PROPOSED REMEDIAL ACTION PLAN

Abandoned Chemical Sales Facility
State Superfund Project
Rochester, Monroe County
Site No. 828105
March 2011

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

PROPOSED REMEDIAL ACTION PLAN

Abandoned Chemical Sales Facility
Rochester, Monroe County
Site No. 828105
March 2011

SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the above referenced site. The disposal of hazardous wastes at the site has resulted in threats to public health and the environment that would be addressed by the remedy proposed by this Proposed Remedial Action Plan (PRAP). The disposal of hazardous wastes at this site, as more fully described in Section 6 of this document, has contaminated various environmental media. The proposed remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This PRAP identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for the preferred remedy.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

The Department has issued this document in accordance with the requirements of 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 document is a summary of the information that can be found in the site-related reports and documents in the document repository identified below.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all PRAPs. This is an opportunity for public participation in the remedy selection process. The public is encouraged to review the reports and documents, which are available at the following repository:

Lyell Branch Library
Attn: Martin Steinhauser
956 Lyell Avenue
Rochester, NY 14606
Phone: (585) 428-8218

A public comment period has been set from:

3/1/2011 to 3/30/2011

A public meeting is scheduled for the following date:

3/14/2011 at 7:15 PM

Public meeting location:

Lyell Branch Library

At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP.

Written comments may also be sent through 3/30/2011 to:

Jason Pelton
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233
jmpelton@gw.dec.state.ny.us

The Department may modify the proposed remedy or select another of the alternatives presented in this PRAP based on new information or public comments. Therefore, the public is encouraged to review and comment on the proposed remedy identified herein. Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the Department's final selection of the remedy for this site.

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 Abandoned Chemical Sales Facility (ACSF) site consists of the 2.29 acre 1600

Jay Street property. The parcel is situated near the intersection of Jay Street and Dodge Street. The property is bordered immediately to the west by the Rochester and Southern Railroad. Further to the west beyond the railroad, the site is bordered by the Valeo Former GM - Delco Chassis Facility (site number 828099). Single and multi-tenant residential buildings border the site to the south and east.

Site Features: An approximate 11,000 square foot, single story block construction building that is slab-on-grade is the only structure located on the 1600 Jay Street property. With the exception of a grassy area north of the site building, the majority of the site is covered with an asphalt and gravel parking surface.

Current Zoning/Use(s): The property is zoned commercial. The southern portion of the building is used by a plumbing and heating and ventilation contractor and the northern portion of the building is used by a high performance motor shop. The site is located in a mixed residential, commercial, and industrial area in the City of Rochester, Monroe County.

Historical Use(s): Property ownership records indicate that Chemical Sales Corporation purchased both 1600 Jay Street and the adjacent parcel to the north, 105 Dodge Street, in 1952. Chemical Sales Corp. retained 105 Dodge Street until August 1972. In 1994 the Chemical Sales Corp. filed for bankruptcy and sold 1600 Jay Street to M.A. Ferrauilo Plumbing. M.A. Ferrauilo Plumbing is the current owner of 1600 Jay Street.

In 2000, the Department first identified the site as a potential site following investigation and remediation activities at a nearby site that was also operated by the Chemical Sales Corporation (site number 828086). As a result of identified hazardous waste disposal being confirmed during the 2002 PSA, the Department listed the ACSF site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York in April 2002.

Based on data collected during the RI documenting that contamination is not present in soil and groundwater on 105 Dodge Street and the data demonstrating that contamination is limited to the 1600 Jay Street parcel and off-site to the south, the 105 Dodge Street parcel was removed from the site classification boundary in May 2010 and not subject to further investigation as part of the hazardous waste site investigation for the ACSF site.

Site Geology and Hydrogeology: Site geology consists of a thin veneer of fine sandy silt overlying a medium dark gray dolomite. The thickness of overburden ranges from approximately 5 feet to 10 feet. The groundwater table in the vicinity of the site is present in the fractured bedrock and occurs at a depth of approximately 10 to 15 feet beneath the ground surface. In general, groundwater flow is to the south, but the presence of a sewer line set in the bedrock beneath Jay Street and the Valeo Former GM - Delco Chassis Facility significantly influences groundwater flow. Groundwater data indicates that the Jay Street sewer utility captures the majority of groundwater that flows south from the ACSF site, redirects the groundwater east within the utility trench, and prevents the migration of site contaminants further south beneath a residential area.

A site location map is attached as Figure 1.

SECTION 4: <u>LAND USE AND PHYSICAL SETTING</u>

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 commercial use (which allows for industrial use) as described in Part 375-1.8(g) is/are being evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the investigation 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: <u>ENFORCEMENT STATUS</u>

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.

The PRPs for the site, documented to date, include:

Ferrauilo Plumbing & Heating

ChemReal Corporation

The PRPs for the site declined to implement a remedial program when requested by the Department. After the remedy is selected, the PRPs will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRPs, the Department will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the state for recovery of all response costs the state has incurred.

SECTION 6: <u>SITE CONTAMINATION</u>

6.1: <u>Summary of the Remedial Investigation</u>

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.

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 Information

The analytical data collected on this site includes data for:

- air
- groundwater
- soil
- soil vapor
- indoor air

The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste 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 at this site is/are:

chloroethane
dichloroethylene
1,1,1 tca
benzene
trichloroethene (tce)
tetrachloroethylene (pce)
toluene
ethylbenzene
vinyl chloride
xylene (mixed)
acetone

As illustrated in Exhibit A, the contaminant(s) of concern exceed the applicable standards, criteria and guidance for:

- groundwater

- soil
- indoor air

6.2: Interim Remedial Measures

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.

There were no IRMs performed at this site during the RI.

6.3: 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*.

Persons who dig below the ground surface may come into contact with contaminants in subsurface soil. People are not drinking site-related contaminants in the groundwater since the area is served by a public water supply not affected by this contamination. Volatile organic compounds in the soil 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. Air sampling at the on-site building has shown that the indoor air is being affected by soil vapor intrusion. Concentrations of site-related contaminants in the indoor air exceed applicable guidelines. A sub-slab depressurization system (a system that ventilates/removes air beneath the building) or similar mitigation action has been recommended to reduce the levels of contaminants in the indoor air. However, actions have not been taken. The indoor air and air beneath two off-site buildings are being monitored to verify mitigation actions are not needed at these properties.

6.4: Summary of Environmental Assessment

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.

The Fish and Wildlife Resources Impact Analysis (FWRIA) for OU(s) 01, which is/are included in the RI report(s), present(s) a detailed discussion of the existing and potential impacts from the site to fish and wildlife receptors.

The primary contaminants of concern at this site include chlorinated solvents with lesser amounts of petroleum contamination. Specifically, the chlorinated solvents include PCE, TCE and 1,1,1-trichloroethane (1,1,1-TCA) along with their breakdown products (cis-1,2-dichloroethene (cis-1,2-DCE), vinyl chloride, and chloroethane). Cis-1,2-DCE and vinyl chloride were the site contaminants detected at the highest concentration in site soil and groundwater. A sediment sample collected from a sump located within the central part of the

1600 Jay Street building contained PCE and TCE at concentrations of 170 parts per million (ppm) and 150 ppm respectively. A subslab soil sample collected near the sump contained cis-1,2-DCE at a maximum concentration of 62 ppm. The highest contaminant concentrations were detected in site soil beneath the 1600 Jay Street building near the sump and the highest contaminant concentrations in groundwater were detected in monitoring wells located along the south-side of the 1600 Jay Street property. The site data also suggests that the presence of non-chlorinated contaminants is facilitating the degradation of PCE and TCE to cis-1,2-DCE and vinyl chloride and 1,1,1-TCA to chloroethane.

The presence of site contaminants in soil and groundwater beneath the site building is influencing subslab soil vapor and the quality of indoor air. Specifically, TCE and cis-1,2-DCE were detected in subslab soil vapor at concentrations of 130,000 micrograms per cubic meter (ug/m3) and 89,000 ug/m3 respectively. TCE and cis-1,2-DCE were also detected in indoor air at concentrations of 170 and 74 ug/m3 respectively and suggest that soil vapor intrusion is occurring at the site building.

The groundwater contamination extends off-site in a southwest, south, and southeast direction. To the southwest, site contaminants have migrated in groundwater onto the Valeo Former GM - Delco Chassis Facility property. To the south and southeast of the site, site contaminants have migrated in groundwater beneath Jay Street and data suggests that the Jay Street sewer utility trench captures a considerable amount of groundwater and prevents significant migration of contaminants further downgradient from the site.

The nearest surface water body is the New York State Barge Canal. The canal is located over 2,500 feet west of the site. Based on the orientation of the off-site groundwater plume, the site contaminants are not migrating toward the barge canal. The majority of surface water runoff from the site is captured by the Monroe County Pure Waters stormwater collection system.

The site presents a significant environmental threat due to the ongoing releases of site contaminants from source areas (soil beneath and immediately north of the 1600 Jay Street building) into groundwater and soil vapor.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

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 Exhibit B. Potential remedial alternatives for the Site were identified, screened and evaluated in the FS report.

A summary of the remedial alternatives that were considered for this site is presented in Exhibit C. 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 D.

7.1: Evaluation of Remedial 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 FS 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.

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.

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

3. Long-term Effectiveness and Permanence. 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.

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

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.

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.

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.

8. Land Use. 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.

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. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the Department will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

7.2: Elements of the Proposed Remedy

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

The estimated present worth cost to implement the remedy is $1,543,000. The cost to construct the remedy is estimated to be $998,000 and the estimated average annual cost is $21,000.

The elements of the proposed remedy are as follows:

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

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

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

2) Contaminated soil from four areas of the site would be excavated to fractured bedrock, which is estimated to occur at a depth of approximately eight feet beneath the ground surface. It is expected that the four excavations would remove contaminant source areas and will achieve the protection of groundwater soil cleanup objectives (PGW SCOs) to the extent practicable. In total, approximately 275 cubic yards (yd3) of contaminated soil would be removed from the site and transported to a permitted disposal facility. The four excavations are fairly localized in areal extent, but the exact dimensions will be confirmed during the remedial design program. Verification samples will be collected to document the quality of soil left in-place following excavation.

3) Following removal of the source areas, each of the excavations would be backfilled. Prior to backfilling the excavations, a demarcation material would be placed in the excavations to differentiate between contaminated material left in place from clean fill material used as backfill. 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 one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is required it will be a minimum of one foot of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial 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).

4) Upon removal of the source areas, in-situ chemical oxidation (ISCO) injections would occur in approximately twenty bedrock injection wells. The ISCO injections would be completed downgradient of the on-site building in the area where groundwater contaminant concentrations are the highest. The injection wells would be installed at approximately 25-foot on center spacing and constructed to introduce the ISCO product from the 12 to 39 foot depth interval. It is estimated that three rounds of injections would be required. To evaluate the effectiveness of the ISCO injections, determine if additional injections are necessary, and to determine if conditions are favorable for subsequent biological amendment injections, groundwater and soil vapor monitoring would be completed within and downgradient of the treatment area.

5) Following the third ISCO injection and based on the groundwater monitoring results, biological amendments would be added to the treatment area to address possible contaminant rebound in groundwater. The injection wells used for the subsurface introduction of ISCO would be used to add the biological amendments from the 12 to 39 foot depth interval.

6) Following the excavation of contaminated soil from beneath and outside the footprint of the site building and the injection of ISCO to address groundwater contamination, the potential for soil vapor intrusion into the site building would be re-evaluated, and if necessary, actions recommended to address exposures related to soil vapor intrusion would be implemented.

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

(a) requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);

(b) allows the use and development of the controlled property for commercial and industrial as defined by Part 375-1.8(g), although land use is subject to local zoning laws;

(c) restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or County DOH;

(d) requires compliance with the Department approved Site Management Plan;

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

(a) an Institutional Control Plan that identifies all use restrictions for the site and details the steps and media-specific requirements necessary to assure the following institutional controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in Paragraph 7 above.

This plan includes, but may not be limited to:

(i) an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;

(ii) descriptions of the provisions of the environmental easement including groundwater use restrictions;

(iii) a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;

(iv) maintaining site access controls and Department notification; and

(v) 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 is not limited to:

(i) monitoring of groundwater and soil vapor to assess the performance and effectiveness of the remedy and determine the need for additional biological amendments;

(ii) a schedule of monitoring and frequency of submittals to the Department; and

(iii) provision to evaluate the potential for vapor intrusion for off-site buildings, including provision for implementing actions recommended to address exposures.

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 6.1.2, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium, 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 four categories; volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides/ polychlorinated biphenyls (PCBs), and inorganics (metals and cyanide). 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 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 where substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental medium.

Source areas identified at the Abandoned Chemical Sales Facility (ACSF) site includes a sump which contains liquid and sediment, and subsurface soil adjacent to the sump, with site contaminant concentrations suggesting the presence of dense non-aqueous phase liquids. Specifically, PCE, TCE, toluene, and xylene were detected at concentrations of 170 ppm, 150 ppm, 240 ppm and 96 ppm respectively in a sediment sample collected from the sump. As shown on Figure 2, the sump is located in the central part of the 1600 Jay Street building. The sump is constructed of concrete and is approximately 1.5 feet in diameter and approximately 5.5 feet in depth (Figure 2 includes two images of the sump located in the 1600 Jay Street building). Subsurface soil collected from beneath the building's concrete slab and approximately two feet from the wall of the sump also contained high concentrations of PCE, TCE, toluene, xylene, and acetone. Unlike the sediment sample from the sump, the subsurface soil samples near the sump also contained a high concentration of cis-1,2-DCE (4.3 ppm to 56 ppm), a breakdown product of PCE and TCE, and a high concentration of acetone (25 ppm to 62 ppm).

The waste/source area associated with the building sump will be addressed in the remedy selection process.

Groundwater

As summarized in Table 1 below, a total of 72 groundwater samples were collected from a network of monitoring wells installed as part of the RI along with existing monitoring wells that were installed as part of investigation activities completed at the adjacent Valeo Former GM - Delco Chassis Facility site. During the RI, groundwater samples were collected from 37 monitoring wells during a November 2007 sampling event and from 25 wells during a September 2010 sampling event. Figure 3 illustrates the groundwater sampling results for the September 2010 sampling event and shows the approximate limits of groundwater contamination. The samples were collected to assess groundwater conditions on- and off-site from monitoring wells constructed with screened intervals within the shallow (less than approximately 30 feet below ground surface) and the intermediate (approximately 30 to 40 feet below ground surface) fractured bedrock.

As shown on Figure 3, the overall distribution of contaminants in groundwater is consistent with the groundwater flow patterns on and near the site. During both sampling events, the highest concentrations of site contaminants were detected in groundwater samples collected from the south-central side of the site and immediately off-site to the south. Cis-1,2-DCE was the site contaminant detected at the highest concentration, in off-site monitoring well MW-13 at concentrations of 110,000 ppb to 140,000 ppb. Monitoring well MW-13 is located along the south-side of Jay Street and in close proximity to the Jay Street underground sewer utility trench.

In addition to cis-1,2-DCE in groundwater, PCE and TCE, along with other breakdown products were detected at concentrations exceeding the groundwater SCGs. Consistent with the overall distribution of cis-1,2-DCE in groundwater, the highest concentrations of TCE and PCE and their degradation products, were detected in monitoring wells located near the south-central part of the site and in monitoring wells located immediately off-site to the south. The maximum concentrations of TCE (65,000 ppb) and PCE (6,700 ppb) were detected in off-site monitoring well MW-10, located south-southwest of the site and adjacent to the Jay Street sewer trench. As summarized in Table 1 below, vinyl chloride was detected in 19 of the 37 monitoring wells sampled at concentrations exceeding the groundwater SCG of 2 ppb. The highest vinyl chloride concentrations ranged from 18,000 ppb to 44,000 ppb and were detected in MW-3, MW-9 and MW-11 on Figure 3, located near the southern portion of the site.

While VOC contamination has migrated off-site to the south and southwest, the data suggests that this contamination is primarily restricted to the area around the Jay Street sewer and does not extend beyond a distance of approximately 300 feet downgradient of the site. As previously discussed (Section 3, Site Description and History), the Jay Street sewer influences groundwater flow and captures a significant amount of the groundwater contamination originating from the site. Site contaminants were not detected exceeding the SCGs in monitoring wells south of the site, downgradient of the Jay Street sewer (MW-14 and MW-15 on Figure 3). The highest concentration of cis-1,2-DCE detected was at 01.1 ppb in samples collected from wells MW-14 and MW-15. Similarly, site contaminants have migrated off-site to the west in groundwater onto the adjacent Valeo Former GM - Delco Chassis Facility property. However, the site contaminants are again primarily restricted to the area near the sewer and are not present in groundwater further to the south and west of the utility trench on Valeo Former GM - Delco Chassis Facility property.

Petroleum-based VOC contamination was also identified in groundwater at concentrations exceeding the respective SCGs in samples collected during the RI. Toluene and 1,2,4-trimethylbenzene, detected at maximum concentrations of 14,000 ppb and 2,600 ppb respectively, were the two petroleum VOC contaminants detected at the highest concentrations. The highest concentrations of toluene were detected in on-site monitoring well MW-11 located near the southwest corner of the site building and the highest 1,2,4-trimethylbenzene groundwater concentration was detected in on-site monitoring well MW-01 located near the north-side of the site building. As summarized in Table 1 below, other petroleum-based VOC contaminants, including benzene, ethylbenzene, and xylene, were detected in groundwater at concentrations exceeding SCGs. The presence of the petroleum-based contaminants in site groundwater is likely facilitating the degradation of TCE and PCE to cis-1,2-DCE and vinyl chloride and 1,1,1-TCA to 1,1-DCA and chloroethane.

In addition to VOC analysis, on-site groundwater was sampled and analyzed for SVOCs, PCBs, pesticides and inorganics/metals. Based on these analyses, no PCBs, SVOCs or metals, other than sodium, iron, and magnesium, were detected in site groundwater. These three metals detected in site groundwater occur naturally and are not associated with disposal at the site. Five pesticides were detected at concentrations exceeding the groundwater SCGs. Heptachlor, detected at concentrations ranging from 0.11 ppb to 1.1 ppb, was the only pesticide detected in each of the three on-site groundwater samples.

Table 1 – Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
VOCs			
1,1,1-Trichloroethane	ND–55,000	5	20 of 72
1,1-Dichloroethane	ND – 36,000	5	39 of 72
1,1-Dichloroethene	ND – 9,800	5	24 of 72
1,2,4-Trimethylbenzene	ND – 2,600	5	17 of 72
1,3,5-Trimethylbenzene	ND – 430	5	9 of 72
Benzene	ND – 1,600	1	29 of 72
Chloroethane	ND – 4,600	5	18 of 72
cis-1,2-Dichloroethene	ND – 140,000	5	40 of 72
Ethylbenzene	ND – 470	5	24 of 72
Tetrachloroethene	ND – 6,700	5	12 of 72
Toluene	ND – 14,000	5	34 of 72
Trichloroethene	ND – 65,000	5	18 of 72
Vinyl chloride	ND – 44,000	2	41 of 72
Xylene (Total)	ND – 1,400	5	28 of 72
Acetone	ND – 960	50	7 of 72
Pesticides			
Aldrin	ND – 0.55	ND	1/3
beta-BHC	ND – 0.37	0.04	2/3
gamma-BHC (Lindane)	ND – 0.057	0.05	1/3
Heptachlor	0.11 – 1.1	0.04	3/3
Heptachlor epoxide	ND – 0.32	0.03	1/3

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).

The primary groundwater contaminants at the site are PCE, TCE and 1,1,1-TCA along with their breakdown products and petroleum-based contaminants including benzene, toluene, ethylbenzene, xylene (BTEX) and

1,2,4-trimethylbenzene. The presence and overall distribution of the site contaminants in groundwater suggest that releases occurred at multiple site locations. Based on historic property use and data collected during the RI, the sources of the groundwater contamination appear to be associated with the sump located in the central part of the building, above ground storage tanks formerly operated north and south of the site building and possible chemical handling in the loading dock area adjacent to the east-side of the site building.

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 and 1,1,1-TCA along with their breakdown products and petroleum-based contaminants including benzene, toluene, ethylbenzene, xylene (BTEX) and 1,2,4-trimethylbenzene.

Soil

During the RI, a total of 73 subsurface soil samples were collected from depths ranging from two to eight feet below ground surface. The 73 subsurface soil samples were collected from 62 of the 67 soil borings installed adjacent to and beneath the site building and from four of the nine test pits excavated north of the site building to locate potential source areas, to delineate the overall extent of subsurface soil contamination, and to assess soil contaminant impacts to groundwater. The locations of the soil borings were based on a combination of past property uses and the results of a passive soil gas survey. The results are summarized in Table 2 below and indicate that soil at the site exceeds the protection of groundwater (PGW) SCOs for volatile organic compounds. The PGW SCOs are used for the primary site contaminants that are present in groundwater at concentrations exceeding the groundwater SCGs. The VOC concentrations ranged from non-detect to 240 ppm and were generally detected in five areas of the site at concentrations exceeding the PGW SCOs. The five areas are shown on Figure 4 and include the following locations:

1) Beneath the site building and adjacent to the sump,
2) The equipment storage yard located east of the central part of the site building,
3) Grassy area north of the site building,
4) West-side of the site building, and
5) Gravel surface storage area immediately north of the site building.

Table 2 - Soil

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted SCO[b] (ppm)	Frequency Exceeding Unrestricted SCO	Commercial Restricted Use SCO[c] (ppm)	Frequency Exceeding Commercial Restricted Use SCO
VOCs					
1,1-Dichloroethane	ND – 1.4	0.27	1 of 73	240	0 of 73
1,1-Dichloroethene	ND – 0.51	0.33	1 of 73	500	0 of 73
1,2-Dichlorobenzene	ND - 28	1.1	1 of 73	500	0 of 73
1,2,4-Trimethylbenzene	ND–57	3.6	3 of 73	190	0 of 73
1,3,5-Trimethylbenzene	ND–16	8.4	2 of 73	190	0 of 73

cis-1,2-Dichloroethene	ND–56	0.25	3 of 73	500	0 of 73
Acetone	ND–62	0.05	11 of 73	500	0 of 73
Ethylbenzene	ND–6.4	1	3 of 73	390	0 of 73
Tetrachloroethene	ND–170	1.3	2 of 73	150	1 of 73
Trichloroethene	ND–150	0.47	1 of 73	200	0 of 73
Toluene	ND–240	0.7	3 of 73	500	0 of 73
Total Xylenes	ND–96	0.26	7 of 73	500	0 of 73

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - Part 375-6.8(a), Unrestricted Soil Cleanup Objectives; and
c - Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use.
Note: With the exception of the SCO for Acetone, the Unrestricted SCOs for the site contaminants are the same as the SCOs for the Protection of Groundwater.

As shown on Figure 4, the highest concentrations of site contaminants were detected in subsurface soil samples collected from the area around the sump located in the central part of the 1600 Jay Street building. Specifically, toluene, acetone, and cis-1,2-DCE were detected at concentrations of 120 ppm, 62 ppm, and 56 ppm respectively from a subsurface soil sample (SS-6 on Figure 4) collected from the six to eight foot depth interval. These contaminants were also in a sediment sample collected from the nearby sump (see discussion on Waste/Source Areas). Although acetone was not detected in the sump, acetone was detected in three of the soil samples beneath the building at concentrations ranging from 5.5 ppm to 62 ppm, above the PGW SCO of 0.05 ppm, but well below the commercial restricted use SCO of 500 ppm. Site contaminants were not detected above the PGW SCOs in soil samples collected beneath the building west, east, and south of the sump. Two soil borings (SS-9 and SS-12) advanced north of the sump in a separate part of the 1600 Jay Street building also contained acetone at concentrations ranging from 5.5 ppm to 14 ppm. Unlike the samples adjacent to the sump, toluene and cis-1,2-DCE were not detected in the samples collected north of the sump. Based on the sampling beneath the building, it is estimated that a total of 170 cubic yards of soil adjacent to the sump exceed the PGW SCOs.

Tetrachloroethene and cis-1,2-DCE were detected at concentrations exceeding the PGW SCOs in soil samples collected from the grassy area north of the site building (SB-31) and from the west-side of the site building (SB-36) respectively. PCE was detected in soil from the three to four foot depth interval at a concentration of 5 ppm and cis-1,2-DCE was detected at a concentration of 0.85 ppm in soil collected from the six to seven foot depth interval. Based on soil samples from nearby locations, the PCE and cis-1,2-DCE contamination appears to be restricted to these two areas and represent a total of approximately 60 cubic yards of contaminated soil.

Subsurface soil samples immediately north of the site building contained petroleum-based contaminants including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethylbenzene, and mixed xylenes at concentrations exceeding the PGW SCOs. 1,2,4-trimethylbenzene was detected at the highest concentration (57 ppm). Subsurface soil samples collected from nearby locations suggest that the petroleum soil contamination is restricted to soil from the six foot to eight foot depth interval over an approximate 600 square foot area (approximately 45 cubic yards of contaminated soil).

No other VOCs were detected in subsurface soil samples collected during the RI at concentrations exceeding the PGW SCOs.

No SVOCs, pesticides, PCBs, or inorganics/metals were detected in on-site subsurface soil samples at concentrations exceeding the unrestricted use soil cleanup objectives, except for one location at which mercury was detected in a subsurface soil sample collected from the three to five depth interval at a concentration of 0.22 ppm and marginally above the unrestricted SCO of 0.18 ppm. The mercury detection was from a soil sample collected near the southwest corner of the site, adjacent to the railroad and Jay Street, and is not likely to be associated with disposal at the site.

Based on the findings of the RI, the past disposal of hazardous waste has resulted in the contamination of subsurface 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 PCE and TCE along with PCE and TCE breakdown products and petroleum-based contaminants including benzene, toluene, ethylbenzene, xylene (BTEX), acetone, and trimethylbenzenes.

Soil Vapor

The evaluation of the potential for soil vapor intrusion (SVI) resulting from the presence of site related soil and or groundwater contamination was evaluated by the sampling of subslab soil vapor beneath structures, indoor air within structures, and ambient outdoor air. Due to the presence of buildings in the impacted area, subslab and indoor air samples were collected to evaluate whether actions are needed to address exposure related to soil vapor intrusion.

During the RI, SVI sampling was completed at one on-site structure and eleven off-site structures in the vicinity of the dissolved phase groundwater plume (Figure 5) during three separate sampling events. Initial SVI samples were collected at eleven locations in March 2007 and follow-up SVI sampling was completed at seven locations in March 2008 and three locations in March 2009. The SVI sampling included the collection of subslab soil vapor, indoor air, and outdoor air samples to evaluate whether actions are needed to address exposure related to soil vapor intrusion. Soil vapor intrusion refers to the process by which volatile chemicals move from a subsurface source into the indoor air of overlying buildings. The approximate SVI sampling locations are shown on Figure 5.

The following summarizes the evaluation of the SVI samples relative to soil and groundwater sampling results and Soil Vapor/Indoor Air Matrix 1 and Matrix 2 included in the NYSDOH SVI guidance:

- Mitigation was recommended at the one on-site building due to the presence of PCE, TCE, cis-1,2-DCE, 1,1,1-TCA, and vinyl chloride at elevated concentrations in subslab and indoor air samples. Following the soil vapor intrusion sampling, the NYSDOH recommended in letters (July 26, 2007 and July 28, 2010) to the site owner that a subslab depressurization system be installed to address the migration of vapors into the site building.
- Monitoring was recommended at three residential properties to evaluate whether concentrations change over time and determine if actions were needed to address exposure. Soil vapor intrusion monitoring is on-going at two of these properties.
- No Further Action was considered appropriate at eight of the twelve properties. At these locations, site contaminants were detected at low concentrations in indoor air and subslab vapor samples. Repeat sampling at these locations confirmed that no further action was appropriate.

Other VOCs were detected in the soil vapor intrusion samples mainly included petroleum and refrigerant compounds and the presence and concentrations of these compounds is consistent with typical background levels of these VOCs in indoor and outdoor air.

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, PCE, TCE, and 1,1,1-TCA along with their breakdown products.

Exhibit B

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 objectives for this site are:

Public Health Protection

Groundwater

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

Soil

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

Soil Vapor

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

Environmental Protection

Groundwater

- Restore the groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of groundwater contamination.

Soil

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

Exhibit C

Description of Remedial Alternatives

The following alternatives were considered based on the remedial action objectives (see Exhibit B) to address the contaminated media identified at the site as described in Exhibit A. Due to the site conditions and the overall nature and extent of contamination, the alternatives are separated into alternatives that address contaminants present in soil and alternatives that address contaminants present in groundwater. Five soil alternatives are discussed below, followed by five groundwater alternatives, and one combined soil and groundwater alternative to achieve restoration to pre-disposal conditions. Exhibit E (Summary of the Proposed Remedy) provides a summary of the preferred soil alternative that when combined with the preferred groundwater alternative most effectively eliminates or mitigates significant threats to public health and the environment and achieves SCGs.

With the exception of the No Action Alternatives, the following common elements would be included as part of the final site remedy:

- Excavation and off-site disposal of contaminated soil from two localized areas north of the site building and one area immediately west of the site building. In total, approximately 105 cubic yards of soil would be excavated from these three areas. In each of the excavation areas, contamination extends to the top of bedrock and would require the excavation of soil to bedrock, a depth of approximately eight feet below ground surface. Following removal of the contaminated soil, the excavations would be backfilled with material which meets the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d). Prior to placement into the excavations, a fabric would be placed in the excavations to serve as a demarcation between soil left in place and the material used as backfill;
- Long-term groundwater quality monitoring program;
- An environmental easement to restrict the use of groundwater at the site and limit use and development of the property to commercial use (and would allow industrial use) consistent with current zoning;
- Following site remediation, the potential for soil vapor intrusion into the site building would be re-evaluated, and if necessary, actions recommended to address exposures related to soil vapor intrusion would be implemented;
- Implementation of an off-site soil vapor intrusion monitoring program, and if necessary, installation of mitigation systems;
- A provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion; and
- Periodic reviews to evaluate the proposed remedy and certify that the remedial measures remain in-place.

Soil Alternative 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative leaves the site in its present condition and does not provide any additional protection to public health and the environment.

Present Worth: *$0*
Capital Cost: *$0*
Annual Costs: *$0*

Soil Alternative 2: Excavation and Off-Site Disposal

Alternative 2 is a conventional remedial method. Under this alternative, contaminated soil would be excavated from the sump area beneath the site building and disposed of off-site at a permitted facility. A total of 170 cubic yards (yd^3) would be excavated from an approximate 19 foot by 22 foot source area beneath the building in the area of the sump. Figure 6 shows the approximate location of the excavation area adjacent to the building sump. In the excavation area, contamination extends to the top of bedrock and would require the excavation of soil to a depth of approximately eight (8) feet below the building's concrete slab. Following removal of the contaminated soil, the excavation would be backfilled with clean fill from an approved source. Prior to placement into the excavations, a fabric would be placed in the excavations to serve as a demarcation between soil left in place and the material used as backfill. As part of the site restoration the sump would not be replaced under Soil Alternative 2 (Excavation and Off-Site Disposal).

The components of Alternative 2 are readily implementable and reliable. It is expected that it would take approximately two (2) months to design and to implement this alternative. Costs are based on removal and disposal of the concrete slab within the building, soil excavation, backfilling of the excavation, and the collection of confirmation soil samples.

Present Worth: *$199,000*
Capital Cost: *$199,000*
Annual Costs: *$0*

Soil Alternative 3: Soil Vapor Extraction

Soil Alternative 3 involves the installation and operation of a soil vapor extraction (SVE) system to reduce contaminant concentrations in the approximate 19 foot by 22 foot sump source area beneath the site building. The SVE wells apply a vacuum to the subsurface that causes contaminated vapors to migrate toward the extraction wells. Vapors extracted from the ground will be treated with activated carbon prior to discharge to the atmosphere. This alternative assumes that the SVE system would require operation, monitoring and maintenance for an estimated 1 to 2 years, and that groundwater monitoring would occur for 30 years to evaluate the effectiveness of the system.

SVE will protect human health and the environment by removing the contaminant mass from the vadose zone soil beneath the site building. Removal of the contaminant mass will further reduce contamination of groundwater at and downgradient of the site. Costs are based on completing a pre-design investigation, installation and operation of the SVE system and long-term groundwater quality monitoring.

Present Worth: *$384,000*
Capital Cost: *$278,000*
Annual Costs: *$21,000*

Soil Alternative 4: *In-Situ* Thermal Treatment

In-situ thermal treatment of the soil will be conducted using electrical resistance heating. Electrical resistance heating uses electricity applied to electrodes installed underground to create a current flow to heat the soil. Heating of the soil causes the contaminants to volatilize from the soil and a series of recovery wells will be used to collect the vapors for further treatment.

This alternative would include the implementation of in-situ electrical resistance heating to address contamination in the approximate 19 foot by 22 foot sump source area beneath the site building. Implementation of this alternative would consist of the installation of approximately seven electrodes located throughout the source area on approximate nine foot spacing. Each electrode would also be paired with one vapor recovery extraction well for the capture and subsequent treatment of vapor.

Soil Alternative 4 provides protection to human health and the environment by removing the contaminant mass beneath the site building. Removal of the contaminant mass will further reduce contamination of groundwater at and downgradient of the site. Costs are based on completing a pre-design investigation, installation and operation of the thermal treatment system, and long-term groundwater quality monitoring. It is expected that this alternative would require approximately one to two months for construction and four months for remediation.

Present Worth: *$916,000*
Capital Cost: *$916,000*
Annual Costs: *$0*

Soil Alternative 5: *Ex-Situ* Chemical Reduction/Oxidation

Similar to Soil Alternative 2, this alternative would involve the excavation of approximately 170 cubic yards (yd^3) of contaminated soil from an approximate 19 foot by 22 foot area beneath the building. Under this alternative however, once the soil is excavated, chemical reduction/oxidation will be used to destroy the site contaminants in the excavated soil. This treatment would be conducted on-site in a temporary enclosure. The chemical reduction/oxidation product is mixed into the soil using tilling equipment. A remedial design and bench scale pilot test would be used to define the specific materials and equipment to achieve the remediation goals. As with Soil Alternative 2, following removal of the contaminated soil, the excavation would be backfilled with clean fill from an approved source. Prior to placement into the excavations, a fabric would be placed in the excavation to serve as a demarcation between soil left in place and the material used as backfill.

Soil Alternative 5 provides protection to human health and the environment by removing the contaminant mass beneath the site building. Removal of the contaminant mass will further reduce contamination of groundwater at and downgradient of the site. Costs are based on completing a pre-design investigation, removal and disposal of the concrete slab within the building, soil excavation, backfilling of the excavation, on-site treatment, and long-term groundwater quality monitoring. This alternative requires approximately four months for implementation and remediation.

Present Worth: *$414,000*
Capital Cost: *$414,000*
Annual Costs: *$0*

Groundwater Alternative 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative leaves the site in its present condition and does not provide any additional protection to public health and the environment.

Present Worth: *$0*
Capital Cost: *$0*
Annual Costs: *$0*

Groundwater Alternative 2: *In-Situ* Thermal Treatment

Under this alternative, *In-situ* thermal treatment of the groundwater would be conducted using electrical resistance heating. Electrical resistance heating relies on electricity that is applied to electrodes installed underground to create a current flow to heat the groundwater to cause the contaminants to volatilize from the groundwater. Implementation of this alternative would consist of the installation of approximately 38 electrodes located on-site in the area where the groundwater contaminant concentrations are the highest. The electrodes would be installed approximately 19.5 feet apart. Each electrode would also be paired with one vapor recovery extraction well. Following recovery, the vapors would require further treatment.

It is expected that it would take approximately four months to design and implement the remedy and approximately four months for remediation. Costs are based on completing a pre-design investigation, installation and operation of the thermal treatment system, and long-term groundwater quality monitoring.

Present Worth: *$3,199,000*
Capital Cost: *$3,060,000*
Annual Costs: *$21,000*

Groundwater Alternative 3: Monitored Natural Attenuation

Monitored natural attenuation consists of monitoring on-site and off-site groundwater for site contaminants to ensure the contamination footprint and contaminant concentrations are stable or decreasing. This alternative includes long-term groundwater monitoring for site contaminants and natural attenuation parameters. Under Groundwater Alternative 3, two additional monitoring wells would be installed. Groundwater samples would be collected for laboratory analysis on a semiannual basis from a total of 12 monitoring wells.

This alternative requires approximately one month for implementation for well installation and collection of baseline samples and approximately 30 years for remediation based on current natural reductive dechlorination.

Present Worth: *$263,000*
Capital Cost: *$42,000*
Annual Costs: *$12,100*

Groundwater Alternative 4: *In-Situ* Chemical Oxidation (ISCO) with Enhanced Anaerobic Bioremediation

To remediate the groundwater on site as part of Groundwater Alternative 4, an in-situ chemical oxidizer (ISCO) would be introduced into the groundwater to chemically break down the site contaminants. A variety of chemical oxidants and application techniques are commercially available. To define the specific materials and equipment appropriate for the site, a pre-design investigation and bench scale pilot test would be completed under this alternative.

Under Groundwater Alternative 4, ISCO would be applied to the groundwater downgradient of the source area during three separate events to reduce the dissolved-phase contaminant concentrations. The ISCO would be introduced into a subsurface treatment zone that extends from approximately 12 feet to 39 feet beneath the ground surface through 20 injection wells spaced approximately 25 feet apart. The ISCO would be applied once the source areas have been addressed. If the source areas are not addressed, the need for additional ISCO applications is increased to treat the dissolved mass of contaminants that would continue to migrate from the source.

To supplement the addition of the chemical oxidizer, enhanced anaerobic bioremediation would be used to treat residual groundwater contamination or possible contaminant rebound. Enhanced anaerobic bioremediation works by providing an electron donor (hydrogen) to the groundwater system. This leads to an increase in reductive dechlorination by increasing the population of microorganisms within the contamination zone that perform anaerobic bioremediation.

As with Alternative 2, the components of Alternative 4 are readily implementable technologies. Costs are based on design of the injection program, purchase and injection of the ISCO material and the enhanced anaerobic bioremediation material, and long-term groundwater quality and soil vapor monitoring. It is expected that it would take approximately six months to design and implement the remedy and approximately one year to remediate the majority of the contamination.

Present Worth:..$1,030,000
Capital Cost:..$646,000
Annual Costs:...$21,000

Groundwater Alternative 5: *In-Situ* Bioremediation Treatment Zone

Alternative 5 consists of an in-situ bioremediation treatment zone to reduce contaminant concentrations within groundwater prior to off-site discharge. Bioremediation utilizes microorganisms to break down site contaminants. When microbes completely digest these chemicals under the optimum temperature, nutrients and oxygen, the contaminants are changed into water and harmless gases such as carbon dioxide.

Groundwater Alternative 5 relies on the injection of a biological amendment into an approximate 350 foot long treatment zone located near the south-site of the site. Prior to injection, the shallow bedrock would be fractured via pneumatic fracturing to ensure adequate introduction of the amendment into the treatment zone. The amendments used for in-situ enhanced bioremedation are typically long-lasting and migrate with groundwater flow, and therefore are expected to migrate with groundwater off-site and continue to provide groundwater treatment.

The in-situ bioremediation treatment zone would treat the plume as the contaminated groundwater flows through the treatment area. Long-term groundwater monitoring within the treatment zone and downgradient of the site would be conducted for up to 30 years. It is expected that it would take approximately one year to design and implement the remedy. Costs are based on completing a pre-design investigation, purchase and injection of the biological amendments, pneumatic fracturing of the bedrock, and long-term groundwater quality monitoring.

Present Worth: *$1,840,000*
Capital Cost: *$1,460,000*
Annual Costs: *$21,000*

Soil and Groundwater Alternative 1: Restoration to Pre-Disposal Conditions Alternative - Excavation and Off-Site Disposal of Soil combined with *In-Situ* Chemical Oxidation for Groundwater

This alternative achieves each of the SCGs discussed in Section 6.1.1 and Exhibit A within the property boundaries. This alternative meets the unrestricted soil cleanup objectives listed in Part 375-6.8 (a). This alternative would include excavation and off-site disposal of soil at the source areas combined with *in-situ* chemical oxidation enhanced anaerobic bioremediation for groundwater on site.

This alternative was developed to restore the Abandoned Chemical Sales Facility site soil and groundwater to pre-disposal conditions. To achieve pre-disposal conditions at the site, this alternative would rely on excavation and off-site disposal to remove site contaminants in soil at concentrations that exceed the unrestricted SCGs. In addition to source removal, this alternative would include the introduction of an in-situ chemical oxidizer (ISCO) to the shallow and intermediate bedrock groundwater to chemically break down the site contaminants.

The restoration to pre-disposal alternative would include the excavation and off-site disposal of approximately 475 yd^3 of soil at the site where contamination was identified at concentrations exceeding the unrestricted SCGs. Specifically, the restoration to pre-disposal alternative would include the excavation of approximately 475 yd^3 from the five areas shown on Figure 4. Specifically, excavation of contaminated soil would occur beneath the building in the area of the sump, from two localized areas north of the site building and one area immediately west of the site building and from the area of the storage yard/loading dock east of the site building. In each of the excavation areas, contamination extends to the top of bedrock and would require the excavation of soil to a depth of approximately eight feet below ground surface. Following removal of the approximate 475 yd^3 of soil, the excavations would be backfilled with clean fill from an approved source.

For the on-site VOC contamination in groundwater, restoration to pre-disposal alternative would rely on in-situ chemical oxidation to achieve the groundwater remedial action objectives. The ISCO would be injected during twelve separate events through 148 injection wells spaced approximately 25 feet apart. The ISCO would be introduced into a subsurface treatment zone that extends from approximately 12 feet to 39 feet beneath the ground surface. The ISCO injections would be completed in an approximate 380 foot by 240 foot area where contaminants are present in site groundwater.

The components of the restoration to pre-disposal alternative are readily implementable and reliable technologies. Costs are based on removal and disposal of the concrete slab within the building, soil excavation, backfilling of the excavations, design of the in-situ chemical oxidation program, and the purchase and injection of the ISCO material. It is expected that it would take approximately twelve months to design and fully implement the restoration to pre-disposal remedy.

Present Worth: *$8,800,000*
Capital Cost: *$8,800,000*

Exhibit D

Remedial Alternative Costs

	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
Common Remedial Elements	153,000	8,800	314,000

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
SOIL ALTERNATIVES			
Soil Alternative 1: No Action	0	0	0
Soil Alternative 2: Excavation and Off-Site Disposal	199,000	0	199,000
Soil Alternative 3: Soil Vapor Extraction	278,000	21,000	384,000
Soil Alternative 4: In-Situ Thermal Treatment	916,000	0	916,000
Soil Alternative 5: Ex-Situ Chemical Reduction/Oxidation	414,000	0	414,000
GROUNDWATER ALTERNATIVES			
Groundwater Alternative 1: No Action	0	0	0
Groundwater Alternative 2: In-Situ Thermal Treatment	3,060,000	Years (0-3): 38,000 Years (3-5): 19,000	3,199,000
Groundwater Alternative 3: Monitored Natural Attenuation	42,000	Years (0-3): 22,000 Years (3-30): 11,000	263,000
Groundwater Alternative 4: In-Situ Chemical Oxidation Followed by Enhanced Anaerobic Bioremediation	646,000	Years (0-3): 38,000 Years (3-30): 19,000	1,030,000
Groundwater Alternative 5: In-Situ Bioremediation Treatment Zone	1,460,000	Years (0-3): 38,000 Years (3-30): 19,000	1,840,000
Soil and Groundwater Alternative 1: Restoration to Pre-Disposal Conditions Alternative - Excavation and Off-Site Disposal of Soil Combined with In-Situ Chemical Oxidation for Groundwater	8,800,000	0	8,800,000

Proposed Remedy*	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
Soil Alternative 2 combined with Groundwater Alternative 4 and Common Remedial Elements	998,000	Years (0-3): 38,000 Years (3-30): 19,000	1,543,000

*Proposed Remedy costs include common remedial elements.

Exhibit E

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing the following remedy for the site:

1) Soil Alternative 2: Excavation and Off-Site Disposal,
2) Groundwater Alternative 4: *In-Situ* Chemical Oxidation with Enhanced Anaerobic Bioremediation, and
3) The common elements listed in Exhibit C (Description of Remedial Alternatives).

The elements of this remedy are described in Section 7.2. The proposed remedy is depicted in Figure 6.

Basis for Selection

The proposed remedy is based on the results of the RI and the evaluation of alternatives.

Soil Alternative 2 (Excavation and Off-Site Disposal) combined with Groundwater Alternative 4 (*In-Situ* Chemical Oxidation Followed by Enhanced Anaerobic Bioremediation) is being proposed because, as described below, it satisfies the threshold criteria and provides the best application of the balancing criterion described in Section 7.1 (Evaluation of Remedial Alternatives). It will achieve the remediation goals for the site by removing the contaminated soil from four known source areas and disposing of the soil at an approved off-site facility, treating the groundwater with the highest contaminant concentrations on site, and significantly reducing off-site migration of the site contaminants in both groundwater and soil vapor. This alternative is as effective as restoration to pre-disposal conditions, yet will be implemented at a considerably lower cost. The restoration to pre-disposal conditions alternative was not selected because of the high cost to implement.

Alternative 1 (No Action) for both soil and groundwater does not provide any protection to public health and the environment and will not be evaluated further. For soil and groundwater, Alternatives 2, 3, 4, and 5, meet the threshold criteria by removing or treating contaminated soil and groundwater. Because each of these alternatives for both soil and groundwater satisfy the threshold criteria, the remaining criteria are particularly important in selecting a final remedy for the site.

Although each of the Soil Alternatives will meet the SCGs, Soil Alternative 2 (Excavation and Off-Site Disposal) achieves the SCGs the quickest since this option involves the direct removal of the contaminated soil from the site. Similarly, the Groundwater Alternatives will each meet the SCGs. However, Alternatives 2 (In-Situ Thermal Treatment) and 4 (*In-Situ* Chemical Oxidation Followed by Enhanced Anaerobic Bioremediation) would achieve SCGs the quickest since they both involve rapid destruction of site contaminants by thermal and chemical techniques respectively. Since Groundwater Alternative 3 (Monitored Natural Attenuation) relies solely on the natural reduction of site contaminants, it is not expected that this alternative would achieve the NYS Class GA Groundwater Standards in the foreseeable future.

Since each of the Soil and Groundwater alternatives include established technologies that are commonly applied during cleanup programs, possible short-term impacts on the community, workers, and the environment can easily be controlled during the implementation of the alternatives. Each of the Soil and Groundwater alternatives would be implemented on the 1600 Jay Street parcel and would not have significant short-term community impacts. With the excavation and transportation off-site of source area soils, Soil Alternative 2 (Excavation and Off-Site Disposal) presents the greatest potential short-term risk to the nearby community. Potential short-term adverse impacts and risks associated with Soil Alternative 2 however, can be controlled with the use of appropriate engineering controls and the preparation of and adherence to a comprehensive construction work plan and health and safety plan.

As previously mentioned, Soil Alternative 2 (Excavation and Off-Site Disposal) will require the shortest amount of time to achieve the soil SCGs since the contaminated soil is being removed from the site. Soil Alternatives 3, 4, and 5 will require approximately six months to two years to meet the soil SCGs. With destruction of the site contaminants, Groundwater Alternatives 2 (In-Situ Thermal Treatment) and 4 (*In-Situ* Chemical Oxidation Followed by Enhanced Anaerobic Bioremediation) would achieve the SCGs more rapidly than Groundwater Alternatives 3 (MNA) and 5 (In-Site Bioremediation). With the site contaminants being present in fractured bedrock however, it is not anticipated that the groundwater alternatives will achieve the NYS Class GA groundwater standards in the foreseeable future.

Achieving long-term effectiveness is best accomplished by excavation and removal of the contaminated overburden soil. As previously mentioned, excavation and off-site disposal from three of the source areas (source areas outside of building footprint) is a common component of Soil Alternatives 2 through 5. Only Soil Alternatives 2 (Excavation and Off-Site Disposal) and 5 (Ex-Situ Chemical Reduction/Oxidation) additionally include the excavation and removal of a source area located beneath the site building. Soil Alternatives 3 and 4 rely on treatment of the source area in-place and may not be as effective as source removal over the long-term. With the exception of Groundwater Alternative 3 (Monitored Natural Attenuation), each of the Groundwater Alternatives provides long-term effectiveness by treating groundwater with high concentrations of the site contaminants. With Groundwater Alternatives (4 and 5), there is the potential for incomplete treatment of the contaminants within a fractured bedrock matrix. Although the long-term effectiveness of the injection of ISCO (Groundwater Alternative 4) is highly dependent on contact with the site contaminants, this alternative also includes follow-up bioremediation injections to address residual groundwater contamination. Through thermal destruction, Groundwater Alternative 2 (In-Situ Thermal Treatment) is more effective and permanent than Groundwater Alternatives 3 through 5.

Soil Alternatives 2 and 5 will significantly reduce the toxicity, mobility, and volume of on-site waste by transferring the material to an approved off-site location where it will be treated (Soil Alternative 2) or by treating the soil at the surface on-site (Soil Alternative 5). Soil Alternative 4 will permanently reduce the toxicity, mobility and volume of contaminants through the use of in-situ remediation of the soil source area. Soil Alternative 3 (SVE) would reduce the toxicity and mobility of the contaminants in the subsurface, however, the extracted vapors would be treated through activated carbon which would require additional treatment and/or disposal which may not reduce the overall volume of contaminants. With the exception of Groundwater Alternative 3 (MNA) each of the Groundwater Alternatives relies on in-situ remedial approaches to permanently reduce the toxicity, mobility, and volume of site contaminants. Groundwater Alternative 2 (In-Situ Thermal Treatment) reduces contaminant toxicity and volume by using heat to destroy COCs. Alternative 4 (In-Situ Chemical Oxidation followed by Enhanced Biodegradation) reduces toxicity and volume but mobility of residuals may be increased.

Each of the Soil and Groundwater alternatives involve technologies that have been applied by the Department and are implementable. Soil Alternative 5 (Ex-Situ Chemical Reduction/Oxidation) requires a large on-site area to treat the soil, thus leaving a portion of the site unusable for several months. Groundwater Alternative 3 (MNA) is the easiest groundwater alternative to implement since it would only require long-term monitoring. Groundwater Alternatives 2, 4, and 5 each present challenges due to the large number of electrodes and/or injection points in fractured bedrock and on a developed parcel, but each of the options can be implemented at the site. Prior to implementation, Groundwater Alternatives 4 and 5 will require bench scale and pilot testing to define the remedial details and to evaluate overall effectiveness.

Soil Alternative 2 (Excavation and Off-Site Disposal) has the lowest overall cost, is the easiest soil alternative to implement, and it provides equal protection to human health and the environment when compared to the other alternatives. Soil Alternative 3 (SVE) has annual operation and maintenance costs for approximately three years after implementation and is more expensive than Alternative 2 (Excavation and Off-Site Disposal). The use of thermal technologies under Soil Alternative 4 is the most expensive soil treatment option. Since Soil Alternative 5 requires soil treatment in addition to the excavation components of Alternative 2 this alternative is more expensive than Alternative 2. With no active remedial action to address groundwater contamination, Groundwater Alternative 3 has the lowest cost and is the easiest option to implement. The high installation and energy costs associated with Groundwater Alternative 2 (In-Situ Thermal Treatment) and the high bioamendment product costs associated with Groundwater Alternative 5 (In-Situ Bioremediation) make these two alternatives more expensive than Groundwater Alternative 4 (In-Situ Chemical Oxidation followed by Enhanced Biodegradation).

Groundwater Alternative 3 (Monitored Natural Attenuation) is the least costly alternative to implement but it would not actively reduce the VOC contamination in groundwater and would allow the groundwater plume to continue to migrate off-site onto the Valeo property and into the Jay Street sewer. The Restoration to Pre-Disposal Condition Alternative has the highest total present worth ($8,800,000). The remaining six soil and groundwater alternatives include remedial approaches focusing on addressing VOC contamination in the area where the concentrations are the highest. Of these alternatives for both soil and groundwater, the options (Soil Alternative 4 and Groundwater Alternative 2) involve the use of thermal treatments and have the highest total cost. The total present worth estimates for Soil Alternatives 2, 3, and 5 are moderately close, ranging from $199,000 to $414,000. Similarly, the total present worth estimates for Groundwater Alternatives 4, and 5 are moderately close, ranging from $1,030,000 to $1,840,000. Relative to these three soil alternatives and two groundwater alternatives, the combination of Soil Alternative 2 (Excavation and Off-Site Disposal) and Groundwater Alternative (Alternative 4) has the lowest total present worth.

Each of the alternatives considered achieves the commercial use cleanup objectives for the site contaminants which are entirely consistent with the current and future use of the site.

Based on the evaluation of both soil and groundwater cleanup alternatives, the combination of Soil Alternative 2 (Excavation and Off-Site Disposal) combined with Groundwater Alternative 4 (In-Situ Chemical Oxidation followed by Enhanced Biodegradation) is the preferred remedy for the site. This combination of alternatives can be readily implemented with minimal disturbances to the surrounding City of Rochester community and eliminates soil and groundwater containing the highest concentrations of site contaminants. The use of enhanced biodegradation following source removal and ISCO treatment will effectively address residual contamination in site groundwater. With removal of the source material and treatment of residual VOC contamination under this combination of alternatives, the off-site migration of VOC contamination will be significantly reduced over the long-term.

The following table summarizes how the combination of Soil Alternative 2 (Excavation and Off-Site Disposal) and Groundwater Alternative 4 (ISCO Injection with Enhanced Anaerobic Bioremediation) along with the common remedial elements will achieve the remediation objectives outlined in Exhibit B (Summary of the Remediation Objectives).

Remedial Objectives for Protection of Public Health	**Remedial Actions for Protection of Public Health**
1) Prevent people from drinking groundwater with contaminant levels exceeding drinking water standards	- Achieved by excavating source areas and treating groundwater with ISCO and biological amendments. - Environmental easement restricting the use of groundwater at the site. - Public water is provided in the area near the site.
2) Prevent contact, or inhalation of volatiles, from contaminated groundwater	- Achieved by excavating source areas and treating groundwater with ISCO and biological amendments. - Development of a Site Management Plan. - Re-evaluation of on-site SVI following remedy implementation.
3) Prevent ingestion/direct contact with contaminated soil	- Achieved by excavating source areas. - Development of a Site Management Plan.
4) Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil	- Achieved by excavating source areas, treating groundwater with ISCO and biological amendments, and provisions for subslab construction that allows for installation of mitigation systems for on-site structures. - Re-evaluation of on-site SVI following remedy implementation. - Soil vapor intrusion monitoring at off-site buildings.
5) Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into the indoor air of buildings at or near a site	- Achieved by excavating source areas, treating groundwater with ISCO and biological amendments, and provisions for subslab construction that allows for installation of mitigation systems for on-site structures. - SVI sampling at off-site properties has shown no need for mitigation systems to address exposures related to SVI.
Remedial Objectives for Environmental Protection	**Remedial Actions for Environmental Protection**
1) Restore the groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable	- Achieved by excavating source areas and treating groundwater with ISCO and biological amendments. - A site management plan that includes long-term monitoring of groundwater.
2) Remove the source of groundwater contamination	- Achieved by excavating source areas.
3) Prevent migration of contaminants that would result in groundwater contamination	- Achieved by excavating source areas and groundwater treatment in the contaminated plume area to eliminate migration to the Jay Street sewer utility.


FIGURE 1
Site Location Map
Abandoned Chem Sales Site
Lyell Ave.
Dodge St.
Mount Read Blvd.
105 Dodge Street Parcel
Valeo Former GM - Delco Chassis Facility
Site #: 828099
Jay St.
Abandoned Chem Sales Site
Site #: 828105
1600 Jay Street
I-490
N
0 175 350 700 1,050 1,400
Feet
Map Details
Created in ArcGIS 9.3
Created by J. Pelton
Date of Last Revision: 1/13/2011
UNAUTHORIZED DUPLICATION
IS A VIOLATION OF APPLICABLE LAWS

FIGURE 2
Site Features & May 2009 Groundwater Contours

New York State
Department of Environmental Conservation

Division of Environmental Remediation

Map Details

Created in ArcGIS 9.3

Created by J. Pelton

Date of Last Revision: 1/26/2011

ACSF Site
Site # 828105

Monroe County
City of Rochester

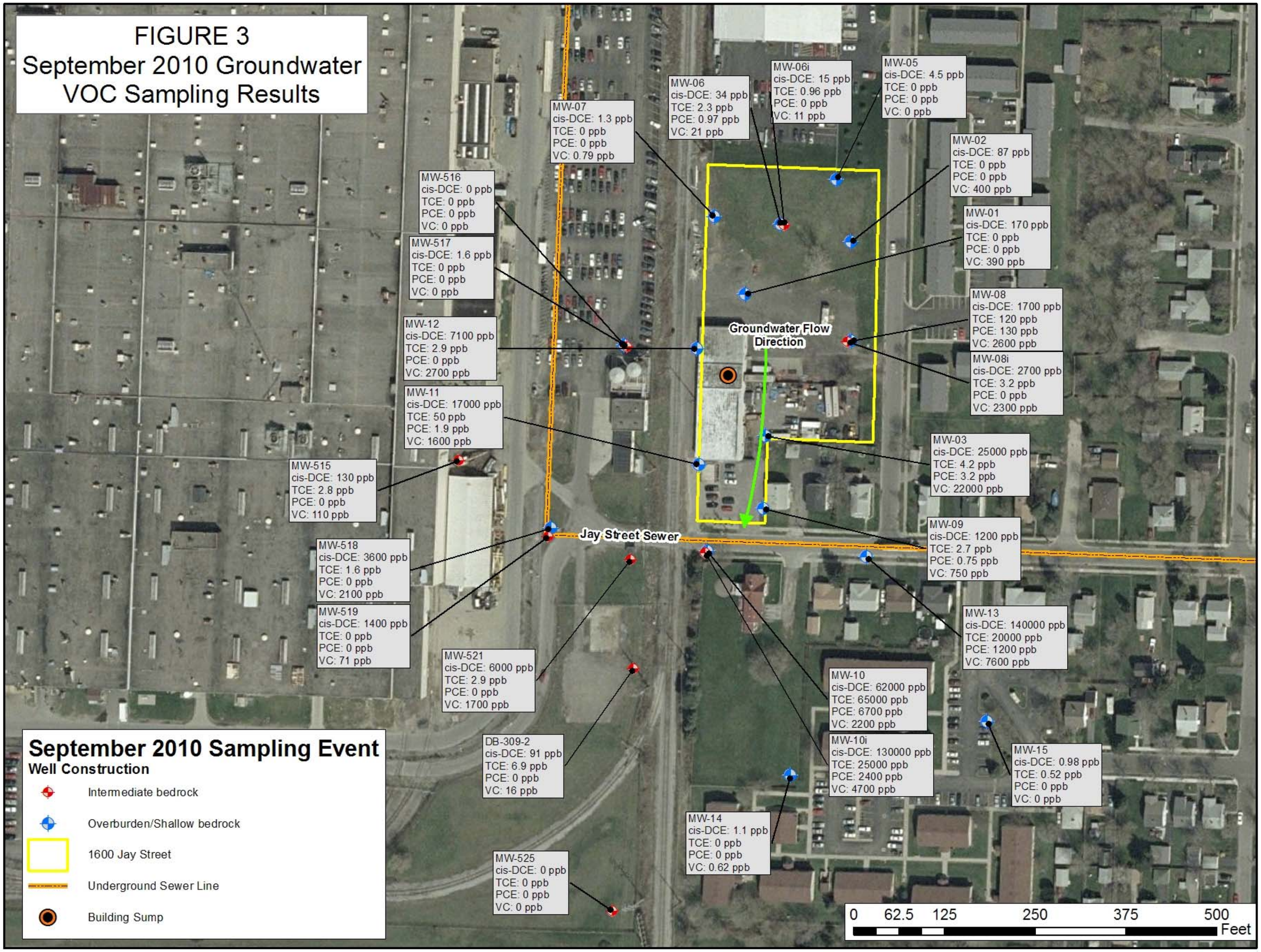
DEC Contacts:
J. Pelton

DOH Contact:
M. Doroski

Spring 2002
Aerial Photography

N W E S

North American Datum 1983
UTM Zone 18N



New York State
Department of Environmental Conservation

Division of Environmental Remediation

Map Details

Created in ArcGIS 9.3

Created by J. Pelton

Date of Last Revision: 1/26/2011

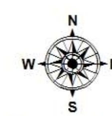
ACSF Site
Site # 828105

Monroe County
City of Rochester

DEC Contacts:
J. Pelton

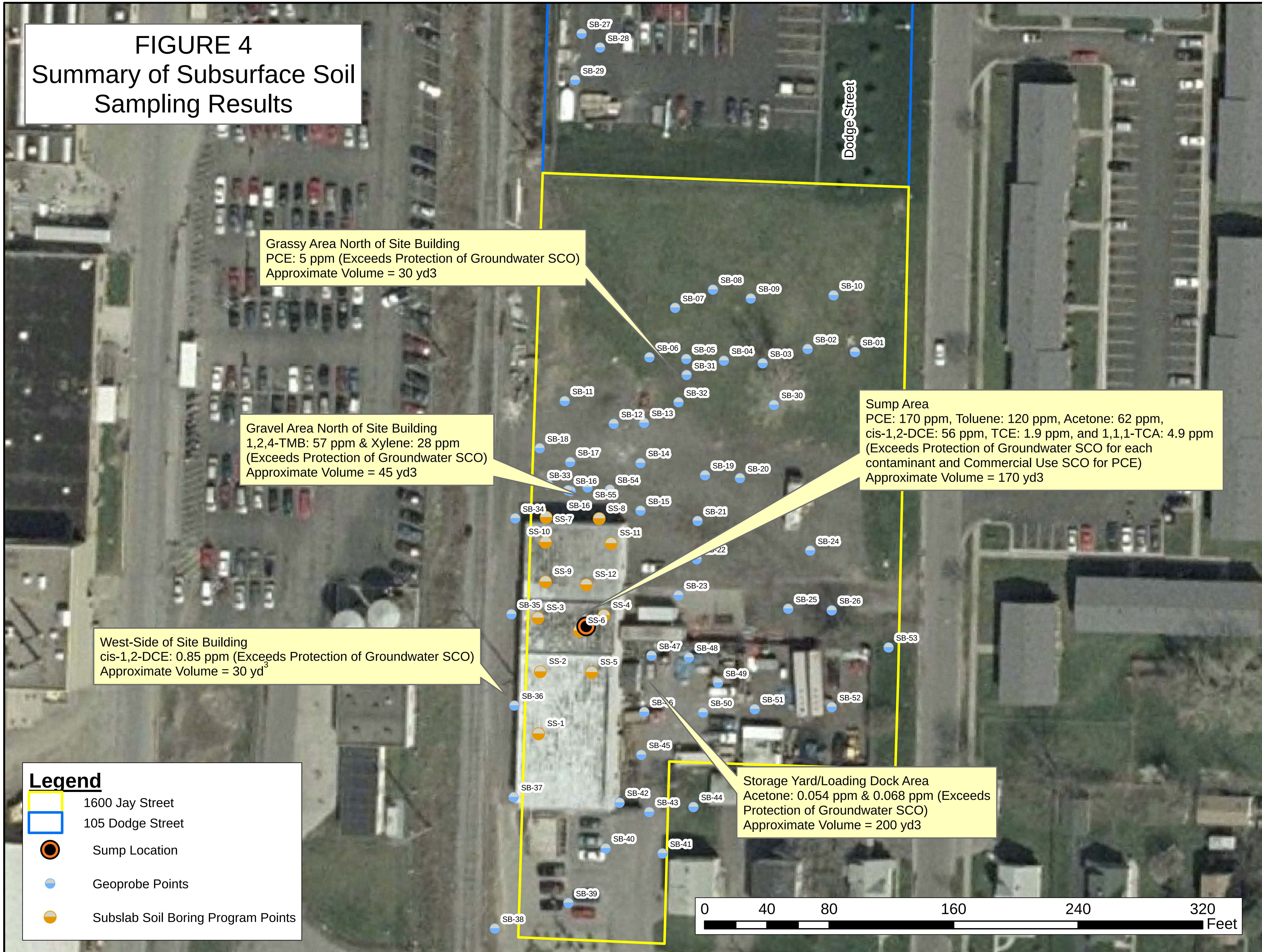
DOH Contact:
M. Doroski

Spring 2002
Aerial Photography



North American Datum 1983
UTM Zone 18N

FIGURE 4
Summary of Subsurface Soil Sampling Results



New York State
Department of Environmental Conservation

Division of Environmental Remediation

Map Details

Created in ArcGIS 9.2

Created by J. Pelton

Date of Last Revision: 1/26/2011

ACSF Site
Site # 828105

Monroe County
City of Rochester

DEC Contact:
J. Pelton

DOH Contact:
M. Doroski

Spring 2002
Aerial Photography

N W E S

North American Datum 1983
UTM Zone 18N

FIGURE 5
Vapor Intrusion Sample Location Map

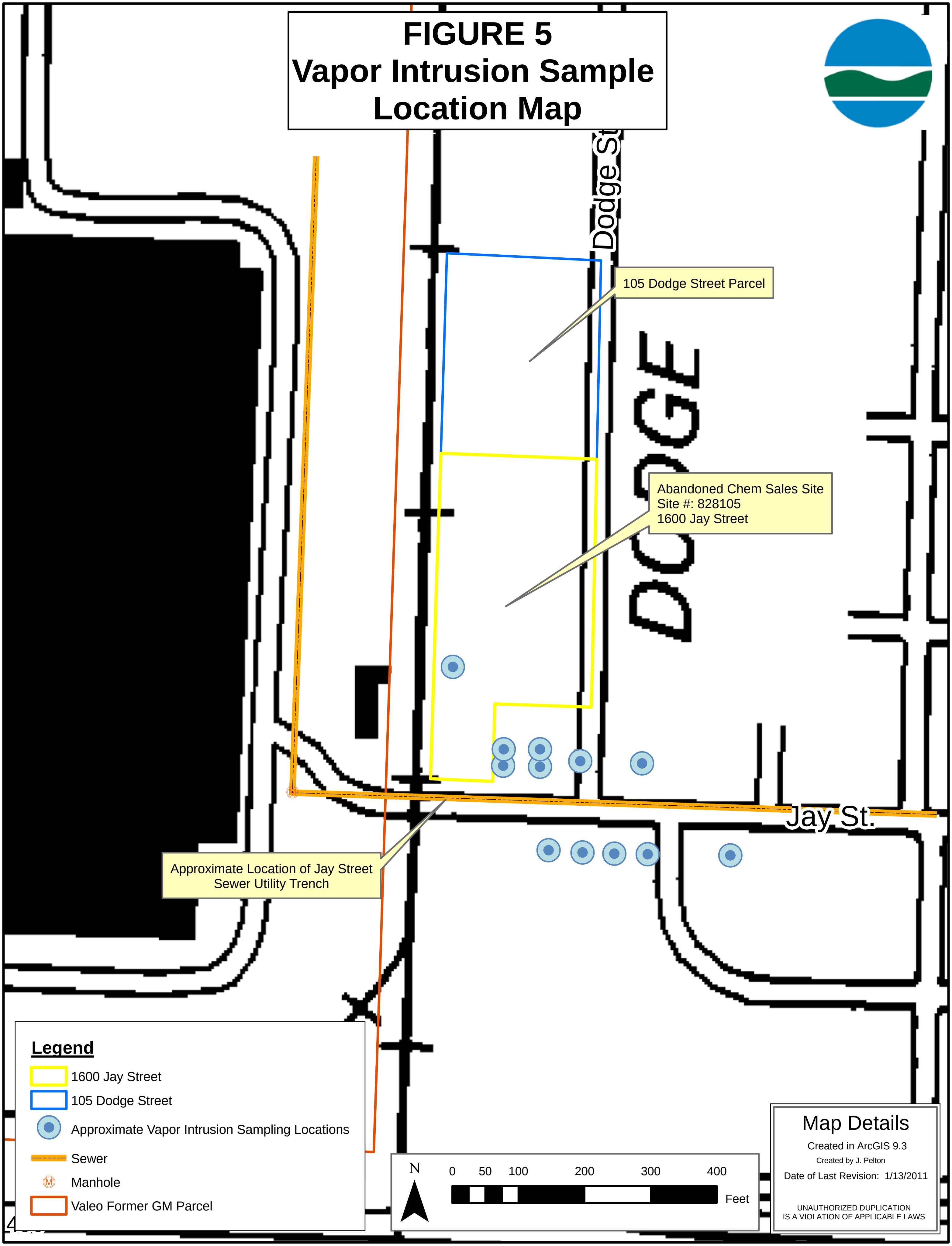


FIGURE 6
Conceptual Illustration of
Proposed Remedial Alternative
Source Area Excavations
Dodge St.
ISCO and Bioremediation
Injection Area
Jay St.
Approximate Location of Jay Street
Sewer Utility Trench
Legend
Source Area Excavations
Injection Area
Sump_Location
Sewer
Manhole
N
0 25 50 100 150 200
Feet
Map Details
Created in ArcGIS 9.3
Created by J. Pelton
Date of Last Revision: 1/13/2011
UNAUTHORIZED DUPLICATION
IS A VIOLATION OF APPLICABLE LAWS