RECORD OF DECISION

68 West First Street
Operable Unit Number 01: On-Site Area
Environmental Restoration Project
Oswego, Oswego County
Site No. E738040
November 2013

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

DECLARATION STATEMENT - RECORD OF DECISION

68 West First Street
Operable Unit Number: 01
Environmental Restoration Project
Oswego, Oswego County
Site No. E738040
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Statement of Purpose and Basis

This document presents the remedy for Operable Unit Number: 01: On-Site Area of the 68 West First Street site, an environmental restoration site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for Operable Unit Number: 01 of the 68 West First Street site and the public's input to the proposed remedy presented by the Department. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Description of Selected Remedy

The elements of the selected remedy are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance

ecological, economic and social goals; and

- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. Excavation

Excavation and off-site disposal of contaminant source areas, including the soil in and around the two sumps located within the on-site building, soil surrounding the former underground storage tank (UST) and the soil surrounding the underground utility or process lines connected to the former 15,000-gallon UST. Excavation in these areas will proceed to bedrock or until endpoint samples indicate there is no soil remaining which contains VOCs at concentrations exceeding their soil cleanup objective for the protection of groundwater, as defined by 6 NYCRR Part 375-6.8. In addition, the concrete slab below the former UST will be removed and further excavation conducted if necessary. Soil to the east of the process lines connecting the southern building sump and the former UST will also be excavated. The approximate excavation areas are shown on Figure 6.

It is estimated approximately 1450 cubic yards of soil will be excavated from these areas.

Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to replace soil removed from the site and establish the designed grades at the site.

3. Excavation Contingency

If any on-site buildings are demolished or areas of paving removed, soil excavation will be conducted to address any additional source areas identified as described in remedy element 2 above.

4. In-Situ Chemical Treatment

In-situ chemical treatment (ISCT) will be implemented to treat the chlorinated volatile organic compounds in groundwater. Injections will be conducted into the subsurface to destroy the contaminants. The approximate area which is anticipated to require injections is indicated on Figure 6. Injections will be conducted into bedrock. If necessary, injections will also be conducted in overburden. The method and depth of injection will be determined during the remedial design. The exact area to be treated will also be determined during the remedial design.

Prior to the full implementation of this technology, laboratory and on-site pilot scale studies will be conducted to more clearly define design parameters.

5. Cover System

A site cover system, consisting of asphalt pavement and concrete building slabs, currently exists over the majority of the site. The existing cover system will be maintained to allow for restricted residential use of the site. A site cover will be required over the remainder of the site to allow for restricted residential use of the site. Any site redevelopment will maintain a site cover, which may consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is required it will be a minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

6. Vapor Mitigation

If the current on-site buildings are occupied prior to or during the implementation of the elements of the remedy targeting soil and groundwater contamination, a sub-slab depressurization system, or a similar engineered system, will be required to prevent the migration of vapors into the building from soil or groundwater. If the site is redeveloped during the remedial action phase, the potential for soil vapor intrusion will be evaluated for any buildings developed on the site, and the recommended actions will be implemented to address exposures related to soil vapor intrusion.

7. Natural Attenuation

Following implementation of the ISCT described in remedy element 4, groundwater contamination remaining after active remediation will be addressed through natural attenuation. Groundwater will be monitored for site-related contamination and other indicators which will provide an understanding of the mechanisms attenuating the contamination (e.g., biological activity, dispersion, etc.). It is anticipated that contamination will decrease by an order of magnitude in a reasonable period of time (5 to 10 years). Reports of the attenuation will be provided at 5 and 10 years, and active remediation will be considered if it appears that natural processes alone will not address the residual contamination.

8. Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property that:

- requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allows the use and development of the controlled property for restricted residential, commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
- requires compliance with the Department approved Site Management Plan.

9. Site Management Plan

A Site Management Plan is required, which includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in remedy element 8 above.

Engineering Controls: The cover system discussed in remedy element 5, the ISCT system discussed in remedy element 4 and the soil vapor mitigation system discussed in remedy element 6.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- a provision for removal of any additional source areas identified under the on-site buildings or paved areas if and when they are demolished;
- descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion should the on-site buildings become reoccupied following implementation of the remedy and for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- monitoring of groundwater to assess the performance and effectiveness of the remedy;
- a schedule of monitoring and frequency of submittals to the Department; and
- monitoring for vapor intrusion for any buildings occupied or developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

c. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

- compliance monitoring for the in-situ groundwater treatment system, if ongoing treatment is necessary, to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
- maintaining site access controls and Department notification; and
- providing the Department access to the site and O&M records.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

November 27, 2013
Date

Robert W. Schick, P.E., Director
Division of Environmental Remediation

RECORD OF DECISION

68 West First Street
Oswego, Oswego County
Site No. E738040
November 2013

SECTION 1: SUMMARY AND PURPOSE

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the above referenced site. The disposal of contaminants at the site has resulted in threats to public health and the environment that would be addressed by the remedy. The disposal or release of contaminants at this site, as more fully described in this document, has contaminated various environmental media. Contaminants include hazardous waste and/or petroleum. The remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This Record of Decision (ROD) identifies the selected remedy, summarizes the other alternatives considered, and discusses the reasons for selecting the remedy.

The 1996 Clean Water/ Clean Air Bond Act provides funding to municipalities for the investigation and cleanup of brownfields. Brownfields are abandoned, idled, or under-used properties where redevelopment is complicated by real or perceived environmental contamination. They typically are former industrial or commercial properties where operations may have resulted in environmental contamination. Brownfields often pose not only environmental, but legal and financial burdens on communities. Under the Environmental Restoration Program, the state provides grants to municipalities to reimburse up to 90 percent of eligible costs for site investigation and remediation activities. Once remediated, the property can then be reused.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and 6 NYCRR Part 375. This document is a summary of the information that can be found in the site-related reports and documents.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all remedies. A public comment period was held, during which the public was encouraged to submit comment on the proposed remedy. All comments on the remedy received during the comment period were considered by the Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document repositories:

City of Oswego
Attn: Mary Vanouse
20 West Oneida Street, 3rd Floor
Oswego, NY 13126
Phone: 315-343-3795

NYSDEC
Attn: Joshua Cook
615 Erie Blvd West
Syracuse, NY 13204
Phone: 315-426-7411

Oswego Public Library
Attn: Edward Elsner
120 East Second Street
Oswego, NY 13126
Phone: 315-341-5867

A public meeting was also conducted. At the meeting, the findings of the remedial investigation (RI) and the alternatives analyses (AA) were presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period was held, during which verbal or written comments were accepted on the proposed remedy.

Comments on the remedy received during the comment period are summarized and addressed in the responsiveness summary section of the ROD.

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The 68 West First Street site is located in an urban area of the City of Oswego, Oswego County. It covers approximately 1.8 acres and consists of the block bounded by West First Street to the east, West Second Street to the west, West Schuyler Street to the south, and a grassy area and West Van Buren street to the north. The site is owned by the City of Oswego and is also referred to as the former Flexo Wire site.

Site Features: The northwestern portion of the site is covered by a one-story concrete slab-on-grade, steel-framed masonry building which covers approximately 20,900 square feet. There is also a one-story building that connects to, and extends east from, the northeastern corner of the main building. This smaller building covers approximately 780 square feet. The rest of the site is paved with the exception of a small grassy area on the northeastern corner of the site, which measures approximately 2000 square feet.

There are two former sumps located in the buildings which were filled with concrete prior to the site entering a remedial program. There was formerly a 15,000-gallon underground storage tank located in the northeastern portion of the site. The tank was removed in September 2009. The tank was connected to at least one of the sumps by sub-surface utility lines which are still present.

Current Zoning and Land Use: The site is currently utilized by the City of Oswego Department of Public Works (DPW), which operates a metal fabricating workshop, a woodworking shop and an automobile maintenance shop at the site. The DPW also utilizes the site for seasonal storage of equipment, trucks and supplies.

The site is currently zoned for commercial use (B2 – Central Business); however, the proposed reuse of the site includes apartments or condominiums, which would be a restricted residential use.

The Oswego River is located approximately 390 feet to the east of the site, and flows north into Lake Ontario, which, at its nearest point, is located approximately 250 feet north of the site. The area to the west of the site is primarily residential. The area to the south contains a mixture of residential and commercial properties, and to the north there is a municipal parking area, a boat launch, a marina, a United States Coast Guard facility, and a marine museum located on property owned by the Oswego Port Authority. To the east and northeast are industrial properties, including a major oil storage facility, the City of Oswego West Side Excess Flow Management facility and a cement shipping terminal.

Past Use of the Site: The site has been used for industrial purposes since at least 1880. Past industrial operations at the site include a tinware manufacturing facility, lumberyards, a planing mill, Oswego Casket Company, Global Match Company, machine shops and a wire manufacturing facility, which was owned and/or operated by the Flexo Wire Company in 1960 and the Copperweld Steel Company, Flexo Wire Division in 1972. Prior uses that appear to have led to site contamination include solvent usage and disposal, reportedly associated with the wire drawing operations; coal storage, usage and coal ash disposal; and metal working operations, including machining and annealing.

Operable Units: The site was divided into two operable units. An operable unit represents a portion of a remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. Operable Unit (OU) 1 is the on-site area. OU 2 is the off-site groundwater plume and off-site soil vapor contamination.

Site Geology and Hydrogeology: Soil at the site consists of historic fill, which consists of a mixture of sand, silt, ash, wood, brick and other debris. Fill was present below the paving or concrete down to the top of bedrock. Bedrock was very shallow on the western side of the site (zero to two feet below the ground surface), and somewhat deeper on the east side of the site (four to ten feet below the ground surface). It was encountered at depths ranging from directly below the building slab, to a depth of approximately ten feet in the northeast corner of the site. The ground surface and bedrock surface slope down to the east-northeast.

Groundwater was generally not encountered in the overburden. Groundwater flow is to the east-northeast towards the Oswego River in both the shallow bedrock groundwater and deeper bedrock groundwater. The shallow bedrock groundwater is located directly below the top of bedrock, up to fifteen feet below the bedrock surface, which is at a maximum of 18.5 feet below the ground surface. The deeper bedrock groundwater was monitored from approximately 30 to 35 feet below the ground surface.

Operable Unit (OU) Number 01 is the subject of this document.

A Record of Decision will be issued for OU 02 concurrent with the OU 01 decision.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to restricted-residential use (which allows for commercial use and industrial use) as described in Part 375-1.8(g) were/was evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the RI to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

No PRPs have been documented to date.

Since no viable PRPs have been identified, there are currently no ongoing enforcement actions. However, legal action may be initiated at a future date by the state to recover state response costs should PRPs be identified. City of Oswego will assist the state in its efforts by providing all information to the state which identifies PRPs. City of Oswego will also not enter into any agreement regarding response costs without the approval of the Department.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

The analytical data collected on this site includes data for:

- groundwater
- soil
- soil vapor
- sub-slab vapor

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in Exhibit A list the applicable SCGs in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Results

The data have identified contaminants of concern. A "contaminant of concern" is a contaminant that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized in Exhibit A. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified for this Operable Unit at this site is/are:

TETRACHLOROETHYLENE (PCE)	LEAD
TRICHLOROETHENE (TCE)	MERCURY
ETHENE, 1,2, Cis-Dichloro	BENZ(A)ANTHRACENE
ETHENE, TRANS- 1,2-DICHLORO-	BENZO(A)PYRENE
DICHLOROETHYLENE	BENZO(B)FLUORANTHENE
VINYL CHLORIDE	BENZO[K]FLUORANTHENE
ARSENIC	Chrysene
BARIUM	DIBENZ[A,H]ANTHRACENE
CHROMIUM	indeno(1,2,3-cd)pyrene
COPPER	

As illustrated in Exhibit A, the contaminant(s) of concern exceed the applicable SCGs for:

- groundwater
- soil
- soil vapor intrusion

6.2: <u>Interim Remedial Measures</u>

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision.

The following IRM(s) has/have been completed at this site based on conditions observed during the RI.

<u>IRM Storage Tank Removal</u>

A 550-gallon aboveground fuel oil storage tank and a 15,000-gallon buried railroad tank car were removed from the site along with sludge that was present within the underground storage tank (UST) and debris that was present within both tanks.

The aboveground tank was located on the west side of the on-site building in a concrete block containment structure. There was no indication that a release had occurred from the tank. The tank was disposed of off-site as scrap metal. There were several small jars with a blue powder within the tank as well as a railroad flare. The materials were removed and containerized for proper off-site disposal.

The 15,000-gallon tank was located on the eastern side of the site. Its original use is unknown, but it is believed to have been used for recirculation of solvents or waste disposal during operation of the on-site wire drawing facility. The buried tank appeared sound but the connections and piping had apparently leaked and contaminated surrounding soils. The tank was underlain by a concrete slab, which was left in-place. The location of the former tank is shown on Figure 2.

Approximately 4,258 gallons of sludge were removed from the tank along with debris such as wood, rocks and heating coils. The sludge and debris were disposed of off-site. The tank was cleaned using water which was collected and disposed of off-site as well.

Approximately 1 to 2 cubic yards of soil within the excavation were noted to exhibit an odor and generated elevated readings on a photoionization detector. A sample of this material was analyzed using the toxicity characteristic leaching procedure, and trichloroethene was detected in the leachate. This material was utilized to partially backfill the excavation.

Confirmatory samples collected from the end of the excavation were analyzed for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). The only VOC detected was TCE, which was detected in each sample at concentrations less than the unrestricted soil cleanup objective. Low levels of several polycyclic aromatic hydrocarbons (PAHs) were also detected in each of the four samples. For three of the samples, none of the PAHs were detected at concentrations that exceeded their unrestricted soil cleanup objectives (SCOs). For the other sample, two PAHs were detected at concentrations that slightly exceeded their unrestricted SCO and their SCO for the protection of public health for restricted residential use. Indeno(1,2,3-cd)pyrene was present in that sample at 0.62 parts per million (ppm). Its restricted residential SCO and unrestricted use SCO are both 0.5 ppm. Benzo(b)fluoranthene was detected at a concentration of 1.1 ppm. Its restricted residential SCO and unrestricted use SCO are both 1 ppm.

6.3: <u>Summary of Environmental Assessment</u>

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern at this site, a Fish and Wildlife Resources Impact Analysis (FWRIA) was deemed not necessary for OU 01.

For OU 1: On-site Area

The primary contaminants of concern (COCs) for OU 1 include several chlorinated volatile organic compounds (VOCs); specifically tetrachloroethene (PCE) and trichloroethene (TCE) and their degradation products, which include 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), and vinyl chloride (VC). Other COCs include several metals, including lead, mercury and others, as well as polycyclic organic hydrocarbons (PAHs).

Soil – PAHs and metals are present in soil across the site at concentrations greater than soil cleanup objectives (SCOs) for the protection of public health for restricted residential use. In general, the levels were only slightly greater than SCOs; however, a few isolated locations contained higher levels.

Lead was detected in one location at 38,800 parts per million (ppm), compared to its restricted residential SCO for the protection of public health of 400 ppm; however, samples collected near this location had much lower levels of lead (maximum of 319 ppm), and the next highest lead concentration detected was 875 ppm. Mercury was detected at a maximum concentration of 52 ppm in one location, compared to its restricted residential SCO for the protection of public health of 0.81 ppm. Samples collected near this location had much lower levels of mercury, and the next highest level of mercury detected during the investigation was 4.5 ppm.

Benzo(a)pyrene (a PAH) was detected at a maximum concentration of 4.9 ppm, compared to its restricted residential SCO of 1 ppm, and it exceeded 1 ppm in 7 out of 23 samples collected from OU 1.

PCE, TCE and their degradation products in general were detected in soil at relatively low concentrations, but in some instances at concentrations which exceed the SCOs for the protection of groundwater. The highest concentrations of VOCs were detected in samples collected to the east of the southern half of the on-site building, which is also east of the utility lines connecting the former sump and the former 15,000-gallon underground storage tank. Of the VOCs, TCE was present at the most significant concentrations; up to 1 ppm, compared to its SCO for the protection of groundwater of 0.47 ppm. cis-1,2-DCE was detected at concentrations up to 0.49 ppm, compared to its SCO for the protection of groundwater of 0.25 ppm. Other degradation products were detected at lower concentrations or not at all in soil. PCE was detected less frequently than TCE, at a maximum concentration of 0.022 ppm, compared to its SCO for the protection of groundwater of 1.3 ppm.

Groundwater – TCE was detected at concentrations exceeding its groundwater standard in every on-site well which yielded water; however, concentrations were much lower on the west and south side of the site than in wells located to the east of the building. Degradation products were present in all on-site wells at concentrations exceeding groundwater standards, except for the westernmost (upgradient) well. The highest concentrations of TCE detected on-site were in samples collected from monitoring wells east of the southern sump. This suggests the primary source of groundwater contamination is located in or near the southern portion of the building, most likely the southern sump, and the groundwater contamination extends east from that area.

TCE and cis-1,2-DCE were present the most often and at the highest concentrations. When the other degradation products were detected, they were present at lower concentrations. When PCE was detected, it was present at concentrations orders of magnitudes lower than TCE. Total VOC contamination was higher in the deep bedrock well in OU 1, when compared to the adjacent shallow bedrock well. PCE was also detected in groundwater in OU 1; however, at concentrations less than its groundwater standard.

Soil Vapor – PCE, TCE and their degradation products were detected at elevated concentrations in soil vapor and sub-slab vapor in OU 1. TCE and PCE were detected in soil vapor and sub-slab vapor samples at concentrations up to 34,000 micrograms per cubic meter (ug/m3) and 590 ug/m3, respectively. Indoor air samples were not collected during the investigation, because the building is currently planned to be demolished.

For OU 2: Off-site Groundwater and Soil Vapor Plumes

The COCs for OU 2 are PCE, TCE and their degradation products, including the following: cis-1,2-DCE; trans-1,2-DCE; 1,1-DCE; and VC.

Groundwater – The COCs were detected in a groundwater plume to the east of the site at concentrations significantly greater than their groundwater standard. The COCs were detected at higher concentrations in the deeper bedrock wells, when compared to adjacent shallow bedrock wells, and were detected at higher concentrations in OU 2 than OU 1. The maximum concentrations of TCE and cis-1,2-DCE detected in groundwater in OU 2 were 10,000 parts per billion (ppb) for each. PCE was detected in groundwater to the east of the site at concentrations up to 180 ppb. Groundwater standards were exceeded in wells located approximately 190 feet east of the site. The Oswego River is located approximately 410 feet east of the site.

Soil Vapor – PCE was detected in soil vapor samples collected to the west of the site at concentrations up to 410 ug/m3; however, re-sampling at that location indicated a lower concentrations of PCE (21 ug/m3). TCE and its degradation products were not detected in those samples. TCE was detected in one soil vapor sample to the east of the site at a concentration of 220 ug/m3. PCE and TCE were detected in soil vapor samples to the north and northwest of the site at concentrations up to 5 ug/m3 and 23 ug/m3, respectively. Access could not be obtained during the remedial investigation to conduct indoor air sampling at off-site locations.

6.4: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure*.

People are not drinking contaminated groundwater associated with the site because the area is served by a public water supply that obtains its water from a different source not affected by this contamination and private water supply wells are not permitted within the City of Oswego. People are not expected to come into contact with contaminated soil or groundwater unless they dig below the existing building or pavement that covers the site. Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. The on-site building is currently vacant; therefore, inhalation of site-related contaminants resulting from soil vapor intrusion is not a concern given the buildings current use. However, sampling indicates that exposures related to soil vapor intrusion would be a concern if the on-site building were to be occupied or if the site were to be redeveloped. Sampling also indicates that soil vapor intrusion may be a concern for off-site properties as well.

6.5: Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial action objectives for this site are:

<u>Groundwater</u>

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of ground or surface water contamination.

<u>Soil</u>

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

<u>Soil Vapor</u>

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

SECTION 7: <u>SUMMARY OF THE SELECTED REMEDY</u>

To be selected the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the site, which are presented in Section 6.5. Potential remedial alternatives for the Site were identified, screened and evaluated in the alternatives analysis (AA) report.

A summary of the remedial alternatives that were considered for this site is presented in Exhibit B. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved. A summary of the Remedial Alternatives Costs is included as Exhibit C.

The basis for the Department's remedy is set forth at Exhibit D.

The selected remedy is referred to as the Expanded Excavation, Focused ISCT, Site Cap & Natural Attenuation remedy.

The estimated present worth cost to implement the remedy is $2,760,000. The cost to construct the remedy is estimated to be $2,370,000 and the estimated average annual cost is $25,800.

The elements of the selected remedy are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. Excavation

Excavation and off-site disposal of contaminant source areas, including the soil in and around the two sumps located within the on-site building, soil surrounding the former underground storage tank (UST) and the soil surrounding the underground utility or process lines connected to the former 15,000-gallon UST. Excavation in these areas will proceed to bedrock or until endpoint samples indicate there is no soil remaining which contains VOCs at concentrations exceeding their soil cleanup objective for the protection of groundwater, as defined by 6 NYCRR Part 375-6.8. In addition, the concrete slab below the former UST will be removed and further excavation conducted if necessary. Soil to the east of the process lines connecting the southern building sump and the former UST will also be excavated. The approximate excavation areas are shown on Figure 6.

It is estimated approximately 1450 cubic yards of soil will be excavated from these areas.

Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to replace soil removed from the site and establish the designed grades at the site.

3. Excavation Contingency

If any on-site buildings are demolished or areas of paving removed, soil excavation will be conducted to address any additional source areas identified as described in remedy element 2 above.

4. In-Situ Chemical Treatment

In-situ chemical treatment (ISCT) will be implemented to treat the chlorinated volatile organic compounds in groundwater. Injections will be conducted into the subsurface to destroy the contaminants. The approximate area which is anticipated to require injections is indicated on Figure 6. Injections will be conducted into bedrock. If necessary, injections will also be conducted in overburden. The method and depth of injection will be determined during the remedial design. The exact area to be treated will also be determined during the remedial design.

Prior to the full implementation of this technology, laboratory and on-site pilot scale studies will be conducted to more clearly define design parameters.

5. Cover System

A site cover system, consisting of asphalt pavement and concrete building slabs, currently exists over the majority of the site. The existing cover system will be maintained to allow for restricted residential use of the site. A site cover will be required over the remainder of the site to allow for restricted residential use of the site. Any site redevelopment will maintain a site cover, which may consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is required it will be a minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

6. Vapor Mitigation

If the current on-site buildings are occupied prior to or during the implementation of the elements of the remedy targeting soil and groundwater contamination, a sub-slab depressurization system, or a similar engineered system, will be required to prevent the migration of vapors into the building from soil or groundwater. If the site is redeveloped during the remedial action phase, the potential for soil vapor intrusion will be evaluated for any buildings developed on the site, and the recommended actions will be implemented to address exposures related to soil vapor intrusion.

7. Natural Attenuation

Following implementation of the ISCT described in remedy element 4, groundwater contamination remaining after active remediation will be addressed through natural attenuation. Groundwater will be monitored for site-related contamination and other indicators which will provide an understanding of the mechanisms attenuating the contamination (e.g., biological activity, dispersion, etc.). It is anticipated that contamination will decrease by an order of magnitude in a reasonable period of time (5 to 10 years). Reports of the attenuation will be provided at 5 and 10 years, and active remediation will be considered if it appears that natural processes alone will not address the residual contamination.

8. Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property that:

- requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allows the use and development of the controlled property for restricted residential, commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
- requires compliance with the Department approved Site Management Plan.

9. Site Management Plan

A Site Management Plan is required, which includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in remedy element 8 above.

Engineering Controls: The cover system discussed in remedy element 5, the ISCT system discussed in remedy element 4 and the soil vapor mitigation system discussed in remedy element 6.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- a provision for removal of any additional source areas identified under the on-site buildings or paved areas if and when they are demolished;
- descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion should the on-site buildings become reoccupied following implementation of the remedy and for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- monitoring of groundwater to assess the performance and effectiveness of the remedy;
- a schedule of monitoring and frequency of submittals to the Department; and
- monitoring for vapor intrusion for any buildings occupied or developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

c. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

- compliance monitoring for the in-situ groundwater treatment system, if ongoing treatment is necessary, to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
- maintaining site access controls and Department notification; and
- providing the Department access to the site and O&M records.

Exhibit A

Nature and Extent of Contamination

This section describes the findings of the Remedial Investigation for all environmental media that were evaluated. As described in Section 6.1, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium for which contamination was identified, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. The contaminants are arranged into three categories; volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and inorganics (metals). For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the Restricted Use SCGs identified in Section 4 and Section 6.1.1 are also presented.

Waste/Source Areas

As described in the RI report, waste/source materials were identified at the site and are impacting groundwater, soil and soil vapor.

Wastes are defined in 6 NYCRR Part 375-1.2 (aw) and include solid, industrial and/or hazardous wastes. Source Areas are defined in 6 NYCRR Part 375 (au). Source areas are areas of concern at a site were substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental medium. Wastes and Source areas that were identified at the site include the following:

- a former 15,000-gallon underground storage tank (UST),
- sumps located within the buildings,
- subsurface process lines running between the building and the former UST, and
- an area east (downgradient) of the sumps and process lines.

Elevated levels of VOCs were detected by a photoionization detector (PID) in these areas during installation of soil borings. Analytical soil data also showed that VOCs were present, in some instances at concentrations greater than soil cleanup objectives (SCOs) for the protection of groundwater.

The former UST was located in the northeast portion of the site. When the 15,000-gallon UST was removed in 2009, there was sludge remaining in the tank, which was removed and disposed of off-site. There was also evidence of soil contamination noted in the field (elevated readings on a PID and odors) identified in a small area on the eastern side of the tank. An analytical sample of this soil subjected to the toxicity characteristic leaching procedure (TCLP) detected trichloroethene (TCE) in the leachate at concentrations greater than its groundwater SCG. TCE was detected at 6.4 micrograms per liter (µg/L) in the leachate. Total concentrations of contaminants in the impacted soil were not determined. This soil was subsequently utilized to backfill the excavation. A concrete slab was present below the former tank which was left in place. The location of the former UST is indicated on Figure 2.

Process lines run between the southern sump (Sump 1) and the former UST grave and appear to be present between the former UST grave and another area of the building, potentially connecting to the northern sump (Sump 2). The potential process lines are indicated on Figure 2 as “Unknown Anomaly”. Utility lines, including water and storm sewer lines, are located to the southeast of the building, running generally east and west (perpendicular to West First Street). It is possible the elevated levels of VOCs in soil east of the southern portion of the building are present as a result of migration along these utility lines or migration east away from the sump or process lines. See Figure 2 for the locations of these features.

Certain waste/source areas identified at the site were addressed by the IRM described in Section 6.2. The remaining waste/source areas identified during the RI will be addressed in the remedy selection process.

Groundwater

Groundwater monitoring wells were installed in Operable Unit (OU) 1 in the overburden, shallow bedrock and deeper bedrock. With the exception of one well, in one instance, groundwater was not present in the overburden wells. The shallow bedrock wells were installed just below the top of bedrock, which ranged from approximately 1.8 feet to approximately 8 feet below grade at the monitoring well locations. The deeper bedrock well was installed to monitor the interval from 31 to 36 feet below grade, which was approximately 27.5 to 32.5 feet below the top of bedrock.

Groundwater samples were collected from overburden and bedrock monitoring wells to assess groundwater conditions on-site. Two rounds of groundwater sampling were conducted, although some wells were only sampled once. In one instance a well was dry during the first round but not the second (an overburden well), and one well had not been installed when the first round of sampling was conducted (the deeper bedrock well). The results of the groundwater sampling indicate that certain VOCs and metals are present at concentrations that exceed SCGs. TCE was detected in every on-site well at concentrations exceeding its groundwater standard; however, concentrations were much lower on the west and south side of the site than in wells located to the east of the building. The highest concentrations of TCE detected on-site were in samples collected from monitoring wells east of the southern sump. The primary source of groundwater contamination is located in or near the southern portion of the building, most likely the southern sump, and the groundwater contamination extends east from the site. Table 1, below, summarizes the exceedances of groundwater SCGs for OU 1, which is the on-site area. Figure 3 summarizes the pertinent results of the groundwater sampling for OU 1.

Table 1 - Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
VOCs			
Tetrachloroethene	ND – 2	5	0 / 12
Trichloroethene	4.6 – 280	5	11 / 12
cis-1,2-Dichloroethene	ND – 1100	5	9 / 12
trans-1,2-Dichloroethene	ND –26	5	3 / 12
1,1-Dichloroethene	ND – 8	5	1 / 12
Vinyl chloride	ND – 67	2	3 / 12
Inorganics			
Antimony	ND – 360	3	5 / 12

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
Barium	61 – 1200	1000	1 / 12
Iron	36 – 5990	300	6 / 12
Lead	ND – 40	25	1 / 12
Manganese	2.3 – 1100	300	8 / 12
Sodium	68,500 – 470,000	20,000	12 / 12
Thallium	ND – 10.2	0.5	1 / 12

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b- SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).
ND – not detected

The primary groundwater contaminants are the chlorinated VOCs tetrachloroethene (PCE) and trichloroethene (TCE), and their degradation products; cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), 1,1-dichloroethene (1,1-DCE) and vinyl chloride (VC), with TCE and cis-1,2-DCE being the most prevalent. The degradation of PCE and TCE proceeds from PCE to TCE, to the three forms of DCE, to VC, with the majority of TCE usually degrading to cis-1,2-DCE. This degradation occurs under reducing conditions, in particular the breakdown of cis-1,2-DCE to VC.

PCE was detected on-site at concentrations less than its groundwater standard, but was detected in off-site wells (OU 2) at concentrations exceeding its groundwater standard. Certain other VOCs were also detected in groundwater; however, they were detected less frequently and at concentrations less than groundwater SCGs, as such, these other VOCs are not included as primary contaminants of concern for groundwater for the site.

Monitoring wells on the upgradient (west) side of the site show significantly lower levels of site-related VOCs than wells on the downgradient (east) side of the site. This, combined with other sampling data (soil, soil vapor), shows there are or were source(s) of VOC groundwater contamination on-site. The total concentration of chlorinated VOCs was higher in the deep bedrock well (MW-9D) when compared to the nearest shallow bedrock well (MW-5). The deeper bedrock groundwater exhibited more degradation than the shallower groundwater. The deep bedrock well had a much higher concentration of cis-1,2-DCE than TCE, while the shallower bedrock groundwater contained higher or similar concentrations of TCE when compared to cis-1,2-DCE. Also, vinyl chloride was detected at its highest concentration on-site in the deep well.

As noted in Table 1, several metals were also detected in groundwater at concentrations exceeding groundwater SCGs. Metals are naturally occurring in the environment, so their presence in groundwater does not necessarily indicate site-related impacts.

Antimony was detected in several on-site shallow bedrock monitoring wells. When detected, it was at concentrations greater than its groundwater standard. It was not detected in deep bedrock groundwater on-site nor was it detected in any off-site well. It is assumed groundwater use will be restricted on-site for the foreseeable future due to the VOC contamination present, and since antimony is not present off-site, active remedial measures targeting antimony are not necessary.

Barium and lead were each detected in only one well at concentrations slightly greater than their groundwater standards. Barium exceeded its groundwater standard in the deep bedrock well and lead in a shallow bedrock well. Barium was not detected in the adjacent shallow bedrock well or a nearby overburden well at concentrations even approaching its groundwater standard. Further, neither barium nor lead was detected in off-site monitoring wells at concentrations exceeding groundwater SCGs. Also, it is worth noting that barium was not detected in soil at concentrations greater than its soil cleanup objective for the protection of groundwater. It is assumed groundwater use will be restricted on-site for the foreseeable future due to the VOC contamination present, and since barium and lead are not present off-site, active remedial measures targeting barium or lead are not necessary

Iron and thallium were also detected in groundwater at concentrations greater than their groundwater SCGs; however, iron appears to be naturally occurring and the detection of thallium in one sample was not confirmed by a duplicate sample or in a subsequent sample from that location.

Based on the findings of the RI, the past disposal of hazardous waste has resulted in the contamination of groundwater. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of groundwater to be addressed by the remedy selection process are: PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE and vinyl chloride.

Soil

Soil samples were collected at the site during the RI to identify source areas, assess soil contamination and potential for impacts to groundwater. Soil samples were collected from depths ranging from one to 10.5 feet. Surface soils were not collected since the areas of concern are either paved or covered by concrete. The results indicate that VOCs, semi-volatile organic compounds (SVOCs) and metals are present at concentrations exceeding the unrestricted soil cleanup objectives (SCOs) and applicable restricted use SCOs. Figure 4 depicts the exceedances of the restricted use SCOs. Table 2 below summarizes the exceedances of SCOs.

Table 2 - Soil

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Use SCG[c] (ppm)	Frequency Exceeding Restricted SCG
VOCs					
Trichloroethene	ND – 1.0	0.47	2 / 35	0.47[d]	2 / 35
cis-1,2-Dichloroethene	ND – 0.49	0.25	1 / 35	0.25[d]	1 / 35
SVOCs					
Benzo(a)anthracene	ND – 4.6	1	6 / 20	1	6 / 20
Benzo(a)pyrene	ND – 4.9	1	6 / 20	1	6 / 20
Benzo(b)fluoranthene	ND – 4.7	1	9 / 20	1	9 / 20
Benzo(k)fluoranthene	ND – 2.4	0.8	4 / 20	3.9	0 / 20
Chrysene	ND – 4.4	1	6 / 20	3.9	1 / 20

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Use SCG[c] (ppm)	Frequency Exceeding Restricted SCG
Dibenz(a,h)anthracene	ND – 0.8	0.33	1 / 20	0.33	1 / 20
Indeno(1,2,3-c,d)pyrene	ND – 3.0	0.5	7 / 20	0.5	7 / 20
Inorganics					
Arsenic	2.3 – 39	13	2 / 30	16	2 / 30
Barium	33.1 – 490	350	6 / 30	400	6 / 30
Cadmium	ND – 3.5	2.5	1 / 30	4.3	0 / 30
Chromium[e]	6.97 – 224	30	9 / 30	180	2 / 30
Copper	26.3 – 967	50	20 / 30	270	5 / 30
Lead	4.5 – 38,800	63	21 / 36	400	5 / 36
Mercury	ND – 52	0.18	17 / 30	0.81	6 / 30
Nickel	7.29 – 89.3	30	9 / 30	310	0 / 30
Silver	ND – 11.3	2	4 / 30	180	0 / 30
Zinc	5.8 – 234	109	9 / 30	10,000	0 / 30
Antimony	ND – 57.8	12[f]	3 / 30	NS	NA
Iron	7020 – 176,000	2,000[f]	30 / 30	NS	NA

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Restricted Residential Use, unless otherwise noted.
d - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Groundwater.
e - Chromium was not speciated during the investigation.
f - SCG: CP-51 / Soil Cleanup Guidance, lowest of the Supplemental Soil Cleanup Objectives
ND – not detected
NS – not specified
NA – not available

The primary soil contaminants are a subset of SVOCs called polycyclic aromatic hydrocarbons (PAHs), metals (in particular copper, lead and mercury, which were detected at concentrations greater than unrestricted SCOs more often than other metals), and VOCs, especially TCE and cis-1,2-DCE, which were detected at concentrations greater than their SCO for the protection of groundwater in a few instances.

PAHs can be formed by incomplete combustion of wood, coal, tar, etc. and are often associated with historic industrial fill material. The PAHs at the site are mostly likely associated with historic industrial fill and/or coal storage. Some metals may be associated with the presence of historic fill as well; however, the most elevated levels of mercury, lead and some other metals are not consistent with concentrations typically found in historic fill. Some of the metals are likely present due to past industrial processes at the site, including the machine shops and wire manufacturing processes.

Based on the findings of the Remedial Investigation, the presence of PAHs; metals, especially mercury, lead and copper; and VOCs, especially TCE and cis-1,2-DCE has resulted in the contamination of soil. The site contaminants identified in soil which are considered to be the primary contaminants of concern, to be addressed by the remedy selection process are the same.

Soil Vapor

The evaluation of the potential for soil vapor intrusion resulting from the presence of site related soil or groundwater contamination was evaluated by the sampling of soil vapor and sub-slab vapor under structures. The on-site buildings are planned to be demolished and therefore indoor air sampling was not conducted during the investigation. Soil vapor sampling locations and a summary of the most pertinent results are depicted on Figure 5.

Eighteen soil vapor samples and twelve sub-slab vapor samples were collected from OU 1 during the RI. Two of the soil vapor samples were collected from the same location, at different depths (SV-20 and SV-20D), as were two of the sub-slab vapor samples (SV-25 and SV-25D). In both cases the shallow and deep vapor sample results were nearly identical. Soil vapor samples exhibited elevated concentrations of TCE, PCE and cis-1,2-DCE, with TCE being present at the highest concentrations. 1,1,1-Trichloroethane was detected in several samples at relatively low concentrations, and in one sample at a somewhat elevated concentration (510 micrograms per cubic meter ($\mu g/m^3$)). TCE was also detected in that sample at an elevated concentration (1100 $\mu g/m^3$). 1,1-DCE was detected in two soil vapor samples, once at an elevated concentration (390 $\mu g/m^3$). TCE was detected at its highest concentration in that sample (34,000 $\mu g/m^3$). Based on a comparison to the New York State's Soil Vapor Intrusion Guidance (NYSDOH 2006), vapor mitigation is recommended for occupied on-site buildings.

Based on the findings of the Remedial Investigation, the disposal of hazardous waste has resulted in the contamination of soil vapor. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of soil vapor to be addressed by the remedy selection process are, TCE and PCE, since any actions undertaken to address TCE and PCE contamination will also address the other chlorinated VOCs.

Exhibit B

Description of Remedial Alternatives

The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A.

Alternative 1: No Further Action

The No Further Action Alternative recognizes the remediation of the site completed by the IRM described in Section 6.2. This alternative leaves the site in its present condition and does not provide any additional protection of the environment or public health.

Alternative 2: Limited Excavation, Site Cap and Natural Attenuation

This alternative includes excavation of soil from the likely disposal areas, construction or maintenance of a cap or cover system across the site, implementation of an institutional control in the form of an environmental easement, development of a Site Management Plan, and monitoring the natural attenuation of groundwater contamination.

Prior to implementing the remedy, a remedial design will be implemented to provide the details necessary for the construction of the remedial program. The remedial design will include development of detailed engineering plans and specifications for the excavation, surface restoration and cap/cover construction. It is estimated the remedial design will take three to five months to complete.

Under this alternative, excavation will be conducted to remove the areas which, based on the RI results, are assumed to be the locations where contaminants were originally released to the environment. Impacted soils will be disposed off-site. Excavated soils that are not grossly contaminated and which meet reuse criteria may be reused on-site below the site cap or cover. The reuse criteria will be determined during the remedial design; however, at a minimum, soil which contains site-specific groundwater contaminants of concern at concentrations greater than their soil cleanup objectives for the protection of groundwater will not be reused on-site. Excavation and off-site disposal is a conventional remedial method. The areas to be excavated include the following: the two buildings sumps; the process lines extending between the building and the former 15,000-gallon UST and a small area where lead was present at an elevated concentration (38,800 parts per million). The estimated volume of each excavated area is as follows:

- Northern building sump (Sump 2) – 100 square feet (sf) by 6 feet (ft), 22 cubic yards [cy];
- Southern building sump (Sump 1) – 600 sf by 6 ft deep, 133 cy;
- Unknown subsurface linear anomaly between the former UST and building – 119 sf by 3 ft deep, 13 cy;
- Process line(s) connecting Sump 1 and the former UST – 330 sf by 3 ft deep, 37 cy; and
- Area of elevated lead in soil – 25 sf by 8 ft deep, 7 cy.

Therefore, the total excavation is estimated at approximately 212 cubic yards; however, if the on-site buildings or pavement are demolished before or during remediation, any additional source areas identified following demolition will also be excavated and disposed off-site. The excavations will be restored with clean backfill which meets the requirement of 6 NYCRR 375-6.7(d) for restricted residential use. The surface of the excavated areas will be restored with asphalt pavement or concrete to restore the existing cap. The site cap will prevent direct contact with contaminated soils at the site and limit infiltration of precipitation into the soil to reduce the potential for additional groundwater contamination.

For areas of the site not already covered by an impervious surface, and where the top two feet exceed soil cleanup objectives for restricted residential use, a cover will be constructed to allow for restricted residential use of the site. The cover may consist of structures, such as buildings, pavement, sidewalks or other impervious surface or a soil cover consisting of at least two feet of clean fill which meets the requirements of 6 NYCRR 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. The areas which are not currently covered by paving or concrete are not considered likely source areas; therefore, a cap is not required for these areas. If the site is redeveloped, the development will include a cap or cover consistent with this requirement.

If the current on-site building is occupied on a regular basis prior to or during implementation of the remedy, mitigation of the potential for soil vapor intrusion (SVI) will be required. If the current on-site building is re-occupied after implementation of the elements of the remedy targeting soil and groundwater contamination, an evaluation of the potential for SVI will be necessary prior to occupation of the building. In the future occupation scenario, SVI mitigation could be implemented without first conducting the SVI evaluation.

It is estimated that construction of Alternative 2 will take approximately two to three weeks to complete.

Since contamination will remain at the site, an institutional control will be placed on the site. The institutional control, in the form of an environmental easement, will: require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3); allow the use and development of the controlled property for restricted residential, commercial and industrial uses as defined by Part 375-1.8(g); restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and require compliance with the Department-approved Site Management Plan.

The Site Management Plan will identify and implement the required institutional and engineering controls. It will include, but not necessarily be limited to the following: an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination; a provision for removal or treatment of any source areas identified under the on-site buildings or pavement if and when the building is demolished or pavement removed; provisions for evaluation of the potential for soil vapor intrusion should the on-site building be occupied in the future (*i.e.*, following implementation of the remedy) and for any future buildings developed on the site, including provisions for implementing actions recommended to address exposures related to soil vapor intrusion; a monitoring plan, which will include details on groundwater monitoring to determine if natural attenuation is sufficiently protective of public health and the environment; a contingency plan for remediation should natural attenuation be determined insufficient; provisions for the management and inspection of the site cover and cap systems, including descriptions of those areas requiring an impervious cap and those areas where a simple cover system is sufficient; descriptions of the provisions of the environmental easement including any land use restrictions; maintaining site access controls and Department notification; and the steps necessary for the periodic reviews and certification of the institutional controls.

The capital cost to implement this alternative includes the costs to: design and conduct the excavation, including pavement restoration and cover system construction; develop the Site Management Plan; and place the environmental easement on the site. For the purpose of developing the cost estimate for this alternative, construction of an SVI mitigation system for the on-site building is not included, since the current plans for the site do not include occupation of the current building. Annual costs under this alternative include the cost to collect and analyze groundwater samples, report the results and provide periodic certifications. The estimated cost of Alternative 2 is as follows:

Present Worth: .... *$ 545,000*
Capital Cost: .... *$ 211,000*
Annual Costs: .... *$ 21,800*

Alternative 3: Limited Excavation, Focused In-situ Chemical Treatment, Site Cap and Natural Attenuation

This alternative includes the same actions as Alternative 2, including the same excavation contingency regarding building demolition and pavement removal, and the same requirement to mitigate the potential for SVI in the current on-site building if it is occupied on a regular basis prior to or during implementation of the elements of the remedy targeting soil and groundwater contamination. This alternative also includes implementation of *in-situ* chemical treatment of groundwater over the area on-site with the highest groundwater concentrations and/or in the area which appears to be the source of the highest levels of off-site groundwater contamination. Following active treatment, this alternative also relies on natural attenuation.

Prior to implementing the groundwater treatment a remedial design program will be implemented to provide the details necessary for the *in-situ* chemical treatment (ISCT). The ISCT will involve placement/injection of chemicals into the subsurface which will react with site contaminants and degrade them to less toxic or non-toxic byproducts. Chemicals commonly utilized for ISCT include oxidants (such as potassium permanganate, calcium peroxide, ozone, hydrogen peroxide and others) or reducing agents (such as zero valent iron). Since the natural degradation of the chlorinated ethenes requires reducing conditions, and since the intent is to rely on natural attenuation following active treatment, use of a reducing agent may be more appropriate at this site. However, delivery of reducing agents away from the initial injection site (*i.e.*, monitoring well) may be difficult and therefore use of an oxidant may be more appropriate. Based on the depth to which the ISCT will be necessary, it will be conducted, at least in part, through wells drilled into bedrock. It is possible this could be supplemented by injection/placement through horizontal wells installed in trenches to the top of bedrock or excavated a short distance into bedrock. The configuration of the chemical placement/injection infrastructure will be determined during the design phase.

It is likely the ISCT design will occur after and/or simultaneously with the design and implementation of the excavation, which is described above for Alternative 2. The ISCT remedial design program will include a pre-design investigation which will include installation of several bedrock monitoring/injection wells and collection of groundwater samples to better define the area requiring active treatment; determine the appropriate chemical agent to be used for the treatment; and determine the appropriate dosage rates. It is likely the design phase will include injection of the treatment chemical(s) over a limited area as a pilot test to determine the efficacy. It is estimated the ISCT design will take approximately nine months to one year (including the pre-design investigation and pilot scale injection).

Following completion of the excavations and ISCT remedial design, a full-scale ISCT application will be implemented. It is likely additional wells will need to be installed for the full-scale ISCT. As noted previously, the parameters of the ISCT will be determined during the remedial design phase; however, in order to generate a cost estimate, and based on data currently available, it was assumed that the ISCT will utilize potassium permanganate as the treatment chemical and that the area to be treated actively will measure 100 feet by 100 feet by 50 feet deep. It is estimated that implementation of the full-scale ISCT will require an additional two to four weeks for well installation, followed by injections to be conducted over a period of approximately three months.

As with Alternative 2, since contamination will remain at the site, an environmental easement (EE) and Site Management Plan (SMP) will be required. The EE and SMP will include the same restrictions and requirements as described for Alternative 2; however, the SMP for this alternative will also include an Operation and Maintenance (O&M) plan for the ISCT system. The O&M plan will include the details necessary to ensure the continued operation, maintenance, optimization, monitoring, and inspection of the ISCT system as well as reporting frequency and protocol. This O&M plan will include the following: details on system layout (*e.g.*, well construction details, storage tank information (if applicable), pump information (if applicable), etc.); troubleshooting; maintenance protocols; description of the chemical agent(s) to be used, along with safety data sheets for those chemicals; information pertinent to the storage of the chemicals, if applicable; copies of any pertinent permits (*e.g.*, underground injection control permit); emergency contacts; other contacts; and any other pertinent information.

The capital cost to implement this alternative includes the costs to: (a) design and conduct the excavation, including pavement restoration and cover system construction; (b) design and implement the ISCT; (c) develop the Site Management Plan; and (d) place the environmental easement on the site. Annual costs under this alternative include the cost to collect and analyze groundwater samples, report the results and provide periodic certifications. Note, while the implementation of the ISCT may last several months, and while a Certificate of Completion may be issued prior to completion of the full-scale ISCT, the cost of the full-scale ISCT is included under capital costs, since it will occur in the first year and since it is expected to be a one-time cost, rather than a recurring cost. The estimated cost of Alternative 3 is as follows:

Present Worth:..$ 2,590,000
Capital Cost:...$ 2,190,000
Annual Costs:..$ 25,800

Alternative 4: Expanded Excavation, Focused In-situ Chemical Treatment, Site Cap and Natural Attenuation

This alternative includes the same actions as Alternative 3, including the same ISCT program and the excavation contingency regarding building demolition and pavement removal, and the same SVI mitigation contingency for the on-site building; however, the area specifically targeted for excavation will be expanded to address additional source areas or potential source areas.

The excavation area is limited to the extent necessary to remove the contaminated soils contributing to the groundwater contamination. Additional areas targeted for excavation by this alternative include the following: (a) the area east of the southern half of the on-site building, which is also east of the southern sump and the process lines connected to the sump and the former UST area and (b) the area surrounding the former 15,000-gallon UST. For each excavation area, it was assumed excavation will be necessary to the top of bedrock, resulting in depths ranging from 3.5 feet for the southern sump and most of the process lines, to approximately 9 feet for the UST.

Elevated concentrations of VOCs were present in samples from the area east of the southern portion of the building. It is possible this was due to migration of contaminants along the utility corridor located south and east of the building, which include a municipal water line and a storm sewer. The water line appears to enter the building in the vicinity of the southern sump, and the utilities run generally east-west, perpendicular to West

First Street. However, based on sampling results, it appears more likely that the elevated levels of contaminants are due to migration to the east-northeast along the top of bedrock.

When the 15,000-gallon UST was removed in 2009, there was evidence of soil contamination (elevated readings on a photoionization detector (PID) and odors) identified in a small area on the eastern side of the tank. This soil was utilized as backfill for the excavation.

The total volume of the excavation required under this alternative is estimated at 1,450 cubic yards, compared to 212 cubic yards under Alternatives 2 and 3. This assumes that all soils excavated are not able to be reused on-site; however, some of the excavated soils may be able to be reused, in particular the clean backfill that was imported to backfill the tank excavation (at least 15,000 gallons or 75 cubic yards). Reuse criteria are discussed under Alternative 2.

As with Alternative 3, since contamination will remain at the site, an environmental easement (EE) and Site Management Plan (SMP) will be required. The EE and SMP will include the same restrictions and requirements as described for Alternative 3.

As with Alternative 3, the capital cost to implement Alternative 4 includes the costs to: (a) design and conduct the excavation, pavement restoration and cover system construction; (b) design and implement the ISCT; (c) develop the Site Management Plan; and (d) place the environmental easement on the site. Annual costs under this alternative include the cost to collect and analyze groundwater samples, report the results and provide periodic certifications. Note, while the implementation of the ISCT may last several months, and while a Certificate of Completion may be issued prior to completion of the full-scale ISCT, the cost of the full-scale ISCT is included under capital costs, since it will occur in the first year and since it is expected to be a one-time cost, rather than a recurring cost. The estimated cost of Alternative 3 is as follows:

Present Worth:..$ 2,760,000
Capital Cost:..$ 2,370,000
Annual Costs:..$ 25,800

Alternative 5: Restoration to Pre-Disposal Conditions

This alternative achieves all of the SCGs discussed in Section 6.1.1 and Exhibit A and soil meets the unrestricted soil clean objectives listed in Part 375-6.8 (a). This alternative includes: excavation and off-site disposal of soil down to bedrock across the entire site and implementation of an *in-situ* groundwater treatment program. It is anticipated that this alternative will also require short-term institutional and engineering controls, over a period of approximately three years. Excavation of all on-site soil to bedrock will necessitate demolition of the on-site buildings prior to excavation.

As with the other alternatives, prior to implementing the excavation, a remedial design program will be implemented to provide the details necessary for the construction of the remedial program. The remedial design will include development of detailed engineering plans and specifications for the excavation, including restoration of the excavation. It is estimated the design of the excavation will take four to six months to complete.

As noted above, excavation under this alternative will proceed to bedrock. If there is bedrock that can be excavated (*e.g.*, weathered bedrock), it will be removed as well to the extent practicable. The total volume of the excavation required under this alternative is estimated at approximately 18,500 cubic yards, including soil, asphalt and concrete. An equivalent amount of backfill will be imported to the site to restore the excavation. Backfill will meet the requirements of 6 NYCRR 375-6.7(d) for unrestricted use. It is estimated demolition, excavation and backfill will take approximately six to seven months to complete.

Since there is groundwater contamination in bedrock, and since the bedrock matrix is probably a secondary source of this contamination, this alternative also includes an intensive ISCT program, which necessitates short-term institutional controls and engineering controls (IC/EC).

Prior to implementing the ISCT program, a remedial design will be implemented to provide the details necessary for the implementation of the ISCT program. This will include the same actions as described for the design of the ISCT for Alternatives 3 and 4, specifically a pre-design investigation and a pilot scale test.

The full-scale ISCT program will be similar to the program described under Alternatives 3 and 4; however, it is assumed it will need to be conducted over a larger area in order to achieve groundwater SCGs in the near term. As with the other alternatives, the details of the ISCT program will be determined during the design phase. For the purposes of generating a cost estimate, it was assumed the treatment will be conducted using potassium permanganate over an area measuring 200 feet by 250 feet by 50 feet deep. It is estimated that implementation of the full-scale ISCT will require four to eight weeks for well installation, followed by injections to be conducted over a period of approximately four to five months.

Since this alternative includes active treatment, which may last several months to a few years, short-term IC/EC may be needed for the site until the treatment program achieves its objectives. For the purposes of the cost estimate it is conservatively assumed the IC/EC will be necessary for three years. If necessary, the institutional control, in the form of an environmental easement will: (a) require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3); (b) restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and (c) require compliance with the Department-approved Site Management Plan.

If short-term IC/ECs are necessary a Site Management Plan will be developed. The Site Management Plan will identify and implement the required institutional and engineering controls. It will include, but not necessarily be limited to the following: (a) provisions for evaluation of the potential for soil vapor intrusion for any future buildings developed on the site, including provisions for implementing actions recommended to address exposures related to soil vapor intrusion; (b) a groundwater monitoring plan; (c) descriptions of the provisions of the environmental easement; (d) maintaining site access controls and Department notification; and (e) the steps necessary for the periodic reviews and certification of the institutional controls. It will also include an O&M plan similar to the O&M plan described for Alternative 3.

The capital cost to implement Alternative 5 includes the costs to: (a) design and conduct the excavation, including restoration; (b) design and implement the ISCT; (c) develop the Site Management Plan; and (d) place the environmental easement on the site. Annual costs under this alternative include the cost to operate the ISCT system for three years, conducting injections periodically throughout; analyze groundwater samples for three years and report the results; and provide periodic certifications for three years. The estimated cost of Alternative 5 is as follows:

Present Worth:..$ 8,060,000
Capital Cost:..$ 7,990,000
Annual Costs (3 years): ....$ 24,800

Exhibit C

Remedial Alternative Costs

Remedial Alternative		Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
Alternative 1:	No Further Action	0	0	0
Alternative 2:	Limited Excavation, Site Cap and Natural Attenuation	211,000	21,800	545,000
Alternative 3:	Limited Excavation, Focused In-Situ Chemical Treatment, Site Cap and Natural Attenuation	2,190,000	25,800	2,590,000
Alternative 4:	Expanded Excavation, Focused In-Situ Chemical Treatment, Site Cap and Natural Attenuation	2,370,000	25,800	2,760,000
Alternative 5:	Restoration to Pre-Disposal Conditions	7,990,000	24,800	8,060,000

Exhibit D

SUMMARY OF THE SELECTED REMEDY

The Department has selected Alternative 4, Expanded Excavation, Focused In-Situ Chemical Treatment (ISCT), Site Cap and Natural Attenuation as the remedy for this site. Alternative 4 will achieve the remediation goals for the site by removing the sources of contamination, treating the most significant areas of on-site groundwater contamination and preventing exposure to contamination through institutional and engineering controls. The elements of this remedy are described in Section 7. The selected remedy is depicted in Figure 6.

Basis for Selection

The selected remedy is based on the results of the RI and the evaluation of alternatives. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375. A detailed discussion of the evaluation criteria and comparative analysis is included in the AA report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

The selected remedy (Alternative 4: Expanded Excavation, Focused ISCT, Site Cap and Natural Attenuation satisfies this criterion by removing the areas of soil contamination, which are sources or potential sources of groundwater contamination, treating the most significant areas of on-site groundwater contamination and preventing exposure to contamination through institutional and engineering controls, namely an environmental easement, site cap/cover system, and, if necessary, soil vapor intrusion mitigation systems.

Alternative 1 (No Further Action) does not provide any additional protection to public health and the environment and will not be evaluated further. Alternative 5 (Restoration to Pre-Disposal Conditions), by removing all soil above bedrock and aggressively treating groundwater contamination in bedrock, meets the threshold criteria. In a similar fashion to Alternative 4, Alternatives 2 (Limited Excavation, Site Cap and Natural Attenuation) and 3 (Limited Excavation, Focused ISCT, Site Cap and Natural Attenuation) also comply with this criterion but to a lesser degree or with lower certainty than Alternative 4.

Alternatives 2, 3 and 4 rely on a restriction of groundwater use at the site to protect human health. Alternative 5 may require a short-term restriction on groundwater use; however, it is expected the restriction will be able to be removed in approximately three years. The potential for soil vapor intrusion will be reduced significantly by Alternative 5. It will also be reduced by Alternative 4 and, to a somewhat lesser extent, Alternatives 3 and 2; however, the potential for soil vapor intrusion will likely remain high under Alternatives 2, 3 and 4. An evaluation of the potential for SVI and/or SVI mitigation is required under Alternatives 2, 3 and 4 in order to protect human health and may be necessary under Alternative 5.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

Alternative 4 complies with SCGs to the extent practicable. It addresses source areas of contamination and prevents exposure to soil contamination through maintenance or construction of a cover system. It also creates the conditions necessary to restore groundwater quality to the extent practicable through implementation of the ISCT program. Alternative 5 complies with SCGs by removing all contaminated soil and treating groundwater *in-situ*. Alternative 3 also complies with this criterion but to a lesser degree and with lower certainty than Alternative 4. It is expected Alternative 5 will achieve groundwater SCGs in less than 5 years, while groundwater contamination above SCGs will remain on-site under Alternatives 3 and 4 for many years. While the description of Alternative 2 in the Alternatives Analysis states groundwater contamination will be addressed through monitored natural attenuation, given the levels of contaminants present in groundwater, it is not certain Alternative 2 will achieve groundwater SCGs since it does not include active remediation of bedrock groundwater contamination, particularly considering it is likely the bedrock matrix is a secondary source of groundwater contamination which will persist for many years without treatment.

Because Alternatives 3, 4, and 5 satisfy the threshold criteria, the remaining criteria are particularly important in selecting a final remedy for the site.

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. <u>Long-term Effectiveness and Permanence.</u> This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

Alternative 5 is the most effective in the long-term since it removes all contamination above bedrock and seeks to aggressively reduce bedrock groundwater contamination. Alternatives 3 and 4 will be effective in the long-term by removing source areas of soil contamination and preventing exposures through institutional and engineering controls. Alternative 4, by removing additional areas of soil contamination, is somewhat more effective in the long-term than Alternative 3.

Alternatives 3 and 4 will require a restriction on groundwater use for the foreseeable future and the potential for soil vapor intrusion will likely remain high under both. Restriction of on-site groundwater usage will likely only be necessary for a few years (three to five) under Alternative 5 and the potential for soil vapor intrusion will be reduced significantly by Alternative 5.

4. <u>Reduction of Toxicity, Mobility or Volume.</u> Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Alternative 5 will result in the largest reduction in the volume of contamination at the site by a large margin, followed by Alternative 4, then Alternative 3. The mobility of the VOC contamination will be reduced by Alternative 3 by removing the presumed source areas. The mobility of the VOC contamination will be further reduced by Alternative 4 by removing additional soil contamination which represents a source or potential source of groundwater contamination. Both Alternative 3 and 4 reduce mobility by covering the contaminated soils with a cover system, thus preventing transport by erosion. Alternatives 3, 4 and 5 will all result in a reduction of the toxicity of the bedrock groundwater contamination as a result of the ISCT program. Alternative 5 includes a more extensive ISCT program than Alternatives 3 and 4, and therefore results in the greatest reduction of toxicity. Alternatives 3 and 4 will result in the same reduction of toxicity in bedrock groundwater.

5. Short-term Impacts and Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

The potential and actual short-term adverse impacts are greatest for Alternative 5, followed by Alternative 4, then Alternative 3; however, the short-term impacts under Alternative 3 and 4 will be of a similar magnitude.

Each alternative will create noise and traffic, due to the operation of construction equipment and hauling soil to and from the site. Alternative 5 will create the most noise and traffic, followed by Alternative 4, then Alternative 3. Each also requires the disturbance of contaminated soils. During intrusive activities the potential exists to generate dust which could migrate off-site if not controlled. The potential also exists to generate contaminated runoff from exposed soils. The greater the volume of soil disturbed, the greater the potential for off-site impacts, though controls employed during construction will mitigate these risks.

Alternative 5 requires more energy input in order to implement than Alternatives 3 or 4, and therefore results in greater greenhouse gas (GHG) emissions during implementation of the remedy due to the longer construction period and the greater number of truck loads needed to haul soil to and from the site. Alternative 4 will result in the next highest amount of GHG emissions, followed by Alternative 3. Considerably more landfill space will be utilized by Alternative 5 than Alternatives 3 or 4. More natural resources (clean soil) need to be utilized in order to implement Alternative 5 than Alternatives 3 or 4, and Alternative 3 will utilize the least amount of clean soil.

Given the depth of excavation required for Alternative 5, installation of an excavation support system may be necessary (*e.g.*, sheet-piling). Installation of sheet-piling creates noise and vibration, which increases the potential for impacts to the surrounding community.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

Each of the alternatives being considered is readily implementable. They each will require installation of bedrock wells and Alternative 5 may require installation of excavation support systems (*e.g.*, sheet-piling), but the equipment, materials and expertise required for these actions are widely available. Each alternative requires implementation of a groundwater treatment program, which will require somewhat specialized personnel with specialized expertise, but it is a well-established technology which is implementable.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

The cost of Alternatives 3 and 4 are on the same order of magnitude, and it should be noted that the cost estimate for Alternative 4 is based on off-site disposal of all excavated soils (*i.e.*, all 1450 cubic yards), which likely will not be necessary, since some of those soils will likely be able to be reused. The cost to implement Alternative 5 is considerably greater than Alternatives 3 and 4, though it will not result in annual costs beyond a few years after implementation.

8. <u>Land Use.</u> When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

Each alternative under consideration allows for the anticipated next use of the site (restricted-residential use). Alternative 5 will not result in any restriction on future use, though short-term controls may be necessary to prevent groundwater use and to evaluate the potential for soil vapor intrusion following implementation of the remedy.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

9. <u>Community Acceptance.</u> Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary has been prepared that describes public comments received and the manner in which the Department will address the concerns raised.

Alternative 4 has been selected, because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.

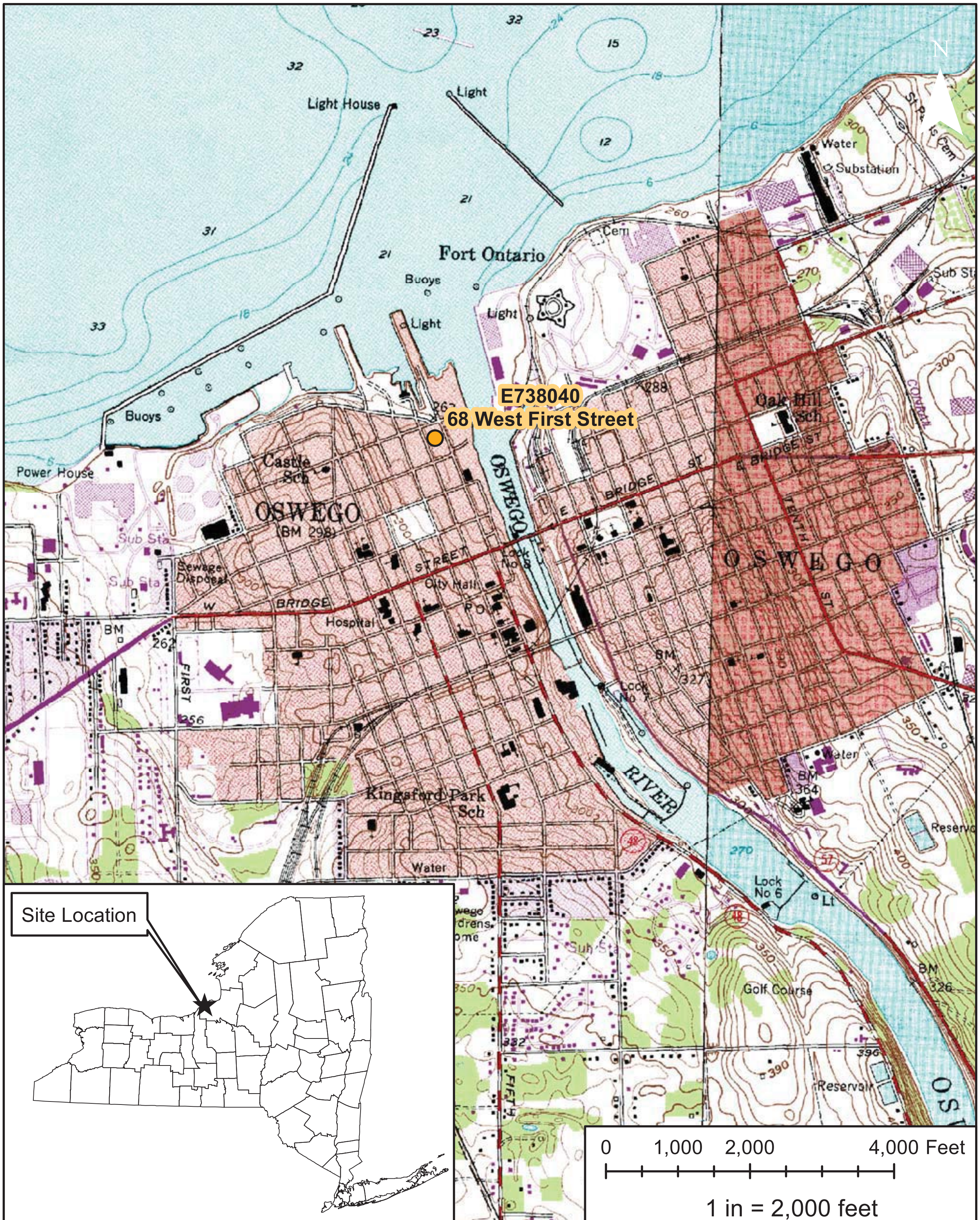
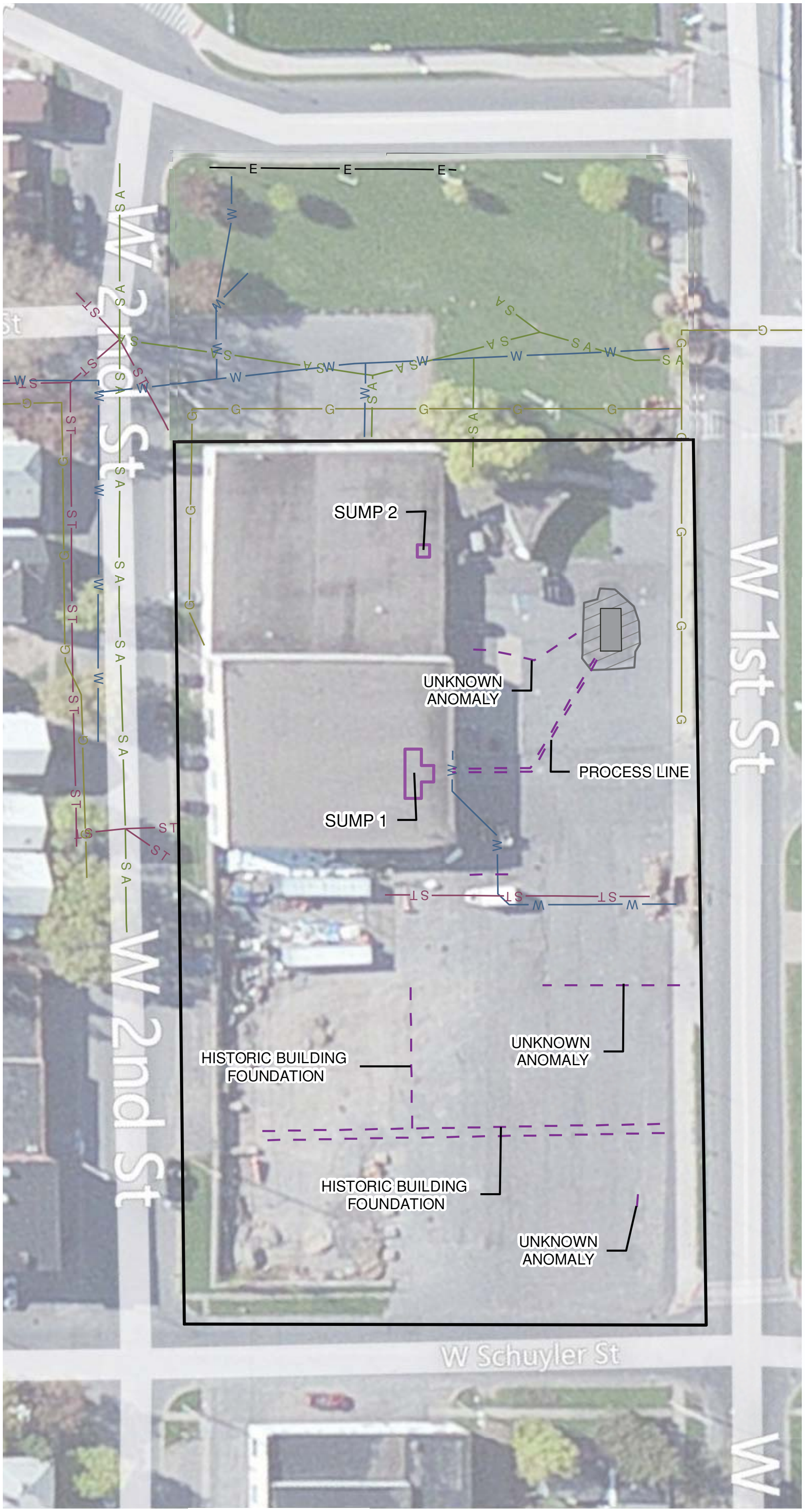


Figure 1 - Site Location

68 West First Street
Site ID E738040
City of Oswego, Oswego County, New York

2013-05-02
JPC

FIGURE 2



LEGEND

- GROUND PENETRATING RADAR ANOMOLY
- ELECTRIC LINE
- WATER LINE
- NATURAL GAS LINE
- SANITARY SEWER
- STORM SEWER
- EXISTING SUMP
- EXCAVATION AREA
- FORMER 15,000 GALLON UST
- SITE BOUNDARY (APPROXIMATE)

68 WEST FIRST STREET
SITE ID E738040
CITY OF OSWEGO
OSWEGO COUNTY, NY

SITE FEATURES

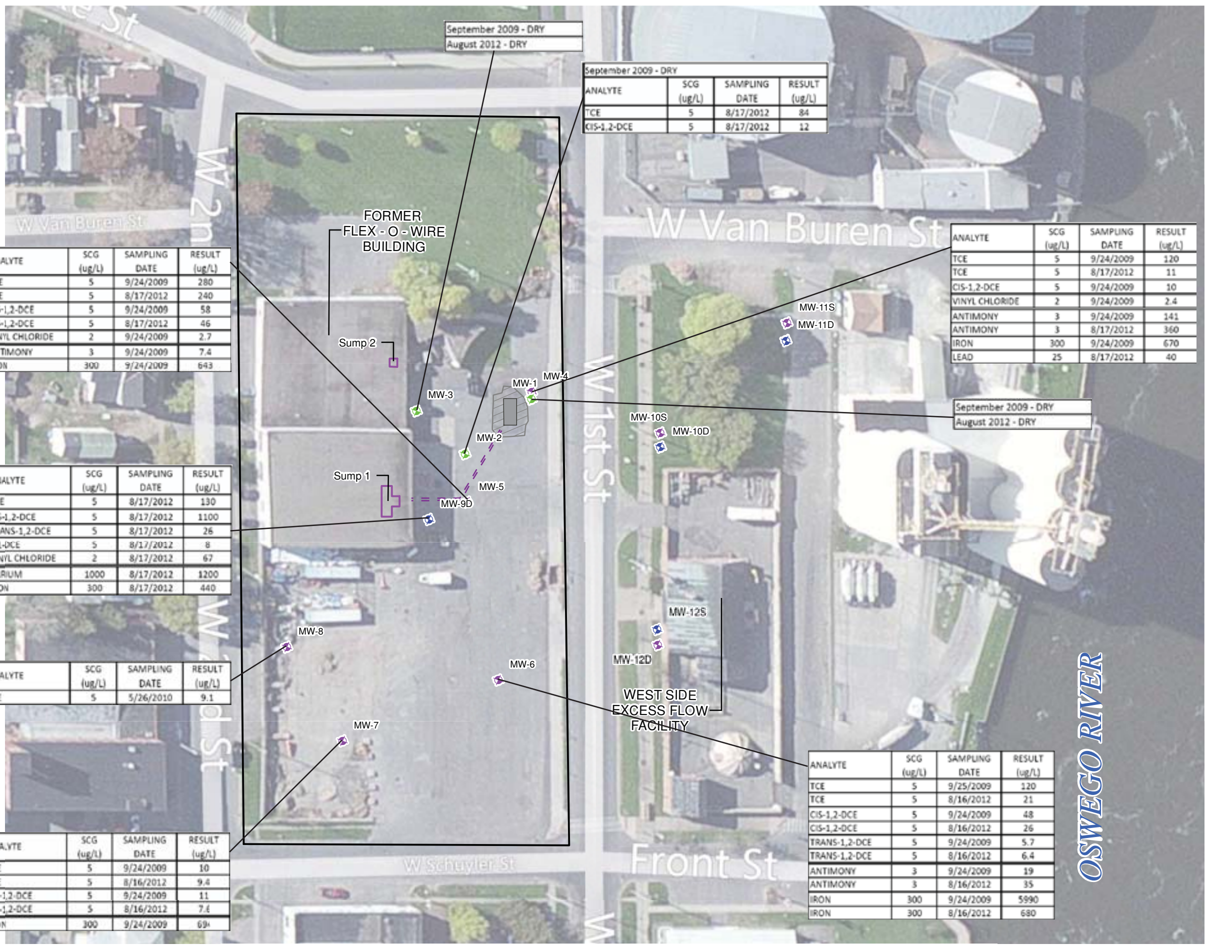
0 37.5 75 150
Feet

MODIFIED BY NYSDEC 2013-05-02
1. Corrected Site Boundary
2. Changed Figure Name and Number

FEBRUARY 2013
283.48496

O'BRIEN & GERE

FIGURE 3



September 2009 - DRY
August 2012 - DRY

September 2009 - DRY			
ANALYTE	SCG (ug/L)	SAMPLING DATE	RESULT (ug/L)
TCE	5	8/17/2012	84
CIS-1,2-DCE	5	8/17/2012	12

ANALYTE	SCG (ug/L)	SAMPLING DATE	RESULT (ug/L)
TCE	5	9/24/2009	280
TCE	5	8/17/2012	240
CIS-1,2-DCE	5	9/24/2009	58
CIS-1,2-DCE	5	8/17/2012	46
VINYL CHLORIDE	2	9/24/2009	2.7
ANTIMONY	3	9/24/2009	7.4
IRON	300	9/24/2009	643

ANALYTE	SCG (ug/L)	SAMPLING DATE	RESULT (ug/L)
TCE	5	9/24/2009	120
TCE	5	8/17/2012	11
CIS-1,2-DCE	5	9/24/2009	10
VINYL CHLORIDE	2	9/24/2009	2.4
ANTIMONY	3	9/24/2009	141
ANTIMONY	3	8/17/2012	360
IRON	300	9/24/2009	670
LEAD	25	8/17/2012	40

September 2009 - DRY
August 2012 - DRY

ANALYTE	SCG (ug/L)	SAMPLING DATE	RESULT (ug/L)
TCE	5	8/17/2012	130
CIS-1,2-DCE	5	8/17/2012	1100
TRANS-1,2-DCE	5	8/17/2012	26
1,1-DCE	5	8/17/2012	8
VINYL CHLORIDE	2	8/17/2012	67
BARIUM	1000	8/17/2012	1200
IRON	300	8/17/2012	440

ANALYTE	SCG (ug/L)	SAMPLING DATE	RESULT (ug/L)
TCE	5	5/26/2010	9.1

ANALYTE	SCG (ug/L)	SAMPLING DATE	RESULT (ug/L)
TCE	5	9/25/2009	120
TCE	5	8/16/2012	21
CIS-1,2-DCE	5	9/24/2009	48
CIS-1,2-DCE	5	8/16/2012	26
TRANS-1,2-DCE	5	9/24/2009	5.7
TRANS-1,2-DCE	5	8/16/2012	6.4
ANTIMONY	3	9/24/2009	19
ANTIMONY	3	8/16/2012	35
IRON	300	9/24/2009	5990
IRON	300	8/16/2012	680

ANALYTE	SCG (ug/L)	SAMPLING DATE	RESULT (ug/L)
TCE	5	9/24/2009	10
TCE	5	8/16/2012	9.4
CIS-1,2-DCE	5	9/24/2009	11
CIS-1,2-DCE	5	8/16/2012	7.6
IRON	300	9/24/2009	69[illegible]

This document was developed in color. Reproduction in B/W may not represent the data as intended.

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PLOTDATE: 02/06/13 9:20:42 AM StantoSA

LEGEND

- PROCESS LINE
- EXISTING SUMP
- EXCAVATION AREA
- FORMER 15,000 GALLON UST

Modified by NYSDEC 2013-05-22
1. Changed figure name and number.
2. Added groundwater data.

68 WEST FIRST STREET
SITE ID E738040, OU 1
CITY OF OSWEGO
OSWEGO COUNTY, NY

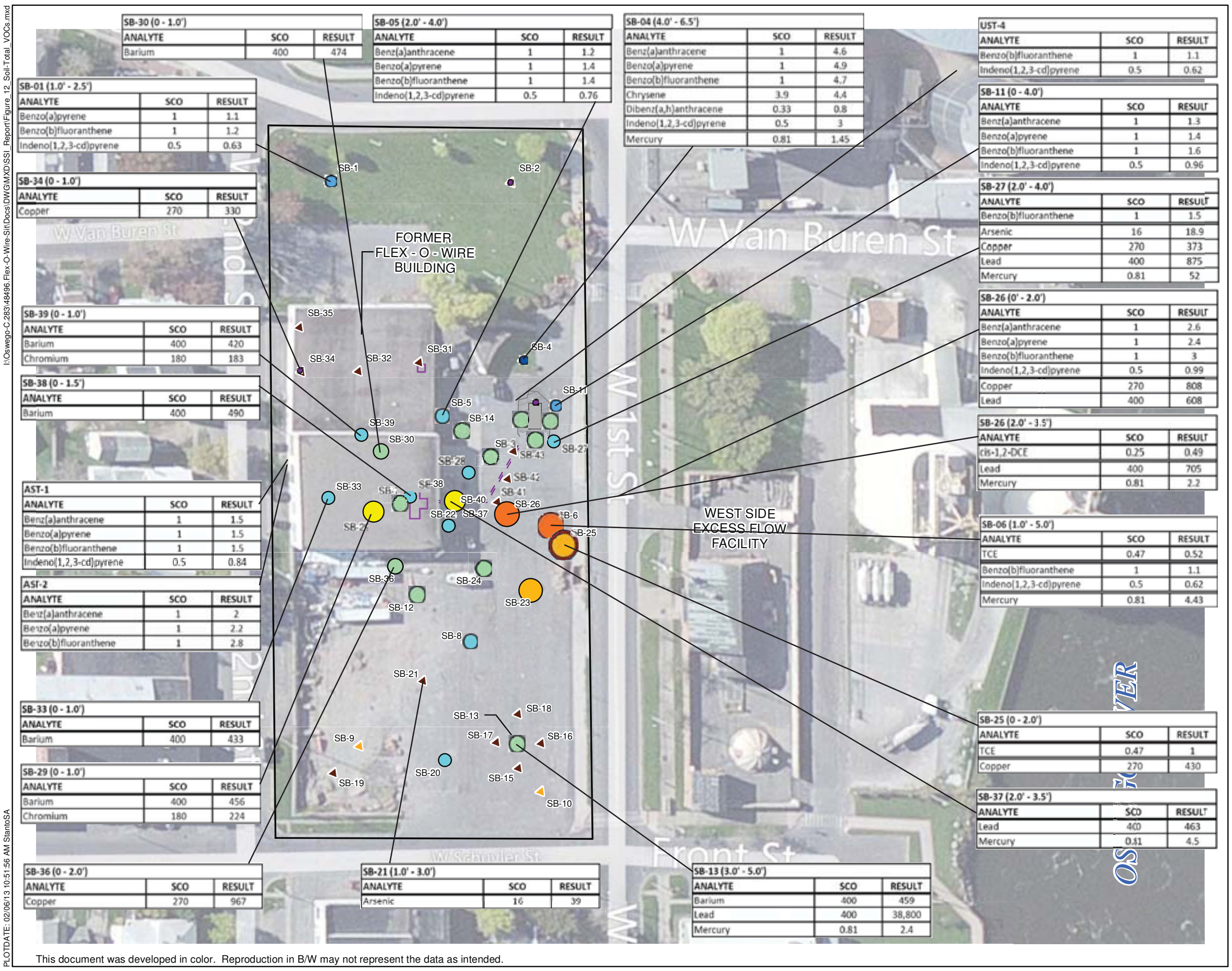
GROUNDWATER SCG EXCEEDANCES

0 37.5 75 150
Feet

FEBRUARY 2013
283.48496

O'BRIEN & GERE

FIGURE 4



SB-30 (0 - 1.0')		
ANALYTE	SCO	RESULT
Barium	400	474

SB-05 (2.0' - 4.0')		
ANALYTE	SCO	RESULT
Benz(a)anthracene	1	1.2
Benzo(a)pyrene	1	1.4
Benzo(b)fluoranthene	1	1.4
Indeno(1,2,3-cd)pyrene	0.5	0.76

SB-04 (4.0' - 6.5')		
ANALYTE	SCO	RESULT
Benz(a)anthracene	1	4.6
Benzo(a)pyrene	1	4.9
Benzo(b)fluoranthene	1	4.7
Chrysene	3.9	4.4
Dibenz(a,h)anthracene	0.33	0.8
Indeno(1,2,3-cd)pyrene	0.5	3
Mercury	0.81	1.45

SB-01 (1.0' - 2.5')		
ANALYTE	SCO	RESULT
Benzo(a)pyrene	1	1.1
Benzo(b)fluoranthene	1	1.2
Indeno(1,2,3-cd)pyrene	0.5	0.63

SB-34 (0 - 1.0')		
ANALYTE	SCO	RESULT
Copper	270	330

SB-39 (0 - 1.0')		
ANALYTE	SCO	RESULT
Barium	400	420
Chromium	180	183

SB-38 (0 - 1.5')		
ANALYTE	SCO	RESULT
Barium	400	490

AST-1		
ANALYTE	SCO	RESULT
Benz(a)anthracene	1	1.5
Benzo(a)pyrene	1	1.5
Benzo(b)fluoranthene	1	1.5
Indeno(1,2,3-cd)pyrene	0.5	0.84

AST-2		
ANALYTE	SCO	RESULT
Benz(a)anthracene	1	2
Benzo(a)pyrene	1	2.2
Benzo(b)fluoranthene	1	2.8

SB-33 (0 - 1.0')		
ANALYTE	SCO	RESULT
Barium	400	433

SB-29 (0 - 1.0')		
ANALYTE	SCO	RESULT
Barium	400	456
Chromium	180	224

SB-36 (0 - 2.0')		
ANALYTE	SCO	RESULT
Copper	270	967

SB-21 (1.0' - 3.0')		
ANALYTE	SCO	RESULT
Arsenic	16	39

SB-13 (3.0' - 5.0')		
ANALYTE	SCO	RESULT
Barium	400	459
Lead	400	38,800
Mercury	0.81	2.4

UST-4		
ANALYTE	SCO	RESULT
Benzo(b)fluoranthene	1	1.1
Indeno(1,2,3-cd)pyrene	0.5	0.62

SB-11 (0 - 4.0')		
ANALYTE	SCO	RESULT
Benz(a)anthracene	1	1.3
Benzo(a)pyrene	1	1.4
Benzo(b)fluoranthene	1	1.6
Indeno(1,2,3-cd)pyrene	0.5	0.96

SB-27 (2.0' - 4.0')		
ANALYTE	SCO	RESULT
Benzo[b]fluoranthene	1	1.5
Arsenic	16	18.9
Copper	270	373
Lead	400	875
Mercury	0.81	52

SB-26 (0' - 2.0')		
ANALYTE	SCO	RESULT
Benz(a)anthracene	1	2.6
Benzo(a)pyrene	1	2.4
Benzo(b)fluoranthene	1	3
Indeno(1,2,3-cd)pyrene	0.5	0.99
Copper	270	808
Lead	400	608

SB-26 (2.0' - 3.5')		
ANALYTE	SCO	RESULT
cis-1,2-DCE	0.25	0.49
Lead	400	705
Mercury	0.81	2.2

SB-06 (1.0' - 5.0')		
ANALYTE	SCO	RESULT
TCE	0.47	0.52
Benzo(b)fluoranthene	1	1.1
Indeno(1,2,3-cd)pyrene	0.5	0.62
Mercury	0.81	4.43

SB-25 (0 - 2.0')		
ANALYTE	SCO	RESULT
TCE	0.47	1
Copper	270	430

SB-37 (2.0' - 3.5')		
ANALYTE	SCO	RESULT
Lead	400	463
Mercury	0.81	4.5

LEGEND

TOTAL VOCs mg/kg

- 0.0022 - 0.005
- >0.005 - 0.0075
- >0.0075 - 0.01
- >0.01 - 0.025
- >0.025 - 0.05
- >0.05 - 0.1
- >0.1 - 0.25
- >0.25 - 0.5
- >0.5 - 1.0
- >1.0 - 1.075
- PRE-SSI SOIL BORING - NO VOC DATA
- SSI SOIL BORINGS - NO VOC DATA

NOTE:
RESULT CONCENTRATIONS EXPRESSED IN mg/kg
SCO - RESTRICTED RESIDENTIAL USE SOIL CLEANUP OBJECTIVE

68 WEST FIRST STREET
SITE ID E738040, OU 1
CITY OF OSWEGO
OSWEGO COUNTY, NY

TOTAL VOCs IN SOILS & EXCEEDANCES OF RESTRICTED RESIDENTIAL SCOs

0 37.5 75 150
Feet

Modified by NYSDEC 2013-05-07
1. Changed figure number & name
2. Added Total VOC data for Pre-SSI borings
3. Added Exceedances of Rest. Res. SCOs

FEBRUARY 2013
283.48496

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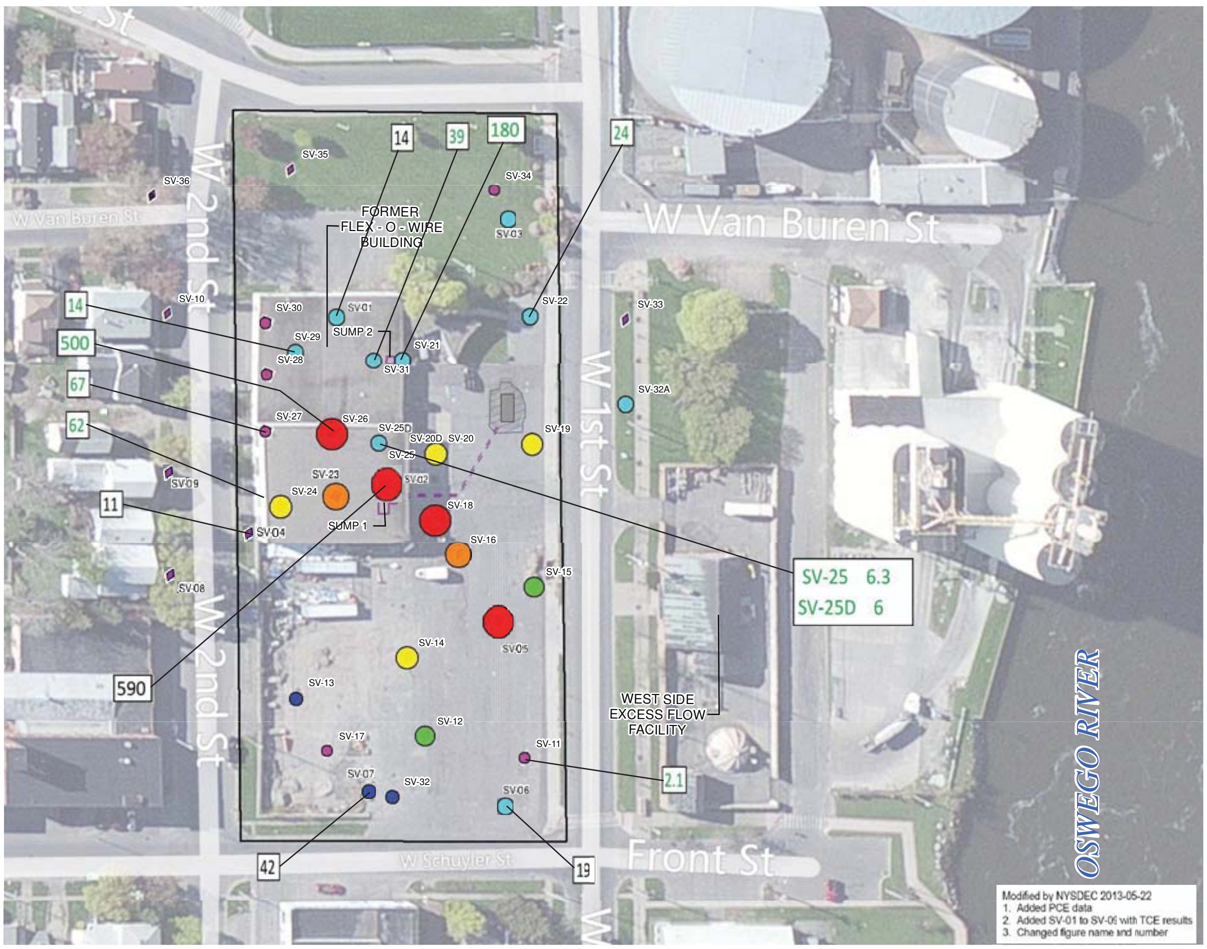
FIGURE 5



This document was developed in color. Reproduction in B/W may not represent the data as intended.

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LEGEND

- SUB-SLAB VAPOR LOCATIONS FEBUARY 2012
- SOIL VAPOR LOCATIONS FEBUARY 2012
- SOIL VAPOR LOCATIONS MAY 2012
- PROCESS LINE
- EXISTING SUMP
- IRM EXCAVATION AREA
- FORMER 15,000 GALLON US
- 14 TETRACHLOROETHENE (PCE) (ug/m3) 2008-10
- 14 TETRACHLOROETHENE (PCE) (ug/m3) 2012

Trichloroethene (TCE) (ug/m3)

- Not Detected - 10
- >10 - 50
- >50 - 100
- >100 - 500
- >500 - 1000
- >1000 - 5000
- >5000 - 10000
- >10000 - 34000

68 WEST FIRST STREET
SITE ID E738040, OU 1
CITY OF OSWEGO
OSWEGO COUNTY, NY

TCE & PCE SUB-SLAB VAPOR & SOIL VAPOR SAMPLING RESULTS

0 37.5 75 150
Feet

FEBRUARY 2013
283.48496

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FIGURE 6

LEGEND

- GROUND PENETRATING RADAR ANOMOLY
- ELECTRIC LINE
- WATER LINE
- NATURAL GAS LINE
- SANITARY SEWER
- STORM SEWER
- EXISTING SUMP
- IRM EXCAVATION AREA
- FORMER 15,000 GALLON UST
- APPROX EXTENT OF SITE & ENV. EASEMENT
- APPROX. AREA OF PROPOSED EXCAVATION
- INJECTION AREA (CONCEPTUAL ONLY)

Modified by NYSDEC 2013-05-22
1. Added remedy elements
2. Corrected site boundary
3. Changed figure name & number

68 WEST FIRST STREET
SITE ID E738040,OU 1
CITY OF OSWEGO
OSWEGO COUNTY, NY

SELECTED REMEDY

0 37.5 75 150
Feet

FEBRUARY 2013
283.48496

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APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

68 West First Street
Operable Unit No. 1: On-Site Area
Environmental Restoration Project
City of Oswego, Oswego County, New York
Site No. E738040

The Proposed Remedial Action Plan (PRAP) for Operable Unit (OU) 1 of the 68 West First Street site was prepared by the New York State Department of Environmental Conservation (the Department) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on August 30, 2013. The PRAP outlined the remedial measure proposed for the contaminated soil, groundwater and soil vapor at OU 1 of the 68 West First Street site.

The release of the PRAP was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on September 12, 2013, which included a presentation of the remedial investigation and alternative analysis (RI/AA) for the 68 West First Street site as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP ended on October 14, 2013.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the Department's responses:

COMMENT 1: How much longer would it take to clean up the site without chemical injection versus with chemical injection? How long does it take for the chemical reaction to occur?

RESPONSE 1: It would take many years longer for the site to be remediated without chemical treatment. The chemical reaction occurs essentially immediately, as long as the injected chemical can be brought into contact with the contaminants.

COMMENT 2: What is the time frame for completing the remediation?

RESPONSE 2: Requests for funding for projects under the Environmental Restoration Program (ERP) currently exceed the $200 million authorized under the 1996 Clean Water/Clean Air Bond Act for the ERP. As such, the Department is not yet providing funding for any new remediation phase ERP projects under the Bond Act.

However, there is a company that is interested in developing the site. As a private company, that party could apply to complete the remedial program for the site under the Department's Brownfield

Cleanup Program (BCP). If that party applies and is accepted into the BCP, then that party would implement the remedy selected by the Record of Decision under the BCP.

The development of the site would probably take several months, and it is likely that the excavations and cover construction would occur simultaneously with the development. For the groundwater treatment portion of the remedy, some additional data will need to be gathered and a pilot test may need to be conducted to determine the appropriate chemical, dosing rate and injection locations. It is estimated those activities will take approximately one to one-and-a-half years. This could be conducted concurrently with the design and implementation of the other portions of the remedy (*e.g.*, excavation and cover system).

In total, it is estimated the process will take approximately two years.

COMMENT 3: Who pays for the remediation? Will the City have to pay for any of it?

RESPONSE 3: If the remediation is conducted under the BCP, then the Applicant to the BCP will pay for the remediation. State tax credits are available to parties completing a remediation under the BCP. Thus far, the State's portion of the costs has been paid through the Environmental Restoration Program, which received its funds from the 1996 Bond Act, while the City paid for 10% of the on-site costs. If the property is remediated under the ERP, the State will again fund up to 90% of the cost. If the property is remediated under the BCP, the City will not be responsible for the cost of remediation.

COMMENT 4: Are you choosing chemical injections as part of the remediation because the bedrock is so shallow?

RESPONSE 4: In part, yes. The shallow bedrock would affect the feasibility of implementing certain other remedial technologies.

COMMENT 5: How long and how often will groundwater be monitored if you proceed with proposed alternative? Is it for thirty years?

RESPONSE 5: Groundwater monitoring will continue for as long as levels of contaminants in groundwater exceed the groundwater standards. The cost estimate is based on thirty years of monitoring, but monitoring may continue longer than that or end sooner. Groundwater will be monitored yearly for the first five to ten years, and after that it is likely the frequency will be reduced if the concentrations of the contaminants have decreased.

COMMENT 6: Does the City have the right to choose another alternative other than the proposed alternative?

RESPONSE 6: The City developed and presented the selected remedy in the alternatives analysis prepared by their consultant as their recommended remediation, which the Department, in consultation with NYSDOH, has now selected as the remedy for the site and the off-site contamination. If the site enters the BCP the Applicant will be expected to implement this remedy, or if the site proceeds in the ERP, the City would also be required to implement it.

APPENDIX B

Administrative Record

ADMINISTRATIVE RECORD

68 West First Street
Operable Unit No. 1: On-Site Area
Environmental Restoration Project
City of Oswego, Oswego County, New York
Site No. E738040

1. Proposed Remedial Action Plan for the 68 West First Street site, Operable Unit No. 1, dated August 2013, prepared by the Department.

2. The Department and the City of Oswego entered into a State Assistance Contract, Contract No. C303843, July 18, 2008.

3. State Assistance Contract (SAC) No. C303843 and SAC Amendments 1 and 2.

4. Remedial Investigation/Alternatives Analysis Report, dated January 2011, prepared by CHA.

5. Supplemental Subsurface Investigation/Alternatives Analysis Report, dated February 2013, prepared by O'Brien & Gere Engineers, Inc.