FOCUSED FEASIBILITY STUDY REPORT

STUART OLVER HOTZ SITE
SITE NO. 828079
BUFFALO, NEW YORK

Prepared For:

NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION
REMEDIAL BUREAU E
WORK ASSIGNMENT D007622-08

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bgs	below ground surface
CAMP	Community Air Monitoring Plan
cy	cubic yards
DCA	dichloroethane
DCE	dichloroethene
DER	Division of Environmental Remediation
FS	Feasibility Study
Geologic	Geologic NY, Inc.
GZA	GeoEnvironmental of New York
HASP	health and safety plan
IDW	Investigation-Derived Waste
ISCO	in-situ chemical oxidation
microg/kg	micrograms per kilogram
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OM&M	operation maintenance and monitoring
ppb	parts per billion
RAO	remedial action objective
ROD	Record of Decision
RD	Remedial Design
RI	Remedial Investigation
SCGs	standards, criteria, and guidance
Shaw	Shaw Environmental Inc.
SMP	Site Management Plan
SOH	Stuart Olver Holtz
TCA	trichloroethane
TCE	trichloroethene
TMV	toxicity, mobility or volume
UIC	Underground Injection Control
URS	URS Corporation
VOCs	volatile organic compounds

1.0 INTRODUCTION

1.1 Contract Authority

URS Corporation (URS) prepared this focused Feasibility Study (FS) report for the Stuart Olver Holtz (SOH) site located in the Town of Henrietta, Monroe County, New York. The report was prepared for the New York State Department of Environmental Conservation (NYSDEC) under the State Superfund Standby Contract, Work Assignment D007622-08.

1.2 Scope of Feasibility Study

This FS report evaluates the remedial action for the contaminated groundwater located on site. Permanganate and molasses have been injected at the site to remediate groundwater, but contamination remains at the site as described in more detail in Section 2.0. This FS is a focused FS that concentrates on additional remedial measures required to clean up the remaining contaminated groundwater at the site.

This FS was developed to meet the requirements set forth in the NYSDEC Department of Environmental Remediation (DER) DER-10 Technical Guidance for Site Investigation and Remediation. This FS specifies the remedial goal, identifies potential remedial technologies feasible for use at this Site, and develops remedial alternatives that meet the remedial objectives for the remaining groundwater contamination at the site.

1.3 Report Organization

This document has been organized consistent with NYSDEC DER-10 and includes the following sections:

- introduction;
- site description and history;
- summary of RI and exposure assessment
- remedial goals and remedial action objectives;
- general response actions;
- identification and screening of technologies; and

- development and analysis of alternatives.

2.0 SITE DESCRIPTION AND HISTORY

This section presents a description of the site and a summary of site conditions and site history.

2.1 Site Description

The SOH site is 3.8 acres in size. It is located at 39 Commerce Drive in a mixed commercial/industrial area in Henrietta, Monroe County, New York (Figure 2-1). A manufacturing building, which formerly occupied the eastern half of the site, was demolished in 2005, and only the building slab remains. The rest of the site consists of a paved parking lot, driveway and grass-covered areas. On the western edge of the property is a swale that receives drainage from the facility. Pullman Manufacturing is located west of the site. Ruby Gordon's Furniture Store is located south of the site, and several commercial/retail buildings that front West Henrietta Road are located east of the site (See Figure 2-2).

2.2 Site History

The site was developed from farmland in 1962. Originally known as Electro Chemical Products, Inc., SOH operated a specialty metals finishing business at this site from 1962 until 1986, when it applied for Chapter 11 bankruptcy protection. The facility was transferred to Metalade, Inc., which conducted operations similar to SOH until 1999.

An uncontrolled release of plating and coating solutions occurred in 1974 during a fire that destroyed a portion of the facility. In 1980, SOH began accumulating drums of solvents for processing in a proposed solvent recovery unit at the site. An operating permit was never granted by the NYSDEC and in 1983 as many as 300 solvent drums were removed from the site, some of which reportedly had leaked. The SOH site was later listed as a Class 2 inactive hazardous waste site by the NYSDEC.

The Record of Decision (ROD) prepared by the NYSDEC in 1997 outlined four goals for the SOH site:

- Eliminate to the extent practicable the potential for direct human or animal contact with site contaminants.

- Reduce, control, or eliminate to the extent practicable the contamination within the soils and waste on site.

- Reduce, control, or eliminate to the extent practicable any further migration of contaminated groundwater from the site, including migration into the Ruby Gordon basement sumps.

- Provide to the extent practicable, for attainment of groundwater standards, criteria, and guidance (SCG) values in the area affected by the site.

For the remedy, the ROD included groundwater collection and treatment and excavation and off-site disposal of on-site and off-site contaminated soil. The ROD also included several actions connected with the SOH building including: removal of sediments from site sumps, catch basins and related piping for offsite disposal; decommissioning drainage lines or connections to and from the former SOH building; disconnect the SOH interior bedrock wells; and regrade and restore the excavated areas.

In October 2005, the NYSDEC modified the remedy selected by the original ROD based on the site information supplied by Shaw Environmental Incorporated (Shaw) investigations conducted in 2000 and 2002. As part of the modification, the Department estimated cleanup time for the passive groundwater treatment alternative at 40 years. The Department estimated the time required to implement a permanganate injection/ augmented bioremediation system as nine years. The in-situ chemical oxidation (ISCO) remedy when compared to the original remedy was estimated to result in a savings of over $3 million.

NYSDEC amended the 1997 ROD with the following proposed activities:

- Implementing a permanganate injection system to destroy the chlorinated ethenes in the overburden groundwater. Injection wells will be installed at the site perimeter downgradient of the contaminated groundwater plume, at the source area, and within the plume.

- Implementing an augmented bioremediation system utilizing a carbon source such as molasses to destroy chlorinated ethanes.

- Conducting periodic long term groundwater monitoring to verify the effectiveness of the remedy.

- Constructing drainage improvements between Ruby Gordon and the SOH site to minimize groundwater recharge to the Ruby Gordon basement.

- Conducting soil gas and air sampling (indoor, ambient, and subslab) of relevant areas adjacent to the site.

- Imposing an institutional control in the form of an environmental easement that will require compliance with the approved site management plan.

- Restricting the use of groundwater as a source of potable water, without the necessary water quality treatment as determined by the New York State Department of Health (NYSDOH).

- Requiring the property owner to complete and submit to the NYSDEC a periodic certification.

A Remedial Design (RD) for injection of permanganate and molasses was completed in October 2010 by URS. The construction contract for injections was subsequently awarded to Geologic NY, Inc. (Geologic). Geologic injected approximately 33,000 gallons of a 5% solution of sodium permanganate to 37 injection wells in April 2011. Based on monitoring results after the injection, approximately 11,000 additional gallons of 5% sodium permanganate solution was injected into 13 injection wells in August 2011. After further monitoring, approximately 12,000 additional gallons of the 5% sodium permanganate solution was injected into 9 injection wells and 5 monitoring wells in November 2011. Approximately 8,000 gallons of a 10% solution of molasses was injected into 37 injection wells and 5 monitoring wells in August 2012. Table 2-1 summarizes the four injection events. Injection locations are shown on Figure 2-3.

2.3 Summary of RI

The RI report was issued by GZA GeoEnvironemental of New York (GZA) in 1996. After Shaw completed a number of design studies, the ROD was modified. Subsequent to the ROD modification, URS performed a Supplemental Investigation at the site and issued the Supplemental Investigation Report in April 2009. The purpose of the Supplemental Investigation

was to further delineate the source area identified in previous investigation in 2007 at the site.
Geology and Hydrogeology

The overburden thickness at the SOH site ranges from 40 feet in URS-08 to 48.2 feet in URS-01 (see Figure 2-3 for well locations). Overburden layers encountered by site borings and test pits (from the ground surface downward) are: a fill layer, a glacial lacustrine layer, an upper till layer, and a lower till layer.

The SOH site is covered by a layer of fill material that is generally reworked silty sand mixed with some man-made debris. Perched groundwater in the fill layer was noted in several borings and monitoring wells installed by GZA. Almost all soil borings and wells installed by URS encountered a seasonal high groundwater table, generally about 4-feet below grade.

The fill material directly overlies a lacustrine layer (or the upper till layer when the lacustrine layer is absent). The lacustrine layer is absent below the central portion of the building slab. The layer is also absent in the area adjacent to the southern edge of the slab where it may have been removed during grading prior to the construction of the SOH building. The lacustrine layer consists of interbedded clay and silt with some sand and gravel lenses. The lacustrine layer overlies the upper till layer.

The upper till layer ranges in thickness from 3.5 feet in URS-02 to 26 feet in OW-8S (see Figure 2-3 for well locations), and acts as the primary overburden aquifer at the site. The upper till is generally a fine to coarse-grained sand with a trace to some silt or clay and a trace of gravel. The compaction of the layer varies in some wells from very loose in the upper portion to very dense near the base of the unit. GZA noted permeable sand strata within the upper till that are discontinuous laterally but provide zones of lateral groundwater flow. These permeable zones are noted by an absence or trace amounts of silt. The permeable zones are typically less than 10 feet thick.

The lower till is a very dense, fine to coarse sand and clayey silt that overlies shale bedrock. The lower till contains a greater percentage of silt and clay than the upper till.

The overburden layer covers the Vernon Shale bedrock. The Vernon shale bedrock erosional surface generally slopes to the northwest. The upper portion of the Vernon shale is very weathered and fissile.

The primary water-bearing overburden unit at the SOH site is the upper glacial till layer. A second, deeper, water-bearing aquifer is located in the uppermost highly weathered and fractured portion of the Vernon shale bedrock.

Overburden monitoring wells onsite are screened within the water-bearing upper glacial till layer. Hydraulic conductivity of the overburden monitoring wells ranges from a minimum of 4.75×10^{-6} cm/sec to a maximum of 1.36×10^{-3} cm/sec. The average hydraulic conductivity of all overburden wells screened in the upper glacial till is approximately 2.27×10^{-4} cm/sec. Overburden groundwater flow is generally to the northwest, in the direction of the Genesee River.

The water-bearing uppermost portion of the Vernon Formation shale bedrock is weathered and highly fractured. The piezometric surface elevation of the bedrock aquifer is located above the lower glacial till layer, which indicates a confined condition of the top of bedrock groundwater. Hydraulic conductivity of the bedrock monitoring wells ranges from a minimum of 2.46×10^{-5} cm/sec to a maximum of 8.43×10^{-4} cm/sec. The bedrock groundwater surface shows a groundwater divide located in the vicinity of wells OW-7R and OW-2R (see Figure 2-3 for well locations). Groundwater in this area flows to the north-northeast or to the west.

2.3.1 Nature and Extent of Contamination

Overburden groundwater is the focus of site remediation and the focused FS. Contamination in the upper till aquifer (the primary aquifer at the site) was characterized by the Supplemental Investigation. Figure 2-4 shows the distribution of VOCs in the upper till layer based on results from the Supplemental Investigation. The primary contaminants detected in the upper till aquifer were 1,1,1-Trichloroethane (1,1,1-TCA), 1,1-Dicholorethane (1,1-DCA), 1,1-Dichloroethene (1,1-DCE), cis 1,2-Dichloroethene (cis 1,2-DCE) and Trichloroethene (TCE).

The remedial design for the site included injections of sodium permanganate and molasses in the most contaminated area of groundwater called the treatment zone as shown on Figure 2-3 and some wells located outside of the treatment zone. After completing injections of sodium permanganate in 2011 and molasses in 2012 as described in Section 2.1, analytical data was collected from groundwater monitoring wells and injection wells in the treatment zone and monitoring wells located in surrounding areas. In general, the groundwater monitoring results

showed reduced concentrations of the primary contaminants at almost all the wells. However, significant groundwater contamination (generally two or more contaminants with concentrations exceeding 1,000 µg/L) remains in some wells in the treatment area, primarily in the southern and western areas of the treatment zone, and in some wells located outside of the treatment zone, even after completion of the injections (see Section 3.3).

2.3.2 Exposure Assessment

Potential exposure pathways identified for groundwater in the 1997 ROD included utility workers working on subsurface utilities along Commerce Drive and construction workers involved in excavation or other intrusive activities on site. Exposure to surface soil contamination was also identified as a pathway of concern, but such exposure is not the subject of the focused FS.

3.0 REMEDIAL GOAL AND REMEDIAL ACTION OBJECTIVES

3.1 Remedial Goal

In keeping with NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation, the remedial goal for the site is to eliminate or reduce to the maximum extent practicable, significant threats to human health and/or the environment due to former site activities.

3.2 Remedial Action Objectives

The RAOs for this focused FS are concerned with remediation of groundwater and provide the basis for evaluating remedial alternatives. The RAOs for the focused FS are as follows:

- Reduce, to the extent practicable, the source of groundwater contamination.
- Reduce, to the extent practicable, the migration of groundwater contamination from the site.
- Restore groundwater to pre-release conditions, to the extent practicable.

Applicable standards, criteria, and guidance (SCGs) for the focused FS include Class GA standards for groundwater and Subpart 375-6.5 groundwater protection cleanup objectives for soil.

3.3 Remediation Areas and Volumes

Groundwater remediation has been initiated at the site in the treatment zone (the area of highest groundwater contamination) shown on Figure 3-1 and some more contaminated wells located outside the treatment zone. However, some significant contamination remains in wells located in the treatment zone and outside the treatment zone as described in Section 2.3.2. For this focused FS, the extent of groundwater contamination is defined by the wells showing significant contamination. These wells are shown in Figure 3-1.

The extent of soil contamination impacting groundwater quality was defined based on the boring program conducted in April 2013 by Geologic. This soil contamination is located in the southern portion of the groundwater treatment zone. The extent of soil contamination is shown on Figure

3-2. The estimated extent of contaminated soil is 3,600 square feet by 20 feet deep for an estimated volume of approximately 2,700 cubic yards.

4.0 IDENTIFICATION OF REMEDIAL TECHNOLOGIES

The remediation of groundwater addressed in this focused FS is additional remediation to be undertaken after previous injections at the site (see Section 2.2). Consequently, the technologies considered for further remediation are limited. Based on direction from NYSDEC, four technologies have been identified for inclusion in the focused FS. These technologies include the following:

- In-situ chemical oxidation (ISCO) using sodium permanganate injection to destroy chlorinated alkenes.
- Augmented bioremediation using molasses injection to destroy chlorinated alkanes
- Excavation of contaminated soil, ex-situ removal of contaminants using aeration, and replacement of soil on site.
- Excavation of contaminated soil and disposal off site.

5.0 DEVELOPMENT AND DESCRIPTION OF ALTERNATIVES

This section combines the remedial technologies considered feasible for the remediation of contaminated groundwater into alternatives for the site.

5.1 Development of Alternatives

From the feasible remedial technologies, and based on direction by the NYSDEC, the following list of remedial alternatives has been developed for the site:

Alternative 1 - No Further Action

Alternative 2 - ISCO and Augmented Bioremediation Using Wells

Alternative 3 – ISCO and Augmented Bioremediation Using Direct Push Injection

Alternative 4 - Excavation Using Sheet Pile and Ex-Situ Aeration

Alternative 5 – Excavation Using Sheet Pile and Off-site Disposal

Alternative 6 – Open-Cut Excavation and Ex-Situ Aeration

Alternative 7 – Open-Cut Excavation and Off-Site Disposal

Although not the emphasis of this focused FS, there are two components of the original remediation presented in the ROD that are considered part of the final remedy, and are therefore considered part of Alternatives 2 through 7. These two components include the following: 1.) excavation and off-site disposal of 875 cubic yards of contaminated surface soil (located on-site and off-site), and 2.) construction of an asphalt-lined drainage swale on the Ruby-Gordon property north of the basement to limit groundwater recharge. For the first component, the ROD included an option to cover onsite contaminated surface soil areas rather than excavate and dispose of soil off-site. However, for this focused FS, it is assumed that all contaminated surface soil would be excavated and disposed of off-site.

5.2 Description of Alternatives

5.2.1 Alternative 1 - No Further Action

The No Further Action alternative is evaluated as a procedural requirement and is used as a basis for comparison with other remedial alternatives. The No Further Action alternative, and the six other alternatives assume that some remedial activities have already been performed at the site. These activities include injections of permanganate and molasses to remediate chlorinated contaminants in groundwater as described in Section 2.2. Under this alternative, the site would not be remediated further, but contamination would attenuate over time by natural processes. It is assumed that a groundwater monitoring program would continue on an annual basis and that a Site Management Plan would be implemented to control exposure to residual contamination.

Size and Configuration

- No remedial construction would take place.
- An SMP would be developed to include institutional and engineering controls to achieve the following: manage residual contaminated media and potential exposures to contaminated media, including procedures for future intrusive activities including soil characterization, handling, health and safety of workers and the community; sample, analyze and evaluate soil vapor, and allow for soil vapor intrusion mitigation methods as required per NYSDOH guidance in future on-site buildings; provide for disposal/reuse in accordance with applicable NYSDEC regulations and procedures; and maintain use restrictions regarding site development and groundwater use.
- Annual sampling and analysis for VOCs, as well as routine water quality indicator parameters, (e.g., oxidation-reduction potential, pH, temperature and conductivity) would be performed in approximately 20 select existing groundwater monitoring wells. The list of parameters, number of monitoring wells, and sampling frequency could be modified following data review of monitoring results.
- An annual report and Five-Year Review would evaluate site conditions, operation, maintenance and monitoring (OM&M) activities and recommend any changes necessary to the OM&M program.

Time for Remediation

- The No Further Action alternative is not expected to achieve the SCOs.
- A 30-year monitoring period is assumed for this focused FS.

Spatial Requirements

- There are no spatial requirements.

Options for Disposal

- There are no materials requiring disposal.

Permit Requirements

- No permits will be required for this alternative.

Limitations

- The No Further Action alternative would not meet the remedial action objectives for the site.

Ecological Impacts

- This alternative is not anticipated to have any significant impacts on fish and wildlife resources.

5.2.2 Alternative 2 – ISCO and Augmented Bioremediation Using Wells

For Alternative 2, two additional injections of molasses followed by an additional injection of sodium permanganate would be implemented in the remaining significantly contaminated wells and in two new wells located in the treatment zone. Alternative 2 also includes excavation of contaminated surface soil and construction of a drainage swale included in the original remedy presented in the ROD.

Size and Configuration

- Two new injection wells (see Figure 3-1) would be installed onsite to improve the distribution of sodium permanganate and molasses solutions.

- Approximately 170 gallons of a 10% solution of molasses would be injected into 21 wells during each injection event. It is assumed that two injection events will be required.
- Approximately 1,100 gallons of a 5% solution of sodium permanganate would be injected into 21 wells. It is assumed that one injection event will be required.
- Approximately 875 cubic yards of contaminated surface soil would be excavated and disposed of off-site. Imported topsoil will be placed and the area seeded.
- An asphalt-lined drainage swale would be constructed on the Ruby-Gordon property to limit groundwater recharge.
- Progress monitoring of groundwater and soil would be implemented during an approximate 2 year period. Progress monitoring would include: 1.) collection of groundwater samples at approximately 50 wells on four occasions with analysis for VOCs; 2.) field analysis (temperature, pH, conductivity, DO, and ORP) at approximately 31 wells on a monthly basis; and 3.) collection of approximately 30 soil samples from 10 boring locations for evaluation of injection performance on two occasions with analysis for VOCs.
- An SMP would be developed to include institutional and engineering controls to achieve the following: manage residual contaminated media and potential exposures to contaminated media, including procedures for future intrusive activities including soil characterization, handling, health and safety of workers and the community; sample, analyze and evaluate soil vapor, and allow for soil vapor intrusion mitigation methods as required per NYSDOH guidance in future on-site buildings; provide for disposal/reuse in accordance with applicable NYSDEC regulations and procedures; and maintain use restrictions regarding site development and groundwater use.
- After completion of injections, annual sampling and analysis for VOCs, as well as routine water quality indicator parameters, (e.g., oxidation-reduction potential, pH, temperature and conductivity) would be performed in approximately 20 select existing groundwater monitoring wells. The list of parameters, number of monitoring wells, and sampling frequency could be modified following data review of monitoring results.

- An annual report and Five-Year Review would evaluate site conditions, OM&M activities and recommend any changes necessary to the OM&M program.

Time for Remediation

- Injections would be completed in approximately 2 years.

Spatial Requirements

- All but two new injection wells are already installed. No additional space requirements are necessary.

Options for Disposal

- Approximately 875 cubic yards of contaminated surface soil would be transported off-site for disposal.
- A small amount of Investigation Derived Waste (IDW) resulting from well installation would need to be disposed of off-site.

Permit Requirements

- USEPA Underground Injection Control (UIC) submittal is required for the two new injections wells.

Limitations

- Environmental easements would be required to limit use of the site to commercial or industrial use only.

Ecological Impacts

- This alternative is not anticipated to have any significant impacts on fish and wildlife resources.

5.2.3 Alternative 3 – ISCO and Augmented Bioremediation Using Direct Push Injection

For Alternative 3, two injections of molasses and one injection of sodium permanganate would be performed in the 3,600 square foot area of contaminated soil using direct push methods. Alternative 3 also includes excavation of contaminated surface soil and construction of a drainage swale included in the original remedy presented in the ROD.

Size and Configuration

- Approximately 20 gallons of a 10% solution of molasses would be injected into 50 direct push injection points during each injection event. It is assumed that two injection events will be required.
- Approximately 100 gallons of a 5% solution of sodium permanganate would be injected into 50 direct push injection points. It is assumed that one injection event will be required.
- Approximately 875 cubic yards of contaminated surface soil would be excavated and disposed of off-site. Imported fill will be placed and the area seeded.
- An asphalt-lined drainage swale would be constructed on the Ruby-Gordon property to limit groundwater recharge.
- Progress monitoring of groundwater and soil would be implemented during an approximate 2 year period. Progress monitoring would include: 1.) collection of groundwater samples at approximately 50 wells on four occasions with analysis for VOCs; 2.) field analysis (temperature, pH, conductivity, DO, and ORP) at approximately 31 wells on a monthly basis; and 3.) collection of approximately 30 soil samples from 10 boring locations for evaluation of injection performance on two occasions with analysis for VOCs.
- An SMP would be developed to include institutional and engineering controls to achieve the following: manage residual contaminated media and potential exposures to contaminated media, including procedures for future intrusive activities including soil characterization, handling, health and safety of workers and the community; sample, analyze and evaluate soil vapor, and allow for soil vapor intrusion mitigation methods as required per NYSDOH guidance in future on-site buildings; provide for

disposal/reuse in accordance with applicable NYSDEC regulations and procedures; and maintain use restrictions regarding site development and groundwater use.

- After completion of injections, annual sampling and analysis for VOCs, as well as routine water quality indicator parameters, (e.g., oxidation-reduction potential, pH, temperature and conductivity) would be performed in approximately 20 select existing groundwater monitoring wells. The list of parameters, number of monitoring wells, and sampling frequency could be modified following data review of monitoring results.
- An annual report and Five-Year Review would evaluate site conditions, OM&M activities and recommend any changes necessary to the OM&M program.

Time for Remediation

- Injections would be completed in approximately 2 years.

Spatial Requirements

- No additional space requirements are necessary since the direct push injections do not require permanent installations.

Options for Disposal

- Approximately 875 cubic yards of contaminated surface soil would be shipped off-site for disposal.

Permit Requirements

- A USEPA Underground Injection Control UIC is required for the proposed injection events.

Limitations

- Environmental easements would be required to limit use of the site to commercial or industrial use only.

Ecological Impacts

- This alternative is not anticipated to have any significant impacts on fish and wildlife resources.

5.2.4 Alternative 4 – Excavation and Ex-Situ Aeration

For Alternative 4, contaminated soil from the 3,600 square foot area would be excavated and aerated. All excavated soil would be placed back in the excavation. Sheet pile would be used to shore the excavation and reduce excavation dewatering. Alternative 4 also includes excavation of contaminated surface soil and construction of a drainage swale included in the original remedy presented in the ROD.

Size and Configuration

- Approximately 100 cubic yards of concrete from the existing buiding slab would be broken up and disposed of on-site in the excavated area.
- Approximately 2,600 cubic yards of contaminated soil would be excavated and the soil would be aerated using a mechanical screener. Dewatering would be required during excavation, and treatment of extracted water prior to discharge would be required.
- Approximately 72,000 square feet of steel sheet pile would be used to shore the excavation.
- All excavated soil would be backfilled and compacted in the excavated area and the excavated area would be graded and covered with topsoil and seeded.
- Approximately 875 cubic yards of contaminated surface soil would be disposed of off-site. Imported topsoil would be placed and the area seeded.
- An asphalt-lined drainage swale would be constructed on the Ruby Gordon property to limit groundwater recharge.
- An SMP would be developed to include institutional and engineering controls to achieve the following: manage residual contaminated media and potential exposures to contaminated media, including procedures for future intrusive activities including soil characterization, handling, health and safety of workers and the community;

sample, analyze and evaluate soil vapor, and allow for soil vapor intrusion mitigation methods as required per NYSDOH guidance in future on-site buildings; provide for disposal/reuse in accordance with applicable NYSDEC regulations and procedures; and maintain use restrictions regarding site development and groundwater use.

- After completion of excavation activities, annual sampling and analysis for VOCs, as well as routine water quality indicator parameters, (e.g., oxidation-reduction potential, pH, temperature and conductivity) would be performed in approximately 20 select existing groundwater monitoring wells. The list of parameters, number of monitoring wells, and sampling frequency could be modified following data review of monitoring results.
- An annual report and Five-Year Review would evaluate site conditions, OM&M activities and recommend any changes necessary to the OM&M program.

Time for Remediation

- Soil remediation is estimated to be complete in approximately 2 months.

Spatial Requirements

- Space would be required for stockpiling and sampling soil after excavation. However, there is adequate space on site for these activities since the site is not currently being used for any industrial or commercial purposes.

Options for Disposal

- Approximately 875 cubic yards of contaminated surface soil would be disposed of off-site.

Permit Requirements

- Contaminated soil would need to be disposed of in an off-site permitted facility.

Limitations

- Environmental easements would be required to limit use of the site to commercial or industrial use only.

- Extensive air monitoring would be required during soil aeration to protect remediation personnel and employees in nearby commercial facilities.

Ecological Impacts

- This alternative is not anticipated to have any significant impacts on fish and wildlife resources.

5.2.5 Alternative 5 – Excavation Using Sheet Pile and Off-Site Disposal

For Alternative 5, contaminated soil in the 3,600 square foot area would be excavated and disposed of off-site. Sheet pile would be used to shore the excavation and reduce excavation dewatering. Clean imported backfill would be used to replace soil taken off site for disposal. Alternative 5 also includes excavation of contaminated surface soil and construction of a drainage swale included in the original remedy presented in the ROD.

Size and Configuration

- Approximately 100 cubic yards of concrete from the existing building slab would be broken up and disposed of on-site in the excavation area.
- Approximately 2,600 cubic yards of contaminated soil would be taken off site for disposal. Dewatering would be required during excavation, and treatment of extracted water prior to discharge would be required.
- Approximately 72,000 square feet of steel sheet pile would be installed to shore the excavation.
- Approximately 2,600 cubic yards of clean fill would be brought on-site to backfill the excavation.
- All excavated areas would be covered with topsoil and seeded.
- Approximately 875 cubic yards of contaminated surface soil would be excavated and disposed of off-site.
- An asphalt-lined drainage swale would be constructed on the Ruby Gordon property to limit groundwater recharge.

- An SMP would be developed to include institutional and engineering controls to achieve the following: manage residual contaminated media and potential exposures to contaminated media, including procedures for future intrusive activities including soil characterization, handling, health and safety of workers and the community; sample, analyze and evaluate soil vapor, and allow for soil vapor intrusion mitigation methods as required per NYSDOH guidance in future on-site buildings; provide for disposal/reuse in accordance with applicable NYSDEC regulations and procedures; and maintain use restrictions regarding site development and groundwater use.
- After completion of excavation activities, annual sampling and analysis for VOCs, as well as routine water quality indicator parameters, (e.g., oxidation-reduction potential, pH, temperature and conductivity) would be performed in approximately 20 select existing groundwater monitoring wells. The list of parameters, number of monitoring wells, and sampling frequency could be modified following data review of monitoring results.
- An annual report and Five-Year Review would evaluate site conditions, OM&M activities and recommend any changes necessary to the OM&M program.

Time for Remediation

- Soil remediation is estimated to be complete in approximately 1 month.

Spatial Requirements

- Space would be required for stockpiling and sampling soil after excavation. However, there is adequate space on site for these activities since the site is not currently being used for any industrial or commercial purposes.

Options for Disposal

- Approximately 2,600 cubic yards of contaminated soil and 875 cubic yards of contaminated surface soil would be disposed of off-site.

Permit Requirements

- Soil would need to be disposed of in a permitted facility.

Limitations

- Environmental easements would be required to limit use of the site to commercial or industrial use only.

Ecological Impacts

- This alternative is not anticipated to have any significant impacts on fish and wildlife resources.

5.2.6 Alternative 6 – Open-Cut Excavation and Ex-Situ Aeration

For Alternative 6, contaminated soil from the 3,600 square foot area would be excavated and aerated. Soil excavated from the 3,600 square foot area would be placed back into the excavation after aeration. Soil outside of the 3,600 square foot area excavated to slope the excavation would not be aerated, but would be placed back into the excavated area. Alternative 6 also includes excavation of contaminated surface soil and construction of a drainage swale included in the original remedy presented in the ROD.

Size and Configuration

- Approximately 400 cubic yards of concrete from the existing building slab would be broken up and disposed of on-site in the excavated area.
- Approximately 2,600 cubic yards of contaminated soil would be aerated using a mechanical screener.
- Approximately 7,800 cubic yards of soil would be excavated to slope the sides of the excavation for the open cut. This quantity of soil is based on a 2.5:1 slope for a total excavation area of approximately 25,600 square feet. It is assumed that this soil would not need to be aerated, but would be replaced into the excavated area.
- Well points would be used to dewater the excavation, and the extracted water would be treated prior to discharge.
- All excavated areas would be covered with topsoil and seeded.
- Approximately 875 cubic yards of contaminated surface soil would be disposed of off-site.

- An asphalt-lined drainage swale would be constructed on the Ruby Gordon property to limit groundwater recharge.
- An SMP would be developed to include institutional and engineering controls to achieve the following: manage residual contaminated media and potential exposures to contaminated media, including procedures for future intrusive activities including soil characterization, handling, health and safety of workers and the community; sample, analyze and evaluate soil vapor, and allow for soil vapor intrusion mitigation methods as required per NYSDOH guidance in future on-site buildings; provide for disposal/reuse in accordance with applicable NYSDEC regulations and procedures; and maintain use restrictions regarding site development and groundwater use.
- After completion of excavation activities, annual sampling and analysis for VOCs, as well as routine water quality indicator parameters, (e.g., oxidation-reduction potential, pH, temperature and conductivity) would be performed in approximately 20 select existing groundwater monitoring wells. The list of parameters, number of monitoring wells, and sampling frequency could be modified following data review of monitoring results.
- An annual report and Five-Year Review would evaluate site conditions, OM&M activities and recommend any changes necessary to the OM&M program.

Time for Remediation

- Soil remediation is estimated to be complete in approximately 4 months.

Spatial Requirements

- Space would be required for stockpiling and sampling soil after excavation. However, there is adequate space on site for these activities since the site is not currently being used for any industrial or commercial purposes.

Options for Disposal

- Approximately 875 cubic yards of contaminated surface soil would be disposed of off-site.

Permit Requirements

- Contaminated soil would need to be disposed of in an off-site permitted facility.

Limitations

- Environmental easements would be required to limit use of the site to commercial or industrial use only.
- Extensive air monitoring would be required during soil aeration to protect remediation personnel and employees in nearby commercial facilities.

Ecological Impacts

- This alternative is not anticipated to have any significant impacts on fish and wildlife resources.

5.2.7 Alternative 7 – Open-Cut Excavation and Off-Site Disposal

For Alternative 7, contaminated soil in the 3,600 square foot area would be excavated and disposed of off-site. Soil outside of the 3,600 square foot area excavated to slope the excavation would not be taken off-site, but would be placed back into the excavated area. Alternative 7 also includes excavation of contaminated surface soil and construction of a drainage swale included in the original remedy presented in the ROD.

Size and Configuration

- Approximately 400 cubic yards of concrete would be broken up and disposed of on-site in the excavated area.
- Approximately 2,600 cubic yards of contaminated soil would be disposed of off-site.
- Approximately 7,800 cubic yards of soil would be excavated to slope the sides of the excavation for the open cut. This quantity of soil is based on a 2.5:1 slope for a total excavation area of approximately 25,600 square feet. It is assumed that this soil would not need to be taken off-site for disposal, but would be placed back in the excavated area.
- Well points would be used to dewater the excavation, and the extracted water would be treated prior to discharge.

- Approximately 2,600 cubic yards of clean fill would be brought on-site to backfill the excavation.
- All excavated areas would be covered with topsoil and seeded.
- Approximately 875 cubic yards of contaminated surface soil would be disposed of off-site.
- An asphalt-lined drainage swale would be constructed on the Ruby Gordon property to limit groundwater recharge.
- An SMP would be developed to include institutional and engineering controls to achieve the following: manage residual contaminated media and potential exposures to contaminated media, including procedures for future intrusive activities including soil characterization, handling, health and safety of workers and the community; sample, analyze and evaluate soil vapor, and allow for soil vapor intrusion mitigation methods as required per NYSDOH guidance in future on-site buildings; provide for disposal/reuse in accordance with applicable NYSDEC regulations and procedures; and maintain use restrictions regarding site development and groundwater use.
- After completion of excavation activities, annual sampling and analysis for VOCs, as well as routine water quality indicator parameters, (e.g., oxidation-reduction potential, pH, temperature and conductivity) would be performed in approximately 20 select existing groundwater monitoring wells. The list of parameters, number of monitoring wells, and sampling frequency could be modified following data review of monitoring results.
- An annual report and Five-Year Review would evaluate site conditions, OM&M activities and recommend any changes necessary to the OM&M program.

Time for Remediation

- Soil remediation is estimated to be complete in approximately 3 months.

Spatial Requirements

- Space would be required for stockpiling and sampling soil after excavation. However, there is adequate space on site for these activities since the site is not currently being used for any industrial or commercial purposes.

Options for Disposal

- Approximately 2,600 cubic yards of soil and 875 cubic yards of contaminated surface soil would be disposed of off-site.

Permit Requirements

- Contaminated soil would need to be disposed of in an off-site permitted facility.

Limitations

- Environmental easements would be required to limit use of the site to commercial or industrial use only.

Ecological Impacts

- This alternative is not anticipated to have any significant impacts on fish and wildlife resources.

6.0 DETAILED ANALYSIS OF ALTERNATIVES

6.1 Description of Evaluation Criteria

Each of the alternatives is subjected to a detailed evaluation with respect to the criteria outlined in 6 NYCRR Part 375 and described below. This evaluation aids in the selection process for remedial actions in New York State.

Overall Protection of Public Health and the Environment

This criterion is an assessment of whether the alternative meets requirements that are protective of human health and the environment. The overall assessment is based on a composite of factors assessed under other evaluation criteria, particularly long-term effectiveness and performance, short-term effectiveness, and compliance with SCGs. This evaluation focuses on how a specific alternative achieves protection over time and how site risks are reduced. The analysis includes how the source of contamination is to be eliminated, reduced, or controlled.

Compliance with Standards, Criteria, and Guidance

This criterion determines whether or not each alternative complies with applicable environmental laws and SCGs pertaining to the chemicals detected in contaminated media, the location of the site, and relating to proposed technologies.

Long-Term Effectiveness and Permanence

This criterion addresses the performance of a remedial action in terms of its permanence and the quantity/nature of waste or residuals remaining at the site after implementation. An evaluation is made of the extent and effectiveness of controls required to manage residuals remaining at the site and the operation and maintenance systems necessary for the remedy to remain effective. The factors that are evaluated include permanence of the remedial alternative, magnitude of the remaining risk, adequacy of controls used to manage residual contamination, and the reliability of controls used to manage residual contamination.

Reduction of Toxicity, Mobility or Volume with Treatment

This criterion assesses the remedial alternative's use of technologies that permanently and significantly reduce toxicity, mobility, or volume (TMV) of the contamination as their principal

element. Preference is given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the site.

Short-Term Effectiveness

This criterion assesses the effects of the alternative during the construction and implementation phase with respect to the effect on human health and the environment. The factors that are assessed include protection of the workers and the community during remedial action, environmental impacts that result from the remedial action, and the time required until the remedial action objectives are achieved.

Implementability

This criterion addresses the technical and administrative feasibility of implementing the alternative and the availability of various services and materials required during implementation. The evaluation includes the feasibility of construction and operation; the reliability of the technology; the ease of undertaking additional remedial action; monitoring considerations; activities needed to coordinate with regulatory agencies; availability of adequate equipment, services and materials, off-site treatment, and storage and disposal services.

Cost

Capital costs and OM&M costs are estimated for each alternative and presented on a present worth basis based on a 5% discount rate. Cost estimates for each remedial alternative are presented in Appendix A and summarized on Table 6-1.

Community and State Acceptance

Concerns of the State and the Community will be addressed separately in accordance with the site review process developed by the NYSDEC.

Land Use

This criterion addresses the current, intended, and reasonably anticipated future land use in the area as impacted by the remediation.

6.2 Alternative 1 – No Further Action

The No Further Action alternative is evaluated as a procedural requirement and as a basis for comparison with other alternatives. This alternative, like the six other alternatives, includes some remedial activities that have already been performed at the site. These activities include injections of permanganate and molasses to remediate chlorinated contaminants in groundwater as described in Section 2.2. This alternative would leave the site in its present condition and would include no additional remedial measures to clean up contaminated soil or groundwater.

6.2.1 Overall Protection of Public Health and the Environment

This alternative would leave the site in its present condition and would only be protective of human health and the environment through the restrictions provided for in the SMP. The alternative does not meet the RAOs for groundwater remediation.

6.2.2 Compliance with SCGs

Since contamination would remain on site, this alternative would not meet SCGs at the site.

6.2.3 Long-Term Effectiveness and Permanence

This alternative would not reduce contaminant concentrations in groundwater. This is not a permanent remedy.

6.2.4 Reduction of Toxicity, Mobility and Volume with Treatment

Reduction of the TMV of contaminants would occur slowly through natural processes. This alternative does not reduce TMV of contaminated groundwater with treatment.

6.2.5 Short-Term Effectiveness

As there is no construction associated with this alternative, there would be no short-term impact to workers or the community. Remedial action objectives would not be met.

6.2.6 Implementability

This alternative would include periodic sampling of groundwater to evaluate the reduction of contamination by natural processes. Environmental easements would prevent the use of untreated groundwater while contamination at the site remained.

6.2.7 Cost

Estimated capital and OM&M costs for Alternative 1 are presented on Table 6-1.

6.2.8 Land Use

Land use is expected to remain commercial/industrial under this alternative.

6.3 Alternative 2 – ISCO and Augmented Bioremediation Using Wells

This alternative includes additional injections of sodium permanganate and molasses in significantly contaminated wells to further remediate groundwater . Alternative 2 also includes excavation of contaminated surface soil and construction of a drainage swale included in the original remedy presented in the ROD.

6.3.1 Overall Protection of Public Health and the Environment

This alternative reduces groundwater contamination and includes environmental easements to prevent use other than commercial or industrial use. It prevents exposure to contamination at concentrations above the SCGs and is protective of human health and the environment.

6.3.2 Compliance with SCGs

This alternative complies with groundwater SCGs to the extent practicable.

6.3.3 Long-term Effectiveness and Permanence

This alternative would permanently reduce groundwater contamination in the significantly contaminated wells, and reduce migration of contamination away from the site. Monitoring would be required and environmental easements would be required to prevent groundwater

ingestion at the site and limit site use to commercial or industrial. This alternative would be an effective and permanent remedy.

6.3.4 Reduction of Toxicity, Mobility and Volume with Treatment

Alternative 2 utilizes in-situ treatment to reduce TMV of contaminants in groundwater.

6.3.5 Short-term Effectiveness

There is minimal construction required for Alternative 2 (installation of 2 injection wells) so there is little potential impact to workers or the community. Injections have already been implemented at the site with no impacts so additional injections would not pose a significant risk. The estimated time to complete remediation is 2 years. After remediation, a Site Management Plan would be implemented that would include environmental easements to prevent development other than commercial or industrial use of the site.

6.3.6 Implementability

Injections have already been implemented at the site so there would be no difficulty in implementing more injections. Groundwater monitoring would be required after completion of the remediation.

6.3.7 Cost

Estimated capital and OM&M costs for Alternative 2 are presented on Table 6-1.

6.3.8 Land Use

Land use is expected to remain commercial/industrial under this alternative.

6.4 Alternative 3 – ISCO and Augmented Bioremediation Using Direct Push Injection

This alternative includes additional injections of sodium permanganate and molasses in the 3,600 square foot area of contaminated soil by direct push methods. Alternative 3 also includes excavation of contaminated surface soil and construction of a drainage swale included in the original remedy presented in the ROD.

6.4.1 Overall Protection of Public Health and the Environment

This alternative reduces groundwater contamination and includes environmental easements to prevent use other than commercial or industrial use. It prevents exposure to contamination at concentrations above the SCGs and is protective of human health and the environment.

6.4.2 Compliance with SCGs

This alternative complies with groundwater SCGs to the extent practicable.

6.4.3 Long-term Effectiveness and Permanence

This alternative would permanently reduce groundwater contamination in the southern portion of the treatment zone and reduce migration of contamination away from the site. Monitoring would be required and environmental easements would be required to prevent groundwater ingestion at the site and limit site use to commercial or industrial. This alternative would be an effective and permanent remedy.

6.4.4 Reduction of Toxicity, Mobility and Volume with Treatment

Alternative 3 utilizes in-situ treatment to reduce TMV of contaminants in groundwater.

6.4.5 Short-term Effectiveness

This alternative includes direct push drilling that could have a small potential impact to workers, but minimal risk to the community. Injections have already been implemented at the site with existing wells, but direct push methods have not been previously used at the site. The estimated time to complete remediation is 2 years. After remediation, a Site Management Plan would be implemented that would include environmental easements to prevent development other than commercial or industrial use of the site.

6.4.6 Implementability

Injections using direct push methods have not been used at this site previously; however, this method of injection is common in the site remediation and should not be difficult to implement to the required 20-foot depths. Groundwater monitoring would be required after completion of the remediation.

6.4.7 Cost

Estimated capital and OM&M costs for Alternative 3 are presented on Table 6-1.

6.4.8 Land Use

Land use is expected to remain commercial/industrial under this alternative.

6.5 Alternative 4 – Excavation Using Sheet Pile and Ex-Situ Aeration

This alternative includes excavation of 2,600 cubic yards of contaminated soil from the 3,600 square foot area and ex-situ aeration of the excavated soil. All excavated soil would be placed back into the excavation after soil concentrations are below the SCGs. Pre-excavation sampling would be performed prior to excavation to more completely delineate the extent of contamination, and documentation sampling would be performed following excavation to document the levels achieved by the remediation. Environmental easements would be implemented to limit the site to commercial or industrial use only. Alternative 4 also includes excavation of contaminated surface soil and construction of a drainage swale included in the original remedy presented in the ROD.

6.5.1 Overall Protection of Public Health and the Environment

This alternative treats contaminated soil in the 3,600 square foot area in the southern portion of the treatment zone and includes environmental easements to prevent use other than commercial or industrial use. It prevents exposure to contamination at concentrations above the SCGs and is protective of human health and the environment.

6.5.2 Compliance with SCGs

This alternative complies with the soil SCGs in the excavated area and complies with groundwater SCGs to the extent practicable. Compliance with action-specific SCGs for air emissions will be met by complying with the vapor emission and dust control plan included in the Community Air Monitoring Plan (CAMP).

6.5.3 Long-term Effectiveness and Permanence

Soil with contaminant concentrations above the SCGs would be treated and reduced to acceptable concentrations; thereby, reducing groundwater contaminant concentrations. Monitoring would be

required and environmental easements would be required to prevent groundwater ingestion at the site and limit site use to commercial or industrial. This alternative would be an effective and permanent remedy.

6.5.4 Reduction of Toxicity, Mobility and Volume with Treatment

Treatment of the contaminated soil in the 3,600 square foot area in the southern portion of the treatment zone would remove the majority of contaminant mass from the site. This alternative includes a treatment technology (mechanical aeration) to reduce the TMV of contamination in groundwater.

6.5.5 Short-term Effectiveness

There would be a potential for on-site workers and workers from nearby businesses to be exposed to fugitive dust or vapors during excavation and handling of contaminated soil. Such potential exposure would be controlled by implementing an air monitoring program during these activities. Exposure would be significantly reduced by employing dust suppression measures, covering stockpiles, and by using personal protective equipment. Emissions from the aeration process would be reduced to acceptable concentrations by controlling the rate of soil processing. The estimated time to complete remediation is 2 months. After remediation, a Site Management Plan would be implemented that would include environmental easements to prevent development other than commercial or industrial use of the site.

6.5.6 Implementability

The equipment and materials needed for this alternative are commercially available. Air monitoring will be critical during the aeration phase of the project. Environmental easements will have to be implemented to insure that the use of the site is restricted to protect human health and the environment. The Department has raised concerns over the safety of the work when using sheet pile for this deep excavation which is mostly below the water table at the site.

6.5.7 Cost

Estimated capital and OM&M costs for Alternative 4 are presented on Table 6-1.

6.5.8 Land Use

Land use is expected to remain commercial/industrial under this alternative.

6.6 Alternative 5 – Excavation Using Sheet Pile and Off-Site Disposal

This alternative includes excavation of 2,600 cubic yards of contaminated soil from the 3,600 square foot area and off-site disposal of this soil. Approximately 2,600 cubic yards of clean soil would be imported from an off-site source to backfill the excavation. Pre-excavation sampling would be performed prior to excavation to more completely delineate the extent of contamination, and documentation sampling would be performed following excavation to document the levels achieved by the remediation. Environmental easements would be implemented to limit the site to commercial or industrial use only. Alternative 5 also includes excavation of contaminated surface soil and construction of a drainage swale included in the original remedy presented in the ROD.

6.6.1 Overall Protection of Public Health and the Environment

This alternative removes contaminated soil from the 3,600 square foot area in the southern portion of the treatment zone and includes environmental easements to prevent use other than commercial or industrial use. It prevents exposure to contamination at concentrations above the SCGs and is protective of human health and the environment.

6.6.2 Compliance with SCGs

This alternative complies with the soil SCGs in the excavated area and complies with groundwater SCGs to the extent practicable.

6.6.3 Long-term Effectiveness and Permanence

The most contaminated soil in the 3,600 square foot area in the southern portion of the treatment zone would be disposed of off-site. Monitoring and environmental easements would be required to prevent groundwater ingestion at the site and limit site use to commercial or industrial. This alternative would be an effective and permanent remedy.

6.6.4 Reduction of Toxicity, Mobility and Volume with Treatment

This alternative does not include a treatment technology that would reduce the TMV of contamination in groundwater at the site.

6.6.5 Short-term Effectiveness

There would be a potential for on-site workers and workers from nearby businesses to be exposed to fugitive dust or vapors during excavation and handling of contaminated soil. Such potential exposure would be controlled by implementing an air monitoring program during these activities. Exposure would be significantly reduced by employing dust suppression measures, covering stockpiles, and by using personal protective equipment. The estimated time to complete remediation is 1 month. After remediation, a Site Management Plan would be implemented that would include environmental easements to prevent development other than commercial or industrial use of the site.

6.6.6 Implementability

The equipment and materials needed for this alternative are commercially available. Environmental easements will have to be implemented to insure that the use of the site is restricted to protect human health and the environment. The Department has raised concerns over the safety of the work when using sheet pile for this deep excavation which is mostly below the water table at the site.

6.6.7 Cost

Estimated capital and OM&M costs for Alternative 5 are presented on Table 6-1.

6.6.8 Land Use

Land use is expected to remain commercial/industrial under this alternative.

6.7 Alternative 6 – Open-Cut Excavation and Ex-Situ Aeration

This alternative includes excavation of 2,600 cubic yards of contaminated soil from the 3,600 square foot area and ex-situ aeration of that excavated soil. It also includes excavation of approximately 7,800 cubic yards of soil to slope the sides of the excavation for the open cut. All

aerated soil would be placed back into the excavation after soil concentrations are below the SCGs. The 7,800 cubic yards of soil excavated for the open cut would not be aerated and would be replaced in the excavation area. Pre-excavation sampling would be performed prior to excavation to more completely delineate the extent of contamination, and documentation sampling would be performed following excavation to document the levels achieved by the remediation. Environmental easements would be implemented to limit the site to commercial or industrial use only. Alternative 6 also includes excavation of contaminated surface soil and construction of a drainage swale included in the original remedy presented in the ROD.

6.7.1 Overall Protection of Public Health and the Environment

This alternative treats contaminated soil in the 3,600 square foot area in the southern portion of the treatment zone and includes environmental easements to prevent use other than commercial or industrial use. It prevents exposure to contamination at concentrations above the SCGs and is protective of human health and the environment.

6.7.2 Compliance with SCGs

This alternative complies with the soil SCGs in the 3,600 square foot contaminated soil area and complies with groundwater SCGs to the extent practicable. Compliance with action-specific SCGs for air emissions will be met by complying with the vapor emission and dust control plan included in the CAMP.

6.7.3 Long-term Effectiveness and Permanence

Soil with contaminant concentrations above the SCGs in the 3,600 square foot area of soil contamination would be treated and reduced to acceptable concentrations; thereby, reducing groundwater contaminant concentrations. Monitoring would be required and environmental easements would be required to prevent groundwater ingestion at the site and limit site use to commercial or industrial. This alternative would be an effective and permanent remedy.

6.7.4 Reduction of Toxicity, Mobility and Volume with Treatment

Treatment of the contaminated soil in the southern portion of the treatment zone would remove the majority of contaminant mass from the site. This alternative includes a treatment technology (mechanical aeration) to reduce the TMV of contamination in groundwater.

6.7.5 Short-term Effectiveness

There would be a potential for on-site workers and workers from nearby businesses to be exposed to fugitive dust or vapors during excavation and handling of contaminated soil. Such potential exposure would be controlled by implementing an air monitoring program during these activities. Exposure would be significantly reduced by employing dust suppression measures, covering stockpiles, and by using personal protective equipment. Emissions from the aeration process would be reduced to acceptable concentrations by controlling the rate of soil processing. The estimated time to complete remediation is 4 months. After remediation, a Site Management Plan would be implemented that would include environmental easements to prevent development other than commercial or industrial use of the site.

6.7.6 Implementability

The equipment and materials needed for this alternative are commercially available. Air monitoring will be critical during the aeration phase of the project. Environmental easements will have to be implemented to insure that the use of the site is restricted to protect human health and the environment.

6.7.7 Cost

Estimated capital and OM&M costs for Alternative 6 are presented on Table 6-1.

6.7.8 Land Use

Land use is expected to remain commercial/industrial under this alternative.

6.8 Alternative 7 – Open-Cut Excavation and Offsite Disposal

This alternative includes excavation of 2,600 cubic yards of contaminated soil from the 3,600 square foot area and off-site disposal of this soil. Approximately 2,600 cubic yards of clean soil

would be imported from an offsite source to backfill the excavation. In addition, 7,800 cubic yards of soil will be excavated for the sloped sidewalls necessary for the open cut. This soil will not be aerated, but will be replaced into the excavated area. Pre-excavation sampling would be performed prior to excavation to more completely delineate the extent of contamination, and documentation sampling would be performed following excavation to document the levels achieved by the remediation. Environmental easements would be implemented to limit the site to commercial or industrial use only. Alternative 7 also includes excavation of contaminated surface soil and construction of a drainage swale included in the original remedy presented in the ROD.

6.8.1 Overall Protection of Public Health and the Environment

This alternative removes contaminated soil in the 3,600 square foot area with contaminant concentrations above the SCOs in the southern portion of the treatment zone and includes environmental easements to prevent use other than commercial or industrial use. It prevents exposure to contamination at concentrations above the SCGs and is protective of human health and the environment.

6.8.2 Compliance with SCGs

This alternative complies with the soil SCGs in the 3,600 square foot contaminated soil area and complies with groundwater SCGs to the extent practicable.

6.8.3 Long-term Effectiveness and Permanence

The most contaminated soil in the treatment zone would be disposed of off-site. Monitoring and environmental easements would be required to prevent groundwater ingestion at the site and limit site use to commercial or industrial. This alternative would be an effective and permanent remedy.

6.8.4 Reduction of Toxicity, Mobility and Volume with Treatment

This alternative does not include a treatment technology that would reduce the TMV of contamination in groundwater at the site.

6.8.5 Short-term Effectiveness

There would be a potential for on-site workers and workers from nearby businesses to be exposed to fugitive dust or vapors during excavation and handling of contaminated soil. Such potential exposure would be controlled by implementing an air monitoring program during these activities. Exposure would be significantly reduced by employing dust suppression measures, covering stockpiles, and by using personal protective equipment. The estimated time to complete remediation is 3 months. After remediation, a Site Management Plan would be implemented that would include environmental easements to prevent development other than commercial or industrial use of the site.

6.8.6 Implementability

The equipment and materials needed for this alternative are commercially available. Environmental easements will have to be implemented to insure that the use of the site is restricted to protect human health and the environment.

6.8.7 Cost

Estimated capital and OM&M costs for Alternative 7 are presented on Table 6-1.

6.8.8 Land Use

Land use is expected to remain commercial/industrial under this alternative.

6.9 Comparative Analysis of Alternatives

6.9.1 Overall Protection of Public Health and the Environment

Alternative 1 does not meet RAOs for the site and is only protective of human health and the environment through implementation of the SMP.

Alternatives 2 through 7 substantially reduce risk. However, Alternatives 4 through 7 reduce risk somewhat faster than Alternatives 2 and 3 by removing contaminated soil in the southern portion of the treatment zone. All six alternatives meet the RAOs and are protective of human health and the environment.

6.9.2 Compliance with SCGs

Alternative 1 would not comply with the SCGs for the Site.

Alternative 2 through 7 comply with the groundwater SCGs to the extent practicable. Compliance with groundwater SCGs would initially be more widespread with Alternative 2 since it includes remediation outside the 3,600 square foot area of contaminated soil. However, in the long term, Alternatives 3 through 7 may result in greater compliance with groundwater SCGs since they include treatment or removal of the largest mass of contamination detected at the site. Alternatives 4 through 7 also comply with soil SCGs in the 3,600 square foot excavated area located in the southern portion of the treatment zone.

6.9.3 Long-term Effectiveness and Permanence

Alternative 1 would not be effective in achieving the remedial action objectives.

Alternatives 2 through 7 are effective and permanent remedies. They are comparable in that all alternatives would require monitoring of groundwater after implementation, and they all would require environmental easements to limit the site to commercial or industrial use after remediation was completed. Alternatives 4 through 7 are somewhat more permanent than Alternatives 2 and 3 because they would likely remove a greater mass of contamination.

6.9.4 Reduction of Toxicity, Mobility and Volume with Treatment

The TMV of contaminated groundwater would not be reduced with treatment under Alternatives 1, 5 or 7. Alternatives 2, 3, 4 and 6 include treatment technologies to reduce the TMV of contaminated groundwater.

6.9.5 Short-term Effectiveness

There are no short-term impacts from Alternative 1.

Alternative 2 involves little intrusive work, and therefore, would have minimal short-term impacts. Alternative 3 involves more intrusive work than Alternative 2, but the added risks are minimal. Alternatives 6 and 7 include an open cut excavation which involves greater excavation quantities and thus more potential impacts than Alternatives 4 and 6. Potential exposure to vapors

is higher for Alternative 4 and 6 since they include soil aeration. Alternatives 4 through 7 would all employ conventional engineering control methods (e.g., air monitoring, dust suppression, etc.) to limit potential exposure. It is estimated that Alternatives 2 and 3would require more time to complete remediation (2 years) when compared to Alternatives 4 (2 months), 5 (1 month), 6 (4 months) and 7 (3 months).

6.9.6 Implementability

Alternative 1 would be the easiest to implement. Alternative 2 would be the next easiest to implement since there is minimal construction and the in-situ treatment methods proposed have already been used at the site. Alternative 3 would be only minimally more difficult to implement than Alternative 2. Alternatives 4 and 5 would be easier to implement compared to Alternatives 6 and 7 because the excavations are smaller and require less time. However, the Department has concerns with safety when using sheet pile for the excavations as included in Alternatives 4 and 5 that could render these alternatives more difficult to construct.

6.9.7 Cost

The ranking of total present worth cost for the alternatives from highest to lowest is as follows:

7 – Open-Cut Excavation and Off-Site Disposal

6 – Open-Cut Excavation and Ex-Situ Aeration

5 – Excavation Using Sheet Pile and Off-Site Disposal

4 – Excavation Using Sheet Pile and Ex-Situ Aeration

3 – ISCO and Augmented Bioremediation Using Direct Push Methods

2 – ISCO and Augmented Bioremediation Using Wells

1 – No Further Action

6.9.8 Land Use

Land use is expected to remain commercial/industrial under for all alternatives.

TABLES

TABLE 2-1
SUMMARY OF ONSITE INJECTIONS

Location	Amount of Permanganate Injected (Gal) April 2011	Amount of Permanganate Injected (Gal) August 2011	Amount of Permanganate Injected (Gal) November 2011	Amount of Molasses (Gal) August 2012
SW-1	1,334	0	0	170
SW-2	37	0	0	170
SW-3	1,445	0	0	170
SW-4	1,031	0	0	170
SW-5	1,353	864	0	170
SW-6	1,371	870	108	170
SW-7	1,184	801	0	170
SW-8	861	0	856	170
SW-9	1,331	0	1,100	170
SW-10	1,349	861	0	170
SW-11	1,185	0	1,104	170
SW-12	838	767	0	170
SW-13	944	759	0	170
SW-14	7	0	0	170
SW-15	44	0	0	4
SW-16	1,431	759	1,222	170
SW-17	29	0	181	25
SW-18	1,415	0	0	97
SW-19	757	0	0	172
SW-20	1,330	748	1,164	170
SW-21	26	0	88	125
SW-22	1,144	0	0	170
SW-23	1,511	0	0	170
SW-24	34	0	0	25
SW-25	1,316	0	0	395
SW-26	1,392	0	1,203	273
SW-27	25	0	0	104
SW-28	51	0	0	168
SW-29	327	1,688	0	170
SW-30	76	0	0	145
SW-31	483	785	0	140
SW-32	1,652	0	0	404
SW-33	2,006	0	0	511
SW-34	628	580	0	170
SW-35	2,031	967	0	151
SW-36	61	0	0	107
SW-37	1,289	543	0	89
URS-01	0	0	0	170
URS-03	0	0	1,079	179
URS-07	0	0	430	0
URS-09	0	0	1,028	0
URS-11	0	0	1,098	0
URS-12	0	0	1,108	0
OW-6S	0	0	0	89
OW-7S	0	0	0	58
MW-02	0	0	0	190
TOTAL	33,326	10,992	11,769	7,965

Table 6-1

SUMMARY OF REMEDIAL ALTERNATIVES COST ESTIMATES
STUART OLVER HOLTZ SITE

Cost Component	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Capital Costs							
Capital Costs	$28,810	$228,900	$283,100	$534,800	$861,900	$1,243,000	$1,471,900
Capital Costs for ROD Components (note 4)	$0	$337,000	$337,000	$337,000	$337,000	$337,000	$337,000
Annual OM&M Costs							
Annual Monitoring Cost	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520	$2,520
Present Worth OM&M Costs							
Present Worth Annual Monitoring Cost	$39,000	$39,000	$39,000	$39,000	$39,000	$39,000	$39,000
Years of Monitoring	30	30	30	30	30	30	30
Present Worth O&M for ROD Components (note 4)	$0	$62,300	$62,300	$62,300	$62,300	$62,300	$62,300
Total Present Worth Cost	$67,810	$667,200	$721,400	$973,100	$1,300,200	$1,681,300	$1,910,200

Notes:

1) 5% discount rate used to determine Present Worth.

2) Costs are rounded to the nearest $1,000.

3) The alternatives are as follows:

Alternative 1 - No Further Action

Alternative 2 - ISCO and Augmented Bioremediation Using Existing Wells

Alternative 3 - ISCO and Augmented Bioremediation Using Direct Push Injection

Alternative 4 - Excavation Using Sheet Pile and Ex-Situ Aeration

Alternative 5 - Excavation Using Sheet Pile and Off-Site Disposal

Alternative 6 - Open-Cut Excavation and Ex-Situ Aeration

Alternative 7 - Open-Cut Excavation and Off-Site Disposal

4) Costs for ROD components are as presented in the Feasibility Study prepared by GZA Environemntal of New York. All other costs were developed by URS for the Focused FS.

FIGURES

Source: ESRI World Imagery

200 0 200 Feet

URS

STUART OLVER HOLTZ
SITE LOCATION

FIGURE 2-1

J:\11174465.00000\DB\GIS\SITE LOCATION.mxd 8/23/2013 MDL

N

E 751,000
N 1,124,000

COMMERCE DRIVE

COMMERCE DRIVE

HYD'T

GV

18"

S

8" PVC

12" RCP

CB

8" CLAY

STUART OLVER HOLTZ
(DEMOLISHED)

SUMP

LOADING DOCK

PIT

CBF1
RIM=527.03
INV=525.5

6" CMP

SMH3

ROAD

HENRIETTA

WEST

PULLMAN
MANUFACTURING

DITCH

24" CMP

EDGE OF STANDING WATER

SMH
RIM=528.41
INV=509.9

END 24" CMP
INV=523.6

DRAINAGE
SWALE

RUBY GORDON'S
FURNITURE

LEGEND

FENCE
RIGHT OF WAY
PROPERTY LINE
SITE BOUNDARY

50' 0 50'
SCALE IN FEET

STUART OLVER HOLTZ SITE
SITE PLAN

URS

FIGURE 2-2

AG20893-111767I5-082113-GCM

PROJECT NO. SHEET NO.

E 751,000
N 1,124,000

COMMERCE DRIVE (50')

LEGEND (THIS DWG.)

- EASEMENT LINE
- PROPERTY LINE
- NEW MONITORING WELL
- NEW SOURCE AREA INJECTION WELL
- EXISTING OVERBURDEN MONITORING WELL
- EXISTING BEDROCK MONITORING WELL
- EXISTING PIEZOMETER

URS-04, HYD'T, CATCH BASIN, 36" MANHOLE, TEMPORARY WATER VALVE, OW-1S, OW-1R, OW-5S, BLACKTOP PARKING LOT, GATE 1, PLUGGED 4" CIP, 18" MANHOLE, B1/PZ-3 WELL, BLACKTOP, SW-1 through SW-37, 4" MANHOLE, URS-09, APPROXIMATE LOCATION OF OREGANOS PZZA, OW-3S, OW-3R, URS-14, URS-03, URS-07, URS-05, URS-16, HUB/TACK FOUND, MW-5 WELL, 36" MANHOLE PLUGGED, CATCH BASIN, URS-10, URS-08, ASPH. PARKING, WOODED AREA, GRAVEL RAMP, IPZ-2, TREATMENT ZONE, URS-02, B3/PZ-2 WELL, CATCH BASIN BLACKTOP, URS-01, OW-7R WELL, OW-7S WELL, URS-12, URS-06, ASPH. PARKING, EDGE OF STANDING WATER, DITCH, WELL MW-2, WELL OW-4S, WELL OW-4R, SEWER EASEMENT, BLACKTOP, URS-11, 24" MANHOLE, OW-LS (MW-2), LOW AREA, B4/PZ-1 WELL, OVERHEAD WIRES, OW-6S WELL, OW-8S, MW-3 WELL, CB MANHOLE, CONC. RAMP, OW-2R WELL, OW-2S WELL, CENTER APPROXIMATE LOCATION OF PATTON PROFESSIONAL, LEICHTNER STUDIOS, HENRIETTA ROAD, WEST, URS-15, OW-9S, URS-13, RUBY GORDON'S FURNITURE, ASPH. PARKING, OW-10S, B101-OW, OW-11S

40' 0 40'
SCALE IN FEET

J:\11174465.00000\CAD\AUG 2013\FIGURE 2-3.dwg, FIGURE-1, 1:2, 8/22/2013, 1-RAL

NO.	DATE	BY	PROJECT ADV'T DEPT. MGR/SUPR ENGR APPROVAL APPROVAL

REVISIONS

URS Corporation
77 Goodell Street, Buffalo, New York 14203
(716)856-5636 phone (716)856-2545 fax

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 BROADWAY
ALBANY, NEW YORK
12233

STUART OLVER HOLTZ SITE
TOWN OF HENRIETTA
MONROE COUNTY
SITE No. 8-28-079

REMEDIAL CONSTRUCTION

WELL LOCATION MAP
SHEET TITLE

OWNER'S PROJECT NUMBER	PROJECT NUMBER 11174465
DATE AUGUST 2013	SCALE AS SHOWN
DRAWN BY EJH	FIGURE 2-3
CHECKED BY DMc	
ARCH/ENGR. CWP	DWG. NUMBER

N

E 751,000
N 1,124,000

COMMERCE DRIVE

COMMERCE DRIVE

URS-04 GV ND

HYD'T

URS-05 ND

OW-1S 5
OW-1R 2

OW-5S 1,851

B1/PZ-3 131

1,011 OW-3S
OW-3R 7

453 URS-14

URS-03 54,523

50,000 40,480 URS-07

50,000

10,000

1,000

LOW

289 URS-10

122,200

URS-09 1,007

STUART OLVER HOLTZ (DEMOLISHED)

ND URS-08

ROAD

MW-5 182

URS-02 497 B3/PZ-2 ND

URS-01 254

5,786 OW-7R
OW-7S

90,905 URS-12

URS-11 47,169

URS-06 ND

MW-2 9,245

6,386

OW-4S 2
OW-4R

10,080

B4/PZ-1

OW-6S

MW-3

OW-8S 18,960

8,550

10,000

ND OW-LS(MW-2)

36 OW-2R
OW-2S 134

SS-6

HENRIETTA

PULLMAN MANUFACTURING

DITCH

OW-9S

7 URS-13

EDGE OF STANDING WATER

RUBY GORDON'S FURNITURE

WEST

ND

1,000

OW-10S 4

1,000

B101-OW

OW-11S 1,512

LEGEND

50' 0 50'
SCALE IN FEET

ND NON-DETECT
289 TOTAL VOCs (µg/l)
FENCE
RIGHT OF WAY
PROPERTY LINE
1000 VOC CONCENTRATION CONTOUR = µg/L

URS-01 SUPPLEMENTAL INVESTIGATION OVERBURDEN MONITORING WELL
SB-14 SOIL BORING
MW-2 OVERBURDEN MONITORING WELL
B4/PZ-1 PIEZOMETER INSTALLED IN PREVIOUS INVESTIGATION
OW-1R BEDROCK MONITORING WELL

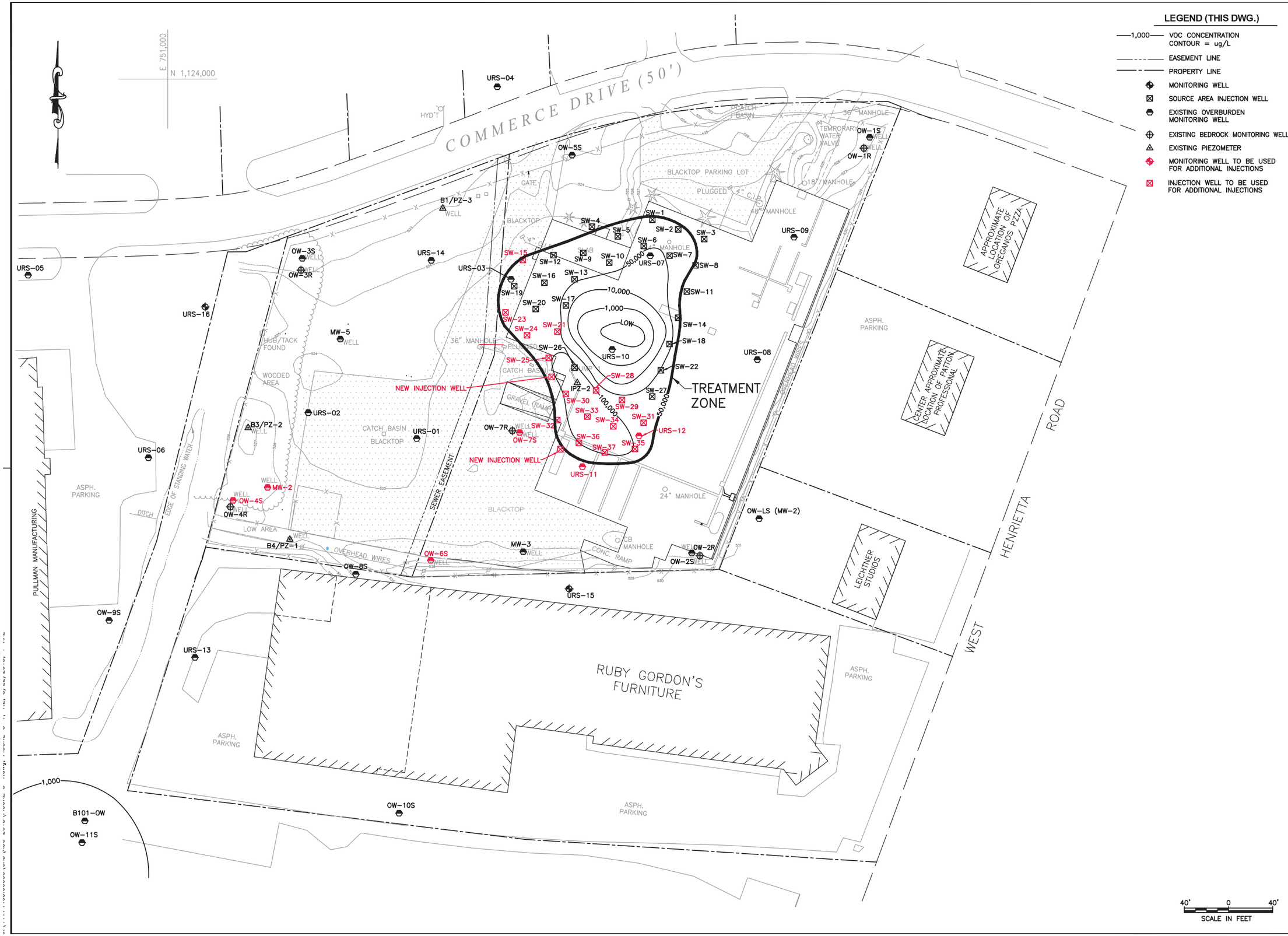
NOTE: Figure is based on data from 2007.

STUART OLVER HOLTZ SITE
TOTAL VOCs UPPER TILL AQUIFER GROUNDWATER CONTAMINATION

URS

FIGURE 2-4

AG120894-11176715-082113-GCM



LEGEND (THIS DWG.)

- 1,000 — VOC CONCENTRATION CONTOUR = ug/L
- EASEMENT LINE
- PROPERTY LINE
- MONITORING WELL
- SOURCE AREA INJECTION WELL
- EXISTING OVERBURDEN MONITORING WELL
- EXISTING BEDROCK MONITORING WELL
- EXISTING PIEZOMETER
- MONITORING WELL TO BE USED FOR ADDITIONAL INJECTIONS
- INJECTION WELL TO BE USED FOR ADDITIONAL INJECTIONS

NO.	DATE	BY	PROJECT ARCH./ENGR. APPROVAL	DEPT. MGR/SUPR APPROVAL

REVISIONS

URS Corporation
77 Goodell Street, Buffalo, New York 14203
(716)856-5636 phone (716)856-2545 fax

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

625 BROADWAY
ALBANY, NEW YORK
12233

STUART OLVER HOLTZ SITE
TOWN OF HENRIETTA
MONROE COUNTY
SITE No. 8-28-079

REMEDIAL CONSTRUCTION

CONTAMINATED WELLS TO BE USED FOR INJECTIONS

SHEET TITLE

OWNER'S PROJECT NUMBER	PROJECT NUMBER
	11174465
DATE: AUGUST 2013	SCALE: AS SHOWN
DRAWN BY: EJH	FIGURE 3-1
CHECKED BY: DMc	
ARCH/ENGR.: CWP	DWG. NUMBER

N

SW-23
SW-20
SW-17
SW-14
SW-24
SW-21
SW-18
URS-08
URS-10
SW-25
SW-26
SW-22
SW-28
SW-30
SW-29
SW-27
SW-33
SW-34
SW-31
SW-32
OW-07S
OW-07R
PB-12A
URS-12
SW-36
SW-37
SW-35
URS-11

PB-13A

Analyte	Depth (ft bgs)	Concentration (µg/Kg)
TCE	16	480,000
TCE	18	30,000
TCE	19	50,000
TCE	21.5	4,100

PB-15A

Analyte	Depth (ft bgs)	Concentration (µg/Kg)
TCE	20	5,300

PB-14A

Analyte	Depth (ft bgs)	Concentration (µg/Kg)
TCE	14	1,400

PB-18A

Analyte	Depth (ft bgs)	Concentration (µg/Kg)
TCE	14	1,500

PB-19A

Analyte	Depth (ft bgs)	Concentration (µg/Kg)
1,1,1-TCA	9	45,000
1,1,1-TCA	14	1,400

PB-16A

Analyte	Depth (ft bgs)	Concentration (µg/Kg)
1,1,1-TCA	4	97,000
1,1,1-TCA	10	19,000
1,1,1-TCA	18	150,000

PB-11A

Analyte	Depth (ft bgs)	Concentration (µg/Kg)
TCE	17	1,300
1,1,1-TCA	18	1,200
TCE	18	9,200
TCE	20	5,900

PB-17A

Analyte	Depth (ft bgs)	Concentration (µg/Kg)
1,1,1-TCA	13	6,000

PB-9A

Analyte	Depth (ft bgs)	Concentration (µg/Kg)
1,1,1-TCA	12	2,700

PB-10A

Analyte	Depth (ft bgs)	Concentration (µg/Kg)
1,1,1-TCA	15	1,500
TCE	15	1,100
1,1,1-TCA	16	1,300
TCE	16	1,200

Legend

- Performance Boring
- Monitoring/Injection Well
- Treatment Zone
- Extent of Soil Contamination

20 0 20 Feet

STUART OLVER HOLTZ SITE
EXTENT OF SOIL CONTAMINATION

URS

FIGURE 3-2

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APPENDICES

APPENDIX A

ALTERNATIVE COST ANALYSES

NYSDEC
Stuart Over Holtz Site
Focused Feasibility Study

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Description:	**ALTERNATIVE 1-No Further Action**	Checked By:	KRJ	Date:	26-Aug-13

Construction Cost Estimate Summary

DESCRIPTION	ESTIMATED COST
SITE MANAGEMENT PLAN	**$20,100**
(CONSTRUCTION) SUBTOTAL 1	**$20,100**

SUPPLEMENTAL PROJECT COSTS

Overhead and Profit (10% of Subtotal 1)	**$2,010**
(CONSTRUCTION) SUBTOTAL 2	**$22,110**
Contingency (30% of Subtotal 2)	**$6,700**
TOTAL CONSTRUCTION COSTS	**$28,810**
Total Capital Costs	**$28,810**
Present Worth Monitoring - 30 Years	**$39,000**
TOTAL COST	**$67,810**

NYSDEC
Stuart Over Holtz Site
Focused Feasibility Study
Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALTERNATIVE 1-No Further Action**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	SITE MANAGEMENT PLAN				
1	Labor	250	MH	$80	$20,000
2	Direct Costs	1	LS	$100	$100
	TOTAL COST				**$20,100**

NYSDEC
Stuart Over Holtz Site
Focused Feasibility Study
Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALTERNATIVE 1-No Further Action**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	MONITORING - 30 YEARS				
1	Groundwater Analysis - VOCs	20	Each	$126	$2,520
	SUBTOTAL 1				**$2,520**
	Present Worth of Subtotal 1 (30 years @ 5% discount rate)	mult. by	15.3725		**$39,000**
	TOTAL COST				**$39,000**

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NYSDEC
Stuart Over Holtz Site
Focused Feasibility Study

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Description:	ALT 2 - ISCO&BIO w/Existing Wells	Checked By:	KRJ	Date:	26-Aug-13

Construction Cost Estimate Summary

DESCRIPTION	ESTIMATED COST
SITE MANAGEMENT PLAN	**$20,100**
WELL INSTALLATION	**$5,900**
MOLASSES INJECTION	**$16,500**
PERMANGANATE INJECTION	**$86,400**
PROGRESS MONITORING	**$47,000**
(CONSTRUCTION) SUBTOTAL 1	**$175,900**

SUPPLEMENTAL PROJECT COSTS

Overhead and Profit (10% of Subtotal 1)	
(CONSTRUCTION) SUBTOTAL 2	
Contingency (30% of Subtotal 2)	**$53,000**
TOTAL CONSTRUCTION COSTS	**$228,900**
Total Capital Costs	**$228,900**
Present Worth Monitoring - 30 Years	**$39,000**
TOTAL COST	**$267,900**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	ALT 2 - ISCO&BIO w/Existing Wells	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	SITE MANAGEMENT PLAN				
1	Labor	250	MH	$80	$20,000
2	Direct Costs	1	LS	$100	$100
	TOTAL COST				**$20,100**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	ALT 2 - ISCO&BIO w/Existing Wells	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	WELL INSTALLATION				
	2 wells @ 24 LF per well				
1	Injection Well Installation	48	LF	$121	$5,900
	TOTAL COST				**$5,900**

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NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	ALT 2 - ISCO&BIO w/Existing Wells	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	MOLASSES INJECTION				
	Inject molasses in 21 wells in two injection events.				
	21 x 170 gal x2 =7,140 gal				
1	Molasses injections	7,140	Gal	$2.31	$16,500
	TOTAL COST				**$16,500**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	ALT 2 - ISCO&BIO w/Existing Wells	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	PERMANGANATE INJECTION				
	Inject permanganate in 21 wells in one injection events.				
	21 x 1100 gal x1 =23,100 gal				
1	Permanganate injections	23,100	Gal	$3.74	$86,400
	TOTAL COST				**$86,400**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	ALT 2 - ISCO&BIO w/Existing Wells	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	PROGRESS MONITORING				
1	Groundwater Sampling - VOCs	200	Each	$126.00	$25,200
2	Groundwater Sampling - TOC	100	Each	$71	$7,100
3	Boring Soil Samples - VOCs	60	Each	$32	$2,000
4	Monthly Monitoring - field parameters	24	Each	$528	$12,700
	TOTAL COST				**$47,000**

NYSDEC
STUART OLVER HOLTZ
Focused Feasibility Study
Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	ALT 2 - ISCO&BIO w/Existing Wells	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	MONITORING - 30 YEARS				
1	Groundwater Analysis - VOCs	20	Each	$126	$2,520
	SUBTOTAL 1				**$2,520**
	Present Worth of Subtotal 1 (30 years @ 5% discount rate)	mult. by	15.3725		**$39,000**
	TOTAL COST				**$39,000**

NYSDEC
Stuart Over Holtz Site
Focused Feasibility Study

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Description:	ALT 3 - ISCO/Bioremediation w/Direct Push	Checked By:	KRJ	Date:	26-Nov-13

Construction Cost Estimate Summary

DESCRIPTION	ESTIMATED COST
SITE MANAGEMENT PLAN	**$20,100**
MOLASSES INJECTION	**$70,000**
PERMANGANATE INJECTION	**$80,000**
PROGRESS MONITORING	**$47,000**
(CONSTRUCTION) SUBTOTAL 1	**$217,100**

SUPPLEMENTAL PROJECT COSTS

Overhead and Profit (10% of Subtotal 1)	
(CONSTRUCTION) SUBTOTAL 2	
Contingency (30% of Subtotal 2)	**$66,000**
TOTAL CONSTRUCTION COSTS	**$283,100**
Total Capital Costs	**$283,100**
Present Worth Monitoring - 30 Years	**$39,000**
TOTAL COST	**$322,100**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	ALT 3 - ISCO/Bioremediation w/Direct Push	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	SITE MANAGEMENT PLAN				
1	Labor	250	MH	$80	$20,000
2	Direct Costs	1	LS	$100	$100
	TOTAL COST				**$20,100**

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NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Cost Estimate

Client: NYSDEC	Project Number: 11176715		
Project: Stuart Olver Holtz	Calculated By: CWP	Date: 21-Nov-13	
Title: ALT 3 - ISCO/Bioremediation w/Direct Push	Checked By: KRJ	Date: 26-Nov-13	

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	MOLASSES INJECTION				
	Inject molasses in 50 direct pushpoints in two injection events.				
	First Injection				
1	Direct injection of molasses, 50 points, 20 gallons per point;	1	Each	$35,000	$35,000
	Injection rate of 0.3 gpm; 8 days to complete with two technicians				
	and Geoprobe with operator;				
	3 days for set-up and tear down.				
	Second Injection				
2	Direct injection of molasses, 50 points, 20 gallons per point;	1	Each	$35,000	$35,000
	Injection rate of 0.3 gpm; 8 days to complete with two technicians				
	and Geoprobe with operator;				
	3 days for set-up and tear down.				
	TOTAL COST				**$70,000**

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NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Cost Estimate

Client:	NYSDEC	Project Number:	11176715	
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date: 21-Nov-13
Title:	ALT 3 - ISCO/Bioremediation w/Direct Push	Checked By:	KRJ	Date: 26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	PERMANGANATE INJECTION				
	Inject permanganate in 50 direct push points in one injection event.				
1	Direct injection of sodium permanganate, 50 points, 100 gallons	1	Each	$80,000	$80,000
	per point;				
	Injection rate of 0.5 gpm; 20 days of injection time with two				
	technicians plus Geoprobe with operator;				
	4 days for set-up and tear down;				
	TOTAL COST				**$80,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	ALT 3 - ISCO/Bioremediation w/Direct Push	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	PROGRESS MONITORING				
1	Groundwater Sampling - VOCs	200	Each	$126.00	$25,200
2	Groundwater Sampling - TOC	100	Each	$71	$7,100
3	Boring Soil Samples - VOCs	60	Each	$32	$2,000
4	Monthly Monitoring - field parameters	24	Each	$528	$12,700
	TOTAL COST				**$47,000**

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NYSDEC
STUART OLVER HOLTZ
Focused Feasibility Study
Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	ALT 3 - ISCO/Bioremediation w/Direct Push	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	MONITORING - 30 YEARS				
1	Groundwater Analysis - VOCs	20	Each	$126	$2,520
	SUBTOTAL 1				**$2,520**
	Present Worth of Subtotal 1 (30 years @ 5% discount rate)	mult. by	15.3725		**$39,000**
	TOTAL COST				**$39,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Description:	**ALT 4 - Excavation w/Sheet Pile&Aeration**	Checked By:	KRJ	Date:	26-Aug-13

Construction Cost Estimate Summary

DESCRIPTION	ESTIMATED COST
Site Management Plan	**$20,100**
Mobilization/Demobilization an Site Services	**$64,300**
Excavation, Aeration and Backfill	**$276,000**
Pre-Excavation Sampling	**$6,000**
Confirmation Sampling	**$2,400**
Restoration	**$4,000**
(CONSTRUCTION) SUBTOTAL 1	**$372,800**

SUPPLEMENTAL PROJECT COSTS

Overhead and Profit (10% of Subtotal 1)	**$38,000**
(CONSTRUCTION) SUBTOTAL 2	**$410,800**
Contingency (30% of Subtotal 2)	**$124,000**
TOTAL CONSTRUCTION COSTS	**$534,800**
Total Capital Costs	**$534,800**
Presetn Worth Monitoring - 30 Years	**$39,000**
TOTAL COST	**$573,800**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11174868		
Project:	Stuart Over Holtz	Calculated By:	CWP	Date:	2-Oct-08
Title:	**ALT 4 - Excavation w/Sheet Pile&Aeration**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	SITE MANAGEMENT PLAN				
1	Labor	250	MH	$80	$20,000
2	Direct Costs	1	LS	$100	$100
	SUBTOTAL				**$20,100**
	TOTAL COST				**$20,100**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALT 4 - Excavation w/Sheet Pile&Aeration**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Mobilization/Demobilization&Site Services				
1	Submittals	1	LS	$5,000	$5,000
2	Health and Safety	44	Day	$700	$30,800
3	Project Sign	1	Each	$1,000	$1,000
4	Erosion and Sediment Control	1	LS	$2,000	$2,000
5	Decon Pad	1	LS	$2,500	$2,500
6	Temporary Fencing	1	LS	$2,000	$2,000
7	Air Monitoring	1	LS	$10,000	$10,000
8	Survey	1	LS	$2,500	$2,500
9	Utilities	1	LS	$2,500	$2,500
10	Mobilize Equipment	1	LS	$4,000	$4,000
11	Demobilize Equipment	1	LS	$2,000	$2,000
	SUBTOTAL				**$64,300**
	TOTAL COST				**$64,300**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALT 4 - Excavation w/Sheet Pile&Aeration**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Excavation, Aeration and Backfill				
1	Break up and remove concrete	100	CY	$40	$4,000
2	Replace concrete in excavation	100	CY	$10	$1,000
3	Excavate, screen, stockpile and replace soil	2600	CY	$42	$109,200
4	Dewatering				
a	Steel Sheet Pile	97	Ton	$1,181	$114,600
b	Sump Installation	1	LS	$5,000	$5,000
c	Pump Rental	2	Month	$2,000	$4,000
d	Hose Rental	2	Month	$500	$1,000
e	Treatment System Rental	2	Month	$3,000	$6,000
f	Operator	320	HR	$60	$19,200
g	Discaharge Sampling	10	Each	$200	$2,000
5	Soil Characterization Sampling	100	Each	$100	$10,000
	SUBTOTAL				**$276,000**
	TOTAL COST				**$276,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALT 4 - Excavation w/Sheet Pile&Aeration**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Pre-Excavation Sampling				
1	Geoprobe	1	Day	$1,500	$1,500
2	Soil Samples	30	Each	$150	$4,500
	SUBTOTAL				**$6,000**
	TOTAL COST				**$6,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALT 4 - Excavation w/Sheet Pile&Aeration**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Confirmation Sampling				
1	Soil Samples	16	Each	$150	$2,400
	SUBTOTAL				**$2,400**
	TOTAL COST				**$2,400**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALT 4 - Excavation w/Sheet Pile&Aeration**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Site Restoration				
1	Topsoil/Fertilizer /Mulch/Seed	400	SY	$10	$4,000
	SUBTOTAL				**$4,000**
	TOTAL COST				**$4,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALT 4 - Excavation w/Sheet Pile&Aeration**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	MONITORING - 30 YEARS				
1	Groundwater Analysis - VOCs	20	Each	$126	$2,520
	SUBTOTAL				**$2,520**
	Present Worth (30 years@5% discount rate)	mult. by	15.3725		**$39,000**
	TOTAL COST				**$39,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Description:	**ALT 5 - Excavation w/Sheet Pile&Disposal**	Checked By:	KRJ	Date:	26-Aug-13

Construction Cost Estimate Summary

DESCRIPTION	ESTIMATED COST
Site Management Plan	**$20,100**
Mobilization/Demobilization an Site Services	**$42,900**
Excavation, Backfill and Disposal	**$526,500**
Pre-Excavation Sampling	**$6,000**
Confirmation Sampling	**$2,400**
Restoration	**$4,000**
(CONSTRUCTION) SUBTOTAL 1	**$601,900**

SUPPLEMENTAL PROJECT COSTS

Overhead and Profit (10% of Subtotal 1)	**$61,000**
(CONSTRUCTION) SUBTOTAL 2	**$662,900**
Contingency (30% of Subtotal 2)	**$199,000**
TOTAL CONSTRUCTION COSTS	**$861,900**
Total Capital Costs	**$861,900**
Presetn Worth Monitoring - 30 Years	**$39,000**
TOTAL COST	**$900,900**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11174868		
Project:	Stuart Over Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALT 5 - Excavation w/Sheet Pile&Disposal**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	SITE MANAGEMENT PLAN				
1	Labor	250	MH	$80	$20,000
2	Direct Costs	1	LS	$100	$100
	SUBTOTAL				**$20,100**
	TOTAL COST				**$20,100**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALT 5 - Excavation w/Sheet Pile&Disposal**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Mobilization/Demobilization&Site Services				
1	Submittals	1	LS	$5,000	$5,000
2	Health and Safety	22	Day	$700	$15,400
3	Project Sign	1	Each	$1,000	$1,000
4	Erosion and Sediment Control	1	LS	$1,000	$1,000
5	Decon Pad	1	LS	$2,500	$2,500
6	Temporary Fencing	1	LS	$2,000	$2,000
7	Air Monitoring	1	LS	$5,000	$5,000
8	Survey	1	LS	$2,500	$2,500
9	Utilities	1	LS	$2,500	$2,500
10	Mobilize Equipment	1	LS	$4,000	$4,000
11	Demobilize Equipment	1	LS	$2,000	$2,000
	SUBTOTAL				**$42,900**
	TOTAL COST				**$42,900**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALT 5 - Excavation w/Sheet Pile&Disposal**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Excavation, Backfill and Disposal				
1	Break up and remove concrete	100	CY	$40	$4,000
2	Replace concrete in excavation	100	CY	$10	$1,000
3	Excavate Soil	2600	CY	$10	$26,000
4	Backfill and Compact with Imported Fill	2600	CY	$33	$85,800
5	Dewatering				
a	Steel Sheet Pile	97	Ton	$1,181	$114,600
b	Sump Installation	1	LS	$5,000	$5,000
c	Pump Rental	1	Month	$2,000	$2,000
d	Hose Rental	1	Month	$500	$500
e	Treatment System Rental	1	Month	$3,000	$3,000
f	Operator	160	HR	$60	$9,600
g	Discharge Sampling	5	Each	$200	$1,000
6	Soil Characterization Sampling	10	Each	$100	$1,000
7	Transport and Disposal of Excavated Soil	2600	CY	$105	$273,000
	SUBTOTAL				**$526,500**
	TOTAL COST				**$526,500**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALT 5 - Excavation w/Sheet Pile&Disposal**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Pre-Excavation Sampling				
1	Geoprobe	1	Day	$1,500	$1,500
2	Soil	30	Each	$150	$4,500
	SUBTOTAL				**$6,000**
	TOTAL COST				**$6,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALT 5 - Excavation w/Sheet Pile&Disposal**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Confirmation Sampling				
1	Soil Samples	16	Each	$150	$2,400
	SUBTOTAL				**$2,400**
	TOTAL COST				**$2,400**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALT 5 - Excavation w/Sheet Pile&Disposal**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Site Restoration				
1	Topsoil/Fertilizer /Mulch/Seed	400	SY	$10	$4,000
	SUBTOTAL				**$4,000**
	TOTAL COST				**$4,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	16-Jul-13
Title:	**ALT 5 - Excavation w/Sheet Pile&Disposal**	Checked By:	KRJ	Date:	26-Aug-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	MONITORING - 30 YEARS				
1	Groundwater Analysis - VOCs	20	Each	$126	$2,520
	SUBTOTAL				**$2,520**
	Present Worth (30 years@5% discount rate)	mult. by	15.3725		**$39,000**
	TOTAL COST				**$39,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Description:	**ALT 6 - Open-Cut Excavation&Aeration**	Checked By:	KRJ	Date:	26-Nov-13

Construction Cost Estimate Summary

DESCRIPTION	ESTIMATED COST
Site Management Plan	**$20,100**
Mobilization/Demobilization an Site Services	**$117,600**
Excavation, Aeration and Backfill	**$693,900**
Pre-Excavation Sampling	**$6,000**
Confirmation Sampling	**$2,400**
Restoration	**$29,000**
(CONSTRUCTION) SUBTOTAL 1	**$869,000**

SUPPLEMENTAL PROJECT COSTS

Overhead and Profit (10% of Subtotal 1)	**$87,000**
(CONSTRUCTION) SUBTOTAL 2	**$956,000**
Contingency (30% of Subtotal 2)	**$287,000**
TOTAL CONSTRUCTION COSTS	**$1,243,000**
Total Capital Costs	**$1,243,000**
Presetn Worth Monitoring - 30 Years	**$39,000**
TOTAL COST	**$1,282,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11174868		
Project:	Stuart Over Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	**ALT 6 - Open-Cut Excavation&Aeration**	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	SITE MANAGEMENT PLAN				
1	Labor	250	MH	$80	$20,000
2	Direct Costs	1	LS	$100	$100
	SUBTOTAL				**$20,100**
	TOTAL COST				**$20,100**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	**ALT 6 - Open-Cut Excavation&Aeration**	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Mobilization/Demobilization&Site Services				
1	Submittals	1	LS	$5,000	$5,000
2	Health and Safety	88	Day	$700	$61,600
3	Project Sign	1	Each	$1,000	$1,000
4	Erosion and Sediment Control	1	LS	$4,000	$4,000
5	Decon Pad	1	LS	$2,500	$2,500
6	Temporary Fencing	1	LS	$4,000	$4,000
7	Air Monitoring	1	LS	$20,000	$20,000
8	Survey	1	LS	$5,000	$5,000
9	Utilities	1	LS	$2,500	$2,500
10	Mobilize Equipment	1	LS	$8,000	$8,000
11	Demobilize Equipment	1	LS	$4,000	$4,000
	SUBTOTAL				**$117,600**
	TOTAL COST				**$117,600**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	**ALT 6 - Open-Cut Excavation&Aeration**	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Excavation, Aeration and Backfill				
1	Break up and remove concrete	400	CY	$40	$16,000
2	Replace concrete in excavation	400	CY	$10	$4,000
3	Excavate, screen, stockpile and replace contaminated soil	2600	CY	$42	$109,200
4	Excavate and Replace Non-Contaminated Soil	7800	CY	$20	$156,000
5	Dewatering w/Well Points First Month	680	LFHdr	$187	$127,200
6	Dewatering w/Well Points Second Month	680	LFHdr	$102.50	$69,700
7	Dewatering w/Well points Third Month	680	LFHdr	$102.50	$69,700
8	Dewatering w/Well Points Fourth Month	680	LFHdr	$102.50	$69,700
9	Treatment System Rental	4	Month	$5,000	$20,000
10	Treatment System Operator	640	HR	$60	$38,400
11	Discharge Sampling	20	Each	$200	$4,000
12	Soil Characterization Sampling	100	Each	$100	$10,000
	SUBTOTAL				**$693,900**
	TOTAL COST				**$693,900**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	**ALT 6 - Open-Cut Excavation&Aeration**	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Pre-Excavation Sampling				
1	Geoprobe	1	Day	$1,500	$1,500
2	Soil Samples	30	Each	$150	$4,500
	SUBTOTAL				**$6,000**
	TOTAL COST				**$6,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	**ALT 6 - Open-Cut Excavation&Aeration**	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Confirmation Sampling				
1	Soil Samples	16	Each	$150	$2,400
	SUBTOTAL				**$2,400**
	TOTAL COST				**$2,400**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	**ALT 6 - Open-Cut Excavation&Aeration**	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Site Restoration				
1	Topsoil/Fertilizer /Mulch/Seed	2900	SY	$10	$29,000
	SUBTOTAL				**$29,000**
	TOTAL COST				**$29,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	**ALT 6 - Open-Cut Excavation&Aeration**	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	MONITORING - 30 YEARS				
1	Groundwater Analysis - VOCs	20	Each	$126	$2,520
	SUBTOTAL				**$2,520**
	Present Worth (30 years@5% discount rate)	mult. by	15.3725		**$39,000**
	TOTAL COST				**$39,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Description:	**ALT 7 - Open-Cut Excavation&Disposal**	Checked By:	KRJ	Date:	26-Nov-13

Construction Cost Estimate Summary

DESCRIPTION	ESTIMATED COST
Site Management Plan	**$20,100**
Mobilization/Demobilization an Site Services	**$96,200**
Excavation, Aeration and Backfill	**$875,200**
Pre-Excavation Sampling	**$6,000**
Confirmation Sampling	**$2,400**
Restoration	**$29,000**
(CONSTRUCTION) SUBTOTAL 1	**$1,028,900**

SUPPLEMENTAL PROJECT COSTS	
Overhead and Profit (10% of Subtotal 1)	**$103,000**
(CONSTRUCTION) SUBTOTAL 2	**$1,131,900**
Contingency (30% of Subtotal 2)	**$340,000**
TOTAL CONSTRUCTION COSTS	**$1,471,900**
Total Capital Costs	**$1,471,900**
Presetn Worth Monitoring - 30 Years	**$39,000**
TOTAL COST	**$1,510,900**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11174868		
Project:	Stuart Over Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	**ALT 7 - Open-Cut Excavation&Disposal**	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	SITE MANAGEMENT PLAN				
1	Labor	250	MH	$80	$20,000
2	Direct Costs	1	LS	$100	$100
	SUBTOTAL				**$20,100**
	TOTAL COST				**$20,100**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	**ALT 7 - Open-Cut Excavation&Disposal**	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Mobilization/Demobilization&Site Services				
1	Submittals	1	LS	$5,000	$5,000
2	Health and Safety	66	Day	$700	$46,200
3	Project Sign	1	Each	$1,000	$1,000
4	Erosion and Sediment Control	1	LS	$3,000	$3,000
5	Decon Pad	1	LS	$2,500	$2,500
6	Temporary Fencing	1	LS	$4,000	$4,000
7	Air Monitoring	1	LS	$15,000	$15,000
8	Survey	1	LS	$5,000	$5,000
9	Utilities	1	LS	$2,500	$2,500
10	Mobilize Equipment	1	LS	$8,000	$8,000
11	Demobilize Equipment	1	LS	$4,000	$4,000
	SUBTOTAL				**$96,200**
	TOTAL COST				**$96,200**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	**ALT 7 - Open-Cut Excavation&Disposal**	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Excavation, Aeration and Backfill				
1	Break up and remove concrete	400	CY	$40	$16,000
2	Replace concrete in excavation	400	CY	$10	$4,000
3	Excavate contaminated soil	2600	CY	$10	$26,000
4	Backfill and Compact with Imported Fill	2600	CY	$33	$85,800
5	Excavate and Replace Non-Contaminated Soil	7800	CY	$20	$156,000
6	Dewatering w/Well Points First Month	680	LFHdr	$187	$127,200
7	Dewatering w/Well Points Second Month	680	LFHdr	$102.50	$69,700
8	Dewatering w/Well points Third Month	680	LFHdr	$102.50	$69,700
9	Treatment System Rental	3	Month	$5,000.00	$15,000
10	Treatment System operator	480	HR	$60	$28,800
11	Discharge Sampling	15	Each	$200	$3,000
12	Soil Characterization Sampling	10	CY	$100	$1,000
13	Transport and Dispose of Excavated Soil	2600	Cy	$105	$273,000
	SUBTOTAL				**$875,200**
	TOTAL COST				**$875,200**

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NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	**ALT 7 - Open-Cut Excavation&Disposal**	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Pre-Excavation Sampling				
1	Geoprobe	1	Day	$1,500	$1,500
2	Soil Samples	30	Each	$150	$4,500
	SUBTOTAL				**$6,000**
	TOTAL COST				**$6,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	**ALT 7 - Open-Cut Excavation&Disposal**	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Confirmation Sampling				
1	Soil Samples	16	Each	$150	$2,400
	SUBTOTAL				**$2,400**
	TOTAL COST				**$2,400**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	**ALT 7 - Open-Cut Excavation&Disposal**	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	Site Restoration				
1	Topsoil/Fertilizer /Mulch/Seed	2900	SY	$10	$29,000
	SUBTOTAL				**$29,000**
	TOTAL COST				**$29,000**

NYSDEC
Stuart Olver Holtz Site
Focused Feasibility Study
Construction Cost Estimate

Client:	NYSDEC	Project Number:	11176715		
Project:	Stuart Olver Holtz	Calculated By:	CWP	Date:	21-Nov-13
Title:	**ALT 7 - Open-Cut Excavation&Disposal**	Checked By:	KRJ	Date:	26-Nov-13

ITEM	DESCRIPTION	QTY.	UNITS	UNIT COST	TOTAL COST
	MONITORING - 30 YEARS				
1	Groundwater Analysis - VOCs	20	Each	$126	$2,520
	SUBTOTAL				**$2,520**
	Present Worth (30 years@5% discount rate)	mult. by	15.3725		**$39,000**
	TOTAL COST				**$39,000**