ALTERNATIVES ANALYSIS REPORT AND REMEDIAL WORK PLAN WARD STREET SITE

INDEX #B8-0566-99-10
SITE #C828117

JULY 2006

Prepared for:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
6274 EAST AVON-LIMA ROAD
AVON, NEW YORK 14414

Prepared on Behalf of:

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July 17, 2006

Mr. Bart Putzig, P.E.
New York State Department of Environmental Conservation
Division of Environmental Remediation
6274 East Avon-Lima Road
Avon, NY 14414-9519

RE: Alternatives Analysis Report and Remedial Work Plan
Ward Street Site
BCA Site No.: C828117
Index #B8-0566-99-10
Rochester, New York

Dear Bart:

On behalf of Germanow-Simon Corporation, please find enclosed the Alternatives Analysis Report and Remedial Work Plan (AAR/RWP) prepared by Stantec Consulting Services Inc. for the above-referenced Ward Street Site, Rochester, NY. This report has been revised per the June 23, 2006 New York State Department of Environmental Conservation (Department) comments. As discussed with Mr. Todd Caffoe, we will be submitting the Remedial Design documents to the Department in the near future.

Please do not hesitate to call should you have any questions or require further information.

Sincerely,

Michael P. Storonsky
Managing Senior Associate

David P. Belaskas, P.E.
Associate

Attachment:

c: Todd Caffoe, P.E. (NYSDEC – Avon)
James Charles Esq. (NYSDEC – Buffalo)
Gary Litwin (NYSDOH – Troy)
Joseph Albert (MCDOH – Rochester)
Debby McNaughton (NYSDOH – Rochester)
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File

Executive Summary

Stantec Consulting Services Inc. (Stantec) has prepared this combined Alternatives Analysis Report and the Remedial Work Plan (AAR/RWP) at the request of Germanow-Simon Corporation (Germanow-Simon) to fulfill its obligations under a Brownfield Cleanup Agreement (BCA) for the Ward Street Site (Site) located in the City of Rochester, Monroe County, New York, Site #C828117 and Index #B8-0566-99-10, that was executed by the New York State Department of Environmental Conservation (Department) on August 31, 2004. This AAR/RWP has been prepared in accordance with the Department's draft Brownfield Cleanup Program Guide (May 2004) and draft DER-10 Technical Guidance for Site Investigation and Remediation.

Several environmental investigations have been completed at the Site since 1999. Much of the initial work was conducted under a Voluntary Cleanup Agreement (VCA) initiated in October 1999 as part of the NYSDEC Voluntary Cleanup Program (VCP). The project was transferred in October 2004 into New York State's Brownfield Cleanup Program (BCP). A complete summary of environmental investigations conducted at the Site is presented in the Remedial Investigation Report dated June 29, 2006. A Multi Phase Vacuum Extraction (MPVE) Pilot Study was conducted in December 2005/January 2006. Findings from the pilot study are presented in the MPVE System Pilot Test report dated April 13, 2006.

Impacted sub-surface soils that constitute areas requiring remedial measures on the Site are grouped into two distinct areas. The first area is located beneath the Building B Annex. The most likely cause of contamination in this area is suspected to have been surface spills of PCE dry-cleaning solvent by Dinaburg Distributing when this portion of the Site was used by Dinaburg Distributing for chemical distribution before Germanow-Simon occupied the property.

The second on-site area is known as the Former Lilac Laundry Area. The most likely cause of contamination in this area is a spill(s) of petroleum-based Stoddard solvent and PCE by Lilac Laundry when this portion of the Site was being used for dry cleaning before Germanow-Simon occupied the property.

In addition to the two above-mentioned on-site areas, several off-site borings/wells indicate the presence of contaminants in front of the Building B Annex along Ward Street that appear to have originated from the beneath the Building B Annex.

Given the potential for off-site migration of contaminants via groundwater, the primary remedial objectives are to remove or eliminate the on-site soil area beneath the Building B Annex that contains contaminants which can act as a source of contaminants to groundwater, and to address the on-site groundwater beneath Building B Annex and the off-site soil and groundwater area in front of the Building B Annex to mitigate and control the identified areas of groundwater contamination. Another remedial action objective will be to address the soils and groundwater containing chlorinated and petroleum-based (Stoddard Solvent) VOCs in the on-site former Lilac Laundry area.

Impacted areas were identified based on concentrations of contaminants in soils in excess of TAGM-RSCOs. Remediation to these standards will require soil contaminant reductions approaching two orders of magnitude, which may or may not be attainable. In any event, the soils containing contaminants will be remediated to concentrations that will be protective of future commercial/industrial use of the Site, with the applicable institutional and engineering controls put in place and operated pursuant to a Department-approved site management plan.

The extent of groundwater contamination requiring mitigation and/or control was defined based on concentrations above class GA drinking water standards or guidance values. Remediation to class GA drinking water standards or guidance values will require groundwater contaminant reductions approaching four orders of magnitude, and may or may not be attained. However, as has been demonstrated on countless similar sites, where it was not possible to immediately achieve water quality standards, the source will be removed and institutional and engineering controls will be put in place and operated pursuant to a Department-approved site management plan so as to make conditions at the Site protective of future commercial/industrial use. In addition, the implementation of the proposed remedy in the off-site area in front of the Building B Annex will ensure that the plume will be addressed and arrested.

The secondary remedial objective for the Site is to mitigate sub-slab vapor in the Building B Annex. A Department-approved sub-slab depressurization system or equivalent mitigation measure will be implemented along with the site-wide remedy.

A number of on-site remedial technologies and approaches were pre-screened on the basis of cost effectiveness, feasibility, and pertinence to the environmental conditions and remedial action objectives for the identified on-site areas of contamination.

Four remediation alternatives were not excluded in the preliminary screening. Those four alternatives (A-D) are presented as follows:

Evaluated Alternative Method, Technology, or Approach	Description
A - Monitored Natural Attenuation (MNA)	• VOCs are organic molecules that are capable of being degraded by natural processes over time. This alternative takes steps to cut off exposure (e.g., the sub-slab depressurization system) and then periodically monitors the contamination.

Evaluated Alternative Method, Technology, or Approach	Description
B - Enhanced MNA	• Enhanced MNA includes the implementation of injection wells for sub-surface application of chemical and microbial materials that accelerate contaminant degradation in anoxic and oxic cycle
C - Multi Phase Vacuum Extraction (MPVE) plus soil excavation with off-site disposal	• Combination of MPVE extraction of contaminants contained in soil vapor and in groundwater from beneath and in front of the Building B Annex, and excavation and off-site disposal of soils from the former Lilac Laundry area.
D - MPVE	• Multi phase vacuum extraction of contaminants contained in soil vapor and in groundwater from beneath and in front of the Building B Annex, and contained in the soils from the former Lilac Laundry area.

Alternative D involves MPVE on-site beneath, and off-site in front of, the Building B Annex, and extends the system to the on-site former Lilac Laundry area, thereby eliminating the need to excavate and dispose of soils in that area. This alternative is considered to provide the best overall performance, as it satisfactorily complies with all criteria, and its overall cost is not significantly more (approximately 20%) than MNA or EMNA.

Stantec recommends remedial alternative D, MPVE for implementation at the two on-site and one off-site areas related to the Ward Street Site. It will remove the ongoing source of contaminants to groundwater. It will also remove contaminants from the groundwater and control the plume to the extent feasible. Our analysis indicates this alternative to be the most effective and reliable solution for remediation of this chlorinated and non-chlorinated VOC-impacted Site. As per the Department's June 23, 2006 comment letter, the Department agrees with Stantec's recommendation and has selected MPVE as the cleanup technology to be implemented at this site.

As set forth in the Remedial Work Plan, application of MPVE at the Site will consist of high vacuum extraction from a total of 10± bedrock wells and 19± overburden wells within the Building B Annex and adjacent areas. In addition, six overburden wells are proposed for the former Lilac Laundry area. The extraction well layout is based on an estimated 15 ft. radius of influence. A sub-slab horizontal screen network will be constructed beneath the Building B Annex to provide sub-slab depressurization. Both aqueous and liquid phase contaminants are proposed to be treated using granular activated carbon.

Upon completion of construction and equipment checks, the MPVE system will be started. The start-up and shakedown period is anticipated to last approximately one month. The start-up period will end after the MPVE is optimized to extract the most VOCs while addressing the impacted soils and groundwater. After start-up is complete, the Final Engineering Report, and an Environmental Easement, will be submitted to the Department documenting completion of the start-up period with a request for issuance of the Certificate of Completion.

It is essential to the business operations of the Germanow-Simon Corporation, the company that has volunteered to cleanup this contamination for which it is not responsible and that is applying to cleanup the contamination identified at 8-28 Ward Street, that the Certificate of Completion be attained by the end of tax year 2006. Therefore, the aim of the accelerated and robust remedial effort at the Site is to attain a Certificate of Completion by December 2006. This is wholly consistent with the declared policy and findings of the New York State Legislature in creating the BCP to encourage businesses to volunteer to remediate these inner city Brownfield properties. In order to accomplish this, an environmental easement will be put in place, and submitted to the Department, in addition to the Final Engineering Report. It is anticipated that the environmental easement and the Final Engineering Report will have to be submitted to the DEC by mid-October for approval. Hence, system construction, startup and optimization will have to be completed by the end of September 2006.

After start-up, data will be collected on a routine basis to assess system performance and assist in determining remediation progress. Cleanup levels will be reevaluated once the MPVE system has operated to the limits of the technology. The system cannot be shut down unless it is demonstrated that on-site contamination will not migrate off-site at concentrations that adversely impact the ability of off-site groundwater to meet applicable SCGs. If the MPVE system is operated to its practical limits, and the Department approves shutdown, then additional technologies may need to be evaluated to contain these contaminants on-site. These technologies must include appropriate engineering and institutional controls and be protective of public health and the environment. The cleanup equipment will remain in place until closure sampling has been completed and approval from the Department has been obtained.

ALTERNATIVES ANALYSIS REPORT AND REMEDIAL WORK PLAN
WARD STREET SITE
JULY 17, 2006

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1.0 Introduction

1.1 PURPOSE AND ORGANIZATION OF REPORT

Stantec Consulting Services Inc. (Stantec) has prepared this combined Alternatives Analysis Report and the Remedial Work Plan (AAR/RWP) at the request of Germanow-Simon Corporation (Germanow-Simon) to fulfill its obligations under a Brownfield Cleanup Agreement (BCA) for the Ward Street Site (Site) located in the City of Rochester, Monroe County, New York (Figure 1), Site #C828117 and Index #B8-0566-99-10, that was executed by the New York State Department of Environmental Conservation (Department) on August 31, 2004. This AAR/RWP has been prepared in accordance with the Department's draft Brownfield Cleanup Program Guide (May 2004) and draft DER-10 Technical Guidance for Site Investigation and Remediation.

This combined AAR/RWP for the Ward Street Site will review the findings of the Remedial Investigation Report (June 29, 2006), evaluate the potential remedial alternatives available to address the contamination, recommend the implementation of Multi Phase Vacuum Extraction (MPVE) as the remedy, and describe the process for implementing that remedy at the Site.

The purpose and objectives of this report are to:

- Summarize existing site conditions and potential routes of exposure;
- Define the nature and distribution of environmental contamination at the Site;
- Review the results of the qualitative exposure assessment;
- Evaluate the effectiveness, ease of implementation and cost of alternative remedial technologies and approaches; and
- Recommend an optimal remedy and present a remedial work plan to implement that remedy.

1.2 SITE DESCRIPTION AND HISTORY

1.2.1 Site Description

Germanow-Simon and its affiliated companies currently occupy the Site and employ approximately 85 individuals at manufacturing facilities that produce bimetal thermometers, plastic optics, and gauge and watch crystals.

The Site presently contains three major buildings (Figure 2). These three structures are currently identified as Building A at 408 St. Paul Street, main offices; Building B at 392 St. Paul Street, Thermometer Division of Tel-Tru Mg. Co. (Figure 3)); and Building C at 23 Emmett Street, Optics Division of Germanow-Simon Corporation.

The Site is bounded to the northwest by commercial buildings, to the northeast by Emmett Street and a parking lot, to the southeast by Ward Street and to the southwest by St. Paul Street. The nearest residential building is located approximately 100 feet to the south of the Building B Annex across Ward Street. The Genesee River Gorge is located approximately 350 feet southwest of the Site across St. Paul Street. The Cork Street cul-de-sac bisects the northern portion of the site in a northwest to southeast direction.

1.2.2 Project Background

Several environmental investigations have been completed at the Site since 1999. Much of the initial work was conducted under a Voluntary Cleanup Agreement (VCA) initiated in October 1999 as part of the NYSDEC Voluntary Cleanup Program (VCP). The project was transferred in October 2004 into New York State's Brownfield Cleanup Program (BCP). A complete summary of environmental investigations conducted at the Site is presented in the Remedial Investigation Report dated June 29, 2006. A Multi Phase Vacuum Extraction (MPVE) Pilot Study was conducted in December 2005/January 2006. Findings from the pilot study are presented in the MPVE System Pilot Test report dated April 13, 2006.

1.2.3 Site History

Review of historic information about the Site has identified on-site a former dry cleaning establishment once operated by Lilac Laundry Inc. and a former gasoline station which was also once occupied by S. Dinaburg, a distributor of dry cleaning and industrial solvents. Off-site, historic information indicates that a gasoline station was operated on the southeast corner of Ward and St. Paul Streets, across Ward Street from the Site.

A complete review of historic information for the Ward Street Site is presented in the Remedial Investigation Report (June 29, 2006).

1.3 SOIL & GROUNDWATER OBJECTIVES

Under the BCP, TAGM-RSCOs are the SCGs for soil cleanup. Contaminants of concern (CoCs) are defined as the hazardous substances for which the concentration in soil exceeds the associated TAGM-RSCO.

Even though no potable use of groundwater is allowed in the City of Rochester, Class GA drinking water-based standards are the applicable SCG for groundwater. CoCs in groundwater were selected based on exceedances of class GA standards, or TOGS 1.1.1 guidance values.

In the event that it is not feasible to achieve the applicable TAGM-RSCOs in soil and/or the class GA standards or TOGS 1.1.1 guidance values in groundwater, site-specific cleanup levels will be established for the Site that, in conjunction with institutional and engineering controls, will attain conditions protective of public health and the environment for the intended and reasonably anticipated use of the Site.

2.0 Summary of Remedial Investigations

The following is a summary of on-site and off-site environmental conditions and the qualitative exposure assessments with an emphasis on impacts to potential remedial efforts. Environmental conditions are reviewed in detail in the Remedial Investigation Report (June 29, 2006).

2.1 SURFACE FEATURES

Germanow-Simon Corporation buildings A, B and C occupy approximately 60% (47,000 sq. ft.) of the Site (78,500 sq. ft.). Stormwater runoff from the building roofs is diverted to the municipal storm sewer. The remaining 40% of the Site's area consists of parking areas that are mostly asphalt or concrete covered, with some areas covered with gravel.

Based on a topographic survey completed by Stantec (formerly Sear-Brown) in October 1999, the topography of the Site slopes gently outward from the center of the property. Ground surface topography varies between an approximate elevation of 508± ft. above mean sea level (AMSL) in the center of the Site immediately south of Building A to approximately 505 ft. AMSL along Emmett street east of the Site and to approximately 506 ft. AMSL at the corner of Ward & St. Paul Streets southwest of the Site. Surface drainage on the Site and on adjoining properties occurs towards peripheral streets where storm sewers intercept the runoff.

2.2 SITE GEOLOGY AND HYDROGEOLOGY

Site geology and hydrogeology data are presented in detail in the Remedial Investigation Report (April 24, 2006). Overburden geology and depth to bedrock at the Site are illustrated in Figure 4.

2.2.1 Geology

Soils on the subject property are mapped in the Monroe County Soil Survey as Urban Land, which are areas that have been so altered or obscured by public works that identification of the soils is not feasible. These areas are commonly located in the older areas of the City of Rochester.

Based upon the subsurface investigations completed to date, interpreted facies for the overburden on the subject property include fill, upper till and lower till deposits. The shallow subsurface fill and glacial till deposits comprise a 20 ft. thick profile of silty sand sediments that overlie dolomitic bedrock tentatively assigned to the Silurian DeCew Formation. The DeCew Formation forms the cap rock of the nearby Upper Falls in the Genesee River Gorge. The DeCew formation consists of lime sand and silt sediments that are very similar to sediments that comprise the upper beds of the Rochester Shale (Gates Member)[1]. The DeCew Formation is generally on the order of 6 to 16 feet thick and is underlain by the Rochester Shale.

Miscellaneous fill thicknesses range from 0.0 to 11.2 ft. and averaged 6.4 ft. across the site. The depth to bedrock across the site ranges between 17.5 ft. and 23.1 ft. below ground surface (ft. BGS) and averages 20.1 ft. BGS. The glacial till profile beneath the fill is divisible into upper and lower portions based upon texture and density. The depth to dense, lower till ranges from 10.0 to 16.0 ft. BGS and averages 12.8 ft. BGS.

2.2.1.1 Fill Material

The fill encountered across the site consists primarily of re-worked till and some imported gravel materials. Based upon analysis of samples from borings B-7 and B-10, the fill materials consist 20.0% - 35.8% gravel, 31.3% - 47.3% sand, 25.9% - 26.6% silt, and 6.1% - 7.0% clay. Miscellaneous fill includes trace amounts of brick, concrete, cinders and ash.

Estimates of porosity, using mass and volume measurements for fill samples, range from 22.7% to 30.7%. Wet densities range from 138.4 to 142.6 pounds per cubic foot (pcf). Dry densities range from 115.9 to 125.8 pcf.

2.2.1.2 Upper Till Deposits

The glacial till profile beneath the fill is divisible into upper and lower portions based upon texture and density. Average upper till descriptions include moist, brown fine sand, some silt, with trace clay and gravel. The upper till deposits are slightly finer-grained and less dense than the lower till profile. Based upon grain-size analyses of samples from B-7, B-10 and B-15, the upper till deposits consist of 0.0% - 7.3% gravel, 32.8% - 48.0% sand, 47.1 – 52.6% silt, and 4.9% - 11.0% clay.

Estimates of porosity, using mass and volume measurements for upper till samples, range from 28.9% to 36.5%. Wet densities range from 127.8 to 138.4 pounds per cubic foot (pcf). Dry densities range from 106.9 to 121.8 pcf.

2.2.1.3 Lower Till Deposits

The lower till deposits represent a dense lodgment till. The transition from upper to lower till is marked by a dramatic increase in N-values (i.e. density). Average lower till descriptions include moist, gray to gray-brown, fine sand and silt, some coarse to fine gravel, with trace clay. The lower till deposits encountered in soil borings appear to be poorly sorted with a higher gravel fraction than the upper till deposits. Based upon grain-size analyses of samples from borings B-7, B-10 and B-15, the lodgment tills consist of 11.8% to 25.2% gravel, 34.4% to 37.0% sand, 35.3% to 46.3% silt, and 4.9% to 5.5% clay.

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[1] Goodman, W.M. (2005), Bedrock Exposures Within the Lower Genesee River Gorge: Their Context within the Stratigraphic Framework for the Niagara Region, Rochester Committee for Scientific Information, Bulletin #329.

Estimates of porosity, using mass and volume measurements for lower till samples, range from 22.6% to 23.4%. Wet densities range from 136.9 to 147.4 pounds per cubic foot (pcf). Dry densities range from 122.8 to 130.7 pcf.

2.2.2 Site Hydrogeology

2.2.2.1 Overburden Flow

The surficial geology provides for a low permeability hydrogeologic setting characterized by a shallow water table, low hydraulic conductivities, and low average linear velocities of groundwater flow.

The depths to water in overburden across the site range from 7.1 to 11.4 ft. BGS and average 9.1 ft. BGS. The average depth to water of 9.1 ft. BGS corresponds to the base of the upper till profile. Shallow groundwater generally flows in a radial direction from the center of the block at the end of Cork Street and flows in a west-southwesterly direction towards the corner of Ward Street and St. Paul Street. Maximum, average and minimum groundwater levels as observed in select on-site and off-site monitoring wells are illustrated in Figure 4.

2.2.2.2 Sewer Influence on Groundwater Flow

A prominent depression in the water table exists beneath the west end of Ward Street. Groundwater flow from both the north and south sides of Ward Street appears to be directed toward the center of the street before the flow proceeds southwesterly toward the intersection with St. Paul Street. The patterns in the equipotential lines suggest a prominent influence of utilities on local groundwater flow directions.

2.2.2.3 Bedrock Flow

Water level data in bedrock collected on September 12, 2005 show that depths to water across the site in wells screened in bedrock ranged from 8.9 to 11.8 ft. BGS and averaged 10.6 ft. BGS. Groundwater in bedrock generally flows in a westerly direction towards St. Paul Street and the Genesee River Gorge.

2.2.3 Hydraulic Conductivity

2.2.3.1 Grain Size Estimates

The hydraulic conductivity of the glacial deposits were estimated during the 1999 Phase II using two separate methods based upon grain-size distributions. The grain-size methods utilized are the Hazen and Shepherd methods which are described in Fetter (1994).

The Hazen method, which is based upon the effective grain size or d_{10} on particle distribution plots, produced hydraulic conductivity values of ranging between 2.9×10^{-6} cm/s and 2.9×10^{-4} cm/s. The geometric mean of these values derived from the Hazen Method is 3.0×10^{-5} cm/s, a value that is consistent with the permeability estimates for regional glacial tills.

The Shepherd method, which is based upon the median grain size or d_{50} on particle distribution plots, was also applied to the geotechnical samples. The Shepherd method estimated values of hydraulic conductivity ranging between 3.7 x 10^{-4} cm/s and 6.1 x 10^{-3} cm/s with a geometric mean value of 1.1 x 10^{-3} cm/s.

The permeability values reported above fall within the normal range for glacial deposits (Freeze and Cherry, 1979). The Shepherd method values appear to be skewed to the higher end of the spectrum because of the relatively high sand content of the on-site deposits. The poor sorting and dense compaction of the lodgment tills, however, would suggest that the lower hydraulic conductivity values derived from the Hazen method are more representative.

Using the available water level, the average hydraulic conductivity and an average porosity of the on-site soils, an estimated average linear velocity for groundwater flow was also calculated. The equation for the linear velocity is:

$$V = \frac{K \times i}{n_e}$$

where K= hydraulic conductivity

i= hydraulic gradient

and n_e= effective porosity

Based upon the Hazen method calculations, the mean hydraulic conductivity value of the overburden profile is 3.0 x 10^{-5} cm/s. Based upon the water level data collected on July 21, 2005, the horizontal hydraulic gradient (i.e. the slope of the water table) is 0.019 as measured between wells MW-32 and MW-16. Using an average porosity value of 28 percent, an estimated linear velocity of 2.0 x 10^{-6} cm/s is calculated. This value equates to a groundwater flow velocity of roughly 2.1 feet per year.

2.2.3.2 Slug Test Calculations

Slug tests were performed on wells MW-17, MW-17R, MW-18, MW-23, MW-24 and MW-24R on October 12, 2001. Slug tests were also performed on wells MW-9R, MW-16, MW-16R, MW-19, MW-20, MW-21 and MW-22 on July 12, 2005. Results from both rising head and falling head tests yielded hydraulic conductivity values ranging between 2.9 x 10^{-5} cm/s and 8.5 x 10^{-4} cm/s for overburden and 1.8 x 10^{-5} cm/s and 6.1 x 10^{-4} cm/s for bedrock. These ranges of values are typical for the silty glacial till and fractured shale and dolomite bedrock (Rochester Shale and DeCew Dolostone) that underlie the investigation area and are consistent with hydraulic conductivities that were estimated from grain size.

2.3 ON-SITE AND OFF-SITE CHEMICAL SCREENING

Chemical screening involves a review of sampling data for environmental media (e.g. subsurface soil, groundwater, soil vapor) with respect to applicable environmental SCGs, both on-site and off-site, and an evaluation of the physical conditions of the contaminant sources or physical hazards near the site, which may pose a health risk to the community.

2.3.1 On-site and Off-site Physical Hazards

As described above, the main site features are buildings and parking areas. Current on-site physical hazards may include activities related to on-going commercial/manufacturing activities at the Site, including vehicular traffic. Underground utilities at the Site such as gas and electricity are a potential hazard during any excavation or drilling activity, which are likely to occur in the context of remedial efforts. Nonetheless, proper planning and scheduling can alleviate most risks associated with physical hazards at this Site.

2.3.2 Field Data, Lab Data and Sampling Design Validation

Data Validation Services, Inc. (DVS) prepared two separate Data Usability Summary Reports (DUSR) for the Ward Street Site, one in January 2002 and the other in October 2005, for soil and groundwater samples collected, respectively, during 2001 and 2005. Most analytical (Tables 1, 2, 4 and 5) results were found to be usable as reported or with minor qualification edits (such as changing a qualifier from “estimated” to “non-detected”) that were required due to typical processing or matrix effects. In some cases, analytical results included both estimated values and diluted values. However DVS indicated that in most cases the results from the diluted samples should be used. In July 2005, results for semi-volatile organic compounds (SVOCs) in MW-9 were deemed unusable due to an apparent matrix effect. This matrix interference is believed to be attributable to the presence of a thin floating product layer related to the past use of Stoddard Solvents at the former Lilac Laundry.

2.4 SOIL, GROUNDWATER AND SOIL VAPOR CHEMICAL SCREENING

As established in the Remedial Investigation Report (June 29, 2006), on-site and off-site impacts are principally attributable to volatile organic compounds (VOCs). The soil chemical screening effort and associated tables and figures, therefore, focus on VOC impacts.

2.4.1 Soil and Groundwater Volume and Contaminant Mass Calculations

Computed soil volumes and masses, groundwater volumes and contaminant masses are summarized in Tables 3 and 6. In situ soil volumes with impacts in excess of TAGM-RSCOs and associated contaminant masses for the area below the Building B Annex were computed using a combination of analytical results, PID readings and contouring of contaminant plumes at different depths derived from linearly interpolated surface models.

Soil and associated contaminant quantities in the other impacted areas were calculated by computing the product of the Thiessen polygon surface areas associated with borings showing concentrations in excess of TAGM-RSCOs and of the estimated depth of impacted soils. PID readings were used to estimate the concentration of contaminants in each stratum where analytical results were unavailable. Soil masses take into account the average density of each stratigraphic unit. Calculations are presented in Appendix A. A soil density of 1.7T/C.Y. was assumed in these calculations.

Contaminated groundwater volumes, as presented in Table 6, were calculated based on the distribution of chlorinated and non-chlorinated VOCs by computing the product of the surface area contained within the 100 µg/L and 1,000 µg/L concentration isocontours, respectively, and the depth of overburden groundwater. A soil porosity of 30% was assumed. Groundwater volumes for bedrock were not calculated due to the limited quantities typically present in bedrock fracture systems.

2.4.2 Chemical Screening for On-Site and Off-Site Soils

Chemical screening for on-site and off-site VOCs in soils was conducted by comparing the detected concentrations of each analyzed VOC to the associated TAGM-RSCO. The results of the chemical screening for sub-surface soils for the Site are given in Tables 1 and 2.

As shown in Table 1, several chlorinated and non-chlorinated VOCs were reported in six off-site and seven on-site borings in sub-surface soils at levels greater than the TAGM-RSCOs. Although human and ecological receptors are unlikely to be exposed to these VOC-impacted soils in circumstances other than in the course of remediation work, these substances have been identified as CoCs since they exceed the TAGM-RSCOs, and/or because they appear to be having a measurable impact on groundwater. These CoCs indicate the presence of impacted areas that should be addressed. Soil analytical results were also compared to groundwater analytical results, PID readings and passive soil vapor survey results in order to aid in the delineation of impacted areas to be addressed by the recommended remedial action.

Impacted sub-surface soils that constitute areas requiring remedial measures on the Site are grouped into two distinct areas:

1. The first area is located beneath the Building B Annex as observed in MW-22, MW-22R, MW-101 and MW-105. PCE concentrations in excess of TAGM-RSCOs were measured in soil samples collected from these borings at depths ranging from 0.5 to 10 ft BGS. Though concentrations obtained from MW-101 are estimates (non-ASP analyses), it is assumed that they exceed TAGM-RSCOs for the purposes of contaminant quantification. The most likely cause of contamination in this area is suspected to have been surface spills of PCE dry-cleaning solvent near MW-105 by Dinaburg Distributing when this portion of the Site was used by Dinaburg Distributing for chemical distribution before Germanow-Simon occupied the property. This area is shown on Figure 4. The in-situ on-site volume of soils with impacts in excess of TAGM-RSCOs in this area is estimated at 1,900 C.Y., or 3,200 tons of soil, for an estimated on-site contaminant mass in this area of 240 lbs for PCE and 21 lbs for TCE and 5.2 lbs for other VOCs. Soil concentrations for PCE in this area exceed the solubility limit (150ppm) for PCE and indicate a potential for the presence of non-aqueous phase liquids (NAPLs). Because of the relatively high concentrations detected, the contaminants in these soils appear to be a source of contamination having a continuing measurable adverse impact on groundwater quality. That impact nevertheless is mitigated to some extent because

these soils are located beneath the floor slab of the Building B Annex and, therefore, are not subjected to infiltrating precipitation.

2. The second on-site area, known as the Former Lilac Laundry Area, is centered on borings B-8, MW-9 and MW-9R in the parking area located between Buildings A, B and C. The borings indicate concentrations of chlorinated and non-chlorinated VOCs (PCE, propylbenzene-n, sec-butylbenzene, tert-butylbenzene, trimethylbenzene-1,2,4, trimethylbenzene-1,3,5 and xylenes) in excess of TAGM-RSCOs at depths ranging from 2 to 8 ft bgs. These concentrations, combined with the presence of measurable VOCs in a discrete area of groundwater, indicate the presence of an impacted area that Germanow-Simon will address during the remediation. The most likely cause of contamination in this area is a spill(s) of petroleum-based Stoddard solvent and PCE by Lilac Laundry when this portion of the Site was being used for dry cleaning before Germanow-Simon occupied the property. The in-situ on-site volume of soils with impacts in excess of TAGM-RSCOs in this area is estimated at 800 C.Y., or 1,400 tons of soil, for an estimated on-site contaminant mass in this area of 5 lbs for PCE, 8 lbs for xylenes and 570 lbs for other petroleum-based VOCs.

The total on-site quantity of soils that are impacted at levels greater than TAGM-RSCOs is estimated at 2,700 C.Y. or 4,600 tons.

In addition to the two above-mentioned on-site areas, several off-site borings indicate the presence of contaminants in the soils in front of the Building B Annex along Ward Street. The impacts to these sub-surface soils are such that Germanow-Simon will implement remedial measures to address them.

1. The soils in front of the Building B Annex along Ward Street have concentrations of contaminants in excess of TAGM-RSCOs. Due to similar contaminants and corresponding depth of impacts, this off-site impacted area is most likely associated with the on-site contaminated area beneath the Building B Annex. It encompasses borings B-104 (10 to 12.4 ft) and MW-16R (12 to 13.4 ft), both of which exhibit PCE concentrations in excess of the TAGM-RSCOs. (As with MW-101, concentrations obtained from B-104 are estimates but are assumed to exceed TAGM-RSCOs.) The in-situ off-site volume of soils with impacts in excess of TAGM-RSCOs in this area is estimated at 1,800 C.Y., or 3,100 tons of soil, for an estimated off-site mass in this area of 135 lbs for PCE, 12 lbs for TCE, and 3.8 lbs for other VOCs.

The remedial investigation also delineated another off-site area with soils containing chlorinated VOCs that is located hydrogeologically up- and cross-gradient from the Building B Annex. The chlorinated VOCs are found in differing proportions in this area, and the contamination appears to be associated with the former High Falls Brewing Company's parking at 8-28 Ward Street. Germanow-Simon has acquired the parking lot from the High Falls Brewing Company and is in the process of entering into a separate BCA with the Department for the further investigation and remediation of this separate off-site area. Because Germanow-Simon intends to extend, with the Department's permission, whatever remedial system is employed to address the two on-site and one off-site areas discussed above to this off-site area, a brief discussion of this second separate off-site area is included:

1. The second off-site area is associated with boring MW-23 where a PCE concentration of 8.3 mg/kg was measured. Due to the position of this area in the Ward Street R.O.W. hydrogeologically up-gradient from the Building B Annex, it is suspected that this finding is associated with off-site impacts within the former High Falls Brewing Company's parking lot north of the boring. The in-situ on-site volume of soils with impacts in excess of TAGM-RSCOs in this area is estimated at 1,500 C.Y., or 2,500 tons of soil, for an estimated off-site contaminant mass in this area of 41 lbs for PCE (based on an impacted area of 6,400 sq. ft.). If Germanow-Simon's recently submitted BCP application is accepted, it is proposed to conduct a separate remedial investigation of this parcel during the summer of 2006 such that this parcel can be remediated to the extent necessary in conjunction with the Ward Street Site.

The total off-site quantity of soils that are impacted at levels greater than TAGM-RSCOs in these two areas is estimated at 3,300 C.Y, or 5,600 tons. Impacts from suspected unrelated off-Site sources on the south of Ward Street (MW-17 and MW-24 areas) are not considered in these calculations.

2.4.3 Chemical Screening for On-Site and Off-Site Groundwater

Chemical screening for groundwater involved comparison of detected concentrations in groundwater from wells within and outside the Site to the New York State Class GA potable groundwater standards in 6 NYCRRR Part 703 and the guidance values in Technical and Operational Guidance Series (TOGS) 1.1.1, NYSDEC, June 1998.

The results of the chemical screening for groundwater are presented in Tables 4 and 5. Several VOCs were reported in overburden and bedrock groundwater on-site and off-site at concentrations greater than Class GA standards.

Figure 5 shows the interpreted horizontal distribution of total chlorinated VOC impacts in the overburden groundwater. Figure 6 presents the horizontal distribution of total chlorinated VOC impacts in bedrock.

The 24-inch VCP sanitary sewer alignment was used to distinguish impacts on the north side of the Ward Street R.O.W. from those on the south side. Off-site impacts observed in the MW-17 and MW-24 areas which appear to be from separate sources were not considered in these calculations.

The more elevated on-site VOC concentrations in overburden groundwater can be grouped into two areas, both of which are associated with the previously identified on-site areas of soil containing VOCs.

1. The first on-site area includes wells MW-22 and MW-105 and coincides with the first soil-impacted area beneath the Building B Annex, but extends further southwest toward

Ward Street, indicating contaminant transport and migration due to groundwater flow. This area is principally associated with chlorinated VOC impacts, as shown on Figure 4. The volume of overburden groundwater with total chlorinated VOC concentrations >1,000 µg/L is estimated at 180,000 GAL, and the volume of overburden groundwater with total non-chlorinated VOC concentrations >100 µg/L is estimated at 20,000 GAL.

2. The second on-site area is considered on the basis of analytical results from samples collected in MW-9 because no other well had exceedances, and coincides with the second soil-impacted area. The impacts from chlorinated VOCs are illustrated in Figure 4. The volume of overburden groundwater with total non-chlorinated VOC concentrations >100 µg/L is conservatively estimated at 100,000 GAL.

Off-site VOC impacts to overburden groundwater are observed associated with the front of the Building B Annex along Ward Street.

1. This off-site area is associated with monitoring well MW-16 and is apparently related to the on-site chlorinated VOC impacts below Building B Annex, as illustrated on Figure 5. The volume of overburden groundwater with total chlorinated VOC concentrations >1,000 µg/L is estimated at more than 120,000 GAL, and the volume of overburden groundwater with total non-chlorinated VOC concentrations >100 µg/L is estimated at more than 40,000 GAL.

The remedial investigation also delineated another off-site area with groundwater containing chlorinated VOCs that corresponds to the previously discussed soil impacts located hydrogeologically up- and cross-gradient from the Building B Annex. This contamination appears to be associated with the former High Falls Brewing Company's parking at 8-28 Ward Street. Because Germanow-Simon intends to extend, with the Department's permission, whatever remedial system is employed to address the two on-site and one off-site areas discussed above to this off-site area, a brief discussion of this second separate off-site area is included:

1. The second area is associated with well MW-23, where chlorinated VOC impacts appear to be associated with the former High Falls Brewing Company parking lot. The volume of overburden groundwater with total chlorinated VOC concentrations >1,000 µg/L is estimated at more than 60,000 GAL, and the volume of overburden groundwater with total non-chlorinated VOC concentrations >100 µg/L is estimated at more than 40,000 GAL.

On-site impacts to bedrock groundwater in bedrock monitoring well MW 22R consist mainly of chlorinated solvents and are consistent with overburden soil and groundwater impacts beneath the Building B Annex. (See Figure 6). There are no apparent impacts to bedrock groundwater in MW-9R. Off-site impacts to bedrock groundwater in MW-16R appear to be related to the on-site contaminated area below the Building B Annex.

2.4.4 Chemical Screening for Soil Vapor

In August and November of 2001, a total of 45 Emflux soil vapor survey canisters were installed along Ward Street (15 canisters) and in the Building B area (30 canisters). The analytical program targeted PCE, TCE, 1,2 dichloroethene (DCE) and vinyl chloride (VC). Soil vapor analyses were used to develop a relative contaminant distribution map. This mapping effort confirmed the presence of an impacted area below the Building B Annex, but also unexpectedly revealed the potential presence of off-site chlorinated VOC impacts at the eventual locations of MW-23 and MW-24. A complete review of the passive soil gas surveys is presented in the Remedial Investigation Report (June 29, 2006).

2.5 CHEMICAL SCREENING FOR SUB-SURFACE VAPOR AND INDOOR AIR

2.5.1 On-site Buildings

Sub-slab vapor and indoor air samples were collected at the Building B Annex as part of the remedial investigation. Those samples were reported to contain detectable concentrations of up to three target VOCs: PCE, TCE, and/or DCE. One indoor air sample taken from the first floor of the Building B Annex had 10 ug/m^3 concentration of TCE. This was the only indoor air sample to exceed a proposed or current NYSDOH's Indoor Air Quality Guideline. The NYSDOH guideline for TCE is the proposed 5 ug/m^3. The 88 ug/m^3 concentration of PCE in the same sample nevertheless begins to approach the 100 ug/m^3 NYSDOH Indoor Air Quality Guideline for PCE.

However, because the Building B Annex is part of Germanow-Simon's active manufacturing operations, OSHA air quality regulations are also applicable. The OSHA time weighted 8-hour permissible exposure level (PEL) for TCE is 100 ppm (537,000 ug/m^3) and for PCE, it is also 100 ppm (678,000 ug/m^3). As the two NYSDOH Indoor Air Quality Guidance Levels were derived based upon the assumption that the exposed individuals, including sensitive children, would remain within the affected air space continuously for 70 years with no opportunity for the VOCs to be excreted from their bodies, and the Germanow-Simon adult workers go home after each 8 hour shift, the OSHA PELs are considered to be the more relevant and appropriate standard by which to evaluate the detected concentrations of TCE and PCE in the indoor air. Furthermore, the OSHA PELs are a regulation, and a regulation as a general matter also takes precedence over an unpromulgated guidance policy. The 10 ug/m^3 TCE and 88 ug/m^3 PCE detected do not begin to exceed the applicable OSHA PEL standards. The MSDS's for PCE and TCE have been added to the file available to workers.

The levels of VOCs detected in the sub-slab soil vapor (21,000 ug/m^3 TCE, 33,000 ug/m^3 PCE and 26,000 ug/m^3 DCE) also exceed the current and proposed NYSDOH Indoor Air Quality Guidelines, although none of the detected sub-slab soil vapors would cause an exceedance of an OSHA PEL even if Germanow-Simon's workers were directly exposed to the VOCs at those levels.

In the meantime, NYSDOH has produced and solicited public comment on a draft Guidance for Evaluating Soil Vapor Intrusion in the State of New York, Public Comment Draft, February 2005. The Guidance's draft "Soil Vapor / Indoor Air Matrices 1 and 2" suggest that the concentrations of PCE and TCE detected in the sub slab vapor and indoor air at the Building B Annex warrant mitigation/continued monitoring. In addition, a letter received from the Department on August 23, 2005 regarding the Sub-slab Soil Gas Survey Report indicated that the Department also believed that the concentrations of PCE and TCE detected in the sub slab vapor and indoor air at the Building B Annex warranted mitigation. It was expressed that an acceptable sub-slab depressurization system may be deferred until a site-wide remediation is selected.

Although the NYSDOH Draft Guidance is currently under review and may be changed, and the Department's determination that mitigation was warranted may be based in part upon the NYSDOH Draft Guidance, Germanow-Simon's remedy for the Building B Annex soils and groundwater will also address NYSDOH's concerns with potential indoor air exposures. Germanow-Simon intends to implement a remedial system that will both mitigate the sub-slab impacts and include the installation of a permanent sub-slab depressurization system.

2.5.2 Off-Site Residential Building

No detectable concentrations of target VOCs were reported for the two St. Simon Terrace indoor air samples or the outdoor air sample.

2.5.3 Off-Site Subsurface Utility Structures

The intrusion of contaminants into subsurface utility structures and surrounding bedding and fill material has not been assessed due to the high risk of performing drilling operations in the densely serviced Ward Street ROW. However, contaminants are suspected to have migrated into the more permeable utility beddings.

3.0 Summary of Qualitative Exposure Assessments

A qualitative on-site and off-site human health assessment and a fish & wildlife exposure assessment were performed for the Ward Street Site. The results of those assessments was included as part of the June 29, 2006 Remedial Investigation Report. Please refer to that document for analyses and figures associated with these assessments.

3.1 QUALITATIVE ON-SITE AND OFF-SITE HUMAN HEALTH EXPOSURE ASSESSMENT SUMMARY

Results of the sub-slab vapor and indoor air survey performed on April 1, 2005 suggest the presence of a vapor inhalation exposure pathway for Germanow-Simon workers in the Building B Annex. In addition, there appears to be the potential for exposure pathways involving inhalation of contaminants suspended in air either as part of a soil particles or volatilized from subsurface soils and groundwater for occupational workers. This pathway would be expected to be temporary and limited to periods of excavation/remediation work.

Direct on-site exposure by way of ingestion, inhalation or dermal contact with contaminated soils or groundwater will also be transient in nature and will be restricted to periods of excavation and remediation work. The combination of remediation and mitigation of on-site contamination, and the employment of a site management plan, including institutional and engineering controls, will prevent exposure and allow continued commercial/industrial use of the property.

Source removal of the soils and groundwater containing the chlorinated VOCs beneath the Building B Annex, and remediation of the soils and groundwater containing VOCs in front of the Building B Annex and in the former Lilac Laundry Area will control the off-Site migration of the contaminated groundwater plume and reduce exposure in the utility corridors.

3.2 QUALITATIVE ON-SITE AND OFF-SITE FISH AND WILDLIFE EXPOSURE ASSESSMENT SUMMARY

There is no analytical data available to conclude that contaminants are migrating to the Genesee River Gorge, where the NYSDEC Natural Heritage Unit has identified historical occurrence of a sensitive receptor. Source removal and abatement of off-site contaminant migration will best address potential off-site exposure potentials to sensitive ecological receptors due to potential contaminated groundwater plume migration towards the Gorge.

4.0 Remedial Goals and Remedial Action Objectives

4.1 REMEDIAL ACTION OBJECTIVES

Remedial action objectives include media specific (i.e., soil and groundwater) and chemical specific goals (i.e., chlorinated VOCs and non-chlorinated VOCs) for protecting human health and the environment. Given the potential for off-site migration of contaminants via groundwater, the primary remedial objectives are to remove or eliminate the on-site soil area beneath the Building B Annex that contains contaminants which can act as a source of contaminants to groundwater, and to address the on-site groundwater beneath Building B Annex and the off-site soil and groundwater area in front of the Building B Annex to mitigate and control the identified areas of groundwater contamination. Another remedial action objective will be to address the soils and groundwater containing chlorinated and petroleum-based (Stoddard Solvent) VOCs in the on-site former Lilac Laundry area.

As described previously, impacted areas were identified based on concentrations of contaminants in soils in excess of TAGM-RSCOs. Remediation to these standards will require soil contaminant reductions approaching two orders of magnitude which may or may not be attainable. In any event, the soils containing contaminants will be remediated to concentrations that will be protective of future commercial/industrial use of the Site, with the applicable institutional and engineering controls put in place and operated pursuant to a Department-approved site management plan.

The extent of groundwater contamination requiring mitigation and/or control was defined based on concentrations above class GA drinking water standards or guidance values. Remediation to class GA drinking water standards or guidance values will require groundwater contaminant reductions approaching four orders of magnitude, and may or may not be attained. However, as has been demonstrated on countless similar sites, where it was not possible to immediately achieve water quality standards, the source will be removed and institutional and engineering controls will be put in place and operated pursuant to a Department-approved site management plan so as to make conditions at the Site protective of future commercial/industrial use. In addition, the implementation of the proposed remedy in the off-site area in front of the Building B Annex will ensure that the plume will be addressed and arrested. Therefore, it is recommended that Germanow-Simon be allowed to discontinue active remedial measures once contaminant levels are reduced by 90% or asymptotic contaminant levels have been demonstrated for a period of four consecutive quarters, whichever occurs first.

The secondary remedial objective for the Site is to mitigate sub-slab vapor in the Building B Annex. A Department-approved sub-slab depressurization system or equivalent mitigation measure will be implemented along with the site-wide remedy (NYSDEC letter to Mr. John Dole, August 16, 2005).

4.2 CONTEMPLATED USE OF SITE

The Site is located in the City of Rochester's "Center City Design" (CCD) district, where zoning incorporates industrial, commercial and residential uses. A restricted-commercial/industrial land use designation prohibiting residential uses without the express permission of the Department would be consistent with existing and future light industrial land uses at the Site.

4.3 CONTAMINATED MEDIA VOLUMES

Contaminated media volumes and masses are discussed in Section 2.4, and are summarized in Tables 3 and 6

5.0 Development and Analysis of Alternatives

5.1 PRELIMINARY SCREENING OF REMEDIATION METHODS, TECHNOLOGIES & APPROACHES

A number of on-site remedial technologies and approaches were pre-screened on the basis of cost effectiveness, feasibility, and pertinence to the environmental conditions and remedial action objectives for the identified on-site areas of contamination.

Remedial methods, technologies and approaches considered in this pre-screening process were included on the basis of Stantec's past experience with remedial work involving similar site characteristics and contaminants, and on the basis of information obtained from the review of resources such as the "Federal Remediation Technologies Roundtable (FRTR) Cost and Performance Remediation Case Studies and Related Information" CD-ROM.

While proven technologies received prime consideration, innovative technologies were considered if there was reason to believe that such technologies could improve the performance of the remedial action or significantly reduce the need for a long-term site management plan. Several technologies can be combined to form a single remedial approach. It is assumed that sub-slab depressurization is a required mitigation measure and will be implemented regardless of the remedial measure chosen.

Remedial methods and technologies, on their own or in combination as a remedial approach, were pre-screened and eliminated from further consideration based on the following pre-screening criteria:

- Are unlikely to address site issues and attain remedial action objectives;
- Are incompatible with site contaminants;
- Are clearly precluded by site conditions, including Germanow-Simon's need to continue to use the warehouse and loading dock in the Building B Annex in order to remain in production;
- Are not fully demonstrated, unreliable, or have performed poorly; or
- Are inappropriate based on engineering judgment.

The following table lists those methods, technologies and approaches that were excluded from the more detailed evaluation of alternatives based on the above criteria.

Discarded Method, Technology, or Approach	Description/Justification
Aerobic In Situ Bioremediation	• Not appropriate for the main contaminants at the site due to the fact that it hinders biodegradation of PCE, TCE, and DCE, which are anaerobically biodegradable.
Air Sparging & SVE	• Enhanced aerobic biodegradation using sparging in groundwater (although combined with soil vapor extraction in the vadose zone) is not appropriate for the main contaminants at the site due to the fact that it hinders biodegradation of PCE, TCE, and DCE, which are anaerobically biodegradable. • Not as efficient as high vacuum extraction given low groundwater recovery rates.
Dual Phase Extraction	• Dual-Phase systems extract vapor and aqueous streams separately using dedicated pumps. These systems are used when high groundwater recovery rates are expected. However, the Site has low groundwater recovery rates. • The MPVE pilot study (while demonstrating the effectiveness of high vacuum extraction at the Site) also demonstrated that groundwater recovery rates that are insufficient to justify the implementation of a dedicated groundwater pump.
Enhanced Anaerobic Biodegradation	• The injection of whey, sodium lactate or chitin to the subsurface to enhance anaerobic reductive dechlorination only addresses the soils adjacent to the point of injection and the overburden groundwater impacts. • Not a viable solution for low permeability soils or bedrock impacts such as those present at the Ward Street Site.

Discarded Method, Technology, or Approach	Description/Justification
Excavation of contaminated soils in the Building B Annex Area	• Excavation of soils below Building B Annex is considered to be neither cost-effective nor a technical feasible remedial method due to the lateral and vertical extent of contamination adjacent to and below building foundations; • Required shoring and support would be very costly, and would significantly impact ongoing business operations which require constant use of the facility's only loading dock which is located at the Building B Annex.
Horizontal Flow Barrier - Sheet Pile Wall or Slurry Trench combined with Iron Reactive flow gates	• Contaminants react with the iron filings in the reactive gate, but does not address flow of contaminants in bedrock; • Difficult to implement due to the presence of subsurface infrastructure and building foundations along Ward and St. Paul Streets. High overall cost of approach if used in combination with any of the other methods required for addressing the other impacted areas.
In Situ Bimetallic Nanoscale Particle (BNP) Treatment	• Technology consisting of pressure injection, with open probe-rods, of submicron particles of zero valent iron (Fe0, with a trace coating of a noble metal that acts as a catalyst). Used to remediate chlorinated VOC impacts to groundwater in high-permeability soils (i.e. coarse sand) and at great depths; • Though shown to be effective, this technology is inappropriate for the Site given the relatively low permeability of the soils.

Discarded Method, Technology, or Approach	Description/Justification
In Situ Conductive Heating	• The heating of unsaturated soils to 212 F to 500 F (followed by soil vapor extraction through heater/vacuum wells) is typically a treatment applicable only to the vadose zone – does not address overburden and bedrock groundwater impacts. Area to be treated must be dewatered in order to be effective. Would adversely affect utilities; • High overall costs.
In Situ Soil Flushing of Groundwater - Surfactant-Enhanced Aquifer Flushing) (using solution of surfactant, calcium chloride, isopropyl alcohol and water)	• High cost of $600/C.Y. as per demonstration projects makes this approach cost prohibitive.
Iron Reactive Wall along north side of Ward Street	• Does not address flow of contaminants in bedrock; • Difficult to implement with multiple utilities; • High overall cost of approach if used in combination with any of the other methods required for addressing the other source areas.
No Action (unmonitored natural attenuation)	• Off-site risks to human health and the environment are neither quantified nor mitigated; • High third party liability.
Oxidation/Reduction by chemical injection	• Is more of a polishing technique to increase effectiveness of overburden remediation. • Does not effectively address bedrock impacts.
Phytoremediation	• Commercial/industrial nature of site (presence of buildings, parking areas and sub-surface infrastructure) precludes applicability of this technology; • Not feasible given observed depth of contamination and groundwater table at the Site.

Discarded Method, Technology, or Approach	Description/Justification
Soil Mixing in the Building B Annex Area	• Difficult to implement due to the presence of subsurface infrastructure and building foundations in the Building B Annex area, and would significantly impact ongoing business operations which require constant use of the facility's only loading dock which is located at the Building B Annex; • Does not address bedrock contamination.
Soil Mixing in the MW-9 area	• Due to the relatively shallow depth and low levels of contamination in these areas, soil mixing is not considered cost-effective relative to other methods.
Soil Vapor Extraction and Thermal Desorption Soil Heating	• Does not address overburden or bedrock groundwater impacts; • High capital and operating costs (electricity).
Steam Enhanced Extraction (SEE)	• In Situ remediation method consisting of a combination of shallow soil vapor extraction, deep and shallow steam injection and deep and shallow groundwater extraction is only cost effective for large-scale sites (10^4-10^5 C.Y.); • Does not address bedrock contamination.

5.2 EVALUATION OF REMEDIATION ALTERNATIVES

Four remediation alternatives were not excluded in the preliminary screening. They will be evaluated in more detail based upon the screening criteria set forth in 6 NYCRR Part 375. Those four alternatives are:

Evaluated Method, Technology, or Approach	Description
Monitored Natural Attenuation (MNA)	• VOCs are organic molecules that are capable of being degraded by natural processes over time. This alternative takes steps to cut off all exposure (like the sub-slab depressurization system) and then periodically monitors the contamination.

Evaluated Method, Technology, or Approach	Description
Enhanced MNA	• Enhanced MNA includes the implementation of injection wells for sub-surface application of chemical and microbial materials that accelerate contaminant degradation in anoxic and oxic cycle
Multi Phase Vacuum Extraction (MPVE) plus soil excavation with off-site disposal	• combination of MPVE extraction of contaminants contained in soil vapor and in groundwater from beneath and in front of the Building B Annex, and excavation and off-site disposal of soils from the former Lilac Laundry area.
MPVE	• multi phase vacuum extraction of contaminants contained in soil vapor and in groundwater from beneath and in front of the Building B Annex, and contained in the soils from the former Lilac Laundry area.

In accordance with Title 6 of the NYCRR part 375, both restricted and un-restricted use alternatives are evaluated in terms of the 9 criteria identified in Section 4.1(e) of Draft DER-10 (2002) and as described in Section 4.8 of the BCP Guidance (2004). For the purpose of this analysis, criterion 7 relating to cost was divided into two sub-criteria, capital cost (criterion 7a) and operation, maintenance and monitoring (OM&M) cost (criterion 7b). Hence the following ten discrete criteria are considered as part of this analysis:

1) Protection of Human Health and the Environment: This criterion is an evaluation of the remedy's ability to protect public health and the environment, assessing how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, engineering controls or institutional controls. The remedy's ability to achieve each of the remedial action objectives (RAOs) is evaluated

2) Standards, Criteria, & Guidance (SCG): Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance. All SCGs for the site will be listed along with a discussion of whether or not the remedy will achieve compliance. For those SCGs that will not be met, provide a discussion and evaluation of the impacts of each, and whether waivers are necessary.

3) Short-term Effectiveness & Impacts: The potential short-term adverse impacts and risks of the remedy upon the community, the workers, and the environment during the construction and/or implementation are evaluated. A discussion of how the identified adverse impacts and health risks to the community or workers at the site will be controlled, and the effectiveness of the controls, should be presented. Provide a discussion of engineering

controls that will be used to mitigate short-term impacts (i.e. dust control measures). The length of time needed to achieve the remedial objectives is also estimated.

4) Long-term Effectiveness & Permanence: This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated:

   a) The magnitude of the remaining risks (i.e. will there be any significant threats, exposure pathways, or risks to the community and environment from the remaining wastes or treated residuals?);

   b) The adequacy of the engineering and institutional controls intended to limit the risk;

   c) The reliability of these controls; and

   d) The ability of the remedy to continue to meet RAOs in the future.

5) Reduction of Toxicity, Mobility, or Volume: The remedy's ability to reduce the toxicity, mobility or volume of site contamination is evaluated. Preference should be given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the site.

6) Implementability: The technical and administrative feasibility of implementing the remedy is evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc. Includes the evaluation of the reliability and viability of implementation of the industrial or engineering controls necessary for a remedy.

7) Cost:

   a) Cost Effectiveness – Capital: Short-term costs of implementation, including equipment purchases and engineering/design.

   b) Cost Effectiveness – Operation, Maintenance and Monitoring: Long-term costs of operation, maintenance and monitoring activities to maintain engineering controls.

8) Community Acceptance: Provide a summary of the public participation program that was followed for the project as per section 1.10 of the DER-10. The public's comments, concerns and overall perception of the remedy are evaluated in a format that responds to all questions that are raised (i.e. responsiveness summary).

9) Land Use: Evaluation of the reasonable anticipated future use of the site and its surroundings when unrestricted levels would not be achieved and should consider the factors presented in Appendix 2 of the BCP Guidance (2004) including applicable zoning laws and maps.

A score of 0 to 10 was assigned for each criterion, for a total of 10 scores per alternative and a maximum total score of 100, whereby a greater sum of the scores represents a better alternative overall. Cost effectiveness criteria 7a and 7b were assigned a score based on the relative performance of each alternative with respect to the lowest and highest estimate per criterion. All other alternatives were qualitatively assessed for this evaluation and assigned a score that is independent of the score assigned to other alternatives. A matrix detailing the analysis of viable remedial alternatives is presented in Table 13. Supporting calculations and conceptual design cost estimates and assumptions for the four selected alternatives are provided in Tables 7 through 12.

The following subsections briefly describe each of the selected remedial alternatives, followed by Stantec's recommended remedial alternative. All alternatives include sub-slab depressurization.

5.2.1 Alternative A : Monitored Natural Attenuation (MNA)

Alternative A consists of monitored natural attenuation with an assumed duration of 30 years. Capital costs are relatively low since they involve only installation of supplemental monitoring wells. Despite the fact that this alternative is the least costly of the 4 that were analyzed, this alternative is considered the least favorable since it does not robustly address the "protection of human health and the environment", "SCGs", "long-term effectiveness and permanence" and "reduction of toxicity, mobility or volume" criteria. This alternative also demonstrates poor remedial 'value' relative to its implementation costs: its cost approaches that of an aggressive remedial program that is more likely to comply with regulatory agency requirements.

Score	Capital	OM&M	Total
39%	$74,000	$921,000	$995,000

5.2.2 Alternative B: Enhanced Monitored Natural Attenuation (EMNA)

Alternative B consists of enhanced monitored natural attenuation with an assumed duration of 20 years. Capital costs are increased relative to MNA due to the implementation of injection wells for sub-surface application of chemical and microbial enhancements (EHC-O, EHC and TERRAMEND) that would accelerate contaminant degradation in anoxic and oxic cycles. OM&M costs are reduced based on the assumption that the applied enhancements would reduce remediation timelines. As per MNA, this alternative will require land use restrictions. This alternative, although better than MNA, does not robustly address the "protection of human health and the environment", "SCGs", "long-term effectiveness and permanence" and "reduction of toxicity, mobility or volume" criteria. However, EMNA is considered more favorable than MNA since the enhancements would offer a better control of byproduct formation (i.e. vinyl chloride) than natural degradation.

Score	Capital	OM&M	Total
44%	$204,000	$860,000	$1,064,000

5.2.3 Alternative C : MPVE and Soil Excavation and Off-Site Disposal

Alternative C consists of a combination of multi phase vacuum extraction (MPVE) beneath and in front of the Building B Annex plus excavation and off-site disposal of soils >TAGM-RSCOs in the on-site MW-9 – former Lilac Laundry area. Excavation of the soils beneath the Building B Annex is infeasible because Germanow-Simon's need to continue to use the warehouse and loading dock in the Building B Annex in order to remain in production. A December 2005 MPVE pilot study has already demonstrated the effectiveness of high vacuum extraction in the Building B Annex. In addition to overburden extraction wells, bedrock extraction wells would be installed on-site beneath and off-site in front of the Building B Annex. Due to rising costs of off-site disposal, this alternative is the most costly overall and is the most capital intensive, though its OM&M costs are the lowest of all four alternatives considered. These costs, and an increase in short-term impacts, make it an unfavorable option with respect to alternative D. OM&M costs are based on a 3-year application of MPVE.

Score	Capital	OM&M	Total
71%	$962,000	$599,000	$1,561,000

5.2.4 Alternative D: MPVE

As per alternative C, alternative D considers MPVE on-site beneath, and off-site in front of, the Building B Annex, but extends the system to the on-site MW-9 – former Lilac Laundry area, thereby eliminating the need to excavate and dispose of soils in that area. This alternative is considered to provide the best overall performance, as it satisfactorily complies with all criteria, and its overall cost is not significantly more (approximately 20%) than MNA or EMNA.

Score	Capital	OM&M	Total
77%	$580,000	$620,000	$1,200,000

6.0 Conclusion: Recommended Remedy

Based on the preceding analysis, Stantec recommends remedial alternative D, multi-phase vacuum extraction, for implementation at the two on-site and one off-site areas related to the Ward Street Site. It will remove the ongoing source of contaminants to groundwater. It will remove contaminants from the groundwater and control the plume to the extent feasible. Our analysis indicates this alternative to be the most effective and reliable, solution for remediation of this chlorinated and non-chlorinated VOC-impacted Site. As per the Department's June 23, 2006 comment letter, the Department agrees with Stantec's recommendation and has selected MPVE as the cleanup technology to be implemented at this site.

7.0 Remedial Work Plan

7.1 TECHNICAL APPROACH

7.1.1 Multi Phase Vacuum Extraction

Multi Phase Vacuum Extraction (MPVE) is an in-situ remediation technology used to simultaneously recover VOCs from subsurface soils and groundwater. Vacuum applied to the subsurface through extraction wells screened across the contaminated zone(s) induces a flow of air, soil vapor, groundwater and dissolved-phase VOCs through the impacted area of the subsurface and out the extraction well. Subsurface airflow volatilizes and extracts VOCs from the soil and groundwater, while dissolved-phase VOCs are removed in groundwater extracted by the system. Extracted air and groundwater typically requires treatment on the surface prior to discharge.

MPVE systems typically consist of an inlet separator (a vacuum-rated vessel that separates groundwater from vapor flow), a high vacuum pump (e.g., a liquid ring pump or LRP, capable of vacuums in the vicinity of 28 in mercury (Hg)), heat exchangers (to pre-treat vapor by cooling it down, thereby extracting moisture through condensation, and reheating the vapor to increase final treatment efficiency), vapor phase treatment (usually granular activated carbon often referred to as GAC) and aqueous phase treatment (also typically GAC or an air stripper).

7.1.2 Summary of MPVE Pilot Study Results

Germanow-Simon retained Stantec in December 2005 to perform a MPVE pilot test at the Ward Street Site. The Ward Street Site MPVE System Pilot Test Report was submitted to the Department on April 14, 2006. The key focus of the study was to determine the VOC recovery rates and groundwater recovery rates, and to establish the relationship between vacuum and formation airflow at the Site.

The pilot study involved the use of a MPVE system trailer, the conversion of monitoring wells within the Building B Annex to extraction wells, construction of a header pipe and discharge pipe linked to two 6,900 gallon recovery tanks and connecting the MPVE system trailer to the Building B electrical system. Pro-Act Services Corporation provided a 15 hp LRP pump capable of a 200 air cubic feet per minute (ACFM) flow rate at 28 inches Hg vacuum. Five existing monitoring wells within the Building B Annex impacted area, MW-16R, MW-22, MW-22R, MW-101, and MW-105, were converted to temporary extraction wells for the pilot study.

A total of six formation airflow tests were performed while operating on one, two, or four extraction wells in total fluids recovery mode. Total fluids recovery mode was determined to be the optimal mode of operation. Total fluids recovery mode consists of applying vacuum to the drop tube with the well casing open to sub-slab soils using a slotted screen to collect soil vapor VOCs. The drop tube is set at the bottom of the recovery well. Two pneumatic response tests were conducted while operating on one extraction well. Total operating time was 205 hours (8.5 days).

The MPVE system was very successful as it recovered an estimated 6.4 GAL of VOCs including PCE and its daughter products during the brief pilot study. The majority of the contaminant was removed in the vapor phase. A pneumatic radius of influence of 5 feet was measured during the pilot study. The fully propagated pneumatic radius of influence for the full-scale operation is estimated at 15 feet.

Given the success of the pilot study, a full scale MPVE system, estimated at 50± HP, was recommended in the report. This system will operate at higher airflow rates and will operate on a greater number of extraction wells to be installed at the two on-site and one off-site areas related to the Ward Street Site. A combination of both horizontal and vertical extraction wells were recommended beneath the Building B Annex to address subsurface impacts and prevent potential vapor intrusion.

7.2 PROJECT PLAN

7.2.1 Full-Scale MPVE System Description

Based on the nature and extent of contamination found at the Site and the results of the MPVE pilot study, a total of 35± extraction wells are planned at the site in 3 distinct areas. A radius of influence of 15 feet is assumed as per the pilot study report, resulting in a grid spacing of 20 feet between extraction wells. Preliminary locations of the extraction wells are shown in Figure 7. The MPVE system will be pre-fabricated, container-mounted, pre-piped, and pre-wired and is expected to contain the following major components:

- One 50 HP, 1300 ACFM (max) @ 20”in Hg capacity air cooled rotary lobe vacuum pump;
- Moisture removal system for pre-treatment of the vapor exhaust to remove and recover condensate;
- Steel and PVC piping;
- Steel, brass and PVC valves;
- 630 gallon air/water separator tank with internally mounted high efficiency low maintenance oil/water separator and air stripper;
- Aqueous phase bag filters;
- Two 2,000 lbs vapor-phase GAC treatment vessels; and
- One 200 lbs aqueous-phase GAC treatment vessel.

7.2.2 Sub-Slab Depressurization System Description

In order to address potential vapor intrusion into the Building B Annex, a sub-slab depressurization (SSD) system will be implemented for use during maintenance operations performed on the MPVE unit and following MPVE remediation, thereby ensuring continuous SSD. Horizontal screens placed within the MPVE header network trenches will be connected to a relatively high suction (approx. 20-50 in-H_2O) radon mitigation blower/fan located along the outer wall of the Building B Annex. It is proposed that bleed air for some of the MPVE extraction wells be drawn from the SSD horizontal screen network during MPVE operation to achieve SSD. For the duration of the MPVE remedial program, the SSD blower will be automatically activated only when the MPVE system is not operational. Following successful remediation of the Site, the SSD unit will be made electrically independent of the MPVE unit.

7.2.3 Site Preparation and Utilities

A series of site preparation activities will be required to implement the proposed MPVE system. Anticipated activities include:

- Installation of vertical overburden and bedrock extraction wells (initial activity) and header piping in trenches in the extraction areas, that will be connected to a central manifold located within the MPVE enclosure;

- Installation of horizontal screens and piping in header network trenches for the sub-slab depressurization system;

- Sub-slab sewer discharge piping to the nearest sewer discharge point in Building B;

- Reconstruction of the Building B Annex floor slab, and the asphalt and/or concrete surfaces off-site in front of the Building B Annex and on-site in the MW-9 former Lilac Laundry area;

- Staging and disposal of concrete, asphalt and contaminated soils removed from trenches and extraction well boreholes; and

- Electrical and telecommunications connections to the existing building.

To the extent possible, excavated soils will be returned to their respective excavations. Excavated soils from installation of vertical extraction wells and trenches that cannot be returned to their respective excavations (>TAGM-SCOs) will be analyzed and disposed of at an approved facility in accordance with applicable regulations.

7.2.4 Vertical Extraction Well Description and Installation

Three groups of extraction wells will be installed: one beneath the Building B Annex, one in front of the Building B Annex, and one in the MW-9 former Lilac Laundry area, respectively. The extraction wells will be 2-inch inside diameter (ID) PVC screen with 0.010-inch slots to promote well efficiency and formation airflow.

The extraction wells will be developed by mechanical surging and bailing to remove the majority of fine-grained materials from the screen and filter pack. Recovered groundwater will be contained in a tank, settled, and treated using the MPVE system once it is operational. The remaining settled sediment will be disposed of in drums.

The extraction wells will be individually connected to a central manifold within the MPVE enclosure using 1.5-inch diameter HDPE (low friction) pipe. The pipe will be attached to the wellheads and drop tubes within flush-mounted 12 -inch surface vaults. Piping will be installed in trenches to a depth of 12 to 18 inches within buildings, and 48 inches in parking areas exposed to freezing weather. Where it cannot be placed at sufficient depths, piping placed outdoors will be heat traced and insulated to protect against freezing.

The proposed MPVE system layout is presented on Figure 7. Extraction wells will be placed on a 20 ft by 20 ft grid configuration, to allow for some overlap assuming a 15 ft radius of influence. This conservative approach will provide flexibility to optimize the system.

7.2.4.1 Building B Annex

A total of fifteen overburden extraction wells will be placed beneath or adjacent to the Building B Annex area, twelve of which will be located indoors on a 20 ft by 20 ft grid (based on a 15 ft radius of influence), while three will be located off-site along Ward Street immediately south of the building near the location of MW-16. The indoor wells will be screened from a depth of 3 ft bgs to the top of bedrock (approx. 22 ft bgs), while the three outdoor wells will be screened from a depth of 8 ft bgs to the top of bedrock to avoid short-circuiting at the surface.

Eight new bedrock extraction wells will be installed in the Building B Annex area to intercept and extract contaminated groundwater flowing through the weathered bedrock. These will be screened from approximately 3 feet below the top of bedrock to 10 feet below the top of bedrock for a screen length of 7 ft and a total well depth of approximately 32 ft bgs. Six of the eight bedrock extraction wells will be located within the Building B Annex, while two will be placed outdoors and off-site along Ward Street immediately south of the building near the location of MW-16.

Four overburden extraction wells are also planned in the MW-15 area. These will be placed on a 20 ft by 20 ft grid and be screened from a depth of approximately 3 ft bgs to 16 ft bgs. Two bedrock extraction wells are planned within the MW-15 area. As per bedrock extraction wells in the Building B Annex, they will be screened from approximately 3 feet below the top of bedrock to 10 feet below the top of bedrock, for a total well depth of approximately 32 ft bgs.

7.2.4.2 MW-9 Area

Six overburden extraction wells are planned in the MW-9 area. These will be screened from a depth of 3 ft bgs to the top of bedrock (located at approximately 20 ft bgs). A new asphalt pad will be constructed over this area to adequately seal the surface and provide protection for the sub-surface header network. Bedrock extraction wells are not required for this area as there are only limited impacts to overburden groundwater.

7.2.5 Permitting

A sewer discharge permit will be required from Monroe County Pure Waters to discharge the treated aqueous effluent. It is understood that an air discharge permit from the Department to discharge the treated vapors will not be required pursuant to the terms of the BCA. However, a substantive review and approval of the anticipated air emissions and the proposed treatment plans by the Department will be required. In addition, a building permit will be required from the City of Rochester.

7.2.6 Site Access and Security

The MPVE system enclosure will be located outdoors along the east wall of Building B in the former High Falls Brewery Parking Lot, which is secured by fencing and a locking gate. The enclosures around the individual wellheads located outdoors will have provisions for locks. Valves, sensors and any other critical operational component of the system will be placed within locked areas.

7.3 SYSTEM OPERATION

Upon completion of construction and equipment checks, the MPVE system will be started. The start-up and shakedown period is anticipated to last approximately one month. Prior to startup, groundwater samples from select monitoring wells (MW-22, MW-22R, MW-16, MW-16R, MW-15, MW-16, MW-105 and MW-9) will be collected and analyzed by the laboratory for VOCs. In addition, static water level readings will be taken at each of the same monitoring wells. During the startup period, the following parameters will be measured and recorded.

- At the Extraction Wells – Vacuum in the well
- At the Extraction unit - Vacuum, discharge pressure, influent and effluent temperature, vapor flow rate, water flow rate, oxygen and carbon dioxide levels, and influent and effluent VOC concentrations in the water and air streams
- At the surrounding monitoring wells – vacuum and depth to groundwater
- Ambient conditions – temperature and precipitation.

To determine the relative performance of each well, vapor flow rate and influent VOC concentration will be measured for each extraction well. This will be accomplished by placing only one well on line for a short period of time, and taking the measurements. If a well is determined to use a large percentage of the flow capacity of the vacuum pump, with a relatively low VOC concentration, flow will be reduced by closing the respective valves.

In addition, select monitoring wells will be periodically fitted with vapor tight caps and manometers of various ranges to measure vacuum. The existing monitoring wells will also be periodically checked for groundwater depth.

The start-up period will end after the MPVE is optimized to extract the most VOCs while addressing the impacted soils and groundwater. After start-up is complete, a report will be submitted to the Department documenting completion of the start-up period. After that, the above data will be collected on a routine basis to assess system performance and assist in determining remediation progress. Collection intervals, and forms to record this data, will be included in the Operations & Maintenance (O&M) plan.

7.3.1 Data Collection and Reporting

Data collection and reporting involves the routine collection and review of process and analytical information. It also involves the development of comprehensive documents to communicate system sampling and analytical requirements to project personnel. The sampling requirements will be presented in the Quality Assurance Project Plan (QAPP) to be included in the detailed design.

A report detailing analytical results and operational data described will be prepared, and submitted to the Department on a quarterly basis. The report will provide data on remediation progress, as well as any problems encountered, as well as the system's vapor and water emissions.

7.3.2 Vapor Sampling

Vapor samples will be collected from the MPVE system exhaust using Tedlar bags at startup and semi-annually and analyzed as per the TO-15 protocol to assess VOC recovery rates and system performance. VOC measurements will also be made with a PID at the system's vapor exhaust prior to and following GAC treatment on a monthly basis.

7.3.3 Groundwater Sampling

It is proposed that monitoring wells MW-22, MW-22R, MW-16, MW-16R, MW-15, MW-16, MW-105 and MW-9, be sampled on a quarterly basis to determine cleanup progress. To evaluate cleanup progress and compare sampling results to earlier, pre-cleanup samples, the MPVE equipment will be shut off for a period of approximately one week prior to sampling. The SSD system will operate during this time to provide uninterrupted vapor intrusion mitigation. The shutdown period will allow the water table to recover from the extraction forces applied during cleanup. After groundwater sampling, the MPVE system will be restarted.

7.3.4 Polishing

Cleanup levels will be reevaluated once the MPVE system has operated to the limits of the technology. The system cannot be shut down unless it is demonstrated that on-site contamination will not migrate off-site at concentrations that adversely impact the ability of off-site groundwater to meet applicable SCGs. If the MPVE system is operated to its practical limits, and the Department approves shutdown, then additional technologies may need to be evaluated to contain these contaminants on-site. These technologies must include appropriate engineering and institutional controls and be protective of public health and the environment. If required, a polishing agent (e.g. Hydrogen release compound (HRC)) will be considered as an additional technology for the Site. This technology would include injection through the existing header network from within the MPVE enclosure to further degrade any remaining VOCs in the subsurface. The MPVE could be selectively operated to mobilize injected enhancements through the contaminated areas, thereby increasing the range of influence of injection.

7.3.5 Cleanup Equipment Shutdown Criteria and Closure Sampling

As previously noted, cleanup levels will be reevaluated once the MPVE system has operated to the limits of the technology. Cleanup levels will be reevaluated once the MPVE system has operated to the limits of the technology. The system cannot be shut down unless it is demonstrated that on-site contamination will not migrate off-site at concentrations that adversely impact the ability of off-site groundwater to meet applicable SCGs. If the MPVE system is operated to its practical limits, and the Department approves shutdown, then additional technologies may need to be evaluated to contain these contaminants on-site. These technologies must include appropriate engineering and institutional controls and be protective of public health and the environment. The cleanup equipment will remain in place until closure sampling has been completed and approval from the Department has been obtained.

After the cleanup equipment has been shut off, monitoring wells MW-22, MW-22R, MW-16, MW-16R, MW-15, MW-16, MW-105 and MW-9 will be sampled within approximately 2 weeks. If the contaminant concentration levels are at or below the remedial action goals, a final sampling event will be planned. The final sampling event will consist of a limited number (approximately 8) of soil boring samples. The locations of the soil samples will be proposed to the Department for review and approval prior to collection.

If the water concentrations have rebounded after cleanup system shutdown to levels above remedial action goals, a polishing injection may be performed, and MPVE may be selectively applied to mobilize the injected enhancements through the contaminated area. Following this, another monitoring well sampling event will be performed.

7.4 PROTECTION OF PUBLIC HEALTH AND THE ENVIRONMENT

7.4.1 Institutional & Engineering Controls and Certifications

An environmental easement will be granted the Department restricting use of the Site to commercial/industrial uses and prohibiting the use of the groundwater until the MPVE system is shutdown with the Department's approval. If the then applicable SCGs for unrestricted use are not attained at MPVE shutdown, then it is anticipated that an environmental easement will continue in effect with such modifications as the Department deems appropriate based upon the degree of cleanup attained. In addition, a soil management plan may be required for any future excavations at the Site.

7.4.2 Health & Safety Plans

Stantec previously prepared a Health and Safety Plan (HASP) for the Remedial Investigation at this Site. This HASP will be modified as needed as part of the final design.

7.4.3 Community Air Monitoring Program

Stantec previously prepared a Community Air Monitoring Plan (CAMP) for the Remedial Investigation. This CAMP will be modified as needed as part of the final design.

7.5 PROJECT MANAGEMENT PLAN

7.5.1 Project Management

Stantec Project Manager Mike Storonsky has primary responsibility for the development and implementation of the BCP Remedial Work Plan, including coordination among the task leaders. Mr. Storonsky will identify staff requirements, direct and monitor site progress, and be responsible for project performance within the established budget and schedule. He will also coordinate the activities of the task leaders, support staff, acquisition of engineering or specialized technical support, and all other aspects of the day-to-day activities associated with the project.

Project engineers Dave Belaskas, P.E., Marc Bouchard, Eng., James Millar, E.I.T. and Michael Lakustiak, P.E. will be responsible for management of construction and installation activities, in addition to overall project quality, including the development of the SAP, review of task-specific QA/QC procedures, review of laboratory, vendor, and contractor plans and procedures, review of draft and final reports, and auditing of specific tasks at established intervals. They will also be responsible for management of on-site operations conducted by Stantec, including sampling and well installation activities. Stantec project engineers will also ensure that the subcontractor laboratories perform analyses as described in the QAPP, in conformance with QA/QC requirements. They will be responsible for proper collection, packaging, preservation, and shipping of samples in accordance with the QAPP and other Department guidelines, and for reviewing validated data and transmitting them to the project team for use in evaluations, analyses, and reports. Messrs. Belaskas, Bouchard, Millar and Lakustiak will report directly to the Project Manager. Mr. Dave Gnage will act as the Site Health and Safety Officer.

One or more ELAP accredited analytical laboratories will provide analytical services during remediation of the Site.

A specialty environmental contractor, Matrix, which is knowledgeable about well installation, and MPVE processes and equipment, will perform the construction and installation of the MPVE system. They will be responsible for the mobilization and setup of the system on site, with observation from Stantec's project engineers.

7.5.2 Project Schedule

The anticipated project schedule for implementation of remedial activities at the Site is shown in Figure 8. In developing this schedule, a 30-day period has been assumed for Department review and approval of deliverables. It has also been assumed that the required permits (e.g., sewer discharge permit for discharge of treated groundwater) can be obtained in a timely fashion.

7.5.3 Quality Assurance/Control Plan

Following Department approval of this Work Plan for public comment, Stantec will prepare a Quality Assurance Project Plan. The QAPP will be submitted to the Department for its review and approval concurrent with the public comment period.

7.5.4 Detailed Design

Following Department approval of this Work Plan for public comment, Stantec will finalize the detailed remedial design of the system. The detailed design will be submitted to the Department for its review and approval immediately after its completion. The detailed design will include: well construction details and layout; process diagrams; system startup protocols; monitoring protocols for carbon breakthrough; an Air-Guide 1 analysis for vapor discharges; sewer connection details; confirmation that the screened intervals of any existing groundwater monitoring wells proposed to be used as part of the MPVE do in fact fall within the proper zones for remediation; and confirmation that there will be adequate monitoring points within the source area after the selected groundwater quality monitoring wells are incorporated into the MPVE system.

7.5.5 Site Management Plan

In conjunction with the detailed design, Stantec will prepare a Site Management Plan for the MPVE system. The Site Management Plan will include an Operation, Maintenance & Monitoring (OM&M) Plan with provisions for periodic certifications and identifications of restrictions for site use, soil excavations and groundwater use. This plan will be submitted to the Department for its review and approval in conjunction with the detailed design during the RWP public comment period.

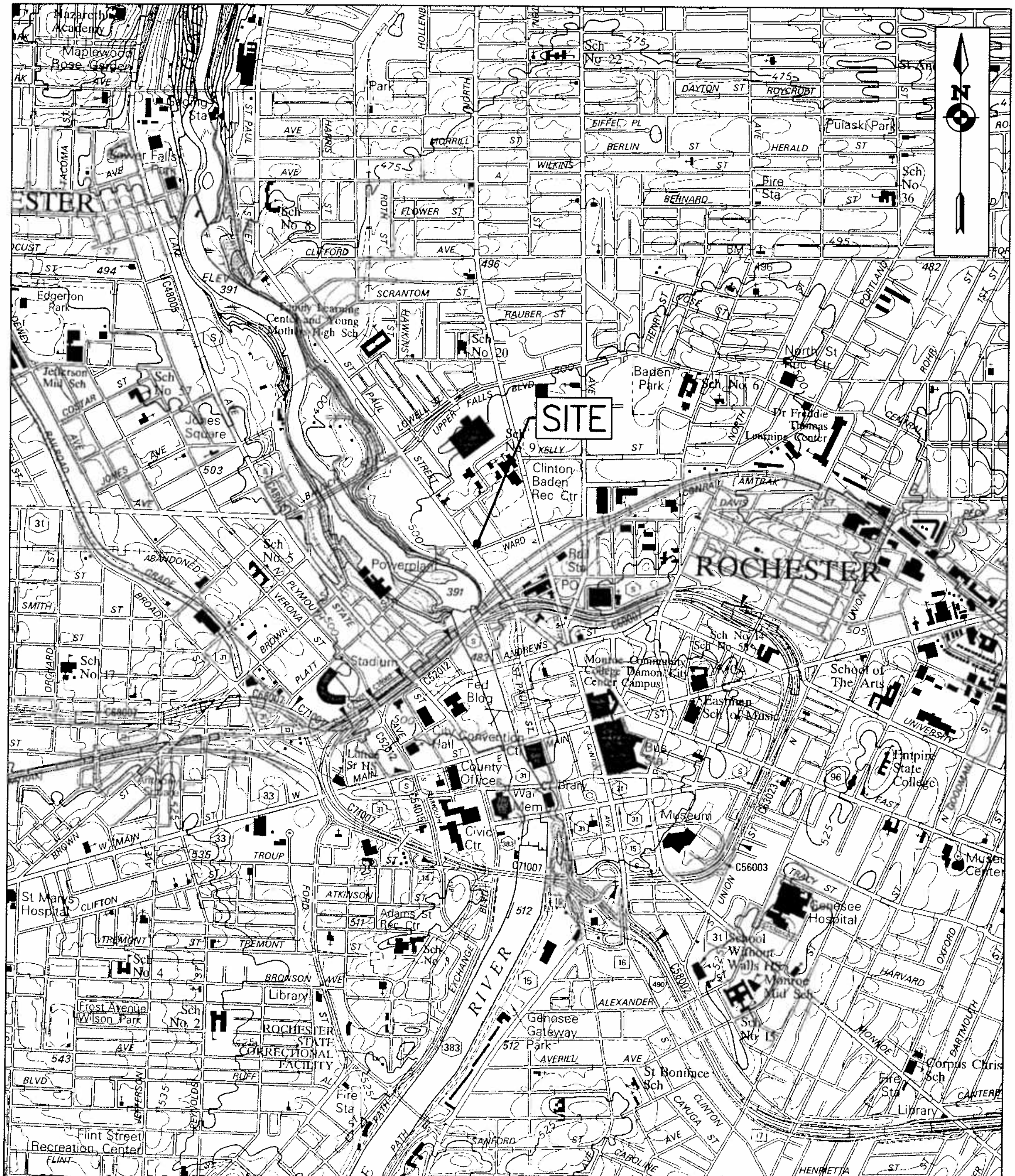
7.5.6 Project Reporting

Stantec will prepare a Final Engineering Report detailing the first month of optimization and operation and submit this to the Department within one month of system startup. Subsequently and during remediation, Stantec will provide quarterly reports showing updated system performance and groundwater monitoring results. Following completion of the remedial program at the Site, Stantec will prepare a final MPVE report summarizing all system performance data and monitoring results, as well as closure soil sampling results.

7.5.7 Certificate of Completion

It is essential to the business operations of the Germanow-Simon Corporation, the company that has volunteered to cleanup this contamination for which it is not responsible and that is applying to cleanup the contamination identified at 8-28 Ward Street, that the Certificate of Completion be attained by the end of tax year 2006. Therefore, the aim of the accelerated and robust remedial effort at the Site is to attain a Certificate of Completion by December 2006. This is wholly consistent with the declared policy and findings of the New York State Legislature in creating the BCP to encourage businesses to volunteer to remediate these inner city brownfield properties. In order to accomplish this, an environmental easement will be in place and a Final Engineering Report will be submitted to the Department. It is anticipated that the environmental easement and the Final Engineering Report will have to be submitted to the DEC by mid-October for approval. Hence, system construction, startup and optimization will have to be completed by the end of September 2006.

FIGURES



PROJECT ENGINEER/ARCHITECT: D. BELASKAS, P.E.

PROJECT MANAGER: M. STORONSKY

DRAWN BY: A. LESS

SCALE: 1" = 2000'

FIRST ISSUE DATE: 02/2006

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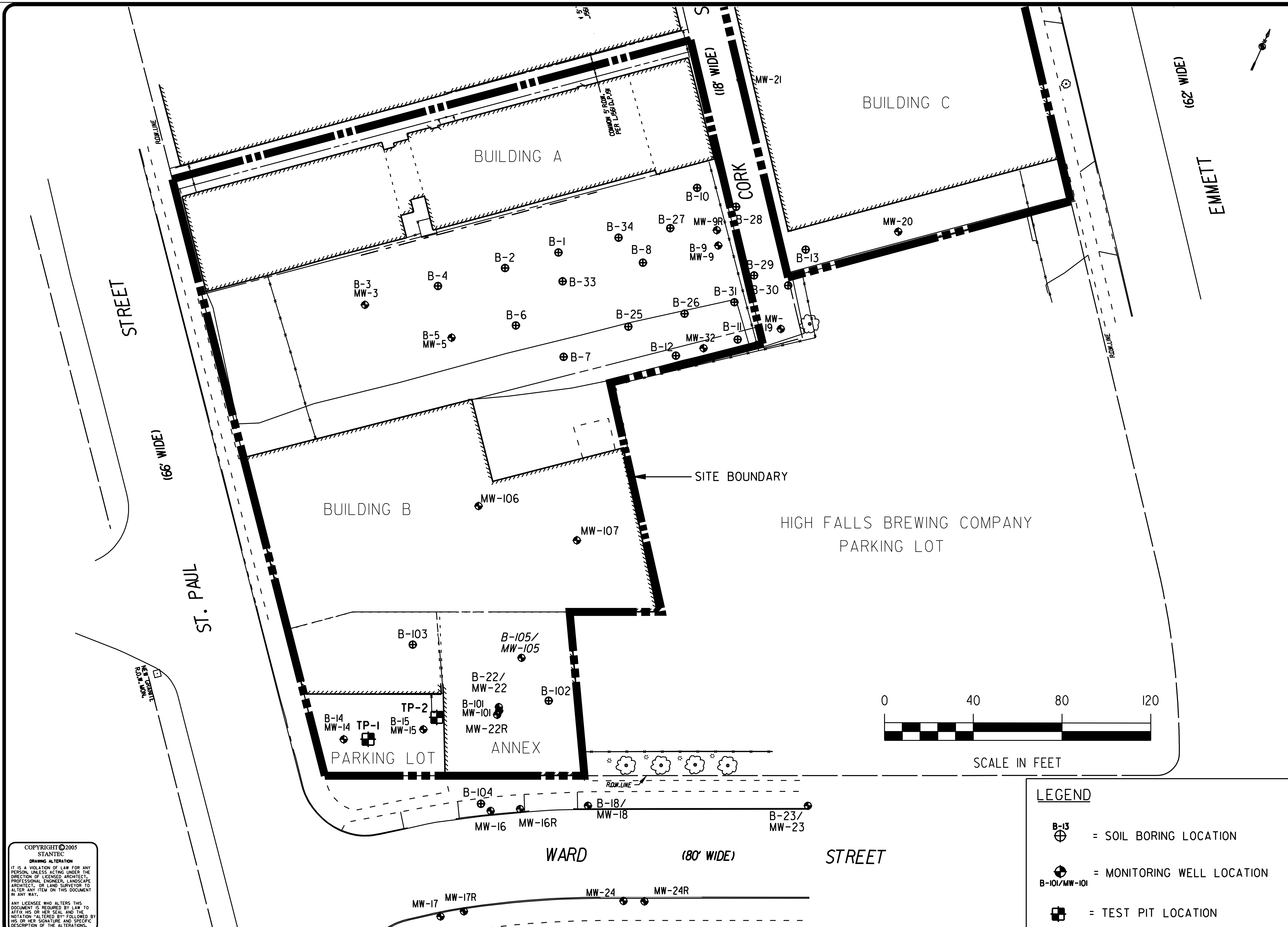
PROJECT: ALTERNATIVES ANALYSIS REPORT AND REMEDIAL WORK PLAN
WARD STREET SITE
ROCHESTER, NEW YORK

TITLE OF DRAWING: SITE LOCATION MAP

PROJECT NO. 190500014

DRAWING NO. FIG. 1

U:\1405205\civil\ALTERNATIVE ALAYSIS Report Figures\FIG1.dwg



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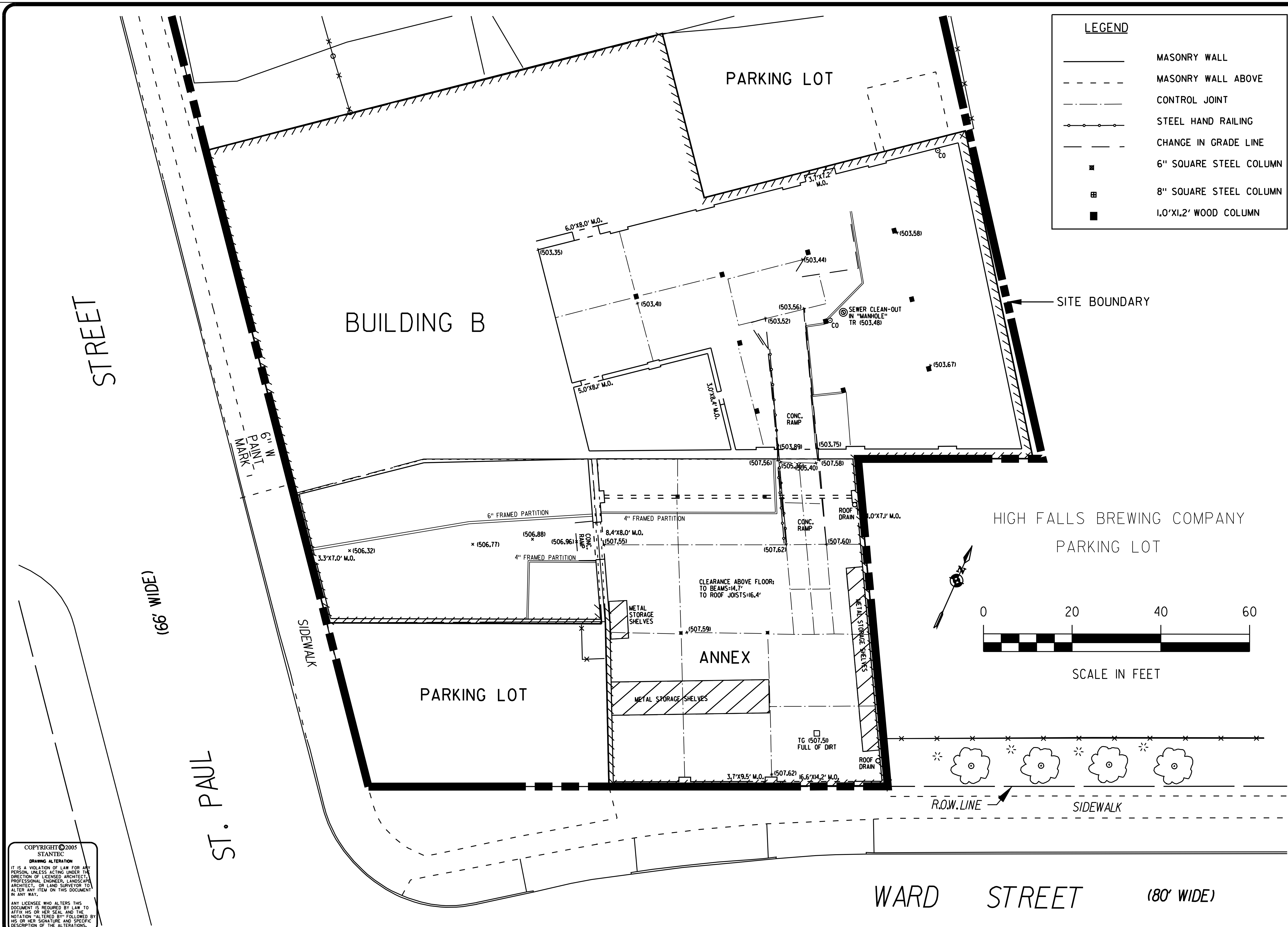
PROJECT
ALTERNATIVES ANALYSIS REPORT AND REMEDIAL WORK PLAN
WARD STREET SITE
ROCHESTER, NEW YORK

TITLE OF DRAWING
BORING AND MONITORING WELL LOCATION MAP

PROJECT NO.
190500014

DRAWING NO.
FIG. 2



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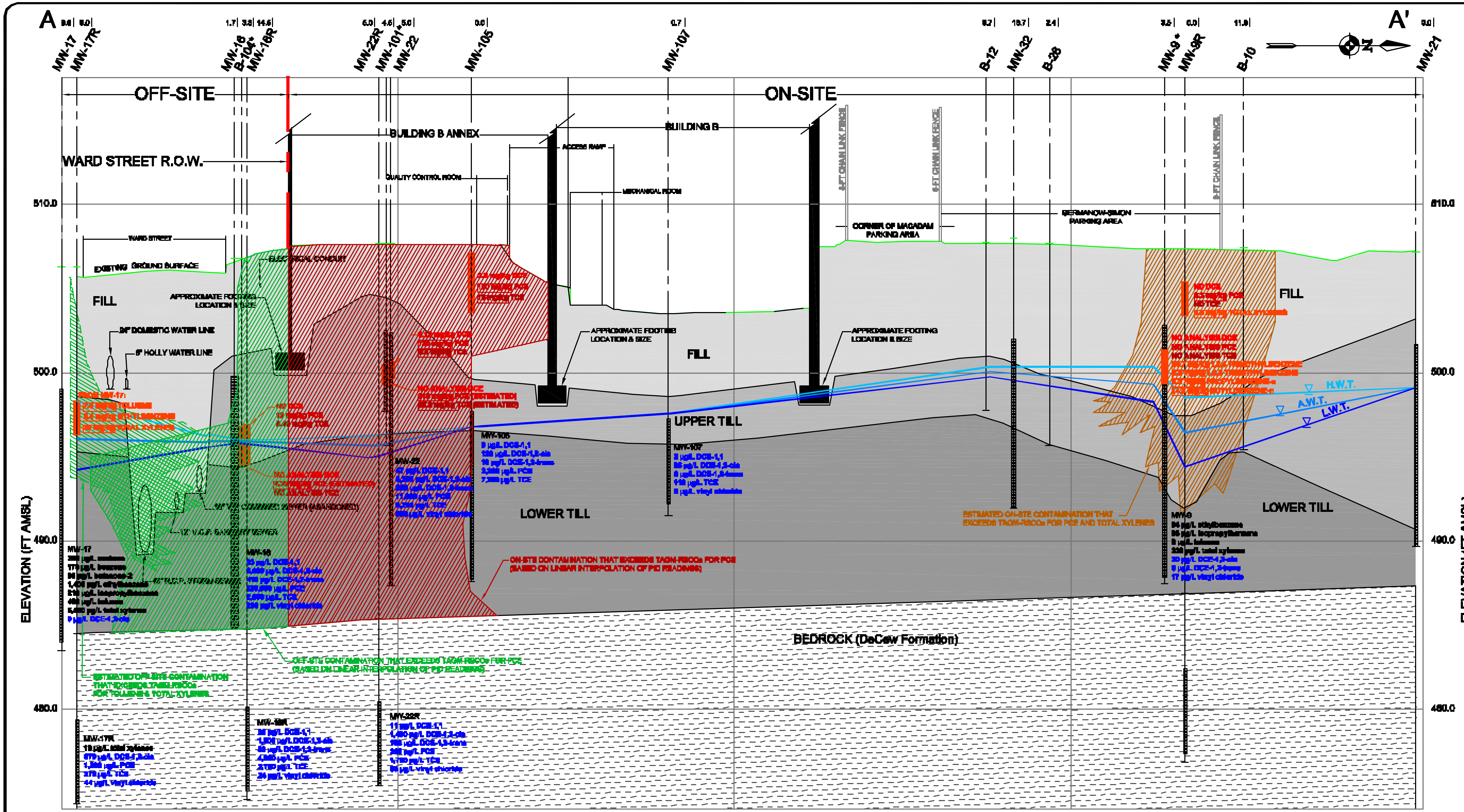
PROJECT
ALTERNATIVES ANALYSIS REPORT AND REMEDIAL WORK PLAN
WARD STREET SITE
ROCHESTER, NEW YORK

TITLE OF DRAWING
BUILDING B ANNEX FLOOR PLAN

PROJECT NO. 190500014
DRAWING NO. FIG. 3



LEGEND:

= ON-SITE PCE CONTAMINATION > TAGM-RSCOs (BASED ON LINEAR INTERPOLATION OF PID READINGS)

= ESTIMATED ON-SITE STODDARD SOLVENT CONTAMINATION > TAGM-RSCOs

= OFF-SITE PCE CONTAMINATION > TAGM-RSCOs (BASED ON LINEAR INTERPOLATION OF PID READINGS)

= ESTIMATED OFF-SITE PETROLEUM HYDROCARBON CONTAMINATION > TAGM-RSCOs

= SAMPLE LOCATION

DCE = DICHLOROETHENE -1,2 (CIS)
PCE = TETRACHLOROETHENE
TCE = TRICHLOROETHENE
ND = ANALYZED BUT NOT DETECTED

BOXED SOIL CONCENTRATIONS EXCEED TAGM-RSCOs.

= APPROXIMATE WELL SCREEN LOCATION

H.W.T. = APPROXIMATE HIGH GROUNDWATER WATER TABLE ELEVATION

A.W.T. = APPROXIMATE AVERAGE GROUNDWATER TABLE ELEVATION

L.W.T. = APPROXIMATE LOW GROUNDWATER TABLE ELEVATION

10 µg/L total xylenes = NON-CHLORINATED VOCs IN GROUNDWATER >CLASS GA STANDARDS

870 µg/L DCE-1,2-cis = CHLORINATED VOCs IN GROUNDWATER >CLASS GA STANDARDS

3.5 | = OFFSET FROM A-A' AXIS.
(| INDICATES DISTANCE IS EAST OF AXIS)
(| INDICATES DIRECTION IS WEST OF AXIS)

* = NON-ASP SOIL ANALYSES. CONCENTRATIONS FOR PCE AND TCE IN SOIL SAMPLES COLLECTED FROM MW-101 AND B-104 ARE ESTIMATED

NOTES:

1. GROUNDWATER SURFACES, STRATA INTERFACES AND GROUND SURFACE ARE BASED ON LINEARLY INTERPOLATED SURFACES THAT INCLUDE ALL AVAILABLE BORINGS AND SURVEY DATA.
2. UNDERGROUND ELECTRICAL SERVICE IS PRESENT WITHIN WARD STREET R.O.W. TYPICAL DEPTH FOR THIS SERVICE IS 18-24" BELOW GROUND SURFACE.

KEY MAP
SCALE 1"=200'

NO.	REVISIONS	DATE	BY
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PROJECT ENGINEER/ARCHITECT: D. BELASKAS, P.E.
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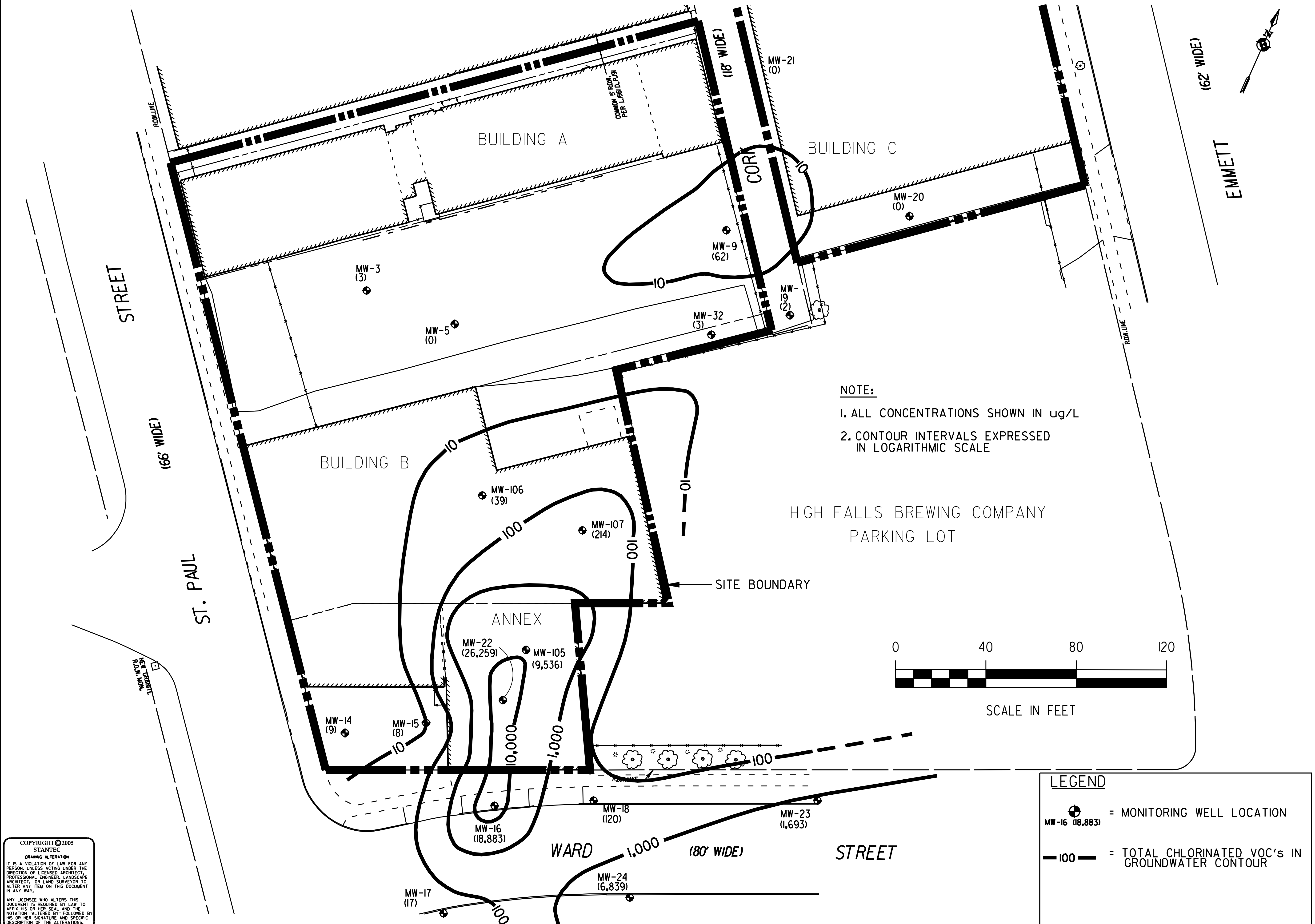
PROJECT: ALTERNATIVES ANALYSIS REPORT AND REMEDIAL WORK PLAN, WARD STREET SITE, ROCHESTER, NEW YORK

TITLE OF DRAWING: STRATIGRAPHY AND INTERPRETED CONTAMINANT DISTRIBUTION

PROJECT NO. 190500014

DRAWING NO. FIG. 4



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PROJECT ENGINEER/ARCHITECT
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PROJECT MANAGER
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SCALE
AS SHOWN
FIRST ISSUE DATE
2/2006

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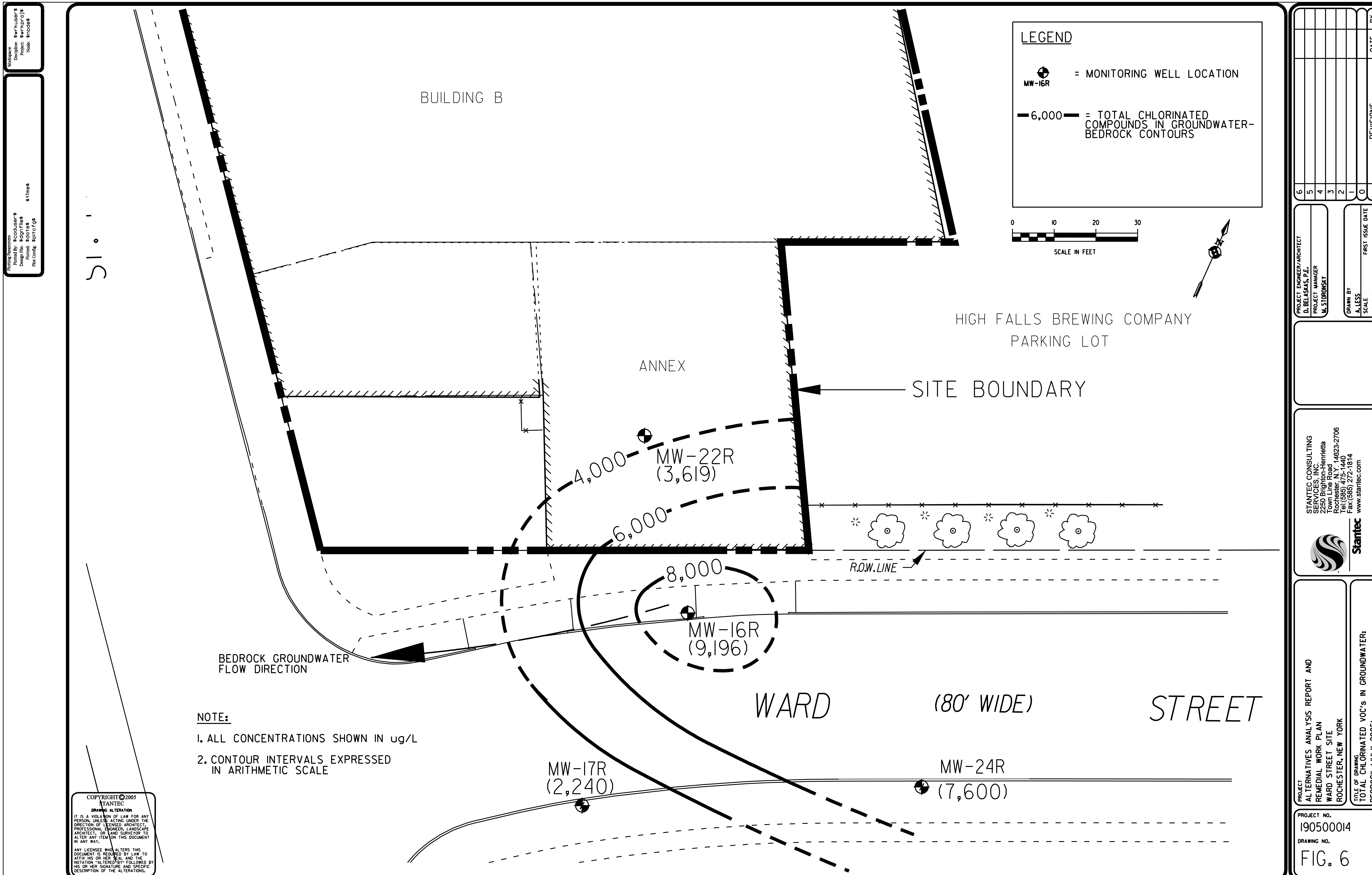
PROJECT
ALTERNATIVES ANALYSIS REPORT AND REMEDIAL WORK PLAN
WARD STREET SITE
ROCHESTER, NEW YORK

TITLE OF DRAWING
TOTAL CHLORINATED VOC's IN GROUNDWATER: OVERBURDEN (JULY 2005)

PROJECT NO.
190500014

DRAWING NO.
FIG. 5


BUILDING B
ANNEX
HIGH FALLS BREWING COMPANY
PARKING LOT
SITE BOUNDARY
LEGEND
MW-16R = MONITORING WELL LOCATION
6,000 = TOTAL CHLORINATED COMPOUNDS IN GROUNDWATER- BEDROCK CONTOURS
0 10 20 30
SCALE IN FEET
4,000
6,000
8,000
MW-22R
(3,619)
MW-16R
(9,196)
MW-17R
(2,240)
MW-24R
(7,600)
R.O.W. LINE
BEDROCK GROUNDWATER
FLOW DIRECTION
WARD (80' WIDE) STREET
NOTE:
1. ALL CONCENTRATIONS SHOWN IN ug/L
2. CONTOUR INTERVALS EXPRESSED
IN ARITHMETIC SCALE
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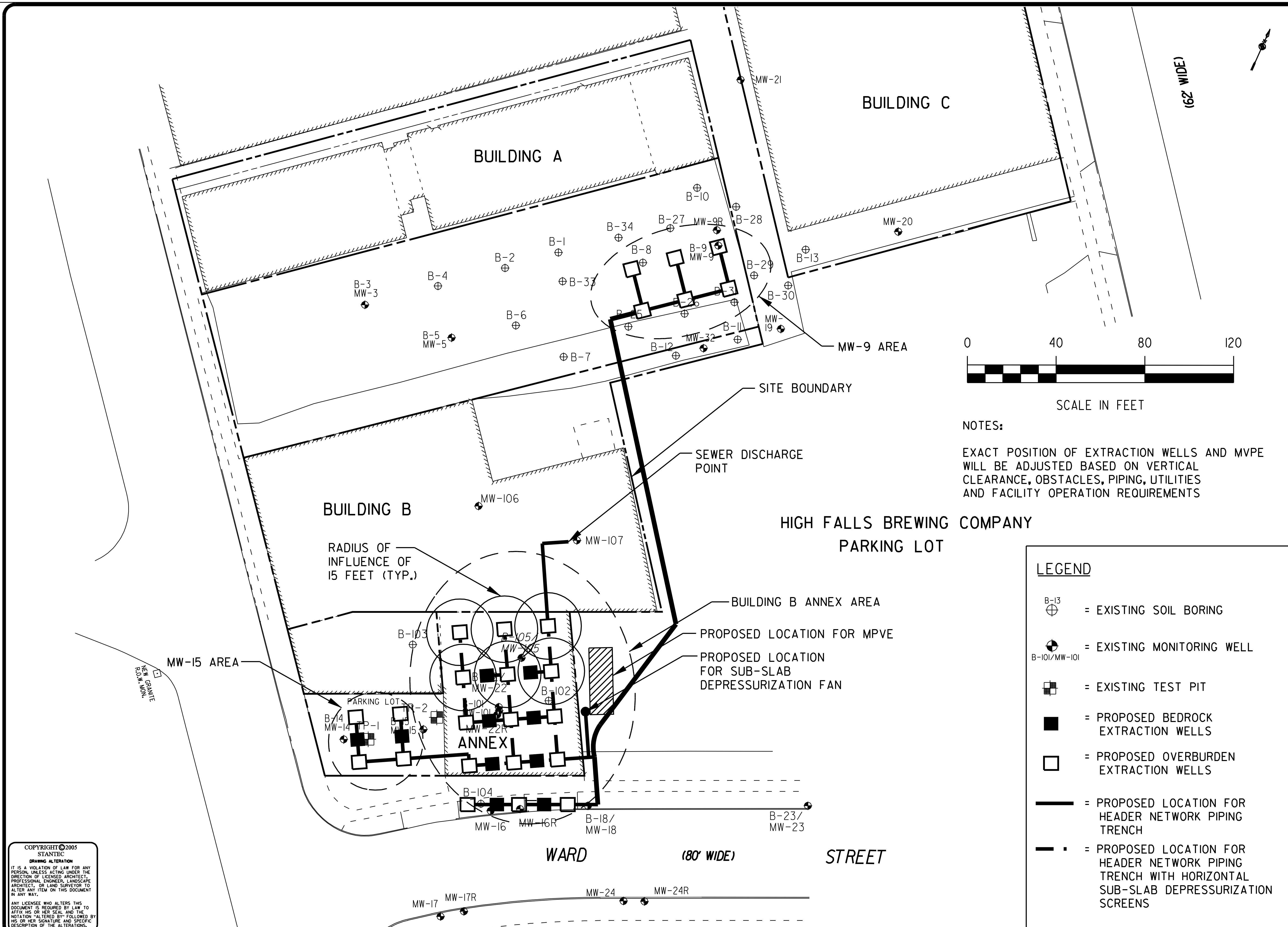
WARD STREET SITE
ROCHESTER, NEW YORK
TITLE OF DRAWING
TOTAL CHLORINATED VOC's IN GROUNDWATER:
BEDROCK (JULY 2005)
PROJECT NO.
190500014
DRAWING NO.
FIG. 6



REVISIONS — 6, 5, 4, 3, 2, 1, 0 — DATE — BY

PROJECT ENGINEER/ARCHITECT D. BELASKAS, P.E.
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FIRST ISSUE DATE 2/2006

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PROJECT
ALTERNATIVES ANALYSIS REPORT AND REMEDIAL WORK PLAN
WARD STREET SITE
ROCHESTER, NEW YORK

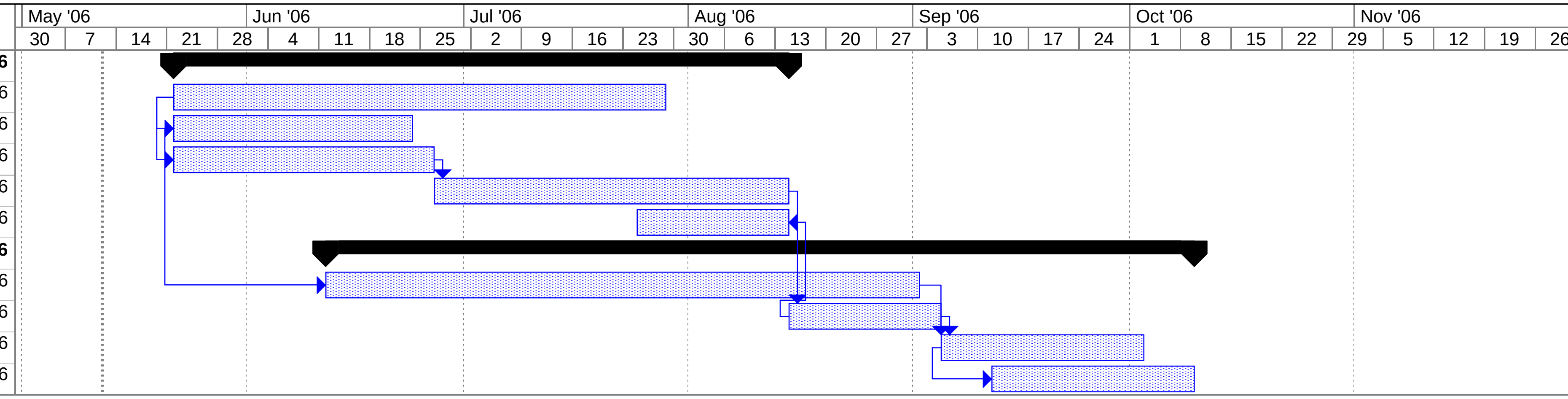
TITLE OF DRAWING
PROPOSED LAYOUT OF MPVE AND SSD SYSTEM

PROJECT NO. 190500014

DRAWING NO. FIG. 7

Figure 8 : Proposed Project Schedule

ID	Task Name	Duration	Start	Finish
1	**AAR & RWP Review and Detailed Design**	**61 days**	**Mon 5/22/06**	**Tue 8/15/06**
2	NYSDEC Review, 45-day Public Comment Period and Approval of AAR & RWP	50 days	Mon 5/22/06	Fri 7/28/06
3	MPVE & SSD Detailed Design	25 days	Mon 5/22/06	Fri 6/23/06
4	OM&M and QA/QC Plans	26 days	Mon 5/22/06	Mon 6/26/06
5	NYSDEC Review and Approval of Detailed Design and OM&M & QA/QC Plans	35 days	Tue 6/27/06	Mon 8/14/06
6	Sewer Discharge Permitting	15 days	Tue 7/25/06	Tue 8/15/06
7	**MPVE Construction & Startup**	**86 days**	**Mon 6/12/06**	**Mon 10/9/06**
8	MPVE Unit Production & Delivery	60 days	Mon 6/12/06	Fri 9/1/06
9	Header Network Construction and System Installation	15 days	Tue 8/15/06	Mon 9/4/06
10	System Startup & Optimization	20 days	Tue 9/5/06	Mon 10/2/06
11	MPVE Remedial Action Report	20 days	Tue 9/12/06	Mon 10/9/06



Project: AAR & RWP Schedule
Date: Fri 5/12/06

Task	Progress	Summary	External Tasks	Deadline
Split	Milestone	Project Summary	External Milestone	

TABLES

Table 1: Summary of Soil Analytical Results - VOCs

Contaminant	TAGM 4046 Recommended Soil Cleanup Objectives (mg/kg)	On-Site Area 1 : Building B Annex				
		MW-14	MW-14	MW-15	MW-22	MW-101*
Sample depth		8 to 10 ft	18 to 18.9 ft	8 to 10 ft	7 to 8 ft	8 to 10 ft
Northing (ft)		-48953.7	-48953.7	-48934.85	-48911.94	-48913.36
Easting (ft)		31844.91	31844.91	31876.12	31903.02	31903.84
Ground Elevation (ft AMSL)		506.80	506.80	507.40	507.66	507.70
Sampling Date		Apr-99	Apr-99	Apr-99	Aug-02	Apr-99
Volatiles						
Acetone	0.2	-	-	-	0.004	-
Benzene	0.06	-	-	-	ND	ND
Bromodichloromethane	-	-	-	-	ND	-
Bromoform	-	-	-	-	ND	-
Bromomethane	-	-	-	-	ND	-
Butanone-2	-	-	-	-	ND	-
Butylbenzene	-	-	-	-	-	-
Butylbenzene (sec)	10	0.2923	ND	0.1871	-	0.1153
Butylbenzene (tert)	10	1.1866	ND	ND	-	0.0956
Butylbenzene-n	10	ND	ND	ND	-	0.0937
Carbon Disulfide	-	-	-	-	ND	-
Carbon tetrachloride	0.6	-	-	-	ND	-
Chlorobenzene	1.7	-	-	-	ND	-
Chloroethane	1.9	-	-	-	ND	-
Chloroform	0.3	-	-	-	ND	-
Chloromethane	0	-	-	-	ND	-
Cyclohexane	-	-	-	-	ND	-
Dibromo-1,2-chloropropane-3	-	-	-	-	ND	-
Dibromochloromethane	-	-	-	-	ND	-
Dibromoethane-1,2	-	-	-	-	ND	-
Dichlorobenzene-1,2	7.9	-	-	-	ND	-
Dichlorobenzene-1,3	1.6	-	-	-	ND	-
Dichlorobenzene-1,4	8.5	-	-	-	ND	-
Dichlorodifluoromethane	-	-	-	-	ND	-
Dichloroethane-1,1	0.2	-	-	-	ND	-
Dichloroethane-1,2	0.1	-	-	-	ND	-
Dichloroethene-1,1	0.4	-	-	-	ND	-
Dichloroethene-1,2 (cis)	-	-	-	-	0.12	-
Dichloroethene-1,2 (trans)	0.3	-	-	-	ND	-
Dichloropropane-1,2	-	-	-	-	ND	-
Dichloropropene-1,3 (cis)	0	-	-	-	ND	-
Dichloropropene-1,3 (trans)	-	-	-	-	ND	-
Dioxane-1,4	-	-	-	-	-	-
Ethylbenzene	5.5	0.6068	ND	ND	ND	0.1213
Hexachlorobenzene	-	-	-	-	-	-
Hexanone-2	-	-	-	-	ND	-
Isopropylbenzene	2.3	0.361	ND	ND	ND	0.126
Isopropyltoluene-4	-	ND	ND	ND	-	ND
Isopropyltoluene-p	10	0.5197	ND	ND	-	0.2332
Methyl acetate	-	-	-	-	ND	-
Methyl ethyl ketone	-	-	-	-	-	-
Methyl tert-butyl ether	0.12	-	-	-	ND	ND
Methyl-4-pentanone-2	-	-	-	-	ND	-
Methylcyclohexane	-	-	-	-	ND	-
Methylene Chloride	0.1	-	-	-	ND	-
Methylene chloride	-	-	-	-	-	-
Propylbenzene-n	3.7	1.7507	ND	ND	-	0.152
Styrene	-	-	-	-	ND	-
Tetrachloroethane-1,1,2,2	-	-	-	-	ND	-
Tetrachloroethene	1.4	-	-	-	**120**	**310**
Toluene	1.5	-	-	-	ND	ND
Trichloro-1,1,2-trifluoroethane-1,2,2	-	-	-	-	ND	-
Trichlorobenzene-1,2,4	-	-	-	-	ND	-
Trichloroethane-1,1,1	0.8	-	-	-	ND	-
Trichloroethane-1,1,2	-	-	-	-	0.002	-
Trichloroethene	0.7	-	-	-	**2.5**	**28.23**
Trichlorofluoromethane	-	-	-	-	ND	-
Trimethylbenzene-1,2,4	10	9.0018	0.0433	ND	-	0.6526
Trimethylbenzene-1,3,5	3.3	2.9304	ND	ND	-	0.2157
Vinyl chloride	0.2	-	-	-	ND	-
Xylene - m	0.8	0.3877	ND	ND	-	0.0803
Xylene - o	0.6	ND	ND	ND	-	0.064
Xylene (mixed)	1.2	-	-	-	ND	-

Notes:

-	No criteria or no analysis
ND	No results above detection limits
	Non-ASP Soil Analyses.
*	Concentrations for tetrachloroethene and trichloroethene are estimates
10	Concentration greater than TAGM-RSCOs

U:\1405205\data\Remediation\MB\AAR & Remedial Work Plan\[190500014_WardStreet_Database.xls]1-Soil Summary

Table 1: Summary of Soil Analytical Results - VOCs

Contaminant	TAGM 4046 Recommended Soil Cleanup Objectives (mg/kg)	On-Site Area 1 : Building B Annex			On-Site Area 2 : MW-9	
		MW-105	MW-106	MW-107	B-8/BA	MW-9
Sample depth		0.5 to 4 ft	4 to 8 ft	0.5 to 4 ft	6 to 8 ft	6 to 8 ft
Northing (ft)		-48887.49	-48832.82	-48828.96	-48702.43	-48681.53
Easting (ft)		31903.3	31857.86	31904.58	31880.83	31908.75
Ground Elevation (ft AMSL)		507.61	503.31	503.53	507.54	507.34
Sampling Date		Feb-05	Feb-05	Feb-05	Apr-99	Apr-99
Volatiles						
Acetone	0.2	0.078	ND	ND	-	-
Benzene	0.06	ND	ND	ND	-	-
Bromodichloromethane	-	ND	ND	ND	-	-
Bromoform	-	ND	ND	ND	-	-
Bromomethane	-	ND	ND	ND	-	-
Butanone-2	-	ND	ND	ND	-	-
Butylbenzene	-	-	-	-	-	-
Butylbenzene (sec)	10	-	-	-	**14.997**	8.3922
Butylbenzene (tert)	10	-	-	-	**11.304**	7.6374
Butylbenzene-n	10	-	-	-	**22.876**	**14.455**
Carbon Disulfide	-	ND	ND	ND	-	-
Carbon tetrachloride	0.6	ND	ND	ND	-	-
Chlorobenzene	1.7	ND	ND	ND	-	-
Chloroethane	1.9	ND	ND	ND	-	-
Chloroform	0.3	ND	ND	ND	-	-
Chloromethane	0	ND	ND	ND	-	-
Cyclohexane	-	ND	ND	ND	-	-
Dibromo-1,2-chloropropane-3	-	ND	ND	ND	-	-
Dibromochloromethane	-	ND	ND	ND	-	-
Dibromoethane-1,2	-	ND	ND	ND	-	-
Dichlorobenzene-1,2	7.9	ND	ND	ND	-	-
Dichlorobenzene-1,3	1.6	ND	ND	ND	-	-
Dichlorobenzene-1,4	8.5	ND	ND	ND	-	-
Dichlorodifluoromethane	-	ND	ND	ND	-	-
Dichloroethane-1,1	0.2	ND	ND	ND	-	-
Dichloroethane-1,2	0.1	ND	ND	ND	-	-
Dichloroethene-1,1	0.4	ND	ND	ND	-	-
Dichloroethene-1,2 (cis)	-	3.8	0.001	ND	-	-
Dichloroethene-1,2 (trans)	0.3	ND	ND	ND	-	-
Dichloropropane-1,2	-	ND	ND	ND	-	-
Dichloropropene-1,3 (cis)	0	ND	ND	ND	-	-
Dichloropropene-1,3 (trans)	-	ND	ND	ND	-	-
Dioxane-1,4	-	-	-	-	-	-
Ethylbenzene	5.5	0.001	ND	ND	ND	ND
Hexachlorobenzene	-	-	-	-	-	-
Hexanone-2	-	ND	ND	ND	-	-
Isopropylbenzene	2.3	ND	ND	ND	ND	ND
Isopropyltoluene-4	-	-	-	-	15.73	6.4797
Isopropyltoluene-p	10	-	-	-	ND	ND
Methyl acetate	-	ND	ND	ND	-	-
Methyl ethyl ketone	-	-	-	-	-	-
Methyl tert-butyl ether	0.12	ND	ND	ND	-	-
Methyl-4-pentanone-2	-	ND	ND	ND	-	-
Methylcyclohexane	-	0.001	ND	ND	-	-
Methylene Chloride	0.1	ND	ND	ND	-	-
Methylene chloride	-	-	-	-	-	-
Propylbenzene-n	3.7	-	-	-	**15.047**	**9.2929**
Styrene	-	ND	ND	ND	-	-
Tetrachloroethane-1,1,2,2	-	ND	ND	ND	-	-
Tetrachloroethene	1.4	**150**	0.004	0.005	ND	ND
Toluene	1.5	0.003	ND	ND	-	-
Trichloro-1,1,2-trifluoroethane-1,2,2	-	ND	ND	ND	-	-
Trichlorobenzene-1,2,4	-	ND	ND	ND	-	-
Trichloroethane-1,1,1	0.8	ND	ND	ND	-	-
Trichloroethane-1,1,2	-	ND	ND	ND	-	-
Trichloroethene	0.7	**10**	0.002	0.002	ND	ND
Trichlorofluoromethane	-	ND	ND	ND	-	-
Trimethylbenzene-1,2,4	10	-	-	-	**85.819**	**60.687**
Trimethylbenzene-1,3,5	3.3	-	-	-	**14.688**	**8.5163**
Vinyl chloride	0.2	ND	ND	ND	-	-
Xylene - m	0.8	-	-	-	ND	ND
Xylene - o	0.6	-	-	-	ND	ND
Xylene (mixed)	1.2	0.006	ND	ND	-	-

Notes:

-	No criteria or no analysis
ND	No results above detection limits Non-ASP Soil Analyses.
*	Concentrations for tetrachloroethene and trichloroethene are estimates
10	Concentration greater than TAGM-RSCOs

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Table 1: Summary of Soil Analytical Results - VOCs

Contaminant	TAGM 4046 Recommended Soil Cleanup Objectives (mg/kg)	On-Site Area 2 : MW-9				
		MW-9R	B-11	MW-19	MW-20	MW-21
Sample depth		2 to 4 ft	6 to 8 ft	4 to 6 ft	2 to 4 ft	4 to 6 ft
Northing (ft)		-48675.39	-48716.7	-48704.6	-48642.81	-48609.15
Easting (ft)		31905.35	31933.94	31949.63	31980.19	31887.53
Ground Elevation (ft AMSL)		507.39	507.75	507.74	507.16	507.20
Sampling Date		Jun-05	Apr-99	Jun-05	Jun-05	Jun-05
Volatiles						
Acetone	0.2	ND	-	0.005	ND	ND
Benzene	0.06	ND	ND	ND	ND	ND
Bromodichloromethane	-	ND	-	ND	ND	ND
Bromoform	-	ND	-	ND	ND	ND
Bromomethane	-	ND	-	ND	ND	ND
Butanone-2	-	ND	-	ND	ND	ND
Butylbenzene	-	-	-	-	-	-
Butylbenzene (sec)	10	-	0.0639	-	-	-
Butylbenzene (tert)	10	-	0.1221	-	-	-
Butylbenzene-n	10	-	0.05	-	-	-
Carbon Disulfide	-	ND	-	ND	ND	ND
Carbon tetrachloride	0.6	ND	ND	ND	ND	ND
Chlorobenzene	1.7	ND	ND	ND	ND	ND
Chloroethane	1.9	ND	ND	ND	ND	ND
Chloroform	0.3	ND	ND	ND	ND	ND
Chloromethane	0	ND	-	ND	ND	ND
Cyclohexane	-	ND	-	ND	ND	ND
Dibromo-1,2-chloropropane-3	-	ND	-	ND	ND	ND
Dibromochloromethane	-	ND	-	ND	ND	ND
Dibromoethane-1,2	-	ND	-	ND	ND	ND
Dichlorobenzene-1,2	7.9	ND	ND	ND	ND	ND
Dichlorobenzene-1,3	1.6	ND	ND	ND	ND	ND
Dichlorobenzene-1,4	8.5	ND	ND	ND	ND	ND
Dichlorodifluoromethane	-	ND	-	ND	ND	ND
Dichloroethane-1,1	0.2	ND	ND	ND	ND	ND
Dichloroethane-1,2	0.1	ND	ND	ND	ND	ND
Dichloroethene-1,1	0.4	ND	ND	ND	ND	ND
Dichloroethene-1,2 (cis)	-	ND	ND	ND	ND	ND
Dichloroethene-1,2 (trans)	0.3	ND	ND	ND	ND	ND
Dichloropropane-1,2	-	ND	-	ND	ND	ND
Dichloropropene-1,3 (cis)	0	ND	-	ND	ND	ND
Dichloropropene-1,3 (trans)	-	ND	-	ND	ND	ND
Dioxane-1,4	-	-	-	-	-	-
Ethylbenzene	5.5	ND	ND	ND	ND	ND
Hexachlorobenzene	-	-	-	-	-	-
Hexanone-2	-	ND	-	ND	ND	ND
Isopropylbenzene	2.3	ND	0.0165	ND	ND	ND
Isopropyltoluene-4	-	-	0.0766	-	-	-
Isopropyltoluene-p	10	-	ND	-	-	-
Methyl acetate	-	ND	-	ND	ND	ND
Methyl ethyl ketone	-	-	-	-	-	-
Methyl tert-butyl ether	0.12	ND	ND	ND	ND	ND
Methyl-4-pentanone-2	-	ND	-	ND	ND	ND
Methylcyclohexane	-	0.15	-	ND	ND	ND
Methylene Chloride	0.1	ND	ND	ND	ND	ND
Methylene chloride	-	-	-	-	-	-
Propylbenzene-n	3.7	-	0.0633	-	-	-
Styrene	-	ND	-	ND	ND	ND
Tetrachloroethane-1,1,2,2	-	ND	-	ND	ND	ND
Tetrachloroethene	1.4	**2.3**	ND	0.004	0.003	ND
Toluene	1.5	ND	ND	ND	0.002	0.002
Trichloro-1,1,2-trifluoroethane-1,2,2	-	ND	-	ND	ND	ND
Trichlorobenzene-1,2,4	-	ND	-	ND	ND	ND
Trichloroethane-1,1,1	0.8	ND	ND	ND	ND	ND
Trichloroethane-1,1,2	-	ND	ND	ND	ND	ND
Trichloroethene	0.7	ND	ND	ND	ND	ND
Trichlorofluoromethane	-	ND	ND	ND	ND	ND
Trimethylbenzene-1,2,4	10	-	1.0393	-	-	-
Trimethylbenzene-1,3,5	3.3	-	0.0262	-	-	-
Vinyl chloride	0.2	ND	ND	ND	ND	ND
Xylene - m	0.8	-	ND	-	-	-
Xylene - o	0.6	-	0.0151	-	-	-
Xylene (mixed)	1.2	**3.8**	-	ND	ND	ND

Notes:

-	No criteria or no analysis
ND	No results above detection limits
*	Non-ASP Soil Analyses. Concentrations for tetrachloroethene and trichloroethene are estimates
10	Concentration greater than TAGM-RSCOs

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Table 1: Summary of Soil Analytical Results - VOCs

Contaminant	TAGM 4046 Recommended Soil Cleanup Objectives (mg/kg)	On-Site Area 2 : MW-9		Off-Site Area 1 : MW-16	
		B-29	B-31	MW-16R	MW-18
Sample depth		7 to 8 ft	9 to 10 ft	12 to 13.4 ft	10 to 12 ft
Northing (ft)		-48686.74	-48701.94	-48956.21	-48936.25
Easting (ft)		31930.82	31925.77	31918.69	31957.83
Ground Elevation (ft AMSL)		507.56	507.78	506.66	507.20
Sampling Date		Jun-05	Jun-05	Jun-05	Sep-01
Volatiles					
Acetone	0.2	ND	ND	ND	0.005
Benzene	0.06	ND	ND	ND	ND
Bromodichloromethane	-	ND	ND	ND	ND
Bromoform	-	ND	ND	ND	ND
Bromomethane	-	ND	ND	ND	ND
Butanone-2	-	ND	ND	ND	ND
Butylbenzene	-	-	-	-	-
Butylbenzene (sec)	10	-	-	-	-
Butylbenzene (tert)	10	-	-	-	-
Butylbenzene-n	10	-	-	-	-
Carbon Disulfide	-	ND	ND	ND	ND
Carbon tetrachloride	0.6	ND	ND	ND	ND
Chlorobenzene	1.7	ND	ND	ND	ND
Chloroethane	1.9	ND	ND	ND	ND
Chloroform	0.3	ND	ND	ND	ND
Chloromethane	0	ND	ND	ND	ND
Cyclohexane	-	ND	ND	ND	ND
Dibromo-1,2-chloropropane-3	-	ND	ND	ND	ND
Dibromochloromethane	-	ND	ND	ND	ND
Dibromoethane-1,2	-	ND	ND	ND	ND
Dichlorobenzene-1,2	7.9	ND	ND	ND	ND
Dichlorobenzene-1,3	1.6	ND	ND	ND	ND
Dichlorobenzene-1,4	8.5	ND	ND	ND	ND
Dichlorodifluoromethane	-	ND	ND	ND	ND
Dichloroethane-1,1	0.2	ND	ND	ND	ND
Dichloroethane-1,2	0.1	ND	ND	ND	ND
Dichloroethene-1,1	0.4	ND	ND	ND	ND
Dichloroethene-1,2 (cis)	-	ND	ND	ND	ND
Dichloroethene-1,2 (trans)	0.3	ND	ND	ND	ND
Dichloropropane-1,2	-	ND	ND	ND	ND
Dichloropropene-1,3 (cis)	0	ND	ND	ND	ND
Dichloropropene-1,3 (trans)	-	ND	ND	ND	ND
Dioxane-1,4	-	-	-	-	-
Ethylbenzene	5.5	0.38	0.55	ND	ND
Hexachlorobenzene	-	-	-	-	-
Hexanone-2	-	ND	ND	ND	ND
Isopropylbenzene	2.3	ND	**7.9**	ND	ND
Isopropyltoluene-4	-	-	-	-	-
Isopropyltoluene-p	10	-	-	-	-
Methyl acetate	-	ND	ND	ND	ND
Methyl ethyl ketone	-	-	-	-	-
Methyl tert-butyl ether	0.12	ND	ND	ND	ND
Methyl-4-pentanone-2	-	ND	ND	ND	ND
Methylcyclohexane	-	ND	ND	ND	ND
Methylene Chloride	0.1	ND	ND	ND	0.011
Methylene chloride	-	-	-	-	-
Propylbenzene-n	3.7	-	-	-	-
Styrene	-	ND	ND	ND	ND
Tetrachloroethane-1,1,2,2	-	ND	ND	ND	ND
Tetrachloroethene	1.4	ND	ND	**12**	0.075
Toluene	1.5	ND	ND	ND	0.001
Trichloro-1,1,2-trifluoroethane-1,2,2	-	ND	ND	ND	ND
Trichlorobenzene-1,2,4	-	ND	ND	ND	ND
Trichloroethane-1,1,1	0.8	ND	ND	ND	ND
Trichloroethane-1,1,2	-	ND	ND	ND	ND
Trichloroethene	0.7	ND	ND	0.46	0.009
Trichlorofluoromethane	-	ND	ND	ND	0.002
Trimethylbenzene-1,2,4	10	-	-	-	-
Trimethylbenzene-1,3,5	3.3	-	-	-	-
Vinyl chloride	0.2	ND	ND	ND	ND
Xylene - m	0.8	-	-	-	-
Xylene - o	0.6	-	-	-	-
Xylene (mixed)	1.2	ND	ND	ND	0.002

Notes:

-	No criteria or no analysis
ND	No results above detection limits
	Non-ASP Soil Analyses.
*	Concentrations for tetrachloroethene and trichloroethene are estimates
10	Concentration greater than TAGM-RSCOs

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Table 1: Summary of Soil Analytical Results - VOCs

Contaminant	TAGM 4046 Recommended Soil Cleanup Objectives (mg/kg)	Off-Site Area 1 : MW-16	Off-Site Area 2 : MW-23	Impacts From Other Suspected Off-Site Source	
		B-104*	MW-23	MW-17	MW-24
Sample depth		10 to 12.4 ft	12 to 14 ft	8 to 10 ft	20 to 21.3 ft
Northing (ft)		-48955.07	-48895.94	-49008.9	-48968.97
Easting (ft)		31913.391	32048.41	31917.44	31989.95
Ground Elevation (ft AMSL)		506.80	507.50	506.30	507.20
Sampling Date		Apr-99	Sep-01	Sep-01	Sep-01
Volatiles					
Acetone	0.2	-	ND	ND	0.012
Benzene	0.06	-	ND	0.025	ND
Bromodichloromethane	-	-	ND	ND	ND
Bromoform	-	-	ND	ND	ND
Bromomethane	-	-	ND	ND	ND
Butanone-2	-	-	ND	ND	ND
Butylbenzene	-	-	-	-	-
Butylbenzene (sec)	10	ND	-	-	-
Butylbenzene (tert)	10	ND	-	-	-
Butylbenzene-n	10	ND	-	-	-
Carbon Disulfide	-	-	ND	ND	ND
Carbon tetrachloride	0.6	-	ND	ND	ND
Chlorobenzene	1.7	-	ND	ND	ND
Chloroethane	1.9	-	ND	0.018	ND
Chloroform	0.3	-	ND	ND	ND
Chloromethane	0	-	ND	ND	ND
Cyclohexane	-	-	ND	6.5	ND
Dibromo-1,2-chloropropane-3	-	-	ND	ND	ND
Dibromochloromethane	-	-	ND	ND	ND
Dibromoethane-1,2	-	-	ND	ND	ND
Dichlorobenzene-1,2	7.9	-	ND	ND	ND
Dichlorobenzene-1,3	1.6	-	ND	ND	ND
Dichlorobenzene-1,4	8.5	-	ND	ND	ND
Dichlorodifluoromethane	-	-	ND	ND	ND
Dichloroethane-1,1	0.2	-	ND	ND	ND
Dichloroethane-1,2	0.1	-	ND	ND	ND
Dichloroethene-1,1	0.4	-	ND	ND	ND
Dichloroethene-1,2 (cis)	-	-	ND	ND	0.008
Dichloroethene-1,2 (trans)	0.3	-	ND	ND	ND
Dichloropropane-1,2	-	-	ND	ND	ND
Dichloropropene-1,3 (cis)	0	-	ND	ND	ND
Dichloropropene-1,3 (trans)	-	-	ND	ND	ND
Dioxane-1,4	-	-	-	-	-
Ethylbenzene	5.5	ND	ND	5.4	ND
Hexachlorobenzene	-	-	-	-	-
Hexanone-2	-	-	ND	ND	ND
Isopropylbenzene	2.3	ND	ND	0.72	ND
Isopropyltoluene-4	-	ND	-	-	-
Isopropyltoluene-p	10	ND	-	-	-
Methyl acetate	-	-	ND	ND	ND
Methyl ethyl ketone	-	-	-	-	-
Methyl tert-butyl ether	0.12	-	ND	ND	ND
Methyl-4-pentanone-2	-	-	ND	ND	ND
Methylcyclohexane	-	-	ND	10	ND
Methylene Chloride	0.1	-	ND	ND	0.011
Methylene chloride	-	-	-	-	-
Propylbenzene-n	3.7	ND	-	-	-
Styrene	-	-	ND	ND	ND
Tetrachloroethane-1,1,2,2	-	-	ND	ND	ND
Tetrachloroethene	1.4	**4.76**	**8.3**	ND	0.006
Toluene	1.5	-	ND	**7.5**	ND
Trichloro-1,1,2-trifluoroethane-1,2,2	-	-	ND	ND	ND
Trichlorobenzene-1,2,4	-	-	ND	ND	ND
Trichloroethane-1,1,1	0.8	-	ND	ND	ND
Trichloroethane-1,1,2	-	-	ND	ND	ND
Trichloroethene	0.7	-	ND	ND	0.16
Trichlorofluoromethane	-	-	ND	ND	ND
Trimethylbenzene-1,2,4	10	ND	-	-	-
Trimethylbenzene-1,3,5	3.3	ND	-	-	-
Vinyl chloride	0.2	-	ND	ND	ND
Xylene - m	0.8	ND	-	-	-
Xylene - o	0.6	ND	-	-	-
Xylene (mixed)	1.2	-	ND	**28**	ND

Notes:

-	No criteria or no analysis
ND	No results above detection limits
*	Non-ASP Soil Analyses. Concentrations for tetrachloroethene and trichloroethene are estimates
10	Concentration greater than TAGM-RSCOs

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Table 2 : Chemical Screening of Sub-Surface Soils - VOCs

Contaminant	TAGM 4046 Recommended Soil Cleanup Objectives (mg/kg)	Frequency of Detection	Range Detected (mg/kg)		Mean of detected values (mg/kg)
			Minimum	Maximum	
Acetone	0.2	6 / 18	0.004	0.14	0.041
Benzene	0.06	1 / 21	0.025	0.025	0.025
Bromodichloromethane	-	0 / 15	-	-	-
Bromoform	-	0 / 15	-	-	-
Bromomethane	-	0 / 15	-	-	-
Butanone-2	-	0 / 15	-	-	-
Butylbenzene	-	-	-	-	-
Butylbenzene (sec)	10	6 / 9	0.0639	**15**	4
Butylbenzene (tert)	10	5 / 9	0.0956	**11**	4.1
Butylbenzene-n	10	4 / 9	0.05	**23**	9.4
Carbon Disulfide	-	0 / 15	-	-	-
Carbon tetrachloride	0.6	0 / 19	-	-	-
Chlorobenzene	1.7	0 / 19	-	-	-
Chloroethane	1.9	1 / 19	0.018	0.018	0.018
Chloroform	0.3	0 / 19	-	-	-
Chloromethane	0	0 / 15	-	-	-
Cyclohexane	-	1 / 15	6.5	6.5	6.5
Dibromo-1,2-chloropropane-3	-	0 / 15	-	-	-
Dibromochloromethane	-	0 / 15	-	-	-
Dibromoethane-1,2	-	0 / 15	-	-	-
Dichlorobenzene-1,2	7.9	0 / 16	-	-	-
Dichlorobenzene-1,3	1.6	0 / 16	-	-	-
Dichlorobenzene-1,4	8.5	0 / 16	-	-	-
Dichlorodifluoromethane	-	0 / 15	-	-	-
Dichloroethane-1,1	0.2	0 / 19	-	-	-
Dichloroethane-1,2	0.1	0 / 19	-	-	-
Dichloroethene-1,1	0.4	0 / 19	-	-	-
Dichloroethene-1,2 (cis)	-	4 / 16	0.001	3.8	0.98
Dichloroethene-1,2 (trans)	0.3	0 / 19	-	-	-
Dichloropropane-1,2	-	0 / 15	-	-	-
Dichloropropene-1,3 (cis)	0	0 / 15	-	-	-
Dichloropropene-1,3 (trans)	-	0 / 15	-	-	-
Dioxane-1,4	-	-	-	-	-
Ethylbenzene	5.5	6 / 27	0.001	5.4	1.2
Hexachlorobenzene	-	-	-	-	-
Hexanone-2	-	0 / 15	-	-	-
Isopropylbenzene	2.3	5 / 24	0.0165	**7.9**	1.8
Isopropyltoluene-4	-	3 / 8	0.0766	16	7.4
Isopropyltoluene-p	10	2 / 9	0.233	0.52	0.38
Methyl acetate	-	0 / 15	-	-	-
Methyl ethyl ketone	-	-	-	-	-
Methyl tert-butyl ether	0.12	0 / 18	-	-	-
Methyl-4-pentanone-2	-	0 / 15	-	-	-
Methylcyclohexane	-	3 / 15	0.001	10	3.4
Methylene Chloride	0.1	2 / 19	0.011	0.011	0.011
Methylene chloride	-	-	-	-	-
Propylbenzene-n	3.7	5 / 9	0.0633	**15**	**5.3**
Styrene	-	0 / 15	-	-	-
Tetrachloroethane-1,1,2,2	-	0 / 15	-	-	-
Tetrachloroethene	1.4	13 / 23	0.003	**310**	**47**
Toluene	1.5	5 / 21	0.001	**7.5**	1.5
Trichloro-1,1,2-trifluoroethane-1,2,2	-	0 / 15	-	-	-
Trichlorobenzene-1,2,4	-	0 / 15	-	-	-
Trichloroethane-1,1,1	0.8	0 / 19	-	-	-
Trichloroethane-1,1,2	-	1 / 19	0.002	0.002	0.002
Trichloroethene	0.7	8 / 22	0.002	**28**	**5.2**
Trichlorofluoromethane	-	1 / 19	0.002	0.002	0.002
Trimethylbenzene-1,2,4	10	6 / 9	0.0433	**86**	**26**
Trimethylbenzene-1,3,5	3.3	5 / 9	0.0262	**15**	**5.3**
Vinyl chloride	0.2	0 / 19	-	-	-
Xylene - m,p	0.8	3 / 12	0.0168	0.39	0.16
Xylene - o	0.6	3 / 12	0.0128	0.064	0.031
Xylene (mixed)	1.2	4 / 15	0.002	**28**	**8**

Notes:

-	No criteria or no analysis
10	Concentration greater than TAGM-RSCOs

Table 3: Summary of Estimated Soil Contamination Volume and Mass Calculations

Area		Affected Wells & Borings	Contaminants of Concern	Estimated Overall surface area >TAGM-RSCOs (sq. ft.)	Estimated average thickness >TAGM-RSCOs (ft)	Estimated In Situ Soil Volume >TAGM-RSCOs (C.Y.)	Estimated In Situ Soil Mass >TAGM RSCOs (tons)	Estimated Total In Situ Excavation Soil Volume (C.Y.)	Estimated Soil Contaminant Mass Within Area >TAGM-RSCOs Defined by Contaminants of Concern (lbs)								Assumptions
									VOC CoCs								
									PCE	TCE	cis-1,2-DCE	Ethylbenzene	Toluene	Total Xylenes	Other VOCs	Total VOCs	
On-site	**1**	MW-22, MW-22R, MW-101 and MW-105	Chlorinated VOCs	2600	22	1900	3200	NA	**240**	**21**	4	0.2	0.1	0.1	0.8	266	In situ soil volumes with impacts in excess of TAGM-RSCOs and associated soil contaminant masses for the area below the Building B Annex were computed using a combination of analytical results, PID readings and contouring of contaminant plumes at different depths derived from linearly interpolated surface models. Contaminant masses for TCE, cis-1,2-DCE, ethylbenzene, toluene, total xylenes and other VOCs are based on the assumption that the distribution of these contaminants is equivalent to that of PCE and that the ratio of the average concentration for each contaminant to the concentration of PCE is constant throughout the area.
	2	B-8, MW-9 and MW-9R	Chlorinated and Non-Chlorinated VOCs	1400	14	800	1400	2100	**5**	0	0	0	0	**8**	**570**	583	Surface area of impacted area is based on Thiessen polygons. Thickness of contamination is assumed to correspond to interval between ground surface and depth of upper till and lower till interface.
Off-site	**1**	MW-16, MW-16R and B-104	Chlorinated VOCs	4500	22	1800	3100	NA	**135**	12	3	0.1	0.1	0.1	0.5	151	As per on-site area 1.

Notes:

10 Mass of contaminant in soil for which concentrations are greater than TAGM 4046 Recommended Soil Cleanup Objectives.

Offsite soil impacts in the MW-16 area are identified and quantified as it is assumed that remedial measures will be extended to this off-site area.

Offsite soil impacts >TAGM RSCOs in the MW-23 area (former HFBC parking lot) are expected to be included in the remediation area in the near future. Estimated surface area 6400 sq. ft.; estimated average thickness 6 ft.; estimated in-situ soil volume 1500 c.y.; estimated in-situ soil mass 2500 tons; estimated total in-situ soil excavation volume 5100 c.y.; and estimated PCE soil contaminant mass 41 lbs. Surface area of impacted area is based on Thiessen polygon, within Ward Street R.O.W. Thickness of contamination is based on PCE concentration and PID readings.

Estimated in situ soil excavation volumes assume 1:1 slopes, and include clean soils as well as >TAGM-RSCOs soils. The Building B Annex area (On-site area 1 and Off-site area 1) is considered impractical to exavate; an excavation estimate has therefore not been presented.

The density of soils is assumed to be 1.7 Tons per C.Y.

Table 4 : Summary of Groundwater Analytical Results -

Contaminant	NYSDEC Groundwater Standards and Guidance Values (µg/L)	On-Site Area 1 : Building B Annex						
		MW-14	MW-15	MW-22	MW-22R	MW-105	MW-106	MW-107
Sampling Date		**Jul-05**	**Jul-05**	**Jul-05**	**Jul-05**	**Jul-05**	**Jul-05**	**Jul-05**
VOCs								
Acetone	50	ND	ND	ND	ND	ND	ND	ND
Benzene	1	**5**	**2**	**23**	**2**	ND	ND	ND
Bromodichloromethane	-	ND	ND	ND	ND	ND	ND	ND
Bromoform	-	ND	ND	ND	ND	ND	ND	ND
Bromomethane	-	ND	ND	ND	ND	ND	ND	ND
Butanone-2	50	8	ND	ND	ND	ND	ND	ND
Butylbenzene	-	-	-	-	-	-	-	-
Butylbenzene (sec)	-	-	-	-	-	-	-	-
Butylbenzene (tert)	-	-	-	-	-	-	-	-
Butylbenzene-n	-	-	-	-	-	-	-	-
Carbon Disulfide	-	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	-	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	-	ND	ND	ND	ND	ND	ND	ND
Chloroethane	-	ND	ND	ND	ND	ND	ND	ND
Chloroform	7	ND	ND	3	ND	ND	ND	ND
Chloromethane	-	ND	ND	ND	ND	ND	ND	ND
Cyclohexane	-	ND	18	4	ND	ND	ND	ND
Dibromo-1,2-chloropropane-3	-	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	-	ND	ND	ND	ND	ND	ND	ND
Dibromoethane-1,2	-	ND	ND	ND	ND	ND	ND	ND
Dichlorobenzene-1,2	3	ND	ND	ND	ND	ND	ND	ND
Dichlorobenzene-1,3	-	ND	ND	ND	ND	ND	ND	ND
Dichlorobenzene-1,4	-	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	-	ND	ND	ND	ND	ND	ND	ND
Dichloroethane-1,1	-	ND	ND	ND	ND	ND	ND	ND
Dichloroethane-1,2	-	ND	ND	ND	ND	ND	ND	ND
Dichloroethene-1,1	5	ND	ND	**47**	**11**	**6**	ND	2
Dichloroethene-1,2 (cis)	5	**9**	4	**5200**	**1400**	**120**	**8**	**86**
Dichloroethene-1,2 (trans)	5	ND	ND	**250**	**180**	**10**	ND	**6**
Dichloropropane-1,2	1	ND	ND	ND	ND	ND	ND	ND
Dichloropropene-1,3 (cis)	-	ND	ND	ND	ND	ND	ND	ND
Dichloropropene-1,3 (trans)	-	ND	ND	ND	ND	ND	ND	ND
Dioxane-1,4	-	-	-	-	-	-	-	-
Ethylbenzene	5	**40**	ND	2	ND	ND	ND	ND
Hexachlorobenzene	-	-	-	-	-	-	-	-
Hexanone-2	50	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	5	**30**	ND	ND	ND	ND	ND	ND
Isopropyltoluene-4	-	-	-	-	-	-	-	-
Isopropyltoluene-p	-	-	-	-	-	-	-	-
Methyl acetate	-	ND	ND	ND	ND	ND	ND	ND
Methyl ethyl ketone	-	-	-	-	-	-	-	-
Methyl tert-butyl ether	-	ND	ND	ND	ND	ND	ND	ND
Methyl-4-pentanone-2	-	ND	ND	ND	ND	ND	ND	ND
Methylcyclohexane	-	22	ND	ND	ND	ND	ND	ND
Methylene Chloride	-	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	-	-	-	-	-	-	-	-
Propylbenzene-n	-	-	-	-	-	-	-	-
Styrene	-	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethane-1,1,2,2	-	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	ND	ND	**11000**	**260**	**2200**	ND	ND
Toluene	5	ND	ND	5	ND	ND	ND	ND
Trichloro-1,1,2-trifluoroethane-1,2,2	-	ND	ND	ND	ND	ND	ND	ND
Trichlorobenzene-1,2,4	-	ND	ND	ND	ND	ND	ND	ND
Trichloroethane-1,1,1	-	ND	ND	ND	ND	ND	ND	ND
Trichloroethane-1,1,2	1	ND	ND	**2**	ND	ND	ND	ND
Trichloroethene	5	ND	ND	**9200**	**1700**	**7200**	**26**	**110**
Trichlorofluoromethane	-	ND	ND	ND	ND	ND	ND	ND
Trimethylbenzene-1,2,4	-	-	-	-	-	-	-	-
Trimethylbenzene-1,3,5	-	-	-	-	-	-	-	-
Vinyl chloride	2	ND	**4**	**560**	**68**	ND	**5**	**5**
Xylene - m,p	-	-	-	-	-	-	-	-
Xylene - o	-	-	-	-	-	-	-	-
Xylene (mixed)	5 **	ND	ND	ND	ND	ND	ND	ND

Notes:

- : No analysis or no criteria

ND : No results above detection limits

(**) : The standard of 5 mg/l is for each discrete isomer (o-xylene, p-xylene and m-xylene)

(G) : Guidance value.

10	Reported value exceeds New York State potable groundwater standards - Technical and Operational Guidance Series 1.1.1 Class GA (NYSDEC, June 1998) and 6 NYCRR Part 703 Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations.

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Table 4 : Summary of Groundwater Analytical Results -

Contaminant	NYSDEC Groundwater Standards and Guidance Values (µg/L)	On-Site Area 2 : MW-9					
		MW-3	MW-9	MW-9R	MW-19	MW-21	MW-32
Sampling Date		**Jul-05**	**Jul-05**	**Jul-05**	**Jul-05**	**Jul-05**	**Jul-05**
VOCs							
Acetone	50	ND	ND	ND	ND	ND	ND
Benzene	1	ND	ND	ND	ND	ND	ND
Bromodichloromethane	-	ND	ND	ND	ND	ND	ND
Bromoform	-	ND	ND	ND	ND	ND	ND
Bromomethane	-	ND	ND	ND	ND	ND	ND
Butanone-2	50	ND	ND	ND	ND	ND	ND
Butylbenzene	-	-	-	-	-	-	-
Butylbenzene (sec)	-	-	-	-	-	-	-
Butylbenzene (tert)	-	-	-	-	-	-	-
Butylbenzene-n	-	-	-	-	-	-	-
Carbon Disulfide	-	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	-	ND	ND	ND	ND	ND	ND
Chlorobenzene	-	ND	ND	ND	ND	ND	ND
Chloroethane	-	ND	ND	ND	ND	ND	ND
Chloroform	7	ND	ND	ND	ND	ND	ND
Chloromethane	-	ND	ND	ND	ND	ND	ND
Cyclohexane	-	ND	ND	ND	ND	ND	ND
Dibromo-1,2-chloropropane-3	-	ND	ND	ND	ND	ND	ND
Dibromochloromethane	-	ND	ND	ND	ND	ND	ND
Dibromoethane-1,2	-	ND	ND	ND	ND	ND	ND
Dichlorobenzene-1,2	3	ND	ND	ND	2	ND	ND
Dichlorobenzene-1,3	-	ND	ND	ND	ND	ND	ND
Dichlorobenzene-1,4	-	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	-	ND	ND	ND	ND	ND	ND
Dichloroethane-1,1	-	ND	ND	ND	ND	ND	ND
Dichloroethane-1,2	-	ND	ND	ND	ND	ND	ND
Dichloroethene-1,1	5	ND	ND	ND	ND	ND	ND
Dichloroethene-1,2 (cis)	5	ND	**30**	ND	ND	ND	ND
Dichloroethene-1,2 (trans)	5	ND	**8**	ND	ND	ND	ND
Dichloropropane-1,2	1	ND	**2**	ND	ND	ND	ND
Dichloropropene-1,3 (cis)	-	ND	ND	ND	ND	ND	ND
Dichloropropene-1,3 (trans)	-	ND	ND	ND	ND	ND	ND
Dioxane-1,4	-	-	-	-	-	-	-
Ethylbenzene	5	ND	**84**	ND	3	ND	ND
Hexachlorobenzene	-	-	-	-	-	-	-
Hexanone-2	50	ND	ND	ND	ND	ND	ND
Isopropylbenzene	5	ND	**85**	ND	**16**	ND	ND
Isopropyltoluene-4	-	-	-	-	-	-	-
Isopropyltoluene-p	-	-	-	-	-	-	-
Methyl acetate	-	ND	ND	ND	ND	ND	ND
Methyl ethyl ketone	-	-	-	-	-	-	-
Methyl tert-butyl ether	-	ND	ND	ND	ND	ND	ND
Methyl-4-pentanone-2	-	ND	ND	ND	ND	ND	ND
Methylcyclohexane	-	ND	ND	2	ND	ND	ND
Methylene Chloride	-	ND	ND	ND	ND	ND	ND
Methylene chloride	-	-	-	-	-	-	-
Propylbenzene-n	-	-	-	-	-	-	-
Styrene	-	ND	ND	ND	ND	ND	ND
Tetrachloroethane-1,1,2,2	-	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	ND	ND	ND	ND	ND	3
Toluene	5	ND	**8**	ND	ND	ND	ND
Trichloro-1,1,2-trifluoroethane-1,2,2	-	ND	ND	ND	ND	ND	ND
Trichlorobenzene-1,2,4	-	ND	ND	ND	ND	ND	ND
Trichloroethane-1,1,1	-	ND	ND	ND	ND	ND	ND
Trichloroethane-1,1,2	1	ND	ND	ND	ND	ND	ND
Trichloroethene	5	3	2	ND	ND	ND	ND
Trichlorofluoromethane	-	ND	ND	ND	ND	ND	ND
Trimethylbenzene-1,2,4	-	-	-	-	-	-	-
Trimethylbenzene-1,3,5	-	-	-	-	-	-	-
Vinyl chloride	2	ND	**17**	ND	ND	ND	ND
Xylene - m,p	-	-	-	-	-	-	-
Xylene - o	-	-	-	-	-	-	-
Xylene (mixed)	5 **	ND	**330**	ND	ND	ND	ND

Notes:

- : No analysis or no criteria

ND : No results above detection limits

(**) : The standard of 5 mg/l is for each discrete isomer (o-xylene, p-xylene and m-xylene)

(G) : Guidance value.

10	Reported value exceeds New York State potable groundwater standards - Technical and Operational Guidance Series 1.1.1 Class GA (NYSDEC, June 1998) and 6 NYCRR Part 703 Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations.

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Table 4 : Summary of Groundwater Analytical Results -

Contaminant	NYSDEC Groundwater Standards and Guidance Values (µg/L)	Off-Site Area 1 : MW-16				Off-Site Area 2 : MW-23	
		MW-16	MW-16R	MW-18	MW-18	MW-23	MW-23
Sampling Date		**Jul-05**	**Jul-05**	**Jul-05**	**Oct-01**	**Jul-05**	**Oct-01**
VOCs							
Acetone	50	ND	ND	ND	**58**	ND	34
Benzene	1	**8**	ND	ND	ND	ND	ND
Bromodichloromethane	-	ND	ND	ND	ND	ND	ND
Bromoform	-	ND	ND	ND	ND	ND	ND
Bromomethane	-	ND	ND	ND	ND	ND	ND
Butanone-2	50	ND	ND	ND	2	ND	ND
Butylbenzene	-	-	-	-	-	-	-
Butylbenzene (sec)	-	-	-	-	-	-	-
Butylbenzene (tert)	-	-	-	-	-	-	-
Butylbenzene-n	-	-	-	-	-	-	-
Carbon Disulfide	-	6	ND	ND	ND	ND	ND
Carbon tetrachloride	-	ND	ND	ND	ND	ND	ND
Chlorobenzene	-	ND	ND	ND	ND	ND	ND
Chloroethane	-	ND	ND	ND	ND	ND	ND
Chloroform	7	ND	ND	ND	ND	ND	ND
Chloromethane	-	ND	ND	ND	ND	ND	ND
Cyclohexane	-	ND	ND	ND	ND	ND	ND
Dibromo-1,2-chloropropane-3	-	ND	ND	ND	ND	ND	ND
Dibromochloromethane	-	ND	ND	ND	ND	ND	ND
Dibromoethane-1,2	-	ND	ND	ND	ND	ND	ND
Dichlorobenzene-1,2	3	ND	ND	ND	ND	ND	ND
Dichlorobenzene-1,3	-	ND	ND	ND	ND	ND	ND
Dichlorobenzene-1,4	-	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	-	ND	ND	ND	ND	ND	ND
Dichloroethane-1,1	-	ND	ND	ND	ND	ND	ND
Dichloroethane-1,2	-	ND	ND	ND	ND	ND	ND
Dichloroethene-1,1	5	**23**	**20**	ND	ND	ND	ND
Dichloroethene-1,2 (cis)	5	**3600**	**1500**	**43**	**8**	**38**	1
Dichloroethene-1,2 (trans)	5	**410**	**52**	ND	ND	ND	ND
Dichloropropane-1,2	1	ND	ND	ND	ND	ND	ND
Dichloropropene-1,3 (cis)	-	ND	ND	ND	ND	ND	ND
Dichloropropene-1,3 (trans)	-	ND	ND	ND	ND	ND	ND
Dioxane-1,4	-	-	-	-	-	-	-
Ethylbenzene	5	ND	ND	ND	ND	ND	ND
Hexachlorobenzene	-	-	-	-	-	-	-
Hexanone-2	50	ND	ND	ND	ND	ND	ND
Isopropylbenzene	5	ND	ND	ND	ND	ND	ND
Isopropyltoluene-4	-	-	-	-	-	-	-
Isopropyltoluene-p	-	-	-	-	-	-	-
Methyl acetate	-	ND	ND	ND	ND	ND	ND
Methyl ethyl ketone	-	-	-	-	-	-	-
Methyl tert-butyl ether	-	ND	ND	ND	ND	ND	ND
Methyl-4-pentanone-2	-	ND	ND	ND	ND	ND	ND
Methylcyclohexane	-	ND	ND	ND	ND	ND	ND
Methylene Chloride	-	ND	ND	ND	ND	ND	ND
Methylene chloride	-	-	-	-	-	-	-
Propylbenzene-n	-	-	-	-	-	-	-
Styrene	-	ND	ND	ND	ND	ND	ND
Tetrachloroethane-1,1,2,2	-	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	**12000**	**4900**	**62**	**16**	**1600**	**240**
Toluene	5	ND	ND	ND	ND	ND	ND
Trichloro-1,1,2-trifluoroethane-1,2,2	-	ND	ND	ND	ND	ND	ND
Trichlorobenzene-1,2,4	-	ND	ND	ND	ND	ND	ND
Trichloroethane-1,1,1	-	ND	ND	ND	ND	ND	ND
Trichloroethane-1,1,2	1	ND	ND	ND	ND	ND	ND
Trichloroethene	5	**2600**	**2700**	**11**	**20**	**55**	**15**
Trichlorofluoromethane	-	ND	ND	ND	ND	ND	ND
Trimethylbenzene-1,2,4	-	-	-	-	-	-	-
Trimethylbenzene-1,3,5	-	-	-	-	-	-	-
Vinyl chloride	2	**250**	**24**	**4**	1	ND	ND
Xylene - m,p	-	-	-	-	-	-	-
Xylene - o	-	-	-	-	-	-	-
Xylene (mixed)	5 **	ND	ND	ND	ND	ND	ND

Notes:

- : No analysis or no criteria

ND : No results above detection limits

(**) : The standard of 5 mg/l is for each discrete isomer (o-xylene, p-xylene and m-xylene)

(G) : Guidance value.

10	Reported value exceeds New York State potable groundwater standards - Technical and Operational Guidance Series 1.1.1 Class GA (NYSDEC, June 1998) and 6 NYCRR Part 703 Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations.

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Table 4 : Summary of Groundwater Analytical Results -

Contaminant	NYSDEC Groundwater Standards and Guidance Values (µg/L)	Impacts From Other Suspected Off-Site Sources							
		MW-17	MW-17	MW-17R	MW-17R	MW-24	MW-24	MW-24R	MW-24R
Sampling Date		**Jul-05**	**Oct-01**	**Jul-05**	**Oct-01**	**Jul-05**	**Oct-01**	**Jul-05**	**Oct-01**
VOCs									
Acetone	50	ND	**200**	ND	7	ND	23	ND	5
Benzene	1	**130**	**170**	ND	ND	ND	**2**	ND	ND
Bromodichloromethane	-	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	-	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	-	ND	ND	ND	ND	ND	ND	ND	ND
Butanone-2	50	ND	**90**	ND	ND	ND	ND	ND	ND
Butylbenzene	-	-	-	-	-	-	-	-	-
Butylbenzene (sec)	-	-	-	-	-	-	-	-	-
Butylbenzene (tert)	-	-	-	-	-	-	-	-	-
Butylbenzene-n	-	-	-	-	-	-	-	-	-
Carbon Disulfide	-	ND	4	ND	7	ND	ND	ND	15
Carbon tetrachloride	-	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	-	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	-	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	7	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	-	68	ND	ND	ND	ND	ND	ND	ND
Cyclohexane	-	260	190	ND	2	ND	ND	ND	ND
Dibromo-1,2-chloropropane-3	-	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	-	ND	ND	ND	ND	ND	ND	ND	ND
Dibromoethane-1,2	-	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorobenzene-1,2	3	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorobenzene-1,3	-	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorobenzene-1,4	-	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	-	ND	ND	ND	ND	ND	ND	ND	ND
Dichloroethane-1,1	-	ND	ND	ND	ND	ND	ND	ND	ND
Dichloroethane-1,2	-	ND	ND	ND	ND	ND	ND	ND	ND
Dichloroethene-1,1	5	ND	ND	ND	**6**	**9**	**21**	ND	**7**
Dichloroethene-1,2 (cis)	5	**14**	**9**	**870**	**200**	**130**	**420**	**1600**	**210**
Dichloroethene-1,2 (trans)	5	ND	ND	ND	4	ND	**6**	ND	2
Dichloropropane-1,2	1	ND	ND	ND	ND	ND	ND	ND	ND
Dichloropropene-1,3 (cis)	-	ND	ND	ND	ND	ND	ND	ND	ND
Dichloropropene-1,3 (trans)	-	ND	ND	ND	ND	ND	ND	ND	ND
Dioxane-1,4	-	-	-	-	-	-	-	-	-
Ethylbenzene	5	**1400**	**640**	ND	2	ND	ND	**810**	ND
Hexachlorobenzene	-	-	-	-	-	-	-	-	-
Hexanone-2	50	ND	6	ND	ND	ND	ND	ND	ND
Isopropylbenzene	5	**75**	**210**	ND	ND	ND	ND	ND	ND
Isopropyltoluene-4	-	-	-	-	-	-	-	-	-
Isopropyltoluene-p	-	-	-	-	-	-	-	-	-
Methyl acetate	-	ND	ND	ND	ND	ND	ND	ND	ND
Methyl ethyl ketone	-	-	-	-	-	-	-	-	-
Methyl tert-butyl ether	-	ND	ND	ND	ND	ND	ND	ND	ND
Methyl-4-pentanone-2	-	2	ND	ND	ND	ND	ND	ND	ND
Methylcyclohexane	-	160	200	ND	2	ND	ND	ND	ND
Methylene Chloride	-	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	-	-	-	-	-	-	-	-	-
Propylbenzene-n	-	-	-	-	-	-	-	-	-
Styrene	-	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethane-1,1,2,2	-	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	3	3	**1000**	**1200**	**5000**	**3100**	**4600**	**260**
Toluene	5	**480**	ND	ND	5	ND	2	ND	ND
Trichloro-1,1,2-trifluoroethane-1,2,2	-	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorobenzene-1,2,4	-	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethane-1,1,1	-	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethane-1,1,2	1	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	ND	ND	**370**	**360**	**1700**	**3200**	**1400**	**320**
Trichlorofluoromethane	-	ND	ND	ND	ND	ND	ND	ND	ND
Trimethylbenzene-1,2,4	-	-	-	-	-	-	-	-	-
Trimethylbenzene-1,3,5	-	-	-	-	-	-	-	-	-
Vinyl chloride	2	ND	ND	ND	**44**	ND	2	ND	ND
Xylene - m,p	-	-	-	-	-	-	-	-	-
Xylene - o	-	-	-	-	-	-	-	-	-
Xylene (mixed)	5 **	**5500**	**2700**	ND	**10**	ND	ND	**4200**	ND

Notes:

- : No analysis or no criteria

ND : No results above detection limits

(**) : The standard of 5 mg/l is for each discrete isomer (o-xylene, p-xylene and m-xylene)

(G) : Guidance value.

10	Reported value exceeds New York State potable groundwater standards - Technical and Operational Guidance Series 1.1.1 Class GA (NYSDEC, June 1998) and 6 NYCRR Part 703 Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations.

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Table 5 : Chemical Screening for Groundwater - VOCs

Contaminant	NYSDEC Groundwater Standards and Guidance Values	Frequency of Detection	Range Detected (µg/L)		Mean of detected values (µg/L)
			Minimum	Maximum	
Acetone	50	6 / 27	5	**200**	**55**
Benzene	1	8 / 27	**2**	**170**	**43**
Bromodichloromethane	-	0 / 27	-	-	-
Bromoform	-	0 / 27	-	-	-
Bromomethane	-	0 / 27	-	-	-
Butanone-2	50	3 / 27	2	**90**	33
Butylbenzene	-	-	-	-	-
Butylbenzene (sec)	-	-	-	-	-
Butylbenzene (tert)	-	-	-	-	-
Butylbenzene-n	-	-	-	-	-
Carbon Disulfide	-	4 / 27	4	15	8
Carbon tetrachloride	-	0 / 27	-	-	-
Chlorobenzene	-	0 / 27	-	-	-
Chloroethane	-	0 / 27	-	-	-
Chloroform	7	1 / 27	3	3	3
Chloromethane	-	1 / 27	68	68	68
Cyclohexane	-	5 / 27	2	260	95
Dibromo-1,2-chloropropane-3	-	0 / 27	-	-	-
Dibromochloromethane	-	0 / 27	-	-	-
Dibromoethane-1,2	-	0 / 27	-	-	-
Dichlorobenzene-1,2	3	1 / 27	2	2	2
Dichlorobenzene-1,3	-	0 / 27	-	-	-
Dichlorobenzene-1,4	-	0 / 27	-	-	-
Dichlorodifluoromethane	-	0 / 27	-	-	-
Dichloroethane-1,1	-	0 / 27	-	-	-
Dichloroethane-1,2	-	0 / 27	-	-	-
Dichloroethene-1,1	5	10 / 27	2	**47**	**15**
Dichloroethene-1,2 (cis)	5	22 / 27	1	**5200**	**700**
Dichloroethene-1,2 (trans)	5	10 / 27	2	**410**	**93**
Dichloropropane-1,2	1	1 / 27	**2**	**2**	**2**
Dichloropropene-1,3 (cis)	-	0 / 27	-	-	-
Dichloropropene-1,3 (trans)	-	0 / 27	-	-	-
Dioxane-1,4	-	-	-	-	-
Ethylbenzene	5	8 / 27	2	**1400**	**370**
Hexachlorobenzene	-	-	-	-	-
Hexanone-2	50	1 / 27	6	6	6
Isopropylbenzene	5	5 / 27	**16**	**210**	**83**
Isopropyltoluene-4	-	-	-	-	-
Isopropyltoluene-p	-	-	-	-	-
Methyl acetate	-	0 / 27	-	-	-
Methyl ethyl ketone	-	-	-	-	-
Methyl tert-butyl ether	-	0 / 27	-	-	-
Methyl-4-pentanone-2	-	1 / 27	2	2	2
Methylcyclohexane	-	5 / 27	2	200	77
Methylene Chloride	-	0 / 27	-	-	-
Methylene chloride	-	-	-	-	-
Propylbenzene-n	-	-	-	-	-
Styrene	-	0 / 27	-	-	-
Tetrachloroethane-1,1,2,2	-	0 / 27	-	-	-
Tetrachloroethene	5	18 / 27	3	**12000**	**2600**
Toluene	5	5 / 27	2	**480**	**100**
Trichloro-1,1,2-trifluoroethane-1,2,2	-	0 / 27	-	-	-
Trichlorobenzene-1,2,4	-	0 / 27	-	-	-
Trichloroethane-1,1,1	-	0 / 27	-	-	-
Trichloroethane-1,1,2	1	1 / 27	**2**	**2**	**2**
Trichloroethene	5	19 / 27	2	**9200**	**1600**
Trichlorofluoromethane	-	0 / 27	-	-	-
Trimethylbenzene-1,2,4	-	-	-	-	-
Trimethylbenzene-1,3,5	-	-	-	-	-
Vinyl chloride	2	12 / 27	1	**560**	**82**
Xylene - m,p	-	-	-	-	-
Xylene - o	-	-	-	-	-
Xylene (mixed)	5 **	5 / 27	**10**	**5500**	**2500**

Notes:
- : No analysis or no criteria
ND : No results above detection limits
(**) : The standard of 5 mg/l is for each discrete isomer (o-xylene, p-xylene and m-xylene)
NS : Specific groundwater standard or guidance value not specified by TOGS 1.1.1

10	Reported value exceeds New York State potable groundwater standards - Technical and Operational Guidance Series 1.1.1 Class GA (NYSDEC, June 1998).

Table 6: Summary of Estimated Overburden Groundwater Contamination Volume and Mass Calculations

Area		Affected Wells	Contaminants of Concern	Estimated Overall surface area >100µg/L total non-chlorinated VOCs (sq. ft.)	Estimated Overall surface area >1,000µg/L total chlorinated VOCs (sq. ft.)	Estimated average thickness of overburden groundwater (ft)	Estimated Groundwater Volume >100µg/L total non-chlorinated VOCs (gallons)	Estimated Groundwater Volume >1,000µg/L total chlorinated VOCs (gallons)	Estimated Non-Chlorinated VOC Mass >100µg/L Dissolved in Overburden Groundwater (lbs)	Estimated Chlorinated VOC Mass >1,000µg/L Dissolved in Overburden Groundwater (lbs)	Assumptions
On-site	**1**	MW-22, MW-101 and MW-105	Chlorinated VOCs	200	6600	11	20000	180000	0.03	8.5	Linear interpolation contouring between monitoring wells based on maximum measured concentrations. Groundwater volume is based on the product of the contour surface area and the estimated average thickness of overburden groundwater.
	2	MW-9	Non-Chlorinated VOCs	3300	NA	12.25	100000	NA	0.4	NA	As per on-site area 1.
Off-site	**1**	MW-16	Chlorinated VOCs	>1500	>4100	11	>40000	>120000	>0.2	>9	As per on-site area 1.

Notes:

- A soil porosity of 0.3 is assumed for groundwater volume calculations
- The 100µg/L and 1,000µg/L isocontours were selected for area, volume and mass calculations on the basis of their measurable extent.
- Isocontour surface areas shown for MW-16 exclude areas south of the deepest utility (24" VCP sanitary sewer) below Ward Street.
- Off-site groundwater impacts in the MW-23 area (former HFBC parking lot) are expected to be in the remediation area in the near future. Estimated surface area with 1000+ ug/L total chlorinated VOCs is > 2100 sq. ft.; estimated average thickness 10.5 ft.; estimated groundwater volume with 1000+ ug/L total chlorinated VOCs is > 60,000 gallons; and estimated chlorinated VOC mass with 1000+ ug/L chlorinated VOCs is > 1.5 lbs. Linear interpolation contouring between monitoring wells based on maximum measured concentrations. Groundwater volume is based on the product of the contour surface area and the estimated average thickness of overburden groundwater.

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Table 7: Ward Street Site Alternatives Analysis - Alternative A

Opinion of Probable Capital Remedial Costs
30-Year Monitored Natural Attenuation (MNA) Program

	UNIT	QTY	UNIT COST $	COST $
MNA System Installation				
Supplemental overburden monitoring well installation	EA	6	$750	$4,500
Supplemental bedrock monitoring well installation	EA	2	$1,000	$2,000
Total MNA System Installation				**$6,500**
Total Installation plus 8% tax				**$7,020**

	UNIT	QTY	UNIT COST $	COST $
MNA System Engineering				
Engineering (design)	LS	1	$5,000	$5,000
Construction oversight/reporting	LS	1	$10,000	$10,000
Total MNA Engineering				**$15,000**

Sub-Total MNA Implementation and Engineering **$22,020**

	UNIT	QTY	UNIT COST $	COST $
SSD EQUIPMENT				
SSD unit	LS	1	$2,500	$2,500
Vapor phase GAC treatment unit (2x 500lbs)	LS	1	$2,500	$2,500
SSD system commissioning	LS	1	$1,000	$1,000
Total SSD Equipment				**$6,000**
Total Implementation plus 8% tax				**$6,480**

	UNIT	QTY	UNIT COST $	COST $
SSD IMPLEMENTATION: HEADER NETWORK CONSTRUCTION AND INFRASTRUCTURE				
Sawcut concrete floor (1ft thick), core foundation wall, remove and stage in poly-lined and covered roll-offs or equivalent	CY	20	$500	$10,000
Load transport and dispose of non-contaminated concrete (non-hazardous)	TON	40	$65	$2,600
Excavate trenches to 1 ft depth and stage soils	CY	12	$100	$1,200
Load, transport, and dispose of non-hazardous soils at solid waste facility	TON	34	$65	$2,210
Load, transport, and dispose of hazardous soils at hazardous waste facility	TON	10	$150	$1,530
Horizontal vapor extraction screens and piping (see Table 12)	LS	1	$3,000	$3,000
Import, place and compact fill in trenches (Including Fill from On-Site)	CY	12	$200	$2,400
Building B Annex floor reconstruction: install structural concrete floor (includes reinforcing, wire mesh, epoxy joint sealer and vapor barrier)	sq.ft.	370	$25	$9,250
Electrical connection of SSD unit	LS	1	$1,000	$1,000
Total SSD Implementation				$33,190
Total SSD Implementation plus 8% tax				**$35,845**

Sub-Total SSD Implementation **$42,325**

Opinion of Probable Capital Remedial Costs Without Contingency **$64,345**

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Table 7: Ward Street Site Alternatives Analysis - Alternative A (continued)

Opinion of Probable Operation, Maintenance and Monitoring Remedial Costs
30-Year Monitored Natural Attenuation (MNA) Program

	UNIT	QTY	UNIT COST $	COST $
MNA System Monitoring and Decommissioning (30 years)				
Quarterly groundwater sampling (120 rounds)	EVENT	120	$1,500	$180,000
Groundwater analysis (18 wells, 120 rounds)	EA	2160	$150	$324,000
Quarterly reports	EA	120	$2,000	$240,000
Confirmatory soil sampling (16 boreholes, including taxes)	EA	16	$1,080	$17,280
System decommissioning (6 wells) (including taxes)	EA	6	$864	$5,184
Total MNA System Monitoring and Decommissioning				**$766,464**

	UNIT	QTY	UNIT COST $	COST $
SSD Engineering & OM&M				
SSD vapor carbon changeout if needed (10 year program) (including taxes)	LS	1	$6,000	$6,000
SSD electrical costs (10 year program) (including taxes)	LS	1	$3,240	$3,240
SSD reporting (10 year program)	yr	10	$2,500	$25,000
Total SSD Engineering & OM&M				**$34,240**

Opinion of Probable OM&M Remedial Costs Without Contingency **$800,704**

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Table 8: Ward Street Site Alternatives Analysis - Alternative B

Opinion of Probable Capital Remedial Costs
20-Year Enhanced Monitored Natural Attenuation (EMNA) Program

	UNIT	QTY	UNIT COST $	COST $
EMNA System Installation				
Supplemental overburden monitoring well installation	EA	6	$750	$4,500
Supplemental bedrock monitoring well installation	EA	2	$1,000	$2,000
EHC-O, EHC and TERRAMEND injection pilot test	LS	1	$35,000	$35,000
EHC-O, EHC and TERRAMEND	CY	3700	$6.30	$23,310
Building B Annex oxygen injection point installation (12 injection points)	LS	1	$13,500	$13,500
Total EMNA System Installation				**$78,310**
Total Installation plus 8% tax				**$84,575**

EMNA System Engineering				
Engineering (design)	LS	1	$15,000	$15,000
Construction observation/reporting	LS	1	$35,000	$35,000
Total EMNA Engineering				**$50,000**

Sub-Total EMNA Implementation and Engineering **$134,575**

SSD EQUIPMENT				
SSD unit	LS	1	$2,500	$2,500
Vapor phase GAC treatment unit (2x 500lbs)	LS	1	$2,500	$2,500
SSD system commissioning	LS	1	$1,000	$1,000
Total SSD Equipment				**$6,000**
Total Implementation plus 8% tax				**$6,480**

SSD IMPLEMENTATION: HEADER NETWORK CONSTRUCTION AND INFRASTRUCTURE				
Sawcut concrete floor (1ft thick), core foundation wall, remove and stage in poly-lined and covered roll-offs or equivalent	CY	20	$500	$10,000
Load transport and dispose of non-contaminated concrete (non-hazardous)	TON	40	$65	$2,600
Excavate trenches to 1 ft depth and stage soils	CY	12	$100	$1,200
Load, transport, and dispose of non-hazardous soils at solid waste facility	TON	34	$65	$2,210
Load, transport, and dispose of hazardous soils at hazardous waste facility	TON	10	$150	$1,530
Horizontal vapor extraction screens and piping (see Table 12)	LS	1	$3,000	$3,000
Import, place and compact fill in trenches (Including Fill from On-Site)	CY	12	$200	$2,400
Building B Annex floor reconstruction: install structural concrete floor (includes reinforcing, wire mesh, epoxy joint sealer and vapor barrier)	sq.ft.	370	$25	$9,250
Electrical connection of SSD unit	LS	1	$1,000	$1,000
Total SSD Implementation				$33,190
Total SSD Implementation plus 8% tax				**$35,845**

Sub-Total SSD Implementation **$42,325**

Opinion of Probable Capital Remedial Costs Without Contingency **$176,900**

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Table 8: Ward Street Site Alternatives Analysis - Alternative B (continued)

Opinion of Probable Operation, Maintenance and Monitoring Remedial Costs
20-Year Enhanced Monitored Natural Attenuation (EMNA) Program

	UNIT	QTY	UNIT COST $	COST $
EMNA System Monitoring and Decommissioning (20 years)				
Injection events (20 events) (including taxes)	EVENT	20	$9,720	$194,400
Quarterly groundwater sampling (80 rounds)	EVENT	80	$1,500	$120,000
Groundwater analysis (18 wells, 80 rounds)	EA	1440	$150	$216,000
Quarterly reports	EA	80	$2,000	$160,000
Confirmatory soil sampling (16 boreholes, including taxes)	EA	16	$1,080	$17,280
System decommissioning (6 wells) (including taxes)	EA	6	$864	$5,184
Total EMNA System Monitoring and Decommissioning				**$712,864**

	UNIT	QTY	UNIT COST $	COST $
SSD Engineering & OM&M				
SSD vapor carbon changeout if needed (10 year program) (including taxes)	LS	1	$6,000	$6,000
SSD electrical costs (10 year program) (including taxes)	LS	1	$3,240	$3,240
SSD reporting (10 year program)	yr	10	$2,500	$25,000
Total SSD Engineering & OM&M				**$34,240**

Opinion of Probable OM&M Remedial Costs Without Contingency **$747,104**

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Table 9: Ward Street Site Alternatives Analysis - Alternative C

Opinion of Probable Capital Remedial Costs

3-Year Multi Phase Vacuum Extraction (MPVE) Program Implementation in the Building B Annex and MW-15 Areas and Excavation and Off-Site Disposal of Impacted Soils in the MW-9 Area

	UNIT	QTY	UNIT COST $	COST $
IMPLEMENTATION OF MPVE AND SSD IN THE BUILDING B ANNEX: HEADER NETWORK CONSTRUCTION AND INFRASTRUCTURE				
Sawcut concrete floor (1ft thick), core foundation wall, remove and stage in poly-lined and covered roll-offs or equivalent	CY	20	$500	$10,000
Load transport and dispose of non-contaminated concrete (non-hazardous)	TON	40	$65	$2,600
Excavate trenches to 1 ft depth and stage soils	CY	12	$100	$1,200
Load, transport, and dispose of non-hazardous soils at solid waste facility	TON	34	$65	$2,210
Load, transport, and dispose of hazardous soils at hazardous waste facility (meets treatment standards)	TON	10	$150	$1,530
Building B Annex header network materials and installation (including piping, valves, drop tubes, surface boxes for extraction from wells and discharge to sewer, etc.)	LS	1	$20,000	$20,000
Horizontal sub-slab vapor extraction screens and piping (see Table 12)	LS	1	$1,500	$1,500
Import, place and compact fill in trenches (Including Fill from On-Site)	CY	12	$200	$2,400
Building B Annex floor reconstruction: install structural concrete floor (includes reinforcing, wire mesh, epoxy joint sealer and vapor barrier)	sq.ft.	370	$25	$9,250
Overburden extraction well installation	ea	12	$750	$9,000
Bedrock extraction well installation	ea	4	$1,000	$4,000
Disposal of water drums produced from extraction well installation	LS	1	$10,500	$10,500
Total Building B Annex MPVE Implementation				$74,190
Total Building B Annex MPVE Implementation plus 8% tax				**$80,125**

	UNIT	QTY	UNIT COST $	COST $
IMPLEMENTATION OF MPVE IN THE MW-15 AREA: HEADER NETWORK CONSTRUCTION AND INFRASTRUCTURE				
Sawcut asphalt (3in thick), core foundation wall, remove and stage in poly lined and covered roll-offs or equivalent	CY	5	$300	$1,500
Load transport and dispose of non-contaminated asphalt (non-hazardous)	TON	10	$65	$650
Excavate trenches to 1 ft depth and stage soils	CY	17	$75	$1,275
Load, transport, and dispose of non-hazardous soils at solid waste facility	TON	4	$65	$260
Load, transport, and dispose of hazardous soils at hazardous waste facility (meets treatment standards)	TON	1	$150	$150
Building B Annex Header Network (including piping, valves, drop tubes, surface boxes for extraction from wells, etc.)	LS	1	$8,500	$8,500
Insulate and heat trace piping in trenches, including installation	ft	50	$40	$2,000
Place and compact fill from on-Site in trenches	CY	17	$50	$850
Asphalt restoration along trenches	LS	1	$2,500	$2,500
Overburden extraction well installation	ea	4	$750	$3,000
Bedrock extraction well installation	ea	2	$1,000	$2,000
Disposal of water drums produced from extraction well installation	ea	1	$2,700	$2,700
Total MW-15 Area MPVE Implementation				$25,385
Total MW-15 Area MPVE Implementation plus 8% tax				**$27,416**

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Table 9: Ward Street Site Alternatives Analysis - Alternative C (continued)

Opinion of Probable Capital Remedial Costs (continued)
3-Year Multi Phase Vacuum Extraction (MPVE) Program Implementation in the Building B Annex and MW-15 Areas and Excavation and Off-Site Disposal of Impacted Soils in the MW-9 Area

	UNIT	QTY	UNIT COST $	COST $
MPVE & SSD EQUIPMENT				
MPVE unit (see Table 12)	LS	1	$140,000	$140,000
MPVE unit delivery	LS	1	$2,000	$2,000
SSD unit	LS	1	$2,500	$2,500
Vapor phase GAC treatment units (2x 2000lbs) & air to air heat exchanger	LS	1	$20,000	$20,000
MPVE & SSD system commissioning	LS	1	$3,000	$3,000
Electrical connection of MPVE unit	LS	1	$5,000	$5,000
Electrical connection of SSD	LS	1	$1,000	$1,000
Total Equipment				$173,500
Total Equipment plus 8% tax				**$187,380**
MPVE IMPLEMENTATION ENGINEERING AND PERMITTING				
Design, specifications, bid package & permitting	LS	1	$87,500	$87,500
System commissioning	LS	1	$25,000	$25,000
Construction observation	LS	1	$25,000	$25,000
MPVE final report	LS	1	$25,000	$25,000
Subtotal MPVE Engineering and Permitting				**$162,500**
IMPLEMENTATION OF EXCAVATION AND OFF-SITE DISPOSAL IN THE MW-9 AREA				
Equipment mob/ demob	LS	1	$3,000	$3,000
Decon/staging areas/HASP	LS	1	$1,500	$1,500
Monitoring well decommissioning (MW-9 and MW-9R)	LS	2	$1,000	$2,000
Removal concrete slab & asphalt and staging (~0.5 ft thick)	CY	70	$15	$1,050
Soil excavation and staging	CY	1900	$10	$19,000
Shoring along cork street	LS	1	$15,000	$15,000
Confirmatory and interim VOC soils sampling	EA	15	$200	$3,000
Dewatering to sewer	LS	1	$10,000	$10,000
Install temporary fencing (~ 5 ft away from perimeter of excavation)	LF	305	$3	$915
Backfill with ORC/HRC	lbs	1000	$10	$10,000
Import, install and compact clean backfill from off-site borrow source	CY	785	$22	$17,270
Install and compact clean backfill from on-site (1900 - 800 = 1100)	CY	1100	$7	$7,700
Site restoration (6-inches crusher run stone over excavated areas)	CY	15	$30	$450
Site restoration (new 8' chain link fence, gate and 4" diam steel posts)	LS	1	$5,000	$5,000
Site restoration (asphalt along Cork St)	LS	1	$5,000	$5,000
2-inch dia. monitoring well installation (replacements for B-8, MW-9 and MW-9R)	EACH	3	$1,500	$4,500
Waste characterization	EACH	2	$1,000	$2,000
Load, transport, and dispose of soils at solid waste facility (non-hazardous)	Tons	816	$65	$53,040
Load, transport, and dispose of soils at hazardous waste facility (hazardous, meets treatment standards)	Tons	544	$150	$81,600
Load transport and dispose of non-contaminated concrete and/or asphalt (non-hazardous)	Tons	140	$65	$9,100
Total Implementation				$251,125
Total Implementation plus 8% tax				**$271,215**
ENGINEERING OF EXCAVATION AND OFF-SITE DISPOSAL IN THE MW-9 AREA				
Engineering (design), bid documents and remedial construction report	LS	1	$55,000	$55,000
Construction observation	DAY	25	$1,500	$37,500
Post-construction groundwater monitoring events (5 events, 5 monitoring wells)	EA	5	$3,000	$15,000
Total Engineering				**$107,500**

Opinion of Probable Capital Remedial Costs Without Contingency **$836,136**

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Table 9: Ward Street Site Alternatives Analysis - Alternative C (continued)

Opinion of Probable Operation, Maintenance and Monitoring Remedial Costs

3-Year Multi Phase Vacuum Extraction (MPVE) Program Implementation in the Building B Annex and MW-15 Areas and Excavation and Off-Site Disposal of Impacted Soils in the MW-9 Area

	UNIT	QTY	UNIT COST $	COST $
MPVE OPERATION, MAINTENANCE AND MONITORING				
System field technician (3yr program)	yr	3	$45,000	$135,000
Vapor and groundwater sampling, analysis, labor, waste characterization (3yr program)	yr	3	$10,000	$30,000
Vapor phase carbon changeout (3yr program)	LS	1	$78,000	$78,000
Aqueous phase carbon changeout (3yr program)	LS	1	$6,000	$6,000
Collected product disposal (55gal drum) (3yr program)	ea	3	$1,000	$3,000
MPVE and occasional SSD electrical costs (3yr program)	LS	1	$74,000	$74,000
Sewer discharge fees	yr	3	$1,500	$4,500
Telecommunication fees (3yr program)	LS	1	$3,280	$3,280
Aboveground storage tank rental (startup only)	month	2	$4,000	$8,000
MPVE reporting (3yr program)	yr	3	$12,000	$36,000
Oxygen / electron donor / microbial slurry injection	LS	1	$25,000	$25,000
Confirmatory Soil Sampling (12 boreholes)	EA	12	$1,000	$12,000
5 Year annual post-remediation groundwater monitoring	yr	5	$10,000	$50,000
Heat trace electrical costs (3yr program)	LS	1	$700	$700
Total OM&M				$465,480
Total OM&M plus 8% tax				**$502,718**

SSD Engineering & OM&M				
SSD vapor carbon changeout if needed (5 year post-remediation program) (including taxes)	LS	1	$3,000	$3,000
SSD electrical costs (5 year post-remediation program) (including taxes)	LS	1	$2,160	$2,160
SSD reporting (5 year post-remediation program)	yr	5	$2,500	$12,500
Total SSD Engineering & OM&M				**$17,660**

Opinion of Probable OM&M Remedial Costs Without Contingency $520,378

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Table 10: Ward Street Site Alternatives Analysis - Alternative D

Opinion of Probable Capital Remedial Costs
3-Year Multi Phase Vacuum Extraction (MPVE) Program Implementation in the Building B Annex, MW-15 and MW-9 Areas

	UNIT	QTY	UNIT COST $	COST $
IMPLEMENTATION OF MPVE & SSD IN THE BUILDING B ANNEX: HEADER NETWORK CONSTRUCTION AND INFRASTRUCTURE				
Sawcut concrete floor (1ft thick), core foundation wall, remove and stage in poly-lined and covered roll-offs or equivalent	CY	20	$500	$10,000
Load transport and dispose of non-contaminated concrete (non-hazardous)	TON	40	$65	$2,600
Excavate trenches to 1 ft depth and stage soils	CY	12	$100	$1,200
Load, transport, and dispose of non-hazardous soils at solid waste facility	TON	34	$65	$2,210
Load, transport, and dispose of hazardous soils at hazardous waste facility (meets treatment standards)	TON	10	$150	$1,530
Building B Annex header network materials and installation (including piping, valves, drop tubes, surface boxes for extraction from wells and discharge to sewer, etc.)	LS	1	$20,000	$20,000
Horizontal sub-slab vapor extraction screens and piping (see Table 12)	LS	1	$1,500	$1,500
Import, place and compact fill in trenches (Including Fill from On-Site)	CY	12	$200	$2,400
Building B Annex Floor Reconstruction: Install Structural Concrete Floor (Includes Reinforcing, Wire Mesh, Epoxy Joint Sealer and Vapor Barrier)	sq.ft.	370	$25	$9,250
Overburden extraction well installation	ea	12	$750	$9,000
Bedrock extraction well installation	ea	4	$1,000	$4,000
Disposal of water drums produced from extraction well installation	LS	1	$10,500	$10,500
Total Building B Annex MPVE Implementation				$74,190
Total Building B Annex MPVE Implementation plus 8% tax				**$80,125**

	UNIT	QTY	UNIT COST $	COST $
IMPLEMENTATION OF MPVE IN THE MW-15 AREA: HEADER NETWORK CONSTRUCTION AND INFRASTRUCTURE				
Sawcut asphalt (3in thick), core foundation wall, remove and stage in poly-lined and covered roll-offs or equivalent	CY	5	$300	$1,500
Load transport and dispose of non-contaminated asphalt (non-hazardous)	TON	10	$65	$650
Excavate trenches to 1 ft depth and stage soils	CY	17	$75	$1,275
Load, transport, and dispose of non-hazardous soils at solid waste facility	TON	4	$65	$260
Load, transport, and dispose of hazardous soils at hazardous waste facility (meets treatment standards)	TON	1	$150	$150
Building B Annex header network (including piping, valves, drop tubes, surface boxes for extraction from wells, etc.)	LS	1	$8,500	$8,500
Insulate and heat trace piping in trenches, including installation	ft	50	$40	$2,000
Place and compact fill from on-Site in trenches	CY	17	$50	$850
Asphalt restoration along trenches	LS	1	$2,500	$2,500
Overburden extraction well installation	ea	4	$750	$3,000
Bedrock extraction well installation	ea	2	$1,000	$2,000
Disposal of water drums produced from extraction well installation	ea	1	$2,700	$2,700
Total MW-15 Area MPVE Implementation				$25,385
Total MW-15 Area MPVE Implementation plus 8% tax				**$27,416**

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Table 10: Ward Street Site Alternatives Analysis - Alternative D (continued)

Opinion of Probable Capital Remedial Costs (continued)

3-Year Multi Phase Vacuum Extraction (MPVE) Program Implementation in the Building B Annex, MW-15 and MW-9 Areas

	UNIT	QTY	UNIT COST $	COST $
IMPLEMENTATION OF MPVE IN THE MW-9 AREA: HEADER NETWORK CONSTRUCTION AND INFRASTRUCTURE				
Sawcut asphalt and/or concrete (3in thick), remove and stage in poly-lined and covered roll-offs or equivalent	CY	10	$500	$5,000
Load transport and dispose of contaminated concrete and/or asphalt (non-hazardous)	TON	20	$65	$1,300
Excavate trenches to 1 ft depth and stage soils	CY	51	$75	$5,100
Load, transport, and dispose of non-hazardous soils at solid waste facility	TON	4	$65	$260
Load, transport, and dispose of hazardous soils at hazardous waste facility	TON	1	$150	$300
Building B Annex header network (including piping, valves, drop tubes, surface boxes for extraction from wells and discharge to sewer, etc.)	LS	1	$13,400	$13,400
Insulate and heat trace piping in trenches, including installation	ft	50	$40	$2,000
Import, place and compact fill in trenches (Including Fill from On-Site)	CY	51	$50	$2,550
Asphalt pad over impacted area and restoration of trench through HFBC parking lot	LS	1	$8,000	$8,000
Overburden extraction well installation	ea	6	$750	$4,500
Disposal of water drums produced from extraction well installation	ea	1	$400	$400
Total MW-9 Area MPVE Implementation				$42,810
Total MW-9 Area MPVE Implementation plus 8% tax				**$46,235**

MPVE & SSD EQUIPMENT				
MPVE unit (see Table 12)	LS	1	$140,000	$140,000
MPVE unit delivery	LS	1	$2,000	$2,000
SSD unit	LS	1	$2,500	$2,500
Vapor phase GAC treatment units (2x 2000lbs) & air to air heat exchanger	LS	1	$20,000	$20,000
MPVE & SSD system commissioning	LS	1	$3,000	$3,000
Electrical connection of MPVE unit	LS	1	$5,000	$5,000
Electrical connection of SSD	LS	1	$1,000	$1,000
Total Equipment				$173,500
Total Equipment plus 8% tax				**$187,380**

MPVE IMPLEMENTATION ENGINEERING AND PERMITTING				
Design, specifications, bid package & permitting	LS	1	$87,500	$87,500
System Commissioning	LS	1	$25,000	$25,000
Construction observation	LS	1	$25,000	$25,000
MPVE final report	LS	1	$25,000	$25,000
Subtotal MPVE Engineering and Permitting				**$162,500**

Opinion of Probable Capital Remedial Costs Without Contingency **$503,656**

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Table 10: Ward Street Site Alternatives Analysis - Alternative D (continued)

Opinion of Probable Operation, Maintenance and Monitoring Remedial Costs
3-Year Multi Phase Vacuum Extraction (MPVE) Program Implementation in the Building B Annex, MW-15 and MW-9 Areas

	UNIT	QTY	UNIT COST $	COST $
MPVE OPERATION, MAINTENANCE AND MONITORING				
System field technician (3yr program)	yr	3	$45,000	$135,000
Vapor and groundwater sampling, analysis, labor, waste characterization (3yr program)	yr	3	$11,000	$33,000
Vapor phase carbon changeout (3yr program)	LS	1	$85,800	$85,800
Aqueous phase carbon changeout (3yr program)	LS	1	$6,600	$6,600
Collected product disposal (55gal drum) (3yr program)	ea	4	$1,000	$4,000
MPVE and occasional SSD electrical costs (3yr program)	LS	1	$74,000	$74,000
Sewer discharge fees	yr	3	$1,650	$4,950
Telecommunication fees (3yr program)	LS	1	$3,280	$3,280
Aboveground storage tank rental (startup only)	month	2	$4,000	$8,000
MPVE reporting (3yr program)	yr	3	$13,200	$39,600
Oxygen / electron donor / microbial slurry injection	LS	1	$25,000	$25,000
Confirmatory Soil Sampling (12 boreholes)	EA	12	$1,000	$12,000
5 Year annual post-remediation groundwater monitoring	yr	5	$10,000	$50,000
MW-15 area heat trace electrical costs (3yr program)	LS	1	$700	$700
MW-9 area heat trace electrical costs (3yr program)	LS	1	$700	$700
Total OM&M				$482,630
Total OM&M plus 8% tax				**$521,240**

SSD Engineering & OM&M				
SSD vapor carbon changeout if needed (5 year post-remediation program) (including taxes)	LS	1	$3,000	$3,000
SSD electrical costs (5 year post-remediation program) (including taxes)	LS	1	$2,160	$2,160
SSD reporting (5 year post-remediation program)	yr	5	$2,500	$12,500
Total SSD Engineering & OM&M				**$17,660**

Opinion of Probable OM&M Remedial Costs Without Contingency **$538,900**

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Table 11: Ward Street Site Alternatives Analysis - Opinion of Probable Remedial Cost Summary

Alternative	**A**	**B**	**C**	**D**
Description	**MNA (30 years)**	**EMNA (20 years)**	**MPVE (Building B Annex & MW-15 Areas) + Excavation (MW-9 Area)**	**MPVE (Building B Annex, MW-9 & MW-15 Areas)**
Capital	$64,345	$176,900	$836,136	$503,656
Contingency on Capital (15%)	$9,652	$26,535	$125,420	$75,548
Rounded (up to nearest $1000) Capital Total With Contingency (15%)	**$74,000**	**$204,000**	**$962,000**	**$580,000**
OM&M	$800,704	$747,104	$520,378	$538,900
Contingency on OM&M (15%)	$120,106	$112,066	$78,057	$80,835
Rounded (up to nearest $1000) OM&M Total With Contingency (15%)	**$921,000**	**$860,000**	**$599,000**	**$620,000**
Total Without Contingency	$865,049	$924,004	$1,356,514	$1,042,556
Total Contingency (15%)	$129,757	$138,601	$203,477	$156,383
Total Unrounded With Contingency (15%)	$994,807	$1,062,605	$1,559,992	$1,198,940
Total Rounded Opinion of Probable Remedial Costs With Contingency (15%)	**$995,000**	**$1,064,000**	**$1,561,000**	**$1,200,000**

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Table 12: Ward Street Site Alternatives Analysis - Remedial Design Assumptions

Sub-Slab Depressurization System

- Sub-slab horizontal screens are placed in three 1ft-wide trenches in the Building B Annex.
- In the case of monitored natural attenuation, supplemental costs are incurred as part of the SSD implementation, compared with alternatives B and C, in order to cut, excavate and reconstruct the slab since the trenches are not created as part of an MPVE implementation.
- It is assumed that the SSD unit will be installed outdoors, and in the case of contiguous implementation with MPVE, is an independent system electrically and mechanically from the MPVE unit and header network.
- The SSD unit consists of a 180-320W, high suction radon mitigation fan.
- GAC treatment of the SSD vapor effluent is assumed to be implemented for the duration of the 5-year SSD program.

Monitored Natural Attenuation

- 6 new monitoring wells with six-foot screen lengths are installed, while 12 historic monitoring wells are sampled along with the new wells as part of the 30 year program.
- 30 year MNA program.
- A quarterly groundwater monitoring frequency is assumed.

Enhanced Monitored Natural Attenuation

- Annual injection of chemical and biological enhancements via 12 injection points in Building B Annex only. MNA program shortened to 20 years due to EHC-O, EHC and TERRAMEND enhancements.

Multi-Phase Vacuum Extraction (MPVE)

- A 20 ft x20 ft well spacing grid (~15ft radius of influence) is assumed.
- The width of trenches, indoor and outdoor, is assumed to be 1 ft.
- The MPVE unit is positioned outdoors in the former HFBC parking lot adjacent to the Building B Annex.
- A proportion of 20% hazardous soils meeting treatment standards is assumed for all excavated soils that are considered contaminated.
- MPVE unit includes two 25HP LRPs, two inlet phase separation vessels, water transfer pumps, oil/water separator, water holding tanks, heated (when system is not operating) and insulated enclosure, ventilation, PLC telemetry, two aqueous phase GAC units (500lbs total), bag filters, etc.
- System provided and commissioned by Maple Leaf Environmental Equipment.
- The vapor phase granulated activated carbon changeout frequency is assumed to diminish with time. The assumed changeout frequency is monthly for the first 4 months, quarterly for the following year, and once every 8 months for the remaining 2.7 years of MPVE operation.
- Sub-roadway piping insulation and heat trace is included for all outdoor underground header network piping that must be locatec less than 4 ft below ground surface.
- Contaminated cuttings from trench excavation and extraction well installation are assumed to be staged and placed in trucks or roll-offs for off-site disposal.
- Header network piping is assumed to be 1.5 inch in diameter.
- The proportion of soils excavated from the trenches considered clean and used as backfill is 10% in the Building B Annex, 95% in the MW-15 area and 80% for all other areas.
- It is assumed that the depth of soil excavated in the indoor trenches is 1 ft from the bottom of the concrete slab, and 4 ft from the bottom of the outdoor surface layers (concrete or asphalt), if present.
- Each extraction well will be individually linked to a central manifold located within the MPVE enclosure.
- A combination of oxygen, electron donor and/or microbial slurry will be injected through the header network to target wells for final polishing.
- Sewer discharge fees are based on 50,000 gal groundwater production per month and a discharge fee of $0.03 per gallon.

MW-9 Area Soil Excavation and Off-Site Disposal

- Non-hazardous soil excavation production rate is assumed to be 200 Tons/day.
- Hazardous soil excavation production rate is assumed to be 100 Tons/day.
- Backfill production rate is assumed to be 200 CY/day.
- Soil excavation and staging includes shoring for an excavation depth of 14 ft along the west side of Cork Street.
- Sufficient staging area is assumed to be available due to the recent acquisition of the adjacent former High Falls Brewing Company parking lot.
- The average excavation depth in the MW-9 area is assumed to be 14ft.
- A proportion of 60% non-hazardous and 40% hazardous meeting treatment standards for excavated soils is assumed.
- All excavated soils are assumed to meet treatment standards based on observed contaminant concentrations.

General Assumptions:

- All costs are in constant fiscal year 2006 dollars.
- The cost of electricity is assumed to be 8.5 cents per kWh.
- Soil density is assumed to be 1.7 Tons/CY.
- Concrete or asphalt density is assumed to be 2 Tons/CY.

Table 13: Ward Street Site Alternatives Analysis Matrix

	Remedial Alternative[1]	Description	1 - Protection of Human Health and the Environment		2 - Standards, Criteria, & Guidance (SCG)		3 - Short-term Effectiveness & Impacts		4 - Long-term Effectiveness & Permanence		5 - Reduction of Toxicity, Mobility, or Volume	
			Score	Discussion	Score	Discussion	Score	Discussion	Score	Discussion	Score	Discussion
Scoring System			0 = Least protective 10 = Most protective		0 = Least likely to meet SCOs 10 = Most likely to meet SCOs		0 = Least effectiveness & most impact 10 = Most effectiveness & least impact		0 = Least effectiveness & permanence 10 = Most effectiveness & permanence		0 = Least reduction 10 = Most reduction	
A	Monitored Natural Attenuation (MNA) and Sub Slab Depressurization (SSD)	**- MNA with 30 years of annual monitoring; - Implemented with SSD in the Building B Annex to mitigate vapor intrusion.**	1	- Immediate risks associated with off-Site migration of VOCs are not mitigated in the short term. - Potential on-Site exposure risks to occupational workers are addressed by sub-slab depressurization.	2	- Compliance with SCGs will not be achieved for an extended period of time, assuming natural mechanisms are in place to degrade contaminants; - Will depend heavily on institutional controls.	9	- Limited short duration construction and contaminated soil handling impacts due to monitoring well and sub-slab depressurization installations. - Impacts associated with installation of sub-slab depressurization (installation of horizontal wells, disposal of excavated materials, slab reconstruction, etc.) - Short-term effectiveness of this alternative is limited to the immediate benefits of sub-slab depressurization.	2	- Wastes and treated residuals will remain on-Site following implementation of MNA, but long-term reduction is expected. - Natural and enhanced processes that induce attenuation of contaminant impacts to the subsurface are dependent upon several factors such as subsurface conditions, amount of contaminant present and possible presence of free product (DNAPL or LNAPL). Given this uncertainty, exposure risks outlined in criteria 1 are most likely to persist for an undetermined period of time; - Monitoring alone will not mitigate exposure risks but will provide some quantification; - Given the current and future intended use of the Site as an industrial facility, land use controls are likely to be reliably less implemented; - High degree of uncertainty associated with meeting remedial action objectives in the future.	0	- More control of short-term and long-term contaminant toxicity, mobility or volume. - Vinyl Chloride concentrations likely to rise within groundwater due to natural degradation of PCE and daughter products. - Poorly addresses impacts to bedrock, where natural degradation is less likely to occur and where pooling of NAPL could occur.
B	Enhanced Monitored Natural Attenuation (EMNA) and Sub-Slab Depressurization (SSD)	**- EMNA with 20 years of annual injections and monitoring; - Injection of EHC-O, EHC and TERRAMEND to accelerate contaminant degradation in anoxic and oxic cycles; - Implemented with SSD in the Building B Annex to mitigate vapor intrusion.**	2	- Immediate risks associated with off-Site migration of VOCs are not mitigated in the short term. - Potential on-Site exposure risks to occupational workers are addressed by sub-slab depressurization.	3	- Compliance with SCGs will not be achieved for an extended period of time; - Enhancements likely to reduce timelines relative to MNA; - Will depend heavily on institutional controls.	8	- Refer to discussion of alternative A. Marginal increase in construction impacts associated with injection point installation.	3	- Refer to discussion of alternative A. Enhancements would provide some benefit in reducing remediation timelines relative to MNA. - Enhancement of MNA through injection of reagents and microbial slurries may provide some engineering control of exposure risk, while control of land use will be mandatory; - Given the current and future intended use of the Site as an industrial facility, land use controls are likely to be reliably implemented, however engineering controls, with the exception of SSD, are likely to be less reliable due to the non-aggressive nature of enhancement technologies;	2	- More control of short-term and long-term contaminant toxicity, mobility or volume. - Use of reagents and microbial slurry to produce both anoxic and oxic conditions in cycles will reduce formation of vinyl chloride. - Poorly addresses impacts to bedrock.
C	Multi Phase Vacuum Extraction (MPVE), Soil Excavation & Off-Site Disposal and Sub-Slab Depressurization (SSD)	**- Implementation of MPVE in the Building B Annex and MW-15 areas; - Excavation and off-site disposal of soils >TAGM-RSCOs in the MW-9 area; - SSD program in Building B Annex following MPVE remediation to mitigate potential long-term vapor intrusion. - Polishing using oxygen, electron donor and/or microbial slurry**	8	- Potential off-Site fish and wildlife exposure risks are mitigated by the aggressive source removal and treatment approach of this alternative. - Potential on-Site exposure risks to occupational workers are addressed by sub-slab depressurization and proper engineering - Excavation and disposal of impacted soils increases temporary exposure risks to humans, fish and wildlife due to handling of contaminated materials and potential for dispersion of contamination in air.	8	- Removal of impacted soils in the MW-9 area will allow immediate compliance with SCGs for this area. - Implementation of MPVE in the Building B Annex and MW-15 areas is likely to allow compliance with SCGs after several years of operation, and will likely reduce needs for engineering and long-term institutional controls.	6	- Heavy truck traffic and associated decontamination, dust control and soil tracking measures required due to excavation of soils in the MW-9 area. - Extensive staging area required. - Limited short duration construction and contaminated soil manipulation impacts within the Building B Annex and MW-15 area due to extraction and monitoring well installations and header network construction. - Short-term effectiveness of this alternative is greatest due to soil excavation and expected immediate recovery of contaminants from the sub-surface due to MPVE.	9	- Low levels of wastes and treated residuals (<TAGM-RSCOs and >drinking water standards) are anticipated to remain on-Site following implementation of MPVE in the Building B Annex and MW-15 area and removal of soils in the MW-9 area. Since these standards are considered protective of human health and the environment, the need for engineering and institutional controls following remediation will be reduced.	9	- Complete removal of impacted soils in the MW-9 area effectively addresses impacts in this area with maximum certainty; - December 2005 MPVE pilot test at the Building B Annex has demonstrated effectiveness of this approach in removing VOCs from the subsurface at the Site; - Depression of groundwater table will reduce contaminant mobility by restricting plume migration; - Removal of VOC impacts in both the dissolved and adsorbed phase in groundwater and soils; - Removal of VOC impacts to bedrock.
D	Multi Phase Vacuum Extraction (MPVE) and Sub Slab Depressurization (SSD)	**- Implementation of MPVE in the Building B Annex, MW-9 and MW-15 areas; - SSD program in Building B Annex following MPVE remediation to mitigate long-term vapor intrusion. - Polishing using oxygen, electron donor and/or microbial slurry**	9	- Off-Site fish and wildlife exposure risks are mitigated by the aggressive treatment used with this alternative. - In situ approach minimizes potential exposures that may have resulted from dispersion of contaminated dust during excavation. - Potential on-Site exposure risks to occupational workers are addressed by sub-slab depressurization.	7	- Implementation of MPVE in the Building B Annex, MW-9 and MW-15 areas is likely to allow compliance with SCGs after several years of operation, and will reduce the need for engineering and long-term institutional controls.	8	- Limited short duration construction and contaminated soil manipulation impacts within the Building B Annex and MW-9 & MW-15 areas due to extraction and monitoring well installations and header network construction. - Not as effective in the short-term as alternative B since the MW-9 area is treated using MPVE instead of excavation.	8	- Low levels of wastes and treated residuals (<TAGM-RSCOs and >drinking water standards) are anticipated to remain on-Site following implementation of MPVE in the Building B Annex and MW-15 and MW-9 areas. Since these standards are considered protective of human health and the environment, the need for engineering and institutional controls following remediation will be reduced.	8	- December 2005 MPVE pilot test at the Building B Annex has demonstrated effectiveness of this approach in removing VOCs from the subsurface at the Site; - Depression of groundwater table will reduce contaminant mobility by restricting plume migration; - Removal of VOC impacts in both the dissolved and adsorbed phase in groundwater and soils; - Removal of VOC impacts to bedrock.

Notes:

1 Design assumptions for each remedial alternative are presented in Table 12
2 Ranked based on the opinion of probable costs for that alternative in proportion to the range of opinions of probable cost for all three alternatives
3 Evaluated based on the Draft BCP Program Guide Appendix 2 15 factors to be considered when evaluating land use criterion.
4 Opinions of probable capital cost include a 15% contingency, and opinions of probable OM&M cost include a 15% contingency.

Definitions:

1 -	Protection of Human Health and the Environment	This criterion is an evaluation of the remedy's ability to protect public health and the environment, assessing how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, engineering controls or institutional controls. The remedy's ability to achieve each of the RAOs is evaluated
2 -	Standards, Criteria, & Guidance (SCG)	Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance. All SCGs for the site will be listed along with a discussion of whether or not the remedy will achieve compliance. For those SCGs that will not be met, provide a discussion and evaluation of the impacts of each, and whether waivers are necessary.
3 -	Short-term Effectiveness & Impacts	The potential short-term adverse impacts and risks of the remedy upon the community, the workers, and the environment during the construction and/or implementation are evaluated. A discussion of how the identified adverse impacts and health risks to the community or workers at the site will be controlled, and the effectiveness of the controls, should be presented. Provide a discussion of engineering controls that will be used to mitigate short term impacts (i.e. dust control measures). The length of time needed to achieve the remedial objectives is also estimated.
4 -	Long-term Effectiveness & Permanence	This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: i. The magnitude of the remaining risks (i.e. will there be any significant threats, exposure pathways, or risks to the community and environment from the remaining wastes or treated residuals?), ii. The adequacy of the engineering and institutional controls intended to limit the risk, iii. The reliability of these controls, and; iv. The ability of the remedy to continue to meet RAOs in the future.
5 -	Reduction of Toxicity, Mobility, or Volume	The remedy's ability to reduce the toxicity, mobility or volume of site contamination is evaluated. Preference should be given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the site.
6 -	Implementability	The technical and administrative feasibility of implementing the remedy is evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc. Includes the evaluation of the reliability and viability of implementation of the industrial or engineering controls necessary for a remedy.
7a -	Cost Effectiveness - Capital	Short-term costs of implementation, including equipment purchases and engineering/design.
7b -	Cost Effectiveness - OM&M	Long-term costs of operation, maintenance and monitoring activities to maintain engineering controls.
8 -	Community Acceptance (see CPP)	Provide a summary of the public participation program that was followed for the project, see section 1.10 for requirements. The public's comments, concerns and overall perception of the remedy are evaluated in a format that responds to all questions that are raised (i.e. responsiveness summary).
9 -	Land Use	Evaluation of the reasonable anticipated future use of the site and its surroundings when unrestricted levels would not be achieved and should consider the factors presented in Appendix 2 of the BCP Guidance (2004) including applicable zoning laws and maps.

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Table 13: Ward Street Site Alternatives Analysis Matrix

Remedial Alternative[1]	6 - Implementability		7a - Cost Effectiveness - Capital			7b - Cost Effectiveness - OM&M			8 - Community Acceptance (see CPP)		9 - Land Use		Overall (sum of all scores)		
	Score	Discussion	Score[2]	Opinion of Probable Costs[4]	Discussion	Score[2]	Opinion of Probable Costs[4]	Discussion	Score	Discussion	Score	Discussion	Total Score (%)	Total Opinion of Probable Cost	Conclusions and recommendations
Scoring System	0 = Least implementable 10 = Most implementable		0 = Least cost effective 10 = Most cost effective			0 = Least cost effective 10 = Most cost effective			0 = Least accepted 10 = Most accepted		0 = Worst based on 15 criteria[3] 10 = Best based on 15 criteria[3]		0 = Worst overall 100 = Best overall		
A	7	- Successful implementation depends largely on presence of natural processes at the Site that are degrading contaminants. These processes are considered present at the Site due to the systematic occurrence of PCE degradation products downgradient from the suspected source location. - If natural degradation phenomena are observed, implementation is straightforward, requiring installation of short screen monitoring wells.	10	$74,000	- Low capital costs consisting of supplemental monitoring well installation and engineering/implementation of a SSD system	0	$921,000	- Highest OM&M costs of all alternatives, due to the extensive 30-year monitoring program.	4	- Community acceptance for MNA is anticipated to be low due to the lack of control of off-Site contaminant migration. - To be completed following review of public comments	4	- Historic, present and anticipated land use at the Site is commercial/industrial. - Institutional controls, which are not currently in place, are likely to be required at the Site under this alternative for an undetermined period of time. - Residential properties to the south of the Site are cross-gradient to groundwater flow.	**39**	**$995,000**	- Least costly of the four alternatives considered; - Least favorable alternative overall due to poor performance with the 'protection of human health and the environment', 'SCG', 'long-term effectiveness and permanence' and 'reduction of toxicity, mobility or volume' criteria. - Poor remedial 'value' : costs of this alternative approach that of an aggressive remedial program that is more likely to comply with regulatory agency requirements.
B	7	- Refer to discussion of Alternative A. - Injection of reagents and microbial slurry will accelerate natural degradation processes.	9	$204,000	- Increase in capital costs relative to MNA due to EMNA design, reagents, microbial slurry and implementation of injection points.	2	$860,000	- OM&M costs associated with 20-yr monitoring program are less than 30-yr MNA due to decreased monitoring time. - Injection events significantly increase OM&M costs for this alternative.	4	- Refer to discussion of alternative A.	4	- Refer to discussion of alternative A.	**44**	**$1,064,000**	- This approach generally has the same drawbacks as MNA: poor performance with the 'protection of human health and the environment', 'SCG' and 'long-term effectiveness and permanence' criteria; - Better control of degredation byproduct formation than MNA; - Unfavorable alternative relative to MPVE since cost approaches that of an aggressive remediation program, but is much less likely to comply with regulatory agency requirements.
C	8	- Excavation of MW-9 area only, due to unfeasible implementation of this method in the MW-15 area and the Building B Annex which has the facility's only loading dock; - Soil excavation and disposal is widely used successfully and reliably. - The area to be excavated around MW-9 may require some shoring to avoid undermining Cork Street and encountering sewer infrastructure, but is otherwise located in an open area; - Sufficient staging surface area is available at the Site to process soils excavated from the MW-9 area. - The December 2005 MPVE Pilot Study has demonstrated high removal rates and an adequate radius of influence for successful implementation of this technology. - Implementation of MPVE will require sub-slab or sub-asphalt extraction well and header network installations both within Building B Annex and outdoors in the MW-15 area.	0	$962,000	- Combined capital cost of MPVE, SSD and soil excavation & disposal is highest of all alternatives.	10	$599,000	- OM&M activities include MPVE system monitoring and maintenance, sampling and analysis, vapor and water GAC effluent treatment system changeouts, waste disposal, telecommunications, power and reporting.	5	- Increase in truck traffic during excavation work is not likely to be well accepted by members of the community; - Effectiveness of the remedial approach in reducing risks to human health is likely to contribute to acceptance of this alternative; - To be completed following review of public comments	8	- Historic, present and anticipated land use at the Site is commercial/industrial; - Institutional controls, which are not currently in place, will be reduced due to greater compliance with SCGs; - Residential properties to the south of the Site are cross-gradient to groundwater flow.	**71**	**$1,561,000**	- Combination of excavation with MPVE is less favorable than MPVE alone due to greater costs associated with soil disposal and associated increase in short-term impacts.
D	8	- The December 2005 MPVE Pilot Study has demonstrated high removal rates and an adequate radius of influence for successful implementation of this technology. - Implementation of MPVE will require sub-slab or sub-asphalt extraction well and header network installations both within Building B Annex and outdoors in the MW 9 and MW-15 areas.	4	$580,000	- Capital cost of extending the MPVE system to the MW-9 area is less than that of excavating and disposing of impacted soils in that area.	9	$620,000	- OM&M activities include MPVE system monitoring and maintenance, sampling and analysis, vapor and water GAC effluent treatment system changeouts, waste disposal, telecommunications, power and reporting; - Additional OM&M cost incurred relative to alternative C due to addition of MW-9 area to MPVE system.	8	- Effectiveness of the remedial approach in reducing risks to human health is likely to contribute to acceptance of this alternative; - Lack of intense truck traffic for this alternative is likely to be favored by the community. - To be completed following review of public comments	8	- Historic, present and anticipated land use at the Site is commercial/industrial; - Institutional controls, which are not currently in place, will be reduced due to greater compliance with SCGs; - Residential properties to the south of the Site are cross-gradient to groundwater flow.	**77**	**$1,200,000**	- Most favorable alternative due to good overall performance - no distinct weak points.

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5 -	Reduction of Toxicity, Mobility, or Volume	The remedy's ability to reduce the toxicity, mobility or volume of site contamination is evaluated. Preference should be given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the site.
6 -	Implementability	The technical and administrative feasibility of implementing the remedy is evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc. Includes the evaluation of the reliability and viability of implementation of the industrial or engineering controls necessary for a remedy.
7a -	Cost Effectiveness - Capital	Short-term costs of implementation, including equipment purchases and engineering/design.
7b -	Cost Effectiveness - OM&M	Long-term costs of operation, maintenance and monitoring activities to maintain engineering controls.
8 -	Community Acceptance (see CPP)	Provide a summary of the public participation program that was followed for the project, see section 1.10 for requirements. The public's comments, concerns and overall perception of the remedy are evaluated in a format that responds to all questions that are raised (i.e. responsiveness summary).
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