRAINING & CERTIFICATIONS:

- 24-hour Geoprobe Direct Image Logging Tools Training – MiHpt
- 10-hour Geoprobe Direct Image Logging Tools Training – HTL & LL MIP
- 10-hour Geoprobe Direct Image Logging Tools Training – OIP/HPT
- 40-hour GEFCO Resource Drilling Training Seminar
- 40-hour OSHA HAZWOPER Training/ 30-hour OSHA Construction Training

QUALIFICATIONS:

Project Manager: 12 years of professional experience to prepare cost estimates and provide technical customer services to many different clients.

High Resolution Site Characterization (HRSC) Team Leader: Operations manager for HRSC technologies at Parratt-Wolff. Danylo leads a team of five Geoprobe® certified technicians operating a diverse array of Geoprobe® Direct Image tools. These tools include: MIP, OIP, HPT, EC, MiHpt, OIHPT, Low Level MIP & MiHpt, and Heated Trunkline MIP. Responsible for project set up, preparatory work, oversight of direct image projects and post-processing data interpretation with clients.

First hand knowledge and experience with drilling methods including; hollow stem auger, fluid rotary, air hammer, wireline rock coring, and direct push technologies. Additionally experienced with drilling services including; vacuum excavation, packer testing, injection services, pumping tests, and well development/rehabilitation.

Licensed Well Driller with the NGWA, and in the states of New York and New Jersey.

Parratt-Wolff, Inc. Board of Directors: Secretary and Treasurer

EXPERIENCE:

2007-Present	Project Manager, Parratt-Wolff, Inc.
2016-Present	Project Manager & HRSC Operations Manager, Parratt-Wolff, Inc.

WAYNE NIELSON, CWD
Direct Image Technician/Driller

REGISTRATION:

Mr. Nielson is a driller with a monitoring well endorsement by the National Ground Water Association and licensed in the state of New York.

SPECIAL TRAINING & CERTIFICATIONS:

- 24-hour Geoprobe Direct Image Logging Tools Training – MiHpt
- 10-hour Geoprobe Direct Image Logging Tools Training – HTL & LL MIP
- 10-hour Geoprobe Direct Image Logging Tools Training – OIP/HPT
- 40-Hour OSHA Health and Safety Training Course
- 8-hour OSHA Health and Safety Refresher Courses
- Heavy Equipment Operation

PROFESSIONAL EXPERIENCE & DUTIES:

Since 2010, Mr. Nielson has assumed increasingly responsible positions within Parratt-Wolff, Inc. At present, he works on direct image and drilling projects out of our Syracuse, NY office. His duties include site meetings, job preparations, and project execution.

Mr. Nielson is skilled in the use of direct push, MIP, OIP and HPT, hollow stem auger, wireline rock coring, angle coring, mud-rotary and air-rotary on both environmental and geotechnical projects. He is also experienced in installing monitoring wells, recovery wells and down-hole instrumentations.

As a direct image technician and driller, Mr. Nielson has worked on a wide variety of projects in states along the east coast and has become adept at problem solving on unusual sites with difficult access requirements.

EXPERIENCE:

2016- Present:	Direct Image Technician & Driller, Parratt-Wolff, Inc.
2012- 2016:	Driller, Parratt-Wolff, Inc.
2012- 2014:	Driller Operator, Parratt-Wolff, Inc.
2010-2012:	Assistant Driller, Parratt-Wolff, Inc.

ATTACHMENT C: LICENSE & CERTIFICATION

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Certificate of Completion

Wayne Nielson

Parratt-Wolffe, Inc.

completed a 24-hour training course in the use and operation of

Direct Image® Logging Tools

from Geoprobe Systems®

Training included instruction, both in the classroom and in field exercises,
in the set-up and use of the MIP and HPT subsurface logging systems including review of field data,
application of quality assurance measures, operation and maintenance of the equipment,
and the interpretation of data obtained from the logs.

Genuine Geoprobe®

Dan Pipp
Direct Image® Specialist

February 14-16, 2017

Certificate of Completion

Danylo Kulczycky

Parratt-Wolff

completed a 24-hour training course in the use and operation of

Direct Image® Logging Tools

from Geoprobe Systems®

Training included instruction, both in the classroom and in field exercises,
in the set-up and use of the MIP-HPT subsurface logging systems including review of field data,
application of quality assurance measures, operation and maintenance of the equipment, and the
interpretation of data obtained from the logs.

Genuine Geoprobe®

Dan Pipp
Direct Image® Specialist
May 17-19, 2016

NGWA
The Groundwater Association

CERTIFIED

Ability–Experience–Knowledge

National Ground Water Association recognizes

Wayne Nielson, CWD

for earning this professional designation, proving competence through successful completion of at least one or a series of specialized examinations — and for the commitment to engage in continuing education annually and to adhere to high standards of professional practice.

Chief Executive Officer

February 5, 2019

Date

December 31, 2019

Certification expiration date

NGWA CERTIFIED CWD

NGWA CERTIFIED CPI

NGWA CERTIFIED CWD/PI

NGWA CERTIFIED MGWC

NGWA CERTIFIED CVCLD

NGWA®
The Groundwater Association

Address 601 Dempsey Road, Westerville, Ohio 43081-8978 USA
Phone (800) 551-7379 • (614) 898-7791 Fax (614) 898-7786
Email ngwa@ngwa.org Websites NGWA.org and WellOwner.org

March 28, 2019

Danylo Kulczycky, CWD - 3202328
Parratt Wolff Inc
5879 Fisher Rd
PO Box 56
East Syracuse NY 13057-2973

Dear Danylo Kulczycky, CWD

Thank you for renewing your NGWA voluntary certification, and for promoting your **pride** and **professionalism** in the industry!

Your new NGWA voluntary certification ID card is attached, which expires at the end of 2019. If you are also an NGWA member, your NGWA membership card is mailed separately when you renew your membership.

As a reminder, when you renew your certification at the end of 2019, you will need to complete and report seven continuing education points (CEPs) earned during the calendar year, provide a signed affidavit verifying you have no legal action pending against you for failure to properly construct wells or install pumps, and that you have maintained the qualified licenses to operate in your state, as well as pay your annual renewal fee.

Your continuing participation in the NGWA voluntary certification program exemplifies your personal dedication to professionalism and increases public confidence in the industry. Keep up the good work!

Sincerely,

Jessica Michell

NGWA®
The Groundwater Association

NGWA
CERTIFIED

Danylo Kulczycky, CWD

Certified in the following categories:

M

Certification no. 3202328 Expires 12/31/2019

ATTACHMENT D: EQUIPMENT SPECIFICATIONS

P.O. Box 56, 5879 Fisher Road, East Syracuse, New York 13057 – (315) 437-1429
Hillsborough, NC – East Syracuse, NY – Lewisburg, PA
www.pwinc.com

GEOPROBE 7822 SPECIFICATIOS

7822DT Unit Platform		
Stroke	78 in	1,981 mm
Weight (approximate)	8,000 lb	3,632 kg
Width	64 in	1,626 mm
Length (folded)	133 in	3,378 mm
Height, w/standard mast (folded)	100 in	2,540 mm
Height, w/rotating mast (folded)	86 in	2,184 mm
Height, w/dual mast (folded)	100 in	2,540 mm
Height, no mast (folded)	79 in	2,007 mm
Height, w/mast (unfolded)	187 in	4,750 mm
Height, no mast (unfolded)	118.5 in	3,010 mm
Foot Travel	20.5 in	521 mm
Extension	15.5 in	394 mm
Lateral Movement (side-to-side)	+ 7 degrees from centerline	
Oscillation	± 13 degrees from vertical	
Rear Stabilizer Lift	2,000 lb	907 kg
Rear Blade Width	60 in	1,524 mm
Ground Speed	0 - 5 mph	0 - 8 kph
Surface Load	4.6 lb/in²	0.32 kg/cm²
Track Width	12 in	305 mm

Percussion Hammer		
Hammer System	GH63	
Percussion Rate	32 Hz	
Forward Torque	517 ft-lb	701 N•M
Reverse Torque	637 ft-lb	864 N•M
Rotation Speed	0 - 234 rpm	
Power Cell Weight	90 lb	41 kg

Hydraulic Systems		
Down Force	36,000 lb	160 kN
Retraction Force	48,000 lb	214 kN
Hydraulic Pressure (system)	4,000 psi	275 bar
Hydraulic Flow Rate (system)	40 gpm	151 Lpm

P.O. Box 56, 5879 Fisher Road, East Syracuse, New York 13057 – (315) 437-1429
Hillsborough, NC – East Syracuse, NY – Lewisburg, PA
www.pwinc.com

APPENDIX B

REGENESIS PRODUCT INFORMATION

REGENESIS

Project Information		
Jamestown Container		
Falconer, NY		
Source Area - ISCR/ERD Option		
Prepared For:		
C&S - Cody Martin		
Target Treatment Zone (TTZ) Info	**Unit**	**Value**
Areal Extent	sq ft	2,550
Top Treat Depth	ft	10.0
Bot Treat Depth	ft	40.0
Vertical Treatment Interval	ft	30.0
Treatment Zone Volume	ft^3	76,500
Treatment Zone Volume	cy	2,833
Soil Type	---	sand
Porosity	cm^3/cm^3	0.33
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	188,846
Treatment Zone Effective Pore Volume	gals	114,452
Fraction Organic Carbon (foc)	g/g	0.002
Soil Density	g/cm^3	1.7
Soil Density	lb/ft^3	108
Soil Weight	lbs	8.3E+06
Hydraulic Conductivity	ft/day	20.0
Hydraulic Conductivity	cm/sec	7.06E-03
Hydraulic Gradient	ft/ft	0.008
GW Velocity	ft/day	0.83
GW Velocity	ft/yr	304
Contaminant Mass	**Unit**	**Value**
Dissolved Phase Contaminant Mass	lbs	5
Sorbed Phase Contaminant Mass	lbs	2
Competing Electron Acceptor Mass	lbs	142
Total Mass Contributing to H2 Demand	**lbs**	**149**
Mass Flux and 3DME Demand	**Unit**	**Value**
Groundwater Flux	L/day	12,035
Stoichiometric 3DME Demand	lbs	604
Total Mass Flux 3DME Demand	lbs	2,971
Toral 3DME Demand	**lbs**	**3,575**
Application Dosing		
3-D Microemulsion to be Applied	**lbs**	**4,400**
S-MZVI to be Applied	**lbs**	**3,500**
BDI Plus to be Applied	**liters**	**44**

3-D Microemulsion®, S-MZVI®, CRS®, BDI® Plus Application Design Summary

Source Area - ISCR/ERD Option		
Treatment Type	**Grid**	
Treatment Areal Extent (sq ft)	2,550	
Spacing Within Rows (ft)	10	
Spacing Between Rows (ft)	10	
DPT Injection Points	26	
Top Application Depth (ft bgs)	10	**Field Mixing Ratios**
Bottom Application Depth (ft bgs)	40	3DME Concentrate per Pt (gals)
3DME to be Applied (lbs)	**4,400**	20
3DME to be Applied (gals)	527	Mix Water per Pt (gals)
3DME Mix %	6%	348
Volume Water (gals)	**9,059**	3DME Mix Volume per Pt (gals)
3DME Mix Volume (gals)	9,587	369
S-MZVI to be Applied (lbs)	**3,500**	S-MZVI Volume per Pt (gals)
S-MZVI Volume (gals)	232	9
BDI Plus to be Applied (L)	**44**	BDI Volume per Pt (L)
BDI Plus Mix Water Volume (gals)	440	1.7
Total Application Volume (gals)	**10,270**	Volume per pt (gals)
Estimated Radius of Injection (ft)	2.0	395
Prepared by: Alana Miller		Volume per vertical ft (gals)
Date: 2/5/2020		13

Technical Notes/Discussion

Vertical interval inlcudes the upper and lower sand zones

Assumptions/Qualifications

In generating this preliminary estimate, Regenesis relied upon professional judgment and site specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site.

REGENESIS developed this Scope of Work in reliance upon the data and professional judgments provided by those whom completed the earlier environmental site assessment(s). The fees and charges associated with the Scope of Work were generated through REGENESIS' proprietary formulas and thus may not conform to billing guidelines, constraints or other limits on fees. REGENESIS does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where REGENESIS may serve as a supplier or subcontractor to an entity which seeks reimbursement from the Government for all or part of the services performed or products provided by REGENESIS, it is the sole responsibility of the entity seeking reimbursement to ensure the Scope of Work and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to an entity which seeks reimbursement from the Government, REGENESIS does not knowingly present or cause to be presented any claim for payment to the Government.

REGENESIS

Project Information		
Jamestown Container		
Falconer, NY		
Barrier		
Prepared For:		
C&S - Cody Martin		
Target Treatment Zone (TTZ) Info	**Unit**	**Value**
Barrier Length	ft	100
Top Treat Depth	ft	10.0
Bot Treat Depth	ft	40.0
Vertical Treatment Interval	ft	30.0
Treatment Zone Volume	ft^3	45,000
Treatment Zone Volume	cy	1,667
Soil Type	---	sand
Porosity	cm^3/cm^3	0.33
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	111,086
Treatment Zone Effective Pore Volume	gals	67,325
Fraction Organic Carbon (foc)	g/g	0.002
Soil Density	g/cm^3	1.7
Soil Density	lb/ft^3	108
Soil Weight	lbs	4.9E+06
Hydraulic Conductivity	ft/day	20.0
Hydraulic Conductivity	cm/sec	7.06E-03
Hydraulic Gradient	ft/ft	0.008
GW Velocity	ft/day	0.83
GW Velocity	ft/yr	304
Contaminant Mass	**Unit**	**Value**
Dissolved Phase Contaminant Mass	lbs	2
Sorbed Phase Contaminant Mass	lbs	2
Competing Electron Acceptor Mass	lbs	83
Total Mass Contributing to H2 Demand	**lbs**	**87**
Mass Flux and 3DME Demand	**Unit**	**Value**
Groundwater Flux	L/day	14,158
Stoichiometric 3DME Demand	lbs	356
Total Mass Flux 3DME Demand	lbs	3,444
Toral 3DME Demand	**lbs**	**3,800**
Application Dosing		
3-D Microemulsion to be Applied	**lbs**	**4,000**
S-MZVI to be Applied	**lbs**	**3,000**
BDI Plus to be Applied	**liters**	**26**

3-D Microemulsion®, S-MZVI®, CRS®, BDI® Plus Application Design Summary

Barrier		
Treatment Type	**Barrier**	
Distance Perpendicular to Flow (ft)	100	
Spacing Within Rows (ft)	6	
Number of Rows	2	
DPT Injection Points	33	
Top Application Depth (ft bgs)	10	**Field Mixing Ratios**
Bottom Application Depth (ft bgs)	40	3DME Concentrate per Pt (gals)
3DME to be Applied (lbs)	**4,000**	15
3DME to be Applied (gals)	479	Mix Water per Pt (gals)
3DME Mix %	6%	250
Volume Water (gals)	**8,236**	3DME Mix Volume per Pt (gals)
3DME Mix Volume (gals)	8,715	264
S-MZVI to be Applied (lbs)	**3,000**	S-MZVI Volume per Pt (gals)
S-MZVI Volume (gals)	199	6
BDI Plus to be Applied (L)	**26**	BDI Volume per Pt (L)
BDI Plus Mix Water Volume (gals)	260	0.8
Total Application Volume (gals)	**9,181**	Volume per pt (gals)
Estimated Radius of Injection (ft)	1.7	278
Prepared by: Alana Miller		Volume per vertical ft (gals)
Date: 2/5/2020		9

Technical Notes/Discussion

Vertical interval inlcudes the upper and lower sand zones

Assumptions/Qualifications

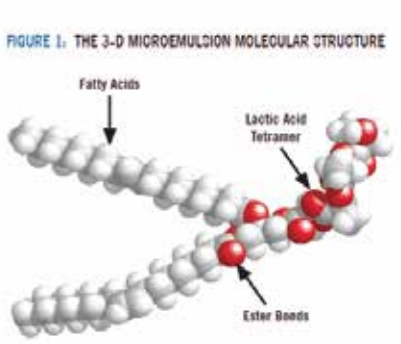
In generating this preliminary estimate, Regenesis relied upon professional judgment and site specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site.

REGENESIS developed this Scope of Work in reliance upon the data and professional judgments provided by those whom completed the earlier environmental site assessment(s). The fees and charges associated with the Scope of Work were generated through REGENESIS' proprietary formulas and thus may not conform to billing guidelines, constraints or other limits on fees. REGENESIS does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where REGENESIS may serve as a supplier or subcontractor to an entity which seeks reimbursement from the Government for all or part of the services performed or products provided by REGENESIS, it is the sole responsibility of the entity seeking reimbursement to ensure the Scope of Work and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to an entity which seeks reimbursement from the Government, REGENESIS does not knowingly present or cause to be presented any claim for payment to the Government.

3-D Microemulsion® Factory Emulsified Technical Description

3-D Microemulsion (3DME®) is comprised of a patented molecular structure containing oleic acids (i.e., oil component) and lactates/polylactates, which are molecularly bound to one another (figure 1). The 3DME molecule contains both a soluble (hydrophilic) and in-soluble (lipophilic) region. These two regions of the molecule are designed to be balanced in size and relative strength. The balanced hydrophilic/lipophilic regions of 3DME result in an electron donor with physical properties allowing it to initially adsorb to the aquifer material in the area of application, then slowly redistribute via very small 3DME "bundles" called micelles. These 3DME micelles spontaneously form within sections of the aquifer where concentrations of 3DME reach several hundred parts per million. The micelles' small size and mobility allow it to move with groundwater flow through the aquifer matrix, passing easily through the pore throats in between soil grains resulting in the further redistribution of 3DME within the aquifer. This allows for advective distribution of the oleic acids which are otherwise insoluble and unable to distribute in this manner, allowing for increased persistence of the lactate/polylactates component due to their initial attachment to the oleic acids.

Example of 3-D Microemulsion



Due to its patented molecular structure, 3DME offers far greater transport when compared to blended emulsified vegetable oil (EVO) products, which fail to distribute beyond the limits of pumping. 3DME also provides greater persistence when compared to soluble substrates such as lactates or simple sugars. The 3DME molecular structures capitalize on the best features of the two electron-donor types while at the same time, minimize their limitations. 3DME is delivered to the site as a ready-to-apply emulsion that is simply diluted with water to generate a large volume of a 3DME colloidal suspension.

Suspension of 3DME generated by this mixing range from micelles on the order of .02 microns to .05 microns in diameter, to "swollen" micelles, (termed "microemulsions") which are on the order of .05 to 5 microns in diameter. Once injected into the subsurface in high volumes, the colloidal suspension mixes and dilutes in existing pore waters. The micelles/microemulsions on the injection front will then begin to sorb onto the surfaces of soils as a result of zeta potential attraction and organic matter within the soils themselves. As the sorption continues, the 3DME will "coat" pore surfaces developing a layer of molecules and in some cases a bilayer. This sorption process continues as the micelles/microemulsion moves outward and disassociates into their hydrophilic/hydrophobic components. The specialized chemistry of 3DME results in a staged release of electron donors: free lactate (immediate); polylactate esters (mid-range) and free fatty acids & fatty acid esters (long-term). Material longevity of three years or greater has been seen at most sites as determined from biogeochemical analyses.

For a list of treatable contaminants with the use of 3DME, view the Range of Treatable Contaminants Guide

Chemical Composition

- Hydrogen Release Compound Partitioning Electron Donor – CAS #823190-10-9
- Sodium Lactate – CAS# 72-17-3
- Water – CAS# – 7732-18-5

3-D Microemulsion® Factory Emulsified Technical Description

Properties

- Density – Approximately 1.0 grams per cubic centimeter (relative to water)
- pH – Neutral (approximately 6.5 to 7.5 standard units)
- Solubility – Soluble in Water
- Appearance – White emulsion
- Odor – Not detectable
- Vapor Pressure – None
- Non-hazardous

Storage and Handling Guidelines

Storage
Store in original tightly closed container
Store in a cool, dry, well-ventilated place
Store away from incompatible materials
Recommended storage containers: plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass

Handling
Avoid contact with eyes, skin, and clothing
Provide adequate ventilation
Wear appropriate personal protective equipment
Observe good industrial hygiene practices

Applications

- 3DME is diluted with water prior to application. Resulting emulsion has viscosity similar to water.
- Easily injects into formation through direct push injection points, injection wells or other injection delivery systems.

Application instructions for this product are contained here 3DME FE Application Instructions.

Health and Safety

Material is food grade and relatively safe to handle. We recommend avoiding contact with eyes and prolonged contact with skin. OSHA Level D personal protection equipment including vinyl or rubber gloves, and eye protection are recommended when handling this product. Please review the Material Safety Data Sheet for additional storage, usage, and handling requirements here: SDS-3DME FE.

REGENESIS

www.regenesis.com
1011 Calle Sombra, San Clemente CA 92673
949.366.8000

S-MicroZVI Specification Sheet

S-MicroZVI Technical Description

S-MicroZVI™ is an *In Situ* Chemical Reduction (ISCR) reagent that promotes the destruction of many organic pollutants and is most commonly used with chlorinated hydrocarbons. It is engineered to provide an optimal source of micro-scale zero valent iron (ZVI) that is both easy to use and delivers enhanced reactivity with the target contaminants via multiple pathways. S-MicroZVI can destroy many chlorinated contaminants through a direct chemical reaction (**see Figure 1**). S-MicroZVI will also stimulate anaerobic biological degradation by rapidly creating a reducing environment that is favorable for reductive dechlorination.

S-MicroZVI is Best in Class For

- ☑ Longevity
- ☑ Kinetics
- ☑ Transport

Sulfidated ZVI

S-MicroZVI is composed of colloidal, sulfidated zero-valent iron particles suspended in glycerol using proprietary environmentally acceptable dispersants. The passivation technique of sulfidation, completed using proprietary processing methods, provides unparalleled reactivity with chlorinated hydrocarbons like PCE and TCE and increases its stability and longevity by minimizing undesirable side reactions. In addition to superior reactivity, S-MicroZVI is designed for easy handling that is unmatched by any ZVI product on the market. Shipped as a liquid suspension, S-MicroZVI requires no powder feeders, no thickening with guar, and pneumatic or hydraulic fracturing is not mandatory. When diluted with water prior to application, the resulting suspension is easy to inject using either direct push or permanent injection wells.

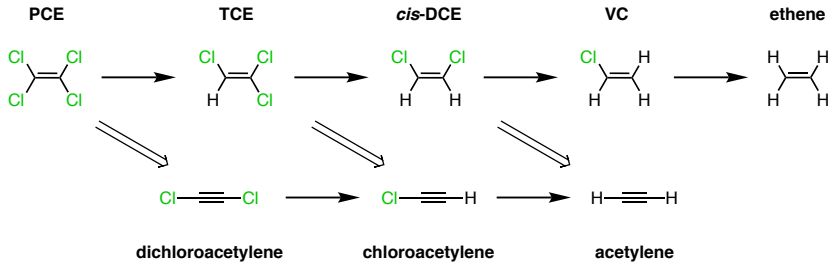


Figure 1: *Chlorinated ethene degradation pathways and products. The top pathway with single line arrows represent the reductive dechlorination (hydrogenolysis) pathway. The lower pathway with downward facing double line arrows represent the beta-elimination pathway.*

To see a list of treatable contaminants, view the S-MicroZVI treatable contaminants guide.

S-MicroZVI™
Sulfidated Zero-Valent Iron

S-MicroZVI Specification Sheet

Chemical Composition

Iron, powders CAS 7439-89-6
Iron (II) sulfide CAS 1317-37-9
Glycerol CAS 56-81-8

Properties

Physical State: Liquid
Form: Viscous metallic suspension
Color: Dark gray
Odor: Slight
pH: Typically 7-9 as applied
Density: 15 lb/gal

Storage and Handling Guidelines

Storage:

- Use within four weeks of delivery
- Store in original containers
- Store at temperatures below 95F°
- Store away from incompatible materials

Handling:

- Never mix with oxidants or acids
- Wear appropriate personal protective equipment
- Do not taste or swallow
- Observe good industrial hygiene practices

Applications

S-MicroZVI is diluted with water on site and easily applied into the subsurface through low-pressure injections. S-MicroZVI can also be mixed with products like 3-D Microemulsion® or PlumeStop® prior to injection.

Health and Safety

The material is relatively safe to handle; however, avoid contact with eyes, skin and clothing. OSHA Level D personal protection equipment including: vinyl or rubber gloves and eye protection are recommended when handling this product. Please review the Safety Data Sheet for additional storage, and handling requirements here: S-MicroZVI SDS.

REGENESIS®

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European Offices (UK, Ireland, Belgium and Italy)
Email: europe@regenesis.com
Tel: +44 (0)1225 61 81 61

BDI PLUS® Technical Description

Bio-Dechlor INOCULUM Plus (BDI PLUS®) is an enriched natural consortium containing species of Dehalococcoides sp. (DHC). BDI PLUS has been shown to simulate the rapid and complete dechlorination of chlorinated solvents such as tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE) and vinyl chloride (VC) to non-toxic end products, ethene, carbon dioxide and water.

The culture also contains microbes capable of dehalogenating halomethanes (e.g., carbon tetrachloride and chloroform) and haloethanes (e.g., 1,1,1-TCA and 1,1-DCA) as well as mixtures of these contaminants.

Species of Dehalococcoides sp. (DHC)

For a list of treatable contaminants with the use of BDI PLUS, view the Range of Treatable Contaminants Guide

Chemical Composition

- Non-hazardous, naturally-occurring, non-altered anaerobic microbes and enzymes in a water-based medium.

Properties

- Appearance – Murky, yellow to grey water
- Odor – Musty
- pH 6.0 to 8.0
- Density – Approximately 1.0 grams per cubic centimeter (0.9 to 1.1 g/cc)
- Solubility – Soluble in Water
- Vapor Pressure – None
- Non-hazardous

Storage and Handling Guidelines

Storage
Store in original tightly closed container
Store away from incompatible materials
Recommended storage containers: plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass
Store in a cool, dry area at 4-5°C (39 - 41°F)
Material may be stored for up to 3 weeks at 2-4°C without aeration

Handling
Avoid prolonged exposure
Observe good industrial hygiene practices
Wear appropriate personal protective equipment

BDI PLUS® Technical Description

Applications

- BDI PLUS is delivered to the site in liquid form and is designed to be injected directly into the saturated zone requiring treatment.
- Most often diluted with de-oxygenated water prior to injection into either hydraulic push injection points or properly constructed injection wells.
- The typical dilution rate of the injected culture is 10 gallons of deoxygenated water to 1 liter of standard BDI PLUS culture.

Application instructions for this product are contained here BDI PLUS Application Instructions.

Health and Safety

Material is non-hazardous and relatively safe to handle; however avoid contact with eyes and prolonged contact with skin. OSHA Level D personal protection equipment including: vinyl or rubber gloves and safety goggles or a splash shield are recommended when handling this product. An eyewash station is recommended. Please review the Material Safety Data Sheet for additional storage, usage, and handling requirements here: BDI PLUS SDS.

REGENESIS

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949.366.8000

Remedial Design Assumptions and Qualifications

Cost Estimate Disclaimer: The cost listed assumes conditions set forth within the proposed scope of work and assumptions and qualifications. Changes to either could impact the final cost of the project. This may include final shipping arrangements, sales tax or application related tasks such as product storage and handling, access to water, etc. If items listed need to be modified, please contact Regenesis for further evaluation.

Shipping Estimates: Shipping estimates are valid for 30 days. All shipping charges are estimates and actual freight charges are calculated at the time of invoice. Additional freight charges may be assessed for any accessorial requested at the time of delivery. The estimate included within assumes standard shipping.

Standard delivery is between 8am -5pm Monday –Friday. *accessorial – can include, but not limited to lift gate and pallet jack at delivery, inside delivery, time definite deliveries, and delivery appointments.

Please communicate any requirements for delivery with the customer service department at the time the order is placed.

Return Policy: To initiate a return please contact your local sales manager for an RMA. A 15% re-stocking fee will be charged for all returned goods. Return freight must be prepaid. All requests to return product must be in original condition and no product will be accepted for return after 90 days from date of delivery.

Professional Judgement: In generating this estimate, REGENESIS relied upon professional judgment and site specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site.

REGENESIS developed this Scope of Work in reliance upon the data and professional judgments provided by those whom completed the earlier environmental site assessment(s), and in reliance upon REGENESIS' prior experience on similar project sites. The fees and charges associated with the Scope of Work were generated through REGENESIS' proprietary formulas and thus may not conform to billing guidelines, constraints or other limits on fees. REGENESIS does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where REGENESIS may serve as a supplier or subcontractor to an entity which seeks reimbursement from the Government for all or part of the services performed or products provided by REGENESIS, *it is the sole responsibility of the entity seeking reimbursement to ensure the Scope of Work and associated charges are in compliance with and acceptable to the Government prior to submission*. When serving as a supplier or subcontractor to an entity which seeks reimbursement from Government, REGENESIS does not knowingly present or cause to be presented any claim for payment to the government.

REGENESIS
1011 Calle Sombra
San Clemente, CA 92673-6244
Tel: 949.366.8000 • Fax: 949.366.8090

Terms and Conditions
Products and Services

1. PAYMENT TERMS. Net 30 Days. Accounts outstanding after 30 days will be assessed 1.5% monthly interest. Volume discount pricing will be rescinded on all accounts outstanding over 90 days. An early payment discount of 1.5% Net 10 is available for cash or check payments only. We accept Master Card, Visa and American Express.

2. **RETURN POLICY.** A 15% re-stocking fee will be charged for all returned goods. All requests to return product must be pre-approved by seller. Returned product must be in original condition and no product will be accepted for return after a period of 90 days.

3 FORCE MAJEURE. Seller shall not be liable for delays in delivery or services or failure to manufacture or deliver due to causes beyond its reasonable control, including but not limited to acts of God, acts of buyer, acts of military or civil authorities, fires, strikes, flood, epidemic, war, riot, delays in transportation or car shortages, or inability to obtain necessary labor, materials, components or services through seller's usual and regular sources at usual and regular prices. In any such event Seller may, without notice to buyer, at any time and from time to time, postpone the delivery or service dates under this contract or make partial delivery or performance or cancel all or any portion of this and any other contract with buyer without further liability to buyer. Cancellation of any part of this order shall not affect Seller's right to payment for any product delivered or service performed hereunder.

4. LIMITED WARRANTY. Seller warrants the product(s) sold and services provided as specified on face of invoice, solely to buyer. Seller makes no other warranty of any kind respecting the product and services, and expressly DISCLAIMS ALL OTHER WARRANTIES OF WHATEVER KIND RESPECTING THE PRODUCT AND SERVICES, INCLUDING ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE AND NON-INFRINGEMENT.

5. DISCLAIMER. Where warranties to a person other than buyer may not be disclaimed under law, seller extends to such a person the same warranty seller makes to buyer as set forth herein, subject to all disclaimers, exclusions and limitations of warranties, all limitations of liability and all other provisions set forth in the Terms and Conditions herein. Buyer agrees to transmit a copy of the Terms and Conditions set forth herein to any and all persons to whom buyer sells, or otherwise furnishes the products and/or services provided buyer by seller and buyer agrees to indemnify seller for any liability, loss, costs and attorneys' fees which seller may incur by reason, in whole or in part, of failure by buyer to transmit the Terms and Conditions as provided herein.

6. LIMITATION OF SELLER'S LIABILITY AND LIMITATION OF BUYER'S REMEDY. Seller's liability on any claim of any kind, including negligence, for any loss or damage arising out of, connected with, or resulting from the manufacture, sale, delivery, resale, repair or use of any goods or performance of any services covered by or furnished hereunder, shall in no case exceed the lesser of (1) the cost of repairing or replacing goods and repeating the services failing to conform to the forgoing warranty or the price of the goods and/or services or part thereof which gives rise to the claim. IN NO EVENT SHALL SELLER BE LIABLE FOR SPECIAL INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING LOST PROFITS, OR FOR DAMAGES IN THE NATURE OF PENALTIES.

7. INDEMNIFICATION. Buyer agrees to defend and indemnify seller of and from any and all claims or liabilities asserted against seller in connection with the manufacture, sale, delivery, resale or repair or use of any goods, and performance of any services, covered by or furnished hereunder arising in whole or in part out of or by reason of the failure of buyer, its agents, servants, employees or customers to follow instructions, warnings or recommendations furnished by seller in connection with such goods and services, by reason of the failure of buyer, its agents, servants, employees or customers to comply with all federal, state and local laws applicable to such goods and services, or the use thereof, including the Occupational Safety and Health Act of 1970, or by reason of the negligence or misconduct of buyer, its agents, servants, employees or customers.

8. EXPENSES OF ENFORCEMENT. In the event seller undertakes any action to collect amounts due from buyer, or otherwise enforce its rights hereunder, Buyer agrees to pay and reimburse Seller for all such expenses, including, without limitation, all attorneys and collection fees.

9. TAXES. Liability for all taxes and import or export duties, imposed by any city, state, federal or other governmental authority, shall be assumed and paid by buyer. Buyer further agrees to defend and indemnify seller against any and all liabilities for such taxes or duties and legal fees or costs incurred by seller in connection therewith.

10. ASSISTANCE AND ADVICE. Upon request, seller in its discretion will furnish as an accommodation to buyer such technical advice or assistance as is available in reference to the goods and services. Seller assumes no obligation or liability for the advice or assistance given or results obtained, all such advice or assistance being given and accepted at buyer's risk.

11. SITE SAFETY. Buyer shall provide a safe working environment at the site of services and shall comply with all applicable provisions of federal, state, provincial and municipal safety laws, building codes, and safety regulations to prevent accidents or injuries to persons on, about or adjacent to the site.

12. INDEPENDENT CONTRACTOR. Seller and Buyer are independent contractors and nothing shall be construed to place them in the relationship of partners, principal and agent, employer/employee or joint ventures. Neither party will have the power or right to bind or obligate the other party except as may be expressly agreed and delegated by other party, nor will it hold itself out as having such authority.

13. REIMBURSEMENT. Seller shall provide the products and services in reliance upon the data and professional judgments provided by or on behalf of buyer. The fees and charges associated with the products and services thus may not conform to billing guidelines, constraints or other limits on fees. Seller does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where seller may serve as a supplier or subcontractor to an entity which seeks reimbursement from the Government for all or part of the services performed or products provided by seller, it is the sole responsibility of the buyer or other entity seeking reimbursement to ensure the products and services and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to an entity which seeks reimbursement from the Government, seller does not knowingly present or cause to be presented any claim for payment to the Government.

14. APPLICABLE LAW/JURISDICTION AND VENUE. The rights and duties of the parties shall be governed by, construed, and enforced in accordance with the laws of the State of California (excluding its conflict of laws rules which would refer to and apply the substantive laws of another jurisdiction). Any suit or proceeding hereunder shall be brought exclusively in state or federal courts located in Orange County, California. Each party consents to the personal jurisdiction of said state and federal courts and waives any objection that such courts are an inconvenient forum.

15. ENTIRE AGREEMENT. This agreement constitutes the entire contract between buyer and seller relating to the goods or services identified herein. No modifications hereof shall be binding upon the seller unless in writing and signed by seller's duly authorized representative, and no modification shall be effected by seller's acknowledgment or acceptance of buyer's purchase order forms containing different provisions. Trade usage shall neither be applicable nor relevant to this agreement, nor be used in any manner whatsoever to explain, qualify or supplement any of the provisions hereof. No waiver by either party of default shall be deemed a waiver of any subsequent default.

APPENDIX C

HEALTH AND SAFETY PLAN

Health and Safety Plan

Former Dowcraft Site
65 South Dow Street
Falconer, NY

Site ID # 9-07-020

Prepared by

C&S Engineers, Inc.
141 Elm Street, Suite 100
Buffalo, New York 14203

August 2017

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ATTACHMENTS

APPENDICES

SECTION 1 – GENERAL INFORMATION

The Health and Safety Plan (HASP) described in this document will address health and safety considerations for all those activities that personnel employed by C&S Engineers, Inc., may be engaged in during site investigation and remediation work at the Former Dowcraft Site located on 65 South Dow Street in Falconer, Chautauqua County, New York (Site). Figure 1 shows the approximate location of the Site. This HASP will be implemented by the Health and Safety Officer (HSO) during site work.

Compliance with this HASP is required of all C&S personnel who enter this Site. The content of the HASP may change or undergo revision based upon additional information made available to the health, safety, and training (H&S) committee, monitoring results or changes in the technical scope of work. Any changes proposed must be reviewed by the H&S committee.

Responsibilities

Project Manager…….	Daniel Riker Phone: (716) 847-1630 Cell: (716) 572-5312
Site Health and Safety Officer……....	Cody Martin Phone: (716) 847-1630 Cell: (716) 864-3752
Emergency Coordinator…….	Cody Martin Phone: (716) 847-1630 Cell: (716) 864-3752
Health and Safety Manager……	Cody Martin Phone: (716) 847-1630 Cell: (716) 864-3752

Emergency Phone Numbers

Emergency Medical Service.....911

Police: Buffalo Police Department (NYPD) 911

Hospital: Buffalo General Hospital.....(716) 859-5600

Fire: Buffalo Fire Department.....911

National Response Center .....(800) 424-8802

Poison Control Center .....(800) 222-1222
Center for Disease Control.....(800) 311-3435
NYSDEC Region 9 (Buffalo, New York) .....(716) 851-7220
C&S Engineers.....(716) 847-1630
Site Superintendent ..... TBD

Project Field Office Trailer .....(716) 847-1630

SECTION 2 - HEALTH AND SAFETY PERSONNEL

2.0 Health and Safety Personnel Designations

The following information briefly describes the health and safety designations and general responsibilities for this Site.

2.1 Project Manager (PM)

The PM is responsible for the overall project including the implementation of the HASP. Specifically, this includes allocating adequate manpower, equipment, and time resources to conduct Site activities safely.

2.2 Health and Safety Manager

- Has the overall responsibility for coordinating and reporting all health and safety activities and the health and safety of Site Workers.
- Must have completed, at a minimum, the OSHA 30-Hour Construction Safety Training, and either the 24-Hour training course for the Occasional Hazardous Waste Site Worker or the 40-Hour training course for the Hazardous Waste Operations Worker that meets OHSA 29 CFR 1910.
- Must have completed the 8-Hour Site supervisor/manager's course for supervisors and managers having responsibilities for hazardous waste Site operations and management.
- Directs and coordinates health and safety monitoring activities.
- Ensures that field teams utilize proper personal protective equipment (PPE).
- Conducts initial on-site specific training prior to Site Workers commencing work.

- Conducts and documents daily and periodic safety briefings.
- Ensures that field team members comply with this HASP.
- Immediately notifies the Construction Manager (CM) Project Manager and Superintendent of all accident/incidents.
- Determines upgrading or downgrading of PPE based on Site conditions and/or real time monitoring results.
- Ensures that monitoring instruments are calibrated daily or as the manufacturer's instructions determine.
- Reports to the CM Project Manager and Superintendent to provide summaries of field operations and progress.
- Submits and maintains all documentation required in this HASP and any other pertinent health and safety documentation.

2.3 Health and Safety Officer (HSO)

- Must be designated to the Health and Safety Manager by each Subcontractor as a Competent Person having, at a minimum, the OSHA 30-Hour Construction Safety Training
- Must schedule and attend a Pre-Construction Safety Meeting with the Health and Safety Manager to discuss the Subcontractor Safety Requirements and must attend the Weekly Subcontractor Coordination Meeting.
- Responsible for ensuring that their lower tier contractors comply with project safety requirements.
- Must make frequent and regular inspections of their work areas and activities and ensure hazards that are under their control are corrected immediately and all other hazards are reported to the Construction Manager's Project Manager and Health and Safety Manager.

- Must report all work related injuries, regardless of severity, to the Construction Manager's Project Manager and the Health and Safety Manager within 24 hours after they occur.

2.4 Emergency Coordinator

- The Emergency Coordinator or his on-site designee will, in coordination with Campus Square, LLC., implement the emergency response procedures whenever conditions at the Site warrant such action.

- The Emergency Coordinator or his on-site designee will be responsible for assuring the evacuation, emergency treatment, emergency transport of C&S personnel as necessary, and notification of emergency response units (refer to phone listing in the beginning of this HASP) and the appropriate management staff.

2.5 Site Workers

- Report any unsafe or potentially hazardous conditions to the Health and Safety Manager.

- Maintain knowledge of the information, instructions, and emergency response actions contained in the HASP.

- Comply with rules, regulations, and procedures as set forth in this HASP, including any revisions that are instituted.

- Prevent unauthorized personnel from entering work Site.

SECTION 3 - PERTINENT SITE INFORMATION

3.1 Site Location and General History

The Dowcraft Site is located at 65 South Dow Street in Falconer, New York and occupies approximately 2.2 acres of land situated immediately east of South Dow Street and approximately 100 feet south of the Chadakoin River. The Jamestown Container manufacturing building is situated between the Site and the Chadakoin River.

The property was first developed in 1890 as a woolen mill until 1939 when it was converted into

a factory which manufactured steel partitions used for offices. As part of this manufacturing process, a vapor degreaser was used which included the use of chemicals such as trichloroethene (TCE). This work continued until 1999 when the facility was closed, a portion of the Site was demolished, and the property was sold to JCC. Figure 1 presents the Site's location.

Site History and Suspect Recognized Environmental Conditions

Chlorinated solvents, primarily, trichloroethene (TCE) and its daughter compounds, were identified as the contaminants of concern (COC) for this Site. TCE is a man-made volatile organic compound used for degreasing metal and electronic parts. Remedial considerations for TCE include its low solubility value and heavy molecular weight. TCE is in a class of chemicals called dense non-aqueous phase liquids (DNAPL) that sink through the water column until they encounter an impermeable barrier.

According to previous environmental reports, the area of former degreaser pit (area of groundwater monitoring wells PW-3 and PW-3R) is a likely source area for the COC plume. The plume originates from the degreaser area and has affected groundwater in the upper and lower sand/gravel layers. The plume extends from the degreaser area to the north, under the JCC building and up to the area of the Chadakoin River. This is an area of approximately one acre. The rate of movement is approximately 2 to 3 feet per year to the north.

Five out of the ten wells that were sampled contained groundwater that exceeded water quality standard for TCE (5 ug/L). Analytical results for TCE in these wells ranged from 7.37 ug/L to 431 ug/L. Other chlorinated compounds, including TCE daughter compounds (cis-1,2-dichloroethene, trans-1,2-dichloroethane and vinyl chloride) were detected in three of the ten wells. The highest concentration of cis-1,2-Dichloroethene was detected in PW-3R (1,990 ug/L). Vinyl chloride was detected in one well, PW-3R, at 861 ug/L.

SECTION 5 - TRAINING

5.1 Site-specific Training

Training will be provided that specifically addresses the activities, procedures, monitoring, and equipment for the Site operations prior to going on site. Training will include familiarization with Site and facility layout, known and potential hazards, and emergency services at the Site, and

details all provisions contained within this HASP. This training will also allow Site Workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

5.2 Safety Briefings

C&S project personnel will be given briefings by the HSO on a daily or as needed basis to further assist Site Workers in conducting their activities safely. Pertinent information will be provided when new operations are to be conducted. Changes in work practices must be implemented due to new information made available, or if Site or environmental conditions change. Briefings will also be given to facilitate conformance with prescribed safety practices. When conformance with these practices is not occurring or if deficiencies are identified during safety audits, the project manager will be notified.

SECTION 6 - ZONES

Four types of Site activity zones are identified for the Brownfield investigation activities, including the Exclusion Zone, Contamination Reduction Zone, Remediation Zone and the Support Zone. Prior to commencement of field work a further definition of where these zones will be set up will be established.

6.1 Exclusion Zone

The area where the unexpected condition is discovered would be considered the Exclusion Zone (EZ). All excavation and handling of contaminated materials generated as a result of the discovery of an unexpected condition would take place within the EZ. This zone will be clearly delineated by hay bales, jersey barriers, and/or similar methods. Safety tape may be used as secondary delineation within the EZ. The zone delineation markings may be opened in areas for varying lengths of time to accommodate equipment operation or specific construction activities. The Site Safety Manager/Director may establish more than one EZ where different levels of protection may be employed or where different hazards exist. Site Workers will not be allowed in the EZ without:

- A buddy (co-worker);
- Appropriate PPE in accordance with OSHA regulations;

- Medical authorization; and
- Training certification in accordance with 29 CFR 1910.120.

6.2 Contamination Reduction Zone

A Contamination Reduction Zone (CRZ) will be established between the EZ and the property limits. The CRZ contains the Contamination Reduction Corridor (CRC) and provides an area for decontamination of Site equipment. The CRZ will be used for general Site entry and egress, in addition to access for heavy equipment and emergency support services. Site Workers will not be allowed in the CRZ without:

- A buddy (co-worker);
- Appropriate PPE in accordance with OSHA regulations;
- Medical authorization; and
- Training certification in accordance with 29 CFR 1910.120.

In addition, the CRZ will include a Site Worker Cleaning Area that will include a field wash station for Site Workers, equipment, and PPE to allow Site Workers to wash their hands, arms, neck, and face after exiting areas of grossly contaminated soil or hazardous materials. All Site Workers will be required to pass through the Site Worker Cleaning Area and wash their hands and remove any loose fill and soils from their clothing and boots prior to exiting the CRZ.

6.3 Remediation Zone

A Remediated Zone (RZ) will be established in portions of the Site where the remediation has been completed and only general construction work will be performed. Setup of the RZ will consist of implementing several measures designed to reduce the risk of workers' exposure and prevent non-trained workers from entering the non-remediated zone. Non-trained workers will work only in areas where the potential for exposure has been minimized by removal of all hazardous materials. The remediated zone will then be separated from the non-remediated zone by installing and maintaining temporary plywood or other construction fences along the boundary between the two zones. If potentially impacted material is uncovered in the RZ, all non-trained workers will

be removed and the Site Safety Manager/Director will assess the potential risks. If, at any other time, the risk of exposure increases while non-trained workers are present in the RZ, the non-trained workers will be removed. At all times, when non- trained workers are present in the RZ, air monitoring for the presence of VOCs will be conducted in the RZ, as well as at the fence line of the non-remediated zone.

6.4 Support Zone

The Support Zone (SZ) will be an uncontaminated area that will be the field support area for the Site operations. The SZ will contain the temporary project trailers and provide for field team communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated equipment or materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples. Meteorological conditions will be observed and noted from this zone, as well as those factors pertinent to heat and cold.

SECTION 7 - PERSONAL PROTECTIVE EQUIPMENT

7.1 General

The level of protection to be worn by field personnel will be defined and controlled by the HSO. Depending upon the type and levels of material present or anticipated at the site, varying degrees of protective equipment will be needed. If the possible hazards are unknown, a reasonable level of protection will be taken until sampling and monitoring results can ascertain potential risks. The levels of protection listed below are based on USEPA Guidelines. A list of the appropriate clothing for each level is also provided.

Level A protection must be worn when a reasonable determination has been made that the highest available level of respiratory, skin, eye, and mucous membrane protection is needed. It should be noted that while Level A provides maximum available protection, it does not protect against all possible hazards. Consideration of the heat stress that can arise from wearing Level A protection should also enter into the decision making process. Level A protection includes:

- Open circuit, pressure-demand self-contained breathing apparatus (SCBA)
- Totally encapsulated chemical resistant suit
- Gloves, inner (surgical type)

- Gloves, outer, chemical protective
- Boots, chemical protective

Level B protection must be used when the highest level of respiratory protection is needed, but hazardous material exposure to the few unprotected areas of the body (e.g., the back of the neck) is unlikely. Level B protection includes:

- Open circuit, pressure-demand SCBA or pressure airline with escape air bottle
- Chemical protective clothing: Overalls and long sleeved jacket; disposal chemical resistant coveralls; coveralls; one or two piece chemical splash suit with hood
- Gloves, inner (surgical type)
- Gloves, outer, chemical protective
- Boots, chemical protective

Level C must be used when the required level of respiratory protection is known, or reasonably assumed to be, not greater than the level of protection afforded by air purifying respirators; and hazardous materials exposure to the few unprotected areas of the body (e.g.., the back of the neck) is unlikely. Level C protection includes:

- Full or half face air-purifying respirator
- Chemical protective clothing: Overalls and long-sleeve jacket; disposable chemical resistant coveralls; coveralls; one or two piece chemical splash suit
- Gloves, inner (surgical type)
- Gloves, outer, chemical protective
- Boots, chemical protective

Level D is the basic work uniform. It cannot be worn on any site where respiratory or skin hazards exist. Level D protection includes:

- Safety boots/shoes
- Safety glasses
- Hard hat with optional face shield

Note that the use of SCBA and airline equipment is contingent upon the user receiving special training in the proper use and maintenance of such equipment.

7.2 Personal Protective Equipment – Site Specific

Level D with some modification will be required when working in the work zone on this Site. In addition to the basic work uniform specified by Level D protection, Nitrile gloves will be required when contact with soil or ground water is likely. Hearing protection will be worn when power equipment is used to perform subsurface investigation work. An upgrade to a higher level (Level C) of protection may occur if determined necessary by the HSO.

SECTION 8 - MONITORING PROCEDURES

8.1 Monitoring During Site Operations

All Site environmental monitoring should be accompanied by periodic meteorological monitoring of appropriate climatic conditions.

8.1.1 Drilling Operations (Monitoring Well Installation and Subsurface Borings) and Test Pit Excavations

Monitoring will be performed by the HSO or drilling observer during the conduct of work. A photoionization detector (PID) equipped with a 10.0 eV lamp will be utilized to monitor for the presence of volatile organic vapors within the breathing zone, the borehole, and subsurface samples upon their retrieval. Drill cuttings and excavation spoils will also be monitored by use of the PID. The PID will be field checked for calibration accuracy three times per day (morning, lunch, and end of day. If subsurface conditions warrant, a combustible gas indicator (CGI) with oxygen alarm may also be used to monitor the borehole for the presence of combustible gases. Similar monitoring of fluids produced during well development will also be conducted.

8.1.2 Interim Remedial Measures

If future Interim Remedial Measures (IRM) occurs, monitoring will be performed during excavation and sampling operations when C&S personnel are within the work zone. Although historical information previously obtained at the Site indicates low level of volatile organic vapors and compounds, a photoionization detector (PID) will be used during subsurface activities. If an IRM is performed, the, the remedial contractor will be required to employ dust control practices during work.

8.2 Action Levels

If readings on the PID exceed 10 ppm for more than fifteen minutes consecutively, then personal protective equipment should be upgraded to Level C. The air purifying respirator used with Level C protective equipment must be equipped with organic vapor cartridges. If readings on the explosive gas meter are within a range of 10%-25% of the LEL then continuous monitoring will be implemented. Readings above 25% of the LEL indicate the potential for an explosive condition. Sources of ignition should be removed and the Site should be evacuated.

8.3 Personal Monitoring Procedures

Personal monitoring shall be performed as a contingency measure in the event that VOC concentrations are consistently above the 10 ppm action level as detected by the PID. If the concentration of VOCs is above this action level, then amendments to the HASP must be made before work can continue at the Site.

SECTION 9 - COMMUNICATIONS

A phone will be located on Site to be utilized by personnel conducting investigation and IRM efforts. Cell phones will be the primary means of communicating with emergency support services/facilities.

SECTION 10 - SAFETY CONSIDERATIONS FOR SITE OPERATIONS

10.1 General

Standard safe work practices that will be followed include:

- Do not climb over/under drums, or other obstacles.
- Do not enter the work zone alone.
- Practice contamination avoidance, on and off-site.
- Plan activities ahead of time, use caution when conducting concurrently running activities.
- No eating, drinking, chewing or smoking is permitted in work zones.
- Due to the unknown nature of waste placement at the Site, extreme caution should be practiced during excavation activities.
- Apply immediate first aid to any and all cuts, scratches, abrasions, etc.

- Be alert to your own physical condition. Watch your buddy for signs of fatigue, exposure, etc.
- A work/rest regimen will be initiated when ambient temperatures and protective clothing create a potential heat stress situation.
- No work will be conducted without adequate natural light or without appropriate supervision.
- Task safety briefings will be held prior to onset of task work.
- Ignition of flammable liquids within or through improvised heating devices (barrels, etc.) or space heaters is forbidden.
- Entry into areas of spaces where toxic or explosive concentrations of gases or dust may exist without proper equipment is prohibited.
- Any injury or unusual health effect must be reported to the Site health and safety officer.
- Prevent splashing or spilling of potentially contaminated materials.
- Use of contact lenses is prohibited while on site.
- Beards and other facial hair that would impair the effectiveness of respiratory protection are prohibited if respiratory protection is necessary.
- Field crew members should be familiar with the physical characteristics of investigations, including:
  - Wind direction in relation to potential sources
  - Accessibility to co-workers, equipment, and vehicles
  - Communication
  - Hot zones (areas of known or suspected contamination)
  - Site access
  - Nearest water sources
- The number of personnel and equipment in potentially contaminated areas should be minimized consistent with site operations.

10.2 Field Operations

10.2.1 Intrusive Operations

The HSO or designee will be present on-site during all intrusive work, e.g., drilling operations, excavations, trenching, and will provide monitoring to oversee that appropriate levels of protection and safety procedures are utilized by C&S Engineers, Inc., personnel. The use of salamanders or other equipment with an open flame is prohibited and the use of protective clothing, especially hard hats and boots, will be required during drilling or other heavy equipment operations.

10.2.2 Excavations and Excavation Trenching

Guidance relating to safe work practices for C&S employees regarding excavations and excavating/trenching operation is presented in Appendix A of this HASP.

SECTION 11 - DECONTAMINATION PROCEDURES

Decontamination involves physically removing contaminants and/or converting them chemically into innocuous substances. Only general guidance can be given on methods and techniques for decontamination. Decontamination procedures are designed to:

- Remove contaminant(s).
- Avoid spreading the contamination from the work zone.
- Avoid exposing unprotected personnel outside of the work zone to contaminants.

Contamination avoidance is the first and best method for preventing spread of contamination from a hazardous site. Each person involved in site operations must practice the basic methods of contamination avoidance listed below. Additional precautions may be required in the HASP.

- Know the limitations of all protective equipment being used.
- Do not enter a contaminated area unless it is necessary to carry out a specific objective.
- When in a contaminated area, avoid touching anything unnecessarily.
- Walk around pools of liquids, discolored areas, or any area that shows evidence of possible contamination.
- Walk upwind of contamination, if possible.
- Do not sit or lean against anything in a contaminated area. If you must kneel (e.g., to take samples), use a plastic ground sheet.
- If at all possible, do not set sampling equipment directly on contaminated areas. Place equipment on a protective cover such as a ground cloth.
- Use the proper tools necessary to safely conduct the work.

Specific methods that may reduce the chance of contamination are:

- Use of remote sampling techniques.
- Opening containers by non-manual means.
- Bagging monitoring instruments.

- Use of drum grapplers.
- Watering down dusty areas.

Equipment which will need to be decontaminated includes tools, monitoring equipment, and personal protective equipment. Items to be decontaminated will be brushed off, rinsed, and dropped into a plastic container supplied for that purpose. They will then be washed with a detergent solution and rinsed with clean water. Monitoring instruments may be wrapped in plastic bags prior to entering the field in order to reduce the potential for contamination. Instrumentation that is contaminated during field operations will be carefully wiped down. Heavy equipment, if utilized for operations where it may be contaminated, will have prescribed decontamination procedures to prevent contaminant materials from potentially leaving the Site. On-site contractors, such as drillers or backhoe operators, will be responsible for decontaminating all construction equipment prior to demobilization.

SECTION 12 – DISPOSAL PROCEDURES

All discarded materials, waste materials, or other objects shall be handled in such a way as to reduce or eliminate the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left on-site. All potentially contaminated materials, e.g., clothing, gloves, etc., will be bagged or drummed as necessary and segregated for proper disposal. All contaminated waste materials shall be disposed of as required by the provisions included in the contract and consistent with regulatory provisions. All non-contaminated materials shall be collected and bagged for appropriate disposal. Investigation derived waste will be managed consistent with the work plan for this Site and DER-10 Technical Guidance for Site Investigation and Remediation dated May 2010.

SECTION 13 - EMERGENCY RESPONSE PROCEDURES

As a result of the hazards at the Site, and the conditions under which operations are conducted, there is the possibility of emergency situations. This section establishes procedures for the implementation of an emergency plan.

13.1 Emergency Coordinator

Emergency Coordinator: ..... Cody Martin .....Work Phone: (716) 847-1630

The Emergency Coordinator or his on-site designee will, in concert with Campus Square LLC, implement the emergency response procedures whenever conditions at the Site warrant such action. The Emergency Coordinator or his on-site designee will be responsible for assuring the evacuation, emergency treatment, emergency transport of C&S personnel as necessary, and notification of emergency response units (refer to phone listing in the beginning of this HASP) and the appropriate management staff.

13.2 Evacuation

In the event of an emergency situation, such as fire, explosion, significant release of toxic gases, etc., all personnel will evacuate and assemble in a designated assembly area. The Emergency Coordinator or his on-site designee will have authority to contact outside services as required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The Emergency Coordinator or his on-site designee must see that access for emergency equipment is provided and that all ignition sources have been shut down once the emergency situation is established. Once the safety of all personnel is established, the Fire Department and other emergency response groups will be notified by telephone of the emergency.

13.3 Potential or Actual Fire or Explosion

Immediately evacuate the Site and notify local fire and police departments, and other appropriate emergency response groups, if LEL values are above 25% in the work zone or if an actual fire or explosion has taken place.

13.4 Environmental Incident (spread or release of contamination)

Control or stop the spread of contamination if possible. Notify the Emergency Coordinator and the Project Manager. Other appropriate response groups will be notified as appropriate.

13.5 Personnel Injury

Emergency first aid shall be applied on-site as necessary. Then, decontaminate (en route if necessary) and transport the individual to nearest medical facility if needed. The ambulance/rescue squad shall be contacted for transport as necessary in an emergency. The directions to the hospital are shown in Section 1 of this HASP and a map is shown in Attachment A.

13.6 Personnel Exposure

- *Skin Contact*: Use copious amounts of soap and water. Wash/rinse affected area thoroughly, and then provide appropriate medical attention. Eyes should be thoroughly rinsed with water for at least 15 minutes.
- *Inhalation*: Move to fresh air and/or, if necessary, decontaminate and transport to emergency medical facility.
- *Ingestion*: Decontaminate and transport to emergency medical facility.
- *Puncture Wound/Laceration*: Decontaminate, if possible, and transport to emergency medical facility.

13.7 Adverse Weather Conditions

In the event of adverse weather conditions, the HSO will determine if work can continue without sacrificing the health and safety of field workers.

13.8 Incident Investigation and Reporting

In the event of an incident, procedures discussed in the Medical Emergency/Incident Response Protocol, presented in Appendix B of this HASP, shall be followed.

SECTION 14 - COMMUNITY RELATIONS

14.1 Community Health and Safety Plan

14.1.1 Community Air Monitoring Plan

Efforts will be taken to complete field work in a manner which will minimize the creation of airborne dust or particulates. Under dry conditions, work areas may be wetted to control dust. During periods of extreme wind, intrusive field work may be halted until such time as the potential for creating airborne dust or particulate matter as a result of investigation activities is limited.

SECTION 15 - AUTHORIZATIONS

Personnel authorized to enter the Site while operations are being conducted must be approved by the HSO. Authorization will involve completion of appropriate training courses, medical examination requirements, and review and sign-off of this HASP. No C&S personnel should enter

the work zone alone. Each site visitor should check in with the HSO or Project Manager prior to entering the work zones.

FIGURE 1

SITE LOCATION MAP

C&S ENGINEERS

C&S COMPANIES®
C&S Engineers, Inc.
90 Broadway
Buffalo, New York 14203
Phone: 716-847-1630
Fax: 716-847-1454
www.cscos.com

3

JAMESTOWN CONTAINER CORP

FALCONER, NEW YORK

MARK	DATE	DESCRIPTION

REVISIONS

PROJECT NO:	N30.001.001
DATE:	August 21, 2017
DRAWN BY:	C. Martin
DESIGNED BY:	C. Martin
CHECKED BY:	

SITE LOCATION MAP

FIGURE 1

Path: F:\Project\N30 - Jamestown Container\N30001001 - Jamestown Container\Environmental\CADD-GIS\GIS\Projects\Untitled.mxd

FIGURE 2

SITE AERIAL PHOTO

C&S ENGINEERS

Legend

- Existing Building
- Historic Buildings
- Groundwater Contours
- Rail Road

0 50 100 200 Feet

C&S COMPANIES®
C&S Engineers, Inc.
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Buffalo, New York 14203
Phone: 716-847-1630
Fax: 716-847-1454
www.cscos.com

3

JAMESTOWN CONTAINER CORP
FALCONER, NEW YORK

MARK	DATE	DESCRIPTION
REVISIONS		

PROJECT NO:	N30.001.001
DATE:	August 21, 2017
DRAWN BY:	C. Martin
DESIGNED BY:	C. Martin
CHECKED BY:	

SITE LOCATION MAP

FIGURE 1

Path: F:\Project\N30 - Jamestown Container\N30001001 - Jamestown Container\Environmental\CADD-GIS\GIS\Projects\Untitled.mxd

ATTACHMENT A

MAP TO HOSPITAL

C&S ENGINEERS

bing maps

A 65 S Dow St, Falconer, NY 14733
B Upmc Chautauqua Wca Hospital, 51 Glasgow Ave, Jamestown, NY 14701

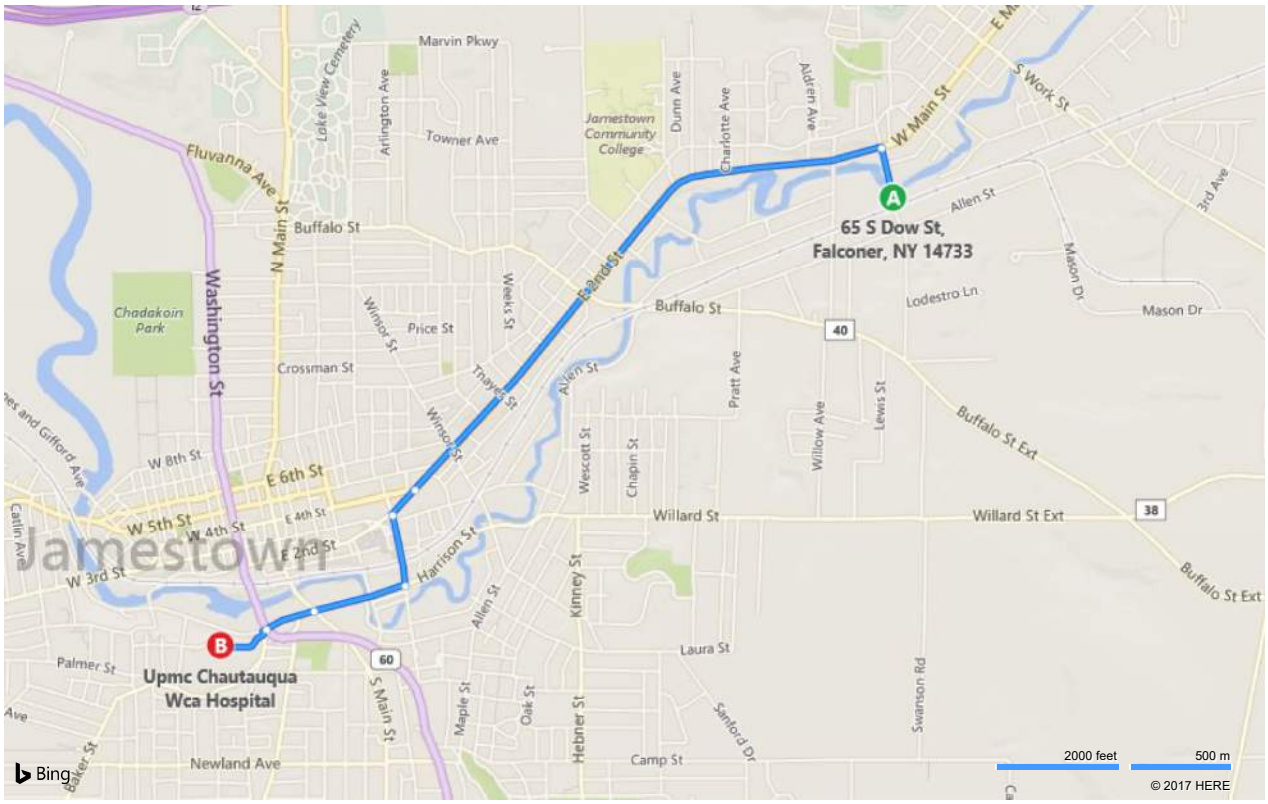
10 min, 3.0 mi
Light traffic (9 min without traffic)
Via RT-394

Type your route notes here

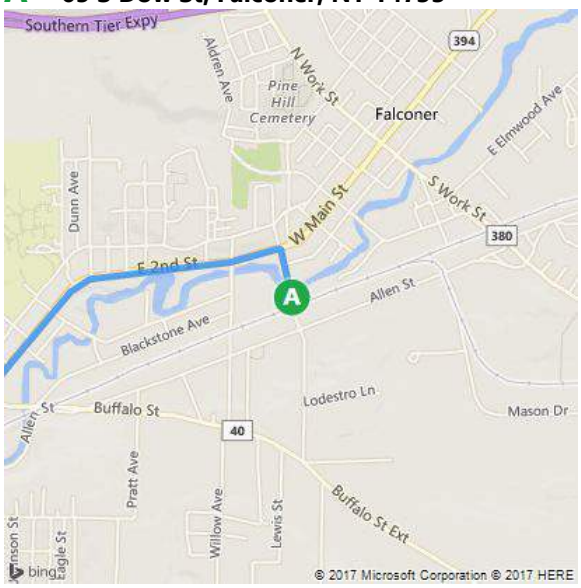
A 65 S Dow St, Falconer, NY 14733

↑	1.	Depart **S Dow St** toward W Everett St	0.2 mi
↰	2.	Turn **left** onto **RT-394 / W Main St** Pass 7-Eleven in 1.1 mi	1.9 mi
↑	3.	Keep **left** onto **E 2nd St** KFC on the corner	0.1 mi
↰	4.	Turn **left** onto **Foote Ave**	0.2 mi
↱	5.	Turn **right** onto **Harrison St**	0.3 mi
↑	6.	Road name changes to **W Harrison St**	0.2 mi
↑	7.	Keep **right** onto **Steele St**	72 ft
↰	8.	Turn **left** onto **Glasgow Ave**	0.2 mi
	9.	Arrive at **Glasgow Ave** on the left The last intersection is Steele St If you reach Culver St, you've gone too far	

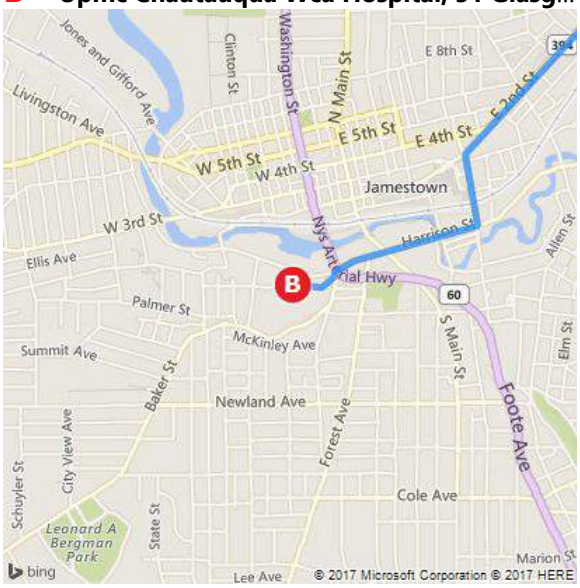
B Upmc Chautauqua Wca Hospital



A **65 S Dow St, Falconer, NY 14733**



B **Upmc Chautauqua Wca Hospital, 51 Glasg...**



Appendix A

EXCAVATION/TRENCHING GUIDELINE

C&S ENGINEERS

C&S ENGINEERS, INC. HEALTH & SAFETY GUIDELINE #14
EXCAVATION/TRENCHING OPERATIONS

TABLE OF CONTENTS

C&S ENGINEERS, INC.
EXCAVATION/TRENCHING OPERATIONS

1.0 PURPOSE

To establish safe operating procedures for excavation/trenching operations at C&S work sites.

2.0 SCOPE

Applies to all C&S activity where excavation or trenching operations take place.

3.0 DEFINITIONS

Excavation — Any manmade cavity or depression in the earth's surface, including its sides, walls, or faces, formed by earth removal and producing unsupported earth conditions by reasons of the excavation.

Trench — A narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.

4.0 RESPONSIBILITY EMPLOYEES

Employees — All employees must understand and follow the procedures outlined in this guideline during all excavation and trenching operations.

Health and Safety Coordinator/Officer (HSC/HSO) - The HSC/HSO is responsible for ensuring that these procedures are implemented at each work site.

5.0 GUIDELINES

5.1 Hazards Associated With Excavation/Trenching

The principal hazards associated with excavation/trenching are:

- Suffocation, crushing, or other injury from falling material.
- Damage/failure of installed underground services and consequent hazards.
- Tripping, slipping, or falling.
- Possibility of explosive, flammable, toxic, or oxygen-deficient atmosphere in excavation.

5.2 Procedures Prior to Excavation

1. Underground Utilities

   - Determine the presence and location of any underground chemical or utility pipes, electrical, telephone, or instrument wire or cables.
   - If the local DigSafely NY is unable to locate private/domestic or plant utilities, then an independent utility locating service must be contacted and mobilized to the site.
   - Identify the location of underground services by stakes, markers or paint.
   - Arrange to de-energize or isolate underground services during excavation. If not possible, or if location is not definite, method of excavation shall be established to minimize hazards by such means as:

     a) Use of hand tools in area of underground services.
     b) Insulating personnel and equipment from possible electrical contact.
     c) Use of tools or equipment that will reduce possibility of damage to underground services and hazard to worker.

2. Identify Excavation Area — Areas to be excavated shall be identified and segregated by means of barricades, ropes, and/or signs to prevent access of unauthorized personnel and equipment. Suitable means shall be provided to make barriers visible at all times.
3. Surface Water Provide means of diverting surface water from excavation.
4. Shoring/Bracing — Shoring or bracing that may be required for installed equipment adjacent to the excavation shall be designed by a competent person.
5. Structural Ramps — Structural ramps that are used solely by employees as a means of access to or egress from the excavation shall be designed by a competent person.

5.3 Procedures For Doing The Excavation

1. **Determine the need for shoring/sloping** — the type of soil will establish the need for shoring, slope of the excavation, support systems, and equipment to be used. The soil condition may change as the excavation proceeds. Appendices A, B, C, D, E, and F of the OSHA Excavation Regulation, 29 CFR 1926 Subpart P, are to be used in defining shoring and sloping requirements.

2. **Mobile equipment** — For safe use of mobile industrial equipment in or near the excavation, the load carrying capacity of soil shall be established and suitable protection against collapse of soil provided by the use of mats, barricades, restricting the location of equipment, or shoring.

3. Excavated material (spoil) shall be stored at least two (2) feet from the edge of the excavation.

4. All trench (vertical sides) excavations greater than five (5) feet deep shall be shored.

5. The excavation shall be inspected daily for changes in conditions, including the presence of ground water, change in soil condition, or effects of weather such as rain or freeze. A safe means of continuing the work shall be established based on changes in condition. Typically test trench excavations made as part of an environmental subsurface nvestigation are made and backfilled the same day.

6. Appropriate monitoring for gas, toxic, or flammable materials will be conducted to establish the need for respiratory equipment, ventilation, or other measures required to continue the excavation safely.

7. Adequate means of dewatering the excavation shall be provided by the contractor as required.

8. A signal person shall be provided to direct powered equipment if working in the excavation with other personnel.

9. A signal person shall be provided when backfilling excavations to direct powered equipment working in the excavation with other personnel.

10. Warning vests will be worn when employees are exposed to public vehicular traffic.

11. Employees shall stand away from vehicles being loaded or unloaded, and shall not be permitted underneath loads handled by lifting or dragging equipment.

12. Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available if hazardous atmospheric conditions exist or may be expected to develop. The specifics will be determined by the HSC/HSM.

13. Walkways or bridges with standard guardrail shall be provided where employees or equipment are required or permitted to cross over excavations.

5.4 Entering the Excavation

No C&S Engineers, Inc., employee shall enter an excavation which fails to meet the requirements of Section 5.3 of this guideline.

6.0 REFERENCES

29 CFR 1926, Subpart P - Excavations

7.0 ATTACHMENTS

29 CFR 1926 Subpart P - Appendices A, B, F

• **Part Number:**	1926
• **Part Title:**	Safety and Health Regulations for Construction
• **Subpart:**	P
• **Subpart Title:**	Excavations
• **Standard Number:**	1926 Subpart P App A
• **Title:**	Soil Classification

(a) Scope and application - (1) Scope. This appendix describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. The appendix contains definitions, sets for requirements, and describes acceptable visual and manual tests for use in classifying soils.

(2) Application. This appendix applies when a sloping or benching system is designed in accordance with the requirements set fo 1926.652(b)(2) as a method of protection for employees from cave-ins. This appendix also applies when timber shoring for excav designed as a method of protection from cave-ins in accordance with appendix C to subpart P of part 1926, and when aluminum shoring is designed in accordance with appendix D. This Appendix also applies if other protective systems are designed and selec from data prepared in accordance with the requirements set forth in 1926.652(c), and the use of the data is predicated on the us classification system set forth in this appendix.

(b) Definitions. The definitions and examples given below are based on, in whole or in part, the following; American Society for T Materials (ASTM) Standards D653-85 and D2488; The Unified Soils Classification System; The U.S. Department of Agriculture (US Textural Classification Scheme; and The National Bureau of Standards Report BSS-121.

"Cemented soil" means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

"Cohesive soil" means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sideslopes, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

"Dry soil" means soil that does not exhibit visible signs of moisture content.

"Fissured" means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

"Granular soil" means gravel, sand, or silt (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

"Layered system" means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

"Moist soil" means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

"Plastic" means a property of a soil which allows the soil to be

deformed or molded without cracking, or appreciable volume change.

"Saturated soil" means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or sheer vane.

"Soil classification system" means, for the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the characteristics of the deposits and the environmental conditions of exposure.

"Stable rock" means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

"Submerged soil" means soil which is underwater or is free seeping.

"Type A" means cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:

(i) The soil is fissured; or

(ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or

(iii) The soil has been previously disturbed; or

(iv) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or

(v) The material is subject to other factors that would require it to be classified as a less stable material.

"Type B" means:

(i) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or

(ii) Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.

(iii) Previously disturbed soils except those which would otherwise be classed as Type C soil.

(iv) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or

(v) Dry rock that is not stable; or

(vi) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

"Type C" means:

(i) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or

(ii) Granular soils including gravel, sand, and loamy sand; or

(iii) Submerged soil or soil from which water is freely seeping; or

(iv) Submerged rock that is not stable, or

(v) Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.

"Unconfined compressive strength" means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.

"Wet soil" means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

(c) Requirements - (1) Classification of soil and rock deposits. Each soil and rock deposit shall be classified by a competent perso Rock, Type A, Type B, or Type C in accordance with the definitions set forth in paragraph (b) of this appendix.

(2) Basis of classification. The classification of the deposits shall be made based on the results of at least one visual and at least analysis. Such analyses shall be conducted by a competent person using tests described in paragraph (d) below, or in other reco methods of soil classification and testing such as those adopted by the American Society for Testing Materials, or the U.S. Depart Agriculture textural classification system.

(3) Visual and manual analyses. The visual and manual analyses, such as those noted as being acceptable in paragraph (d) of thi shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify prc properties, factors, and conditions affecting the classification of the deposits.

(4) Layered systems. In a layered system, the system shall be classified in accordance with its weakest layer. However, each laye classified individually where a more stable layer lies under a less stable layer.

(5) Reclassification. If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any w changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumst

(d) Acceptable visual and manual tests. - (1) Visual tests. Visual analysis is conducted to determine qualitative information regarc excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil take samples from excavated material.

(i) Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the amounts of the particle sizes. Soil that is primarily composed of fine-grained material material is cohesive material. Soil composec of coarse-grained sand or gravel is granular material.

(ii) Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does nc clumps is granular.

(iii) Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack-like openings such as tens could indicate fissured material. If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of m ground and are indications of potentially hazardous situations.

(iv) Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground s and to identify previously disturbed soil.

(v) Observed the opened side of the excavation to identify layered systems. Examine layered systems to identify if the layers slop the excavation. Estimate the degree of slope of the layers.

(vi) Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water see the sides of the excavation, or the location of the level of the water table.

(vii) Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the s the excavation face.

(2) Manual tests. Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil a provide more information in order to classify soil properly.

(i) Plasticity. Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8-inch in diameter. Cohe material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of 1/8-inch be held on one end without tearing, the soil is cohesive.

(ii) Dry strength. If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is g combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clu only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps wh break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the s considered unfissured.

(iii) Thumb penetration. The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive so test is based on the thumb penetration test described in American Society for Testing and Materials (ASTM) Standard designatior "Standard Recommended Practice for Description of Soils (Visual - Manual Procedure).") Type A soils with an unconfined compre strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great eff soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molde finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practical excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influe flooding), the classification of the soil must be changed accordingly.

(iv) Other strength tests. Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetron using a hand-operated shearvane.

(v) Drying test. The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesi and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.5 six inches (15.24 cm) in diameter until it is thoroughly dry:

(A) If the sample develops cracks as it dries, significant fissures are indicated.

(B) Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil ha cohesive material content. The soil can be classified as an unfissured cohesive material and the unconfined compressive strength determined.

(C) If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cc fissures. If they pulverize easily into very small fragments, the material is granular.

Next Standard (1926 Subpart P App B)

Regulations (Standards - 29 CFR) - Table of Contents

• **Part Number:**	1926
• **Part Title:**	Safety and Health Regulations for Construction
• **Subpart:**	P
• **Subpart Title:**	Excavations
• **Standard Number:**	1926 Subpart P App B
• **Title:**	Sloping and Benching

(a) ***Scope and application.*** This appendix contains specifications for sloping and benching when used as methods of protecting working in excavations from cave-ins. The requirements of this appendix apply when the design of sloping and benching protectiv is to be performed in accordance with the requirements set forth in § 1926.652(b)(2).

(b) ***Definitions.***

Actual slope means the slope to which an excavation face is excavated.

Distress means that the soil is in a condition where a cave-in is imminent or is likely to occur. Distress is evidenced by such phen the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slu material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the fa excavation; and ravelling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the excavation and trickling or rolling down into the excavation.

Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site condi protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).

Short term exposure means a period of time less than or equal to 24 hours that an excavation is open.

(c) ***Requirements*** -- (1) ***Soil classification.*** Soil and rock deposits shall be classified in accordance with appendix A to subpart I 1926.

(2) ***Maximum allowable slope.*** The maximum allowable slope for a soil or rock deposit shall be determined from Table B-1 of tl appendix.

(3) ***Actual slope.*** (i) The actual slope shall not be steeper than the maximum allowable slope.

(ii) The actual slope shall be less steep than the maximum allowable slope, when there are signs of distress. If that situation occur slope shall be cut back to an actual slope which is at least ½ horizontal to one vertical (½H:1V) less steep than the maximum allo slope.

(iii) When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person sh determine the degree to which the actual slope must be reduced below the maximum allowable slope, and shall assure that such achieved. Surcharge loads from adjacent structures shall be evaluated in accordance with § 1926.651(i).

(4) ***Configurations.*** Configurations of sloping and benching systems shall be in accordance with Figure B-1.

TABLE B-1
MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V)(1) FOR EXCAVATIONS LESS THAN 20 FEET DEEP(3)
STABLE ROCK	VERTICAL (90°)
TYPE A (2)	3/4:1 (53°)
TYPE B	1:1 (45°)
TYPE C	1 ½:1 (34°)

Footnote(1) Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angle rounded off.

Footnote(2) A short-term maximum allowable slope of 1/2H:1V (63°) is allowed in excavations in Type A soil that are 12 feed (3.67 m) or l depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53°).

Footnote(3) Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

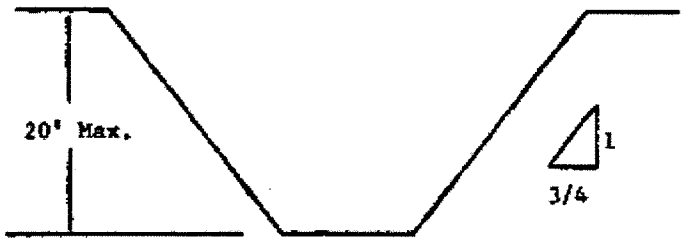
Figure B-1

Slope Configurations

(All slopes stated below are in the horizontal to vertical ratio)

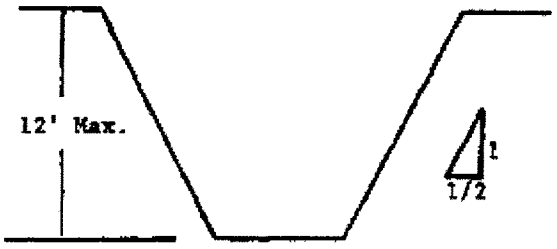
B-1.1 Excavations made in Type A soil.

1. All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of ¾:1.



SIMPLE SLOPE -- GENERAL

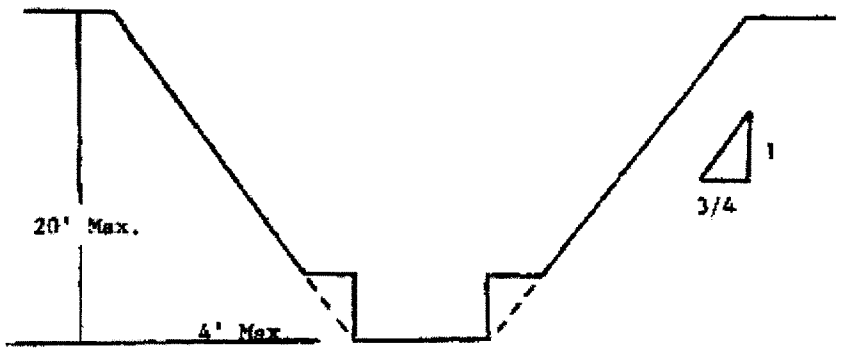
Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have maximum allowable slope of ½:1.



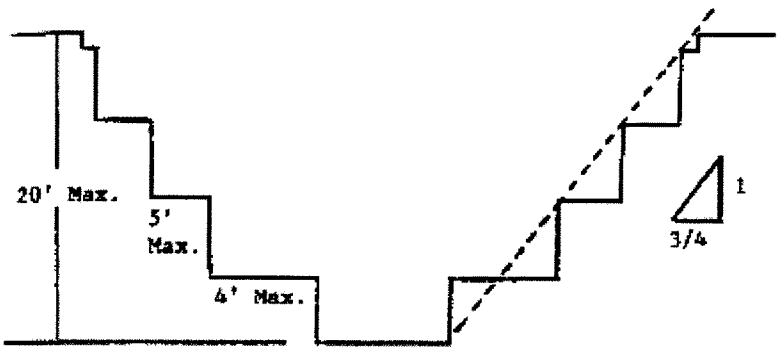
SIMPLE SLOPE -- SHORT TERM

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 3/4 to 1 and maximum bench dimens

follows:

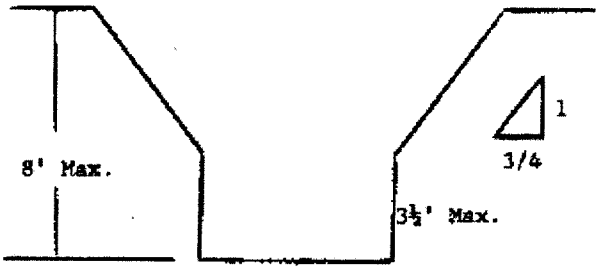


SIMPLE BENCH



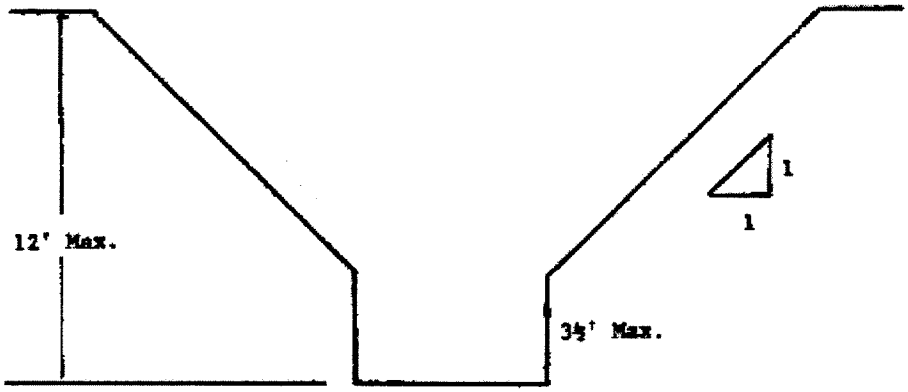
MULTIPLE BENCH

3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical sid feet.



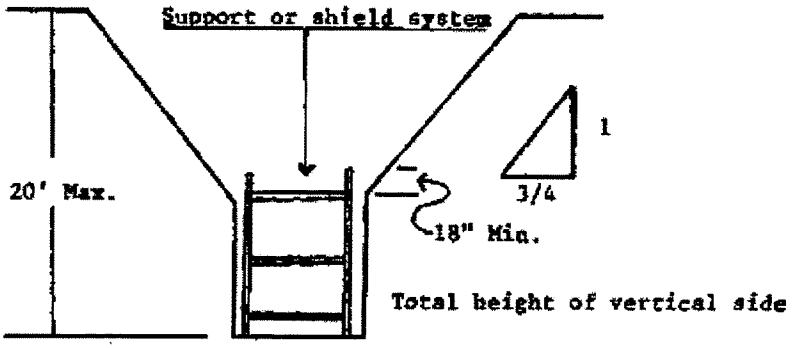
UNSUPPORTED VERTICALLY SIDED LOWER PORTION -- MAXIMUM 8 FEET IN DEPTH)

All excavations more than 8 feet but not more than 12 feet in depth with unsupported vertically sided lower portions shall have a r allowable slope of 1:1 and a maximum vertical side of 3½ feet.



UNSUPPORTED VERTICALLY SIDED LOWER PORTION -- MAXIMUM 12 FEET IN DEPTH)

All excavations 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maxi allowable slope of ¾:1. The support or shield system must extend at least 18 inches above the top of the vertical side.

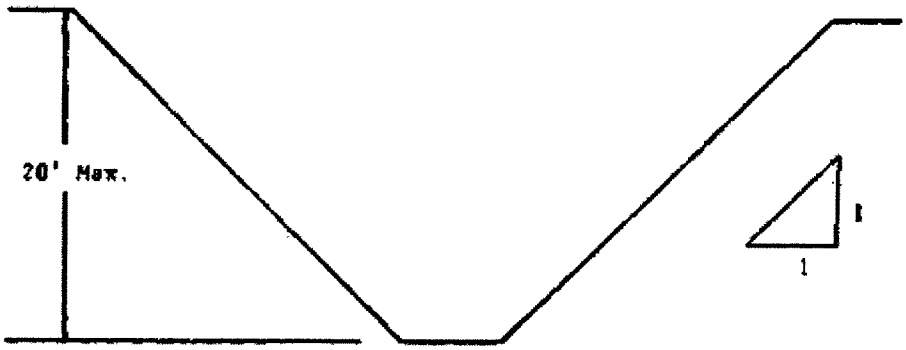


SUPPORTED OR SHIELDED VERTICALLY SIDED LOWER PORTION

4. All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other opt permitted under § 1926.652(b).

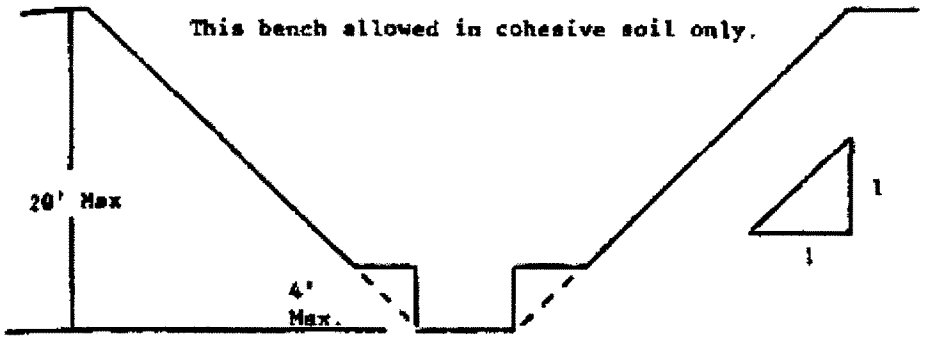
B-1.2 Excavations Made in Type B Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.

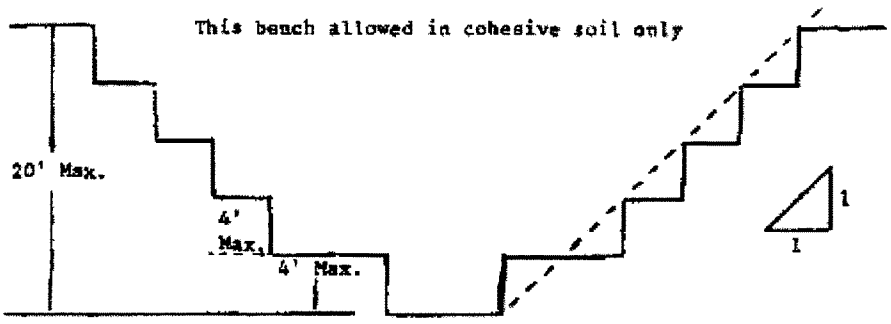


SIMPLE SLOPE

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions

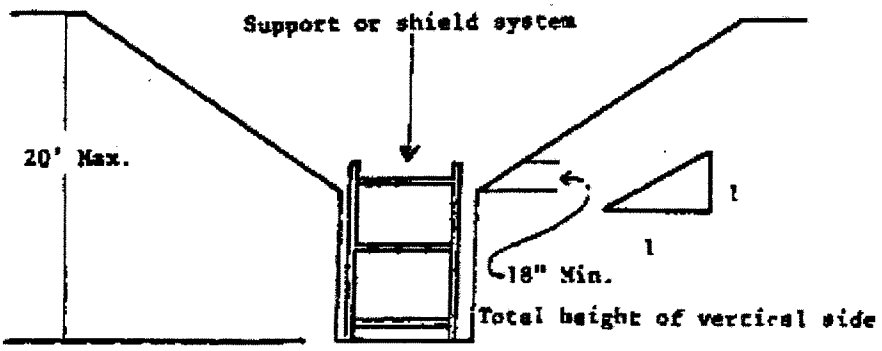


SINGLE BENCH



MULTIPLE BENCH

3. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at le inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.

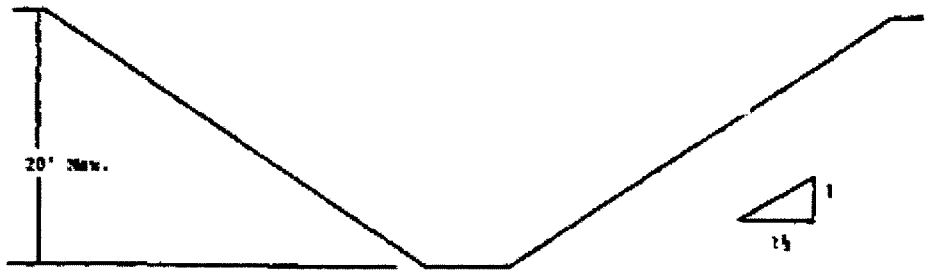


VERTICALLY SIDED LOWER PORTION

4. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652(b).

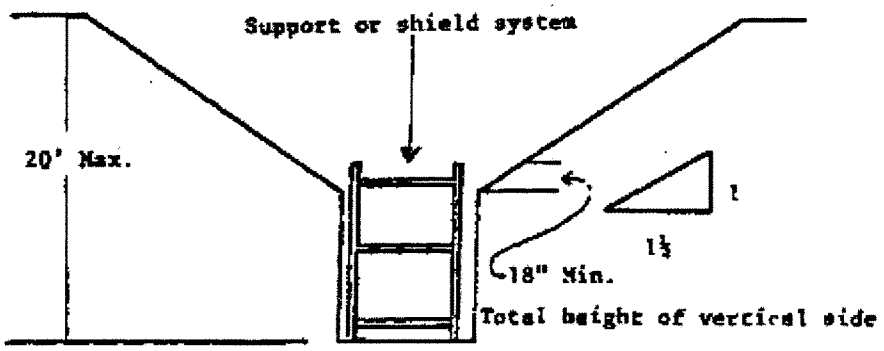
B-1.3 Excavations Made in Type C Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1½:1.



SIMPLE SLOPE

2. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at le inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1½:1.

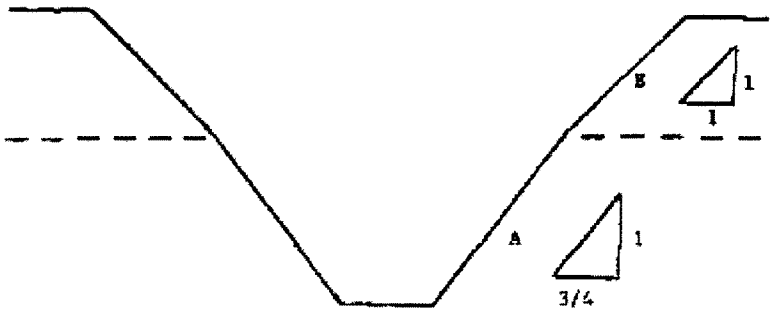


VERTICAL SIDED LOWER PORTION

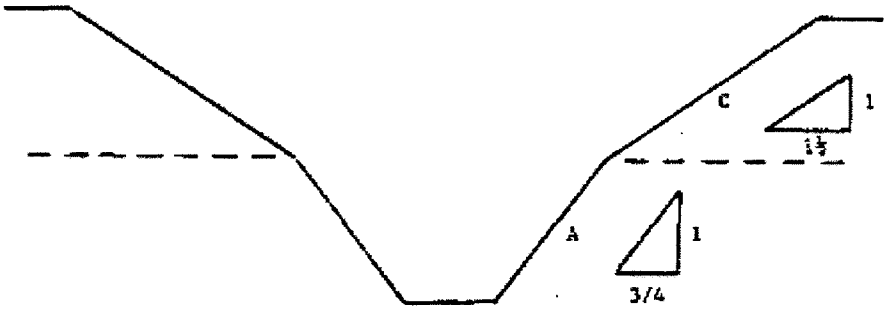
3. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652(b).

B-1.4 Excavations Made in Layered Soils

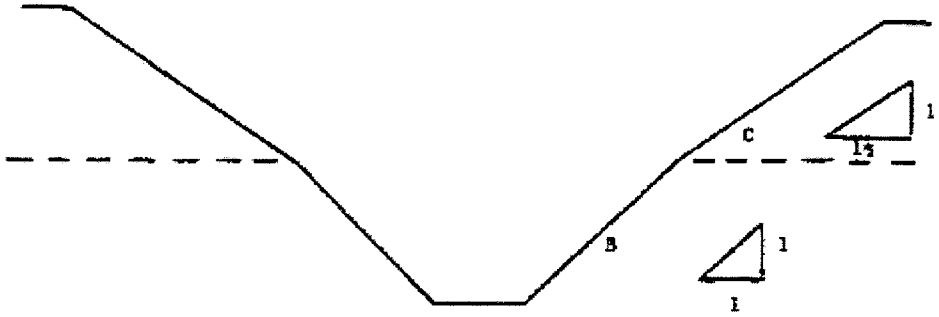
1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth b



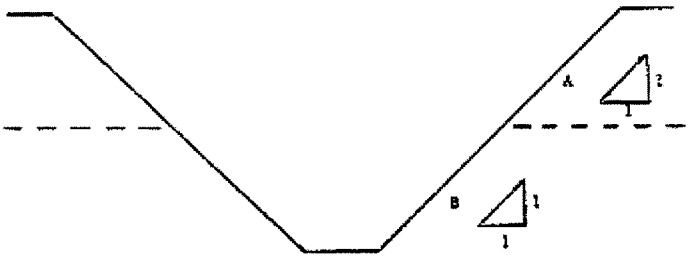
B OVER A



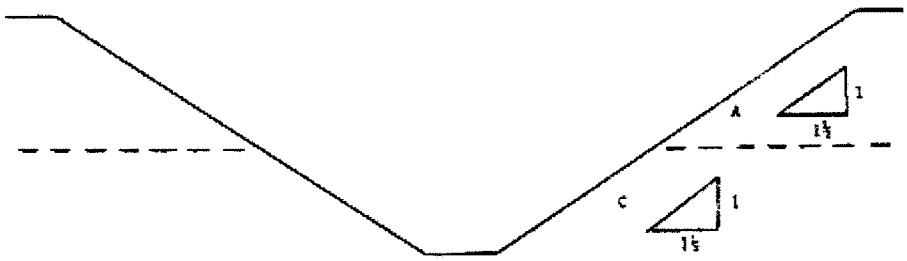
C OVER A



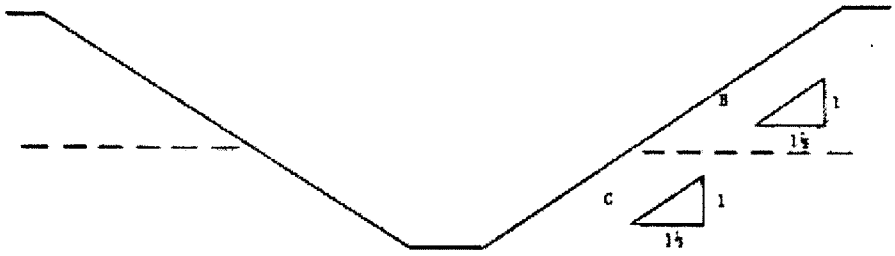
C OVER B



A OVER B



A OVER C



B OVER C

2. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652(b).

Next Standard (1926 Subpart P App C)

Regulations (Standards - 29 CFR) - Table of Contents

- **Part Number:** 1926
- **Part Title:** Safety and Health Regulations for Construction
- **Subpart:** P
- **Subpart Title:** Excavations
- **Standard Number:** 1926 Subpart P App F
- **Title:** Selection of Protective Systems

The following figures are a graphic summary of the requirements contained in subpart P for excavations 20 feet or less in depth. Prc systems for use in excavations more than 20 feet in depth must be designed by a registered professional engineer in accordance wit 1926.652(b) and (c).

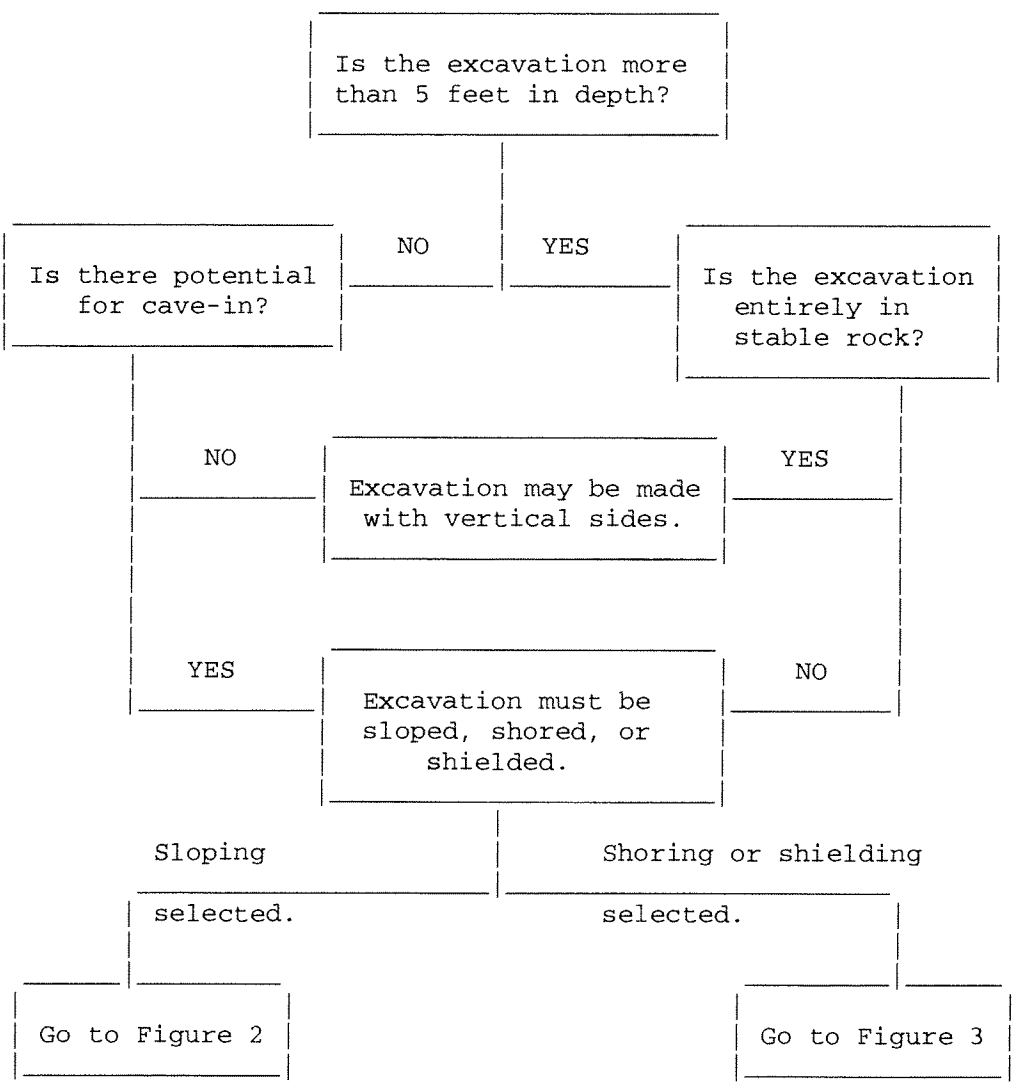


FIGURE 1 - PRELIMINARY DECISIONS

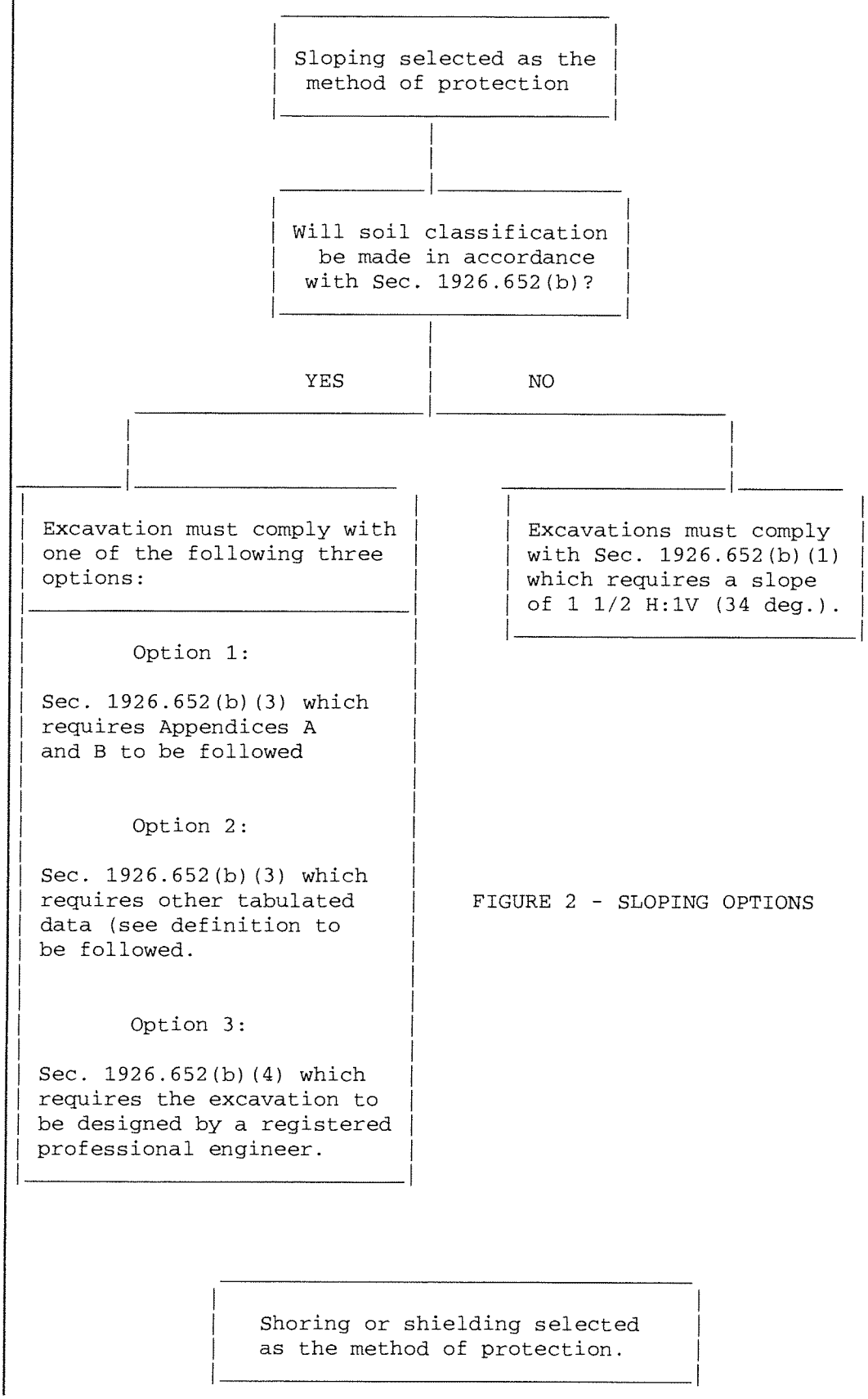


FIGURE 2 - SLOPING OPTIONS

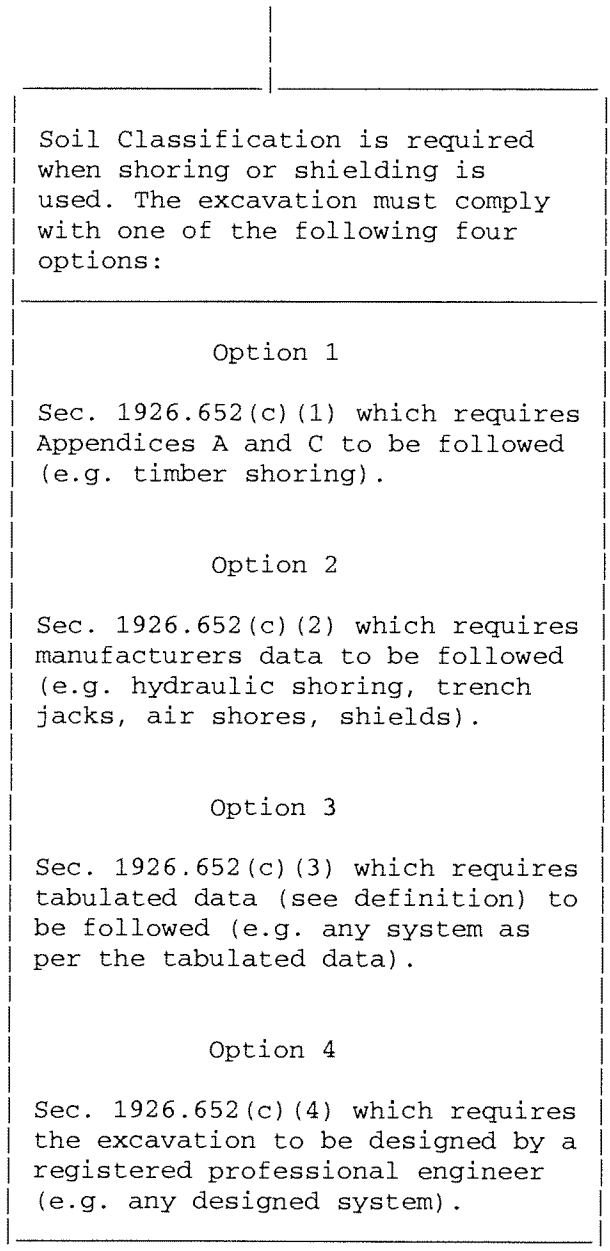


FIGURE 3 - SHORING AND SHIELDING OPTIONS

Next Standard (1926 Subpart Q)

Regulations (Standards - 29 CFR) - Table of Contents

Appendix B

GUIDANCE ON INCIDENT INVESTIGATION

AND REPORTING

C&S ENGINEERS

3. Following the treatment and care of the injured employee, the emergency coordinator or his on-site designee and the project manager will initiate the completion of the first injury report. The Health & Safety Manager will assist.

Project Manager

1. Upon notification of a personal injury or illness on the job site, will notify C & S Engineers, Inc, President and Corporate Legal and C&S Companies Health and Safety Manager.
2. Will report to the worksite to initiate the first injury report.
3. Will report to the treatment facility to check on the well being of the injured employee. The project manager will ensure that the treatment facility is aware that this is a workers compensation case.
4. Will assist the Health and Safety Manager in the analysis of the incident.

Health & Safety Manager

1. Upon notification of the personal injury will determined if it is necessary to report to the treatment facility or the accident site, depending on the nature of the injuries and the circumstances of the accident.
2. Will report to the worksite to begin a root cause analysis investigation of the accident. The investigation may include interview of witnesses, field crew , and project manager, the photographing of the scene, reconstruction of the accident scene, using test instruments and taking measurements. The Health and Safety Manager may draw diagrams from the information learned.
3. The Health and Safety Manager will work with the owner/client as necessary to investigate the accident.
4. The Health & Safety manager will ensure that the site is safe to resume work.
5. The Health & Safety Manager shall initiate the New York State Compensation form requirements (C-2) and forward a copy of the C-2 to the C & S Engineers, Inc. controller for transmittal to the Compensation Carrier within 8 hrs of notification of the incident or by the end of the next business day.
6. The Health and Safety manager, upon completion of the investigation, will provide the Project Manager with a written investigative report (copy to the President)
7. The accident will be reviewed at the next Project Managers meeting with the intent to prevent further or similar events on other projects.
8. The Health & Safety Manager will assess the incident to determine OSHA record ability and make record if necessary on the OSHA 300 form, within five working days.

Incident Response

1.0 PURPOSE

To prevent the occurrence of accidents on C&S Engineers, Inc., work sites and to establish a procedure for investigation and reporting of incidents occurring in, or related to C&S work activities.

2.0 SCOPE

Applies to all incidents related to C&S Engineers, Inc. work activities.

3.0 DEFINITIONS

Accident - An undesired event resulting in personal injury and/or property damage, and/or equipment failure.

Fatality - An injury or illness resulting in death of the individual.

Incident - Any occurrence which results in, or could potentially result in, the need for medical care or property damage. Such incidents shall include lost time accidents or illness, medical treatment cases, unplanned exposure to toxic materials or any other significant occurrence resulting in property damage or in "near misses."

Incidence Rate - the number of injuries, illnesses, or lost workdays related to a common exposure base of 100 full-time workers. The rate is calculated as:

N/EH x 200,000

N = number of injuries and illnesses or lost workday cases; EH = total hours worked by all associates during calendar year. 200,000 = base for 100 full-time equivalent workers (working 40 hours per week, 50 weeks per year).

Injury - An injury such as a cut, fracture, sprain, amputation, etc. which results from a work accident or from a single instantaneous event in the work environment.

Lost Workday Case - A lost workday case occurs when an injured or ill employee experiences days away from work beginning with the next scheduled work day. Lost workday cases do not occur unless the employee is effected beyond the day of injury or onset of illness.

Recordable Illness - An illness that results from the course of employment and must be entered on the OSHA 300 Log and Summary of Occupational Injuries and Illnesses. These illnesses require medical treatment and evaluation of work related injury. For example, dermatitis, bronchitis, irritation of eyes, nose, and throat can result from work and non-work related incidents.

Recordable Injury - An injury that results from the course of employment and must be entered on the OSHA 300 Log and Summary of Occupational Injuries and Illnesses. These injuries require medical treatment; may involve loss of consciousness; may result in restriction of work or motion or transfer to another job; or result in a fatality.

Near Miss - An incident which, if occurring at a different time or in a different personnel or equipment configuration, would have resulted in an incident.

4.0 RESPONSIBILITIES

Employees - It shall be the responsibility of all C&S Engineers, Inc. employees to report all incidents as soon as possible to the HSC, regardless of the severity.

Human Resources - has overall responsibility for maintaining accident/ incident reporting and investigations according to current regulations and recording injuries/ illness on the OSHA 300 log, and posting the OSHA 300 log.

Emergency Coordinator - It is the responsibility of the Emergency Coordinator to investigate and prepare an appropriate report of all accidents, illnesses, and incidents occurring on or related to C&S Engineers, Inc. work. The Emergency Coordinator shall complete Attachment A within 24 hours of the incident occurrence.

Health and Safety Manager (HSM) - It is the responsibility of the HSM to investigate and prepare an appropriate report of all lost time injuries and illnesses and significant incidents occurring on or related to C&S Companies. The HSM shall maintain the OSHA 300 form.

Project Managers (PM) - It shall be the PM's responsibility to promptly correct any deficiencies in personnel, training, actions, or any site or equipment deficiencies that were determined to cause or contribute to the incident investigated.

5.0 GUIDELINES

5.1 Incident Investigation

The Project Manager will immediately investigate the circumstances surrounding the incident and will make recommendations to prevent recurrence. The HSM shall be immediately notified by telephone if a serious accident/ incident occurs. The incident shall be evaluated to determine whether it is OSHA recordable. If the incident is determined to be OSHA 300 recordable, it shall be entered on the OSHA 300 form.

The Project Manager with assistance from the HSM must submit to the office an incident report form pertaining to any incident resulting in injury or property damage.

5.2 Incident Report

The completed incident report must be completed by the Project Manager within 12 hours of the incident and distributed to the HSM, and Human Resources. This form shall be maintained by Human Resources for at least five years for all OSHA recordable cases. This form serves as an equivalent to the OSHA 101 form.

5.3 Incident Follow-up Report

The Incident Follow-Up Report (Attachment B) shall be distributed with the Incident Report within one week of the incident. Delay in filing this report shall be explained in a brief memorandum.

5.4 Reporting of Fatalities or Multiple Hospitalization Accidents

Fatalities or accidents resulting in the hospitalization of three or more employees must be reported to OSHA verbally or in writing within 8 hours. The report must contain 1) circumstances surrounding the accident(s), 2) the number of fatalities, and 3) the extent of any injuries.

5.5 OSHA 300A Summary Form

Recordable cases must be entered on the log within six workdays of receipt of the information that a recordable case has occurred. The OSHA log must be kept updated to within 45 calendar days.
OSHA 300 forms must be updated during the 5 year retention period, if there is a change in the extent or outcome of an injury or illness which affects an entry on a log. If a change is necessary, the original entry should be lined out and a corrected entry made on that log. New entries should be made for previously unrecorded cases that are discovered or for cases that initially weren't recorded but were found to be recordable after the end of the year. Log totals should also be modified to reflect these changes.

5.5.1 Posting

The log must be summarized at the end of the calendar year and the summary must be posted from February 1 through May 31.

5.6 OSHA 300A

Facilities selected by the Bureau of Labor Statistics (BLS) to participate in surveys of occupational injuries and illnesses will receive the OSHA 300A. The data from the annual summary on the OSHA 300 log should be transferred to the OSHA 300A, other requested information provided and the form returned as instructed by the BLS.

5.7 Access to OSHA Records

All OSHA records (accident reporting forms and OSHA 300 logs) should be available for inspection and copying by authorized Federal and State government officials.

Employees, former employees, and their representatives must be given access for inspection and copying to only the log, OSHA No. 300, for the establishment in which the employee currently works or formerly worked.

6.0 REFERENCES

29 CFR Part 1904

7.0 ATTACHMENTS

Attachment A - Incident Investigation Form
Attachment B - Incident Follow-Up Report
Attachment C - Establishing Recordability

ATTACHMENT A

INCIDENT INVESTIGATION FORM

Accident investigation should include:

Location: _____

Time of Day: _____

Accident Type: _____

Victim: _____

Nature of Injury: _____

Released Injury: _____

Hazardous Material: _____

Unsafe Acts: _____

Unsafe Conditions: _____

Policies, Decisions: _____

_____

Personal Factors: _____

_____

Environmental Factors: _____

_____

_____

ATTACHMENT B

Date _____

Foreman: _____

INCIDENT FOLLOW-UP REPORT

Date of Incident: _____

Site: _____

Brief description of incident: _____

_____

_____

_____

_____

Outcome of incident: _____

_____

_____

_____

Physician's recommendations: _____

_____

_____

_____

Date the injured returned to work: _____

Project Manager Signature: _____

Date: _____

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

ATTACHMENT C

ESTABLISHING RECORDABILITY

1. Deciding whether to record a case and how to classify the case.

   Determine whether a fatality, injury or illness is recordable.

   A fatality is recordable if:

   - Results from employment

   An injury is recordable if:

   - Results from employment and
   - It requires medical treatment beyond first aid or
   - Results in restricted work activity or job transfer, or
   - Results in lost work day or
   - Results in loss of consciousness

   An illness is recordable if:

   - It results from employment

2. Definition of "Resulting from Employment"

   Resulting from employment is when the injury or illness results from an event or exposure in the work environment. The work environment is primarily composed of: 1) The employer's premises, and 2) other locations where associates are engaged in work-related activities or are present as a condition of their employment.

   The employer's premises include company rest rooms, hallways, cafeterias, sidewalks and parking lots. Injuries occurring in these places are generally considered work related.

   The employer's premises EXCLUDES employer controlled ball fields, tennis courts, golf courses, parks, swimming pools, gyms, and other similar recreational facilities, used by associates on a voluntary basis for their own benefit, primarily during off work hours.

   Ordinary and customary commute, is not generally considered work related.

   Employees injured or taken ill while engaged in consuming food, as part of a normal break or activity is not considered work related. Employees injured or taken ill as the result of smoking, consuming illegal drugs, alcohol or applying make up are generally not considered work related. Employee injured by un authorized horseplay is generally not considered work related, however, an employee injured as a result of a fight or other workplace violence act, may be considered work related.

Associates who travel on company business are considered to be engaged in work related activities all the time they spend in the interest of the company. This includes travel to and from customer contacts, and entertaining or being entertained for purpose of promoting or discussing business. Incidents occurring during normal living activities (eating, sleeping, recreation) or if the associate deviates from a reasonably direct route of travel are not considered OSHA recordable.

3. Distinction between Medical Treatment and First Aid.

First aid is defined as any one-time treatment, and any follow up visit for the purpose of observation, of minor scratches, cuts, burns, splinters, etc., which do not ordinarily require medical care. Such one time treatment, and follow up visit for the purpose of observation, is considered first aid even though provided by a physician or registered professional personnel.

Medical Treatment (recordable)

a) They must be treated only by a physician or licensed medical personnel.

b) They impair bodily function (i.e. normal use of senses, limbs, etc.).

c) They result in damage to physical structure of a non superficial nature (fractures).

d) They involve complications requiring follow up medical treatment.