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FOCUSED FEASIBILITY STUDY REPORT

PRESENTATION OF AIR PERMEABILITY TESTING RESULTS AND EVALUATION OF SOIL REMEDIAL ALTERNATIVES RELATED TO THE CATTARAUGUS CUTLERY AREA

LITTLE VALLEY SUPERFUND SITE CATTARAUGUS COUNTY, NEW YORK

Prepared by
United States Environmental Protection Agency

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EXECUTIVE SUMMARY

The remedy selected in the August 2005 Record of Decision (ROD) for the Little Valley Superfund site includes excavation and off-site treatment/disposal of contaminated soils located on the former site of the Cattaraugus Cutlery and monitored natural attenuation (MNA) for the site-wide groundwater.

In September and November 2005, in accordance with the selected remedy for the soil, the United States Environmental Protection Agency (EPA) undertook pre-excavation soil sampling to define the boundaries of the soil contamination at the site. The results from this sampling effort indicated that the volume of contaminated soil is substantially greater than originally estimated in the ROD (it has increased from approximately 220 cubic yards to approximately 3,000 cubic yards).

Since the increased volume of contaminated soil at the site might impact the feasibility, effectiveness, and overall cost effectiveness of the selected soil remedy, the remedial alternatives for the soil component of the remedy selected in the ROD are reevaluated in this report.

1.0 INTRODUCTION

1.1 Purpose

The purpose of this focused feasibility study (FFS) report is to reevaluate the remedial alternatives for the soil component of the remedy selected in the August 2005 ROD in consideration of the increased volume of contaminated soil at the site.

1.2 Site Background

The Little Valley Superfund site includes a plume of contaminated groundwater which stretches for a distance of approximately 7 to 8 miles between the Village of Little Valley and the northern portion of the City of Salamanca along Route 353. While the site is located in a rural, agricultural area, a number of active and inactive small industrial facilities are located within a mile of the site.

There are over one hundred residential properties situated along Route 353, the main transportation route between the Village of Little Valley and the City of Salamanca. Private wells constitute the only source of drinking water for these properties.

In 1982, the Cattaraugus County Health Department (CCHD) and the New York State Department of Environmental Conservation (NYSDEC), while investigating trichloroethene (TCE) contamination around a small manufacturing facility along Route 353, detected TCE in nearby private wells. In 1989, the CCHD and New York State Department of Health (NYSDOH) documented that the TCE contamination plume extends approximately 7-8 miles from the Village of Little Valley to the northern edge of the City of Salamanca, which is part of the Allegheny Indian Reservation. NYSDEC installed a number of monitoring wells in the area to investigate possible sources of the contamination, including a former drum storage area, a private disposal site next to the former drum storage area, an inactive municipal landfill which accepted industrial wastes, and several industrial facilities.

The groundwater at the nearby industrial facility had TCE concentrations as high as 390 micrograms per liter (µg/l) and cis-1, 2-dichloroethene at concentrations exceeding Federal and New York State drinking water standards. Although the CCHD issued health advisories to the exposed residents in 1989, affected well owners were not provided with alternate water sources. About six well owners independently installed granular activated carbon filter systems and several chose to purchase bottled water.

Between 1989 and September 1995, the CCHD and the NYSDOH sampled a number of private water supplies in the area. Of the 74 wells that were sampled, 55 had TCE contamination with levels ranging from 1 µg/l to 50 µg/l; 42 of those sample results were equal to or greater than the NYSDOH drinking water standard of 5 µg/l. Additional sampling conducted during December 1995 by the CCHD indicated that 51 private wells had concentrations of TCE exceeding the Federal and state standards.

Following the listing of the site on the National Priorities List on June 17, 1996, EPA prepared an FFS to develop, screen, and evaluate various alternatives for an alternative water supply system for the affected and potentially affected residences at the site. Based upon the findings of the 1996 FFS, EPA issued a ROD on September 30, 1996, providing for an interim alternate water supply (Operable Unit 1). The ROD called for the installation of air stripper treatment units on all affected and potentially affected private wells.

Installation of the air stripper treatment units was performed from May 1997 through October 1997. Air strippers were selected because, based upon the maximum TCE concentrations that were present in the private wells at that time, they would be significantly less costly to maintain than granular activated carbon treatment units. Subsequently, granular activated carbon units were installed in addition to the air strippers as polishing units to ensure the consistent removal of contaminants.

The 1996 ROD called for an evaluation of the efficacy of the individual treatment systems within five years of their installation and a determination as to whether or not a more permanent alternate water supply system would be required. The ROD also stated that this evaluation would consider the data collected during the Operable Unit 2 groundwater and source identification Remedial Investigation and Feasibility Study (RI/FS). In April 2002, EPA issued an Explanation of Significant Differences (ESD) for Operable Unit 1. In the ESD, EPA determined that it was appropriate to continue to protect public health with individual treatment units rather than to construct a permanent alternate water supply. EPA also concluded at that time that because of the significant reduction in contaminant concentrations in the private wells, the granular activated carbon units alone would be able to effectively remove the contamination and would be as protective of public health as the combined air stripper/granular activated carbon treatment units. EPA, subsequently, removed the air stripper treatment units and added a second granular activated carbon unit to each of the affected wells. In October 2002, New York State assumed responsibility for the maintenance of the granular activated carbon treatment units. Currently there are granular activated carbon treatment units installed on 91 private wells at the site. Private wells in the area are sampled annually.

In September 1996, EPA initiated the Operable Unit 2 RI/FS to locate the source(s) of the contamination, to identify and evaluate measures to control or mitigate the source(s), and to address groundwater contamination. The RI/FS was completed in April 2005 and a ROD was signed on August 19, 2005. The selected remedy includes excavation and off-site treatment/disposal of contaminated soils located on the former site of the Cattaraugus Cutlery ("Cattaraugus Cutlery Area" or "CCA") and MNA for the site-wide groundwater. EPA will also continue to protect public health with the above-mentioned individual treatment units until groundwater standards are met.

In late 2005, in accordance with the August 2005 ROD, EPA undertook soil sampling to define the boundaries of the soil contamination at the site. The results from this sampling effort indicated that the volume of contaminated soil is substantially greater than originally estimated (it has increased from approximately 220 cubic yards to approximately 3,000 cubic yards).

In April 2006, EPA performed an air flow study at the CCA to provide an indication as to whether or not in-situ soil vapor extraction (ISVE) could successfully be used to remediate volatile organic compound (VOC)-contaminated soils.

2.0 SUMMARY OF SOIL INVESTIGATION RESULTS AND RISK

2.1 Summary of Soil Investigation Results

The CCA consists of several parcels that were used to manufacture cutlery. The W.W. Wilson Cutlery Company, which was formed in the 1890s, operated on the parcels until around 1900, when the company was sold to the Cattaraugus Cutlery Company. The Cattaraugus Cutlery Company manufactured cutlery at this location until the 1950s. Subsequent owners or operators have included Knowles-Fischer (auto parts stamping) and AVM, which owned the property between 1970 and 1977. King Windows, which manufactured stamped metal window parts, is believed to have operated on portions of the property between 1977 and 1993. At present, the property is privately owned, and has been used for storage and a variety of industrial activities since 1993. See Figure 1 for a site plan.

Based upon the soil data collected during the RI, the Cattaraugus Cutlery Area was determined to be a current localized source of groundwater contamination at the Site. Table 1 shows the TCE concentrations at the CCA based upon soil samples collected during the RI. Two of these samples exceeded the New York State Technical and Administrative Guidance Memorandum No. 94-HWR-4046 (TAGM) objective[1]—1,200 micrograms per kilogram (µg/kg) at 0 to 2 inches below ground surface (bgs) and 72,000 µg/kg at 1.5 to 2 feet bgs and 11,000 µg/kg at 1 to 2 feet bgs.

The soil contamination was further delineated by pre-excavation soil sampling conducted in late 2005 (See *Subsurface Soil Sampling Little Valley Superfund Site (Cattaraugus Cutlery Area), Little Valley, New York, Work Assignment 0-165 - Trip Report*, Lockheed Martin, June 2, 2006). Figure 2 identifies the sample locations and Table 2 and Figure 3 summarize the results from this soil sampling. As can be seen by these results, forty samples exceeded the TAGM objective, the highest being 198,000 µg/kg at 0 to 2 inches bgs at LV-N28. As can be seen by the figure, soil contamination exists underneath one of the on-Site buildings. Based upon these sample results, it is estimated that 3,000 cubic yards of soil are contaminated with TCE levels exceeded the TAGM objective.

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[1] *Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels*, NYSDEC, Division of Hazardous Waste Remediation, New York State Department of Environmental Conservation, January 24, 1994.

There are currently no federal or state promulgated standards for contaminant levels in soils. There are, however, other federal or state advisories, criteria, or guidance (To-Be-Considered guidance or "TBCs"), one of which is the New York State TAGM objectives. The soil cleanup objectives identified in NYSDEC's TAGM are either a human-health protection value or a value based on protection of groundwater (calculating the concentration in soil which would theoretically produce contaminant concentrations in the groundwater which would meet groundwater standards), whichever is more stringent. The TAGM is being used as the soil cleanup levels for this site. The TAGM for TCE is 700 µg/kg, which falls within EPA's acceptable risk range.

Soil samples were also collected from the former Korn Razor Manufacturing Company in April 2006. This area is located adjacent to CCA. TCE was not detected about the TAGM objectives at this location. (See *Subsurface Soil Sampling Little Valley Superfund Site (Former Cattaraugus Department of Public Works Parcel), Little Valley, New York, Work Assignment 0-165 - Trip Report*, Lockheed Martin, June 9, 2006).

2.2 Cattaraugus Cutlery Area Human Health and Ecological Risks

Based upon the results of the RI, a baseline human health risk assessment was conducted to estimate the risks associated with current and future property conditions.

The human-health estimates summarized below are based on current reasonable maximum exposure scenarios and were developed by taking into account various conservative estimates about the frequency and duration of an individual's exposure to TCE, as well as the toxicity of this contaminant. A screening level ecological risk assessment was also conducted to assess the risk posed to ecological receptors due to Site-related contamination.

Human Health Risk Assessment

Based upon the results of the risk assessment, it has been concluded that TCE is a chemical of concern for commercial workers in the CCA relative to potential exposures to soil; the estimated excess lifetime cancer risk is 7.6 x 10-4. Under all scenarios, the total estimated HI value is less than one. Therefore, no non-cancer health effects are expected to occur.

Ecological Risk Assessment

Based upon the results of the ecological risk assessment, it has been concluded that the TCE present in the surface soils at the CCA poses a low risk to terrestrial ecological receptors.

The CCA was found only limited value for ecological receptors, since only a small amount of terrestrial/wetland habitat (consisting of small isolated fragments of deciduous woodland or open field) exist for both.

A field-based qualitative benthic macroinvertebrate survey for both Little Valley Creek and an unnamed tributary to Little Valley Creek revealed the presence of a diverse benthic community in both water bodies. These communities did not display significant alterations in community structure in either area.

Based upon the results of the RI and the risk assessments, EPA has determined that actual or threatened releases of hazardous substances from the source areas, if not addressed by the preferred remedy or one of the other active measures considered, may present a current or potential threat to human health and the environment.

2.3 Air Permeability Testing

ISVE works best in high permeability soils. Because of concerns about the viability of ISVE at the CCA due to the predominance of silt, From April 15 – 16, 2006, EPA performed an air flow study at the CCA to provide an indication as to whether or not ISVE could successfully be used to remediate VOC-contaminated soils.
Six soil vapor extraction/monitoring wells were installed from 7 to 12 feet deep bgs in the contaminated area for evaluation. An additional, 20 ft. long and 2 ft. deep horizontal test trench was also installed. A 15 HP rotary lobe blower, capable of generating 500 scfm at 5 inches mercury vacuum was used to conduct site operation tests. Air flow and vapor concentration data was collected during test operations from each well and from the combined air stream of all six wells.

The results of the testing indicated that air flow rates, contaminant concentration levels, and the radius of influence of the ISVE extraction/monitoring wells were suitable to support full-scale ISVE pilot test operations. Air flow rates measured at each well under a range of vacuum levels combined with manometer readings from adjacent wells and piezometers which indicated that contaminated sub-surface soils are suitable for the application of SVE technology. Air flow rates ranged from a low of 5 scfm up to 70 scfm. The average radius of influence of the extraction wells ranged from 5 feet up to more than 16 feet. An extraction trench exhibited a flow rate of 182 scfm and a radius of influence of more than 5 feet.

Contaminant concentrations in the field were monitored with a PID and supplemented with laboratory analysis using method analysis TO-15 and SUMMA canisters, collected from each test well and the entire system. Samples were collected under a range of vacuum levels and over several hours to monitor changes in concentration with time of operation. In general, air concentrations of TCE ranged from 7.69 milligrams per kilogram (mg/kg) to 48.7 mg/kg. TCE composite air concentrations from all ISVE extraction wells (1-6) and the extraction trench were 5.8 mg/kg, and 15.6 mg/kg without the extraction trench. TCE composite air concentrations from the shallow wells (1-4) were 12.5 mg/kg, and the deep extractions wells (5-6) were 14.3 mg/kg.

Based upon the results of the air permeability testing, it has been concluded that ISVE would likely be effective in removing TCE from the soils within the CCA. Pilot testing would be required for the purpose of evaluating and characterizing the extracted soil vapors and determining the radius of influence and other performance parameters.

For a summary of the results of the air permeability testing, see Appendix A.

3.0 IDENTIFICATION OF REMEDIAL ALTERNATIVES

3.1 Remedial Action Objectives

Remedial action objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered (TBC) guidance, and site-specific risk-based levels.

The following RAOs for the contaminated soil are applicable:

- Minimize or eliminate TCE migration from contaminated soils to the groundwater;
- Minimize or eliminate any contaminant migration from contaminated soils to indoor air;
- Reduce or eliminate any direct contact or inhalation threat associated with TCE-contaminated soils and any inhalation threat associated with soil vapor.

Soil cleanup objectives are those established in the New York State Technical and Administrative Guidance Memorandum No. 94-HWR-4046 (TAGM) guidelines[2].

3.2 Identification of Soil Remedial Alternatives

The following 3 soil alternatives will be evaluated:

Alternative S-1: No Action

Capital Cost:	$0
Annual Operation and Maintenance Cost:	$0
Present-Worth Cost:	$0

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[2] *Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels*, NYSDEC, Division of Hazardous Waste Remediation, January 24, 1994.

There are currently no federal or state promulgated standards for contaminant levels in soils. There are, however, other federal or state advisories, criteria, or guidance (TBCs), one of which is the New York State TAGM objectives. The soil cleanup objectives identified in NYSDEC's TAGM are the more stringent cleanup level between a human-health protection value or a value based on protection of groundwater (calculating the concentration in soil which would theoretically produce contaminant concentrations in the groundwater which would meet groundwater standards). The TAGM is being used as the soil cleanup levels for this site. The TAGM for TCE is 700 µg/kg, which falls within EPA's acceptable risk range.

Construction Time:	0 months

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with the other alternatives. The no-action remedial alternative for soil does not include any physical remedial measures that address the problem of soil contamination at the site.

Because this alternative would result in contaminants remaining on-Site above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the site be reviewed at least once every five years. If justified by the review, remedial actions may be implemented to remove, treat, or contain the contaminated soils.

Alternative S-2: *In-Situ* Soil Vapor Extraction

Capital Cost:	$413,000
Annual Operation and Maintenance Cost:	$36,000
Present-Worth Cost:	$507,000
Construction Time:	2 months

Under this alternative, approximately 3,000 cubic yards of TCE-contaminated soil in the CCA would be remediated by ISVE. ISVE involves drawing air through a series of wells to volatilize the solvents in the soils. The extracted vapors would then be treated.

The exact configuration and number of vacuum extraction wells would be determined based on the results of a pilot-scale treatability study.

While the actual period of operation of the ISVE system would be based upon soil sampling results which demonstrate that the affected soils have been treated to soil TAGM objectives, it is estimated that the system would operate for a period of 3 years.

Alternative S-3: Excavation and Off-Site Disposal

Capital Cost:	$876,000
Annual Operation and Maintenance Cost:	$0
Present-Worth Cost:	$876,000
Construction Time:	3 months

This alternative involves the excavation of approximately 3,000 cubic yards of TCE-contaminated soil to an estimated depth of five feet in the CCA. The actual extent of the excavation and the volume of the excavated soil would be based on post-excavation confirmatory sampling. Shoring of the excavated areas and extraction and treatment of any water that enters the excavated area may be necessary. All excavated material would be characterized and transported for treatment and/or disposal at an off-Site Resource Conservation and Recovery Act (RCRA)-compliant disposal facility.

It is estimated that this effort could be completed in three months.

4.0 DETAILED ANALYSIS OF ALTERNATIVES

4.1 Introduction

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely, overall protection of human health and the environment, compliance with applicable or relevant and appropriate requirements, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, cost, and state and community acceptance.

The evaluation criteria are described below.

- Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- Compliance with ARARs addresses whether or not a remedy would meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies, with respect to these parameters, a remedy may employ.

- Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- Cost includes estimated capital and operation and maintenance costs, and net present-worth costs.

- State acceptance indicates if, based on its review of the soil sampling report, FFS report, and modified Proposed Plan, the State concurs with the preferred remedy at the present time. State acceptance will be evaluated in the Proposed Plan, which will identify EPA's preferred remedial alternative.

- Community acceptance will be assessed in the ROD and refers to the public's general response to the alternatives described in the soil sampling report, FFS report, and the Proposed Plan.

4.2 Detailed Evaluation of Remedial Alternatives

Alternative S-1: No Action

Description

The Superfund program requires that the No Action Alternative be considered as a baseline for comparison with the other alternatives. The No Action Alternative for soil does not include any physical remedial measures that address the problem of soil contamination at the CCA.

Because this alternative would result in contaminants remaining on the CCA above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the site be reviewed at least once every five years.

Assessment

Overall Protection of Human Health and the Environment

The No Action Alternative would entail no monitoring, removal, or treatment of TCE-contaminated soil. There may be a slow reduction of the volume of the TCE-contaminated soils due to natural volatilization, biodegradation, and flushing during stormwater infiltration. Since any volume contaminated soil reduction would be gradual, the exposure risks would be expected to remain the same. There is an ongoing potential for exposure to TCE-contaminated soils and migration of TCE to groundwater. The No Action Alternative would not be protective of human health and the environment.

Compliance with ARARs

The No Action Alternative does not satisfy action-specific ARARs and no location-specific ARARs would be triggered by this alternative. There are no TCE-specific ARARs. This alternative would not comply with New York State's soil cleanup objectives as specified in the soil TAGM.

Long-Term Effectiveness and Permanence

The No Action Alternative provides no reduction in risk. Long-term risks associated with the No Action alternative are related to the potential baseline human health risks. These risks would still exist through the potential soil exposure pathways (*i.e.*, ingestion, absorption, and inhalation).

As required by CERCLA, review and evaluation of site conditions would be performed

every five years. If justified by the review, additional remedial actions could be required. This alternative would not be effective over the long-term because TCE-contaminated soils would remain in place. The risks posed by TCE-contaminated media would not be mitigated.

Reduction of Toxicity, Mobility, or Volume Through Treatment

This alternative does not include any containment, treatment, removal, or disposal actions, and would leave the contaminated soils intact. There may be a slow reduction of the toxicity and volume of the TCE-contaminated soils due to natural volatilization, biodegradation, and flushing during stormwater infiltration. However, the mobility of the TCE would remain unchanged during this time period and the potential for continued contribution to the groundwater would also remain unchanged. This alternative would not result in reduction of toxicity, mobility, or volume through treatment.

Short-Term Effectiveness

The No Action Alternative for soils does not include any remedial activities. Since this alternative does not involve construction activities, there are no threats to workers or the community during implementation.

Implementability

- Technical Feasibility

The technical feasibility of this alternative would be very high, since no remedial activities or monitoring would be performed.

- Administrative Feasibility

This alternative would require administrative coordination for performance of site reviews every five years. Coordination with state and local authorities might be required in the future for making appropriate decisions with regard to additional remedial activities.

- Availability of Services and Materials

No services or materials would be required for this alternative.

Cost

There would be no capital or O&M costs associated with this alternative.

Alternative S-2: *In-Situ* Soil Vapor Extraction

Description

This alternative would include field pilot testing, and *in-situ* treatment by ISVE to remediate the TCE-contaminated soil at CCA as shown in Figure 2. Under this alternative, approximately 3,000 cubic yards of TCE-contaminated soil in the CCA would be remediated by ISVE. ISVE involves drawing air through a series of wells to volatilize the solvents in the soils. The extracted vapors would then be treated.

The exact configuration and number of vacuum extraction wells would be determined based on the results of a pilot-scale treatability study.

The implementation of ISVE would address the RAOs through prevention of human exposure to TCE in the soil and removal of a high percentage of TCE from the subsurface. Figure 2 shows the conceptual ISVE treatment area.

Utilizing grain size analyses and the visual soil classifications presented in the RI Report (TtFW, 2005), the CCA subsurface soils have been found to be predominantly granular with estimated typical permeabilities of 2.1×10^{-2} cm/sec. These granular soils are interlayered with finer-grained soils whose plasticity indices average six percent, and whose permeabilities are estimated to be three orders of magnitude less than those of the granular soils. Because the granular soils are the predominant type, and because the layering is generally horizontal, ISVE within the geologic formation is expected to be effective. However, the effectiveness of soil vapor extraction at the CCA would need to be verified during pilot testing. The ISVE system would likely utilize multiple PVC wells, screened from near surface to approximately 5 to 10 feet bgs. The extracted vapors would be treated to air emissions standards with activated carbon. Note that the conceptual treatment area, and the number of wells, may be modified based on the pre-design investigation results.

Because the contaminated soils would be treated under this alternative there would be no need for institutional controls, five-year reviews, or long-term monitoring.

Assessment

Overall Protection of Human Health and the Environment

This alternative would prevent human and ecological exposure to contaminants in the soils and the migration of contaminants from soil to groundwater.

Compliance with ARARs

This alternative would meet the action level with respect to TCE at the CCA because ISVE treatment is a proven method for removing volatile organics from the soil, and the extracted vapors would be treated via carbon adsorption. This alternative would be completed in compliance with action- and location-specific ARARs.

Alternative S-2 activities would be performed in accordance with appropriate criteria, advisories and guidances, and would fulfill the RAOs. This alternative fulfills the RAOs because it prevents human exposure to TCE in the surface and subsurface soils at the CCA, and mitigates the migration of TCE from soil to groundwater.

Long-Term Effectiveness and Permanence

ISVE is a well established technology. Based upon the results of field air permeability testing, it has been concluded that ISVE would likely be effective in removing TCE from the soils within the CCA. Pilot testing would be required for the purpose of evaluating and characterizing the extracted soil vapors and determining the radius of influence and other performance parameters. These data would be used in the system design evaluation, and the system performance would be monitored with extracted vapor measurements and soil borings.

This alternative would generate treatment residuals which would have to be appropriately handled.

Reduction of Toxicity, Mobility, and Volume Through Treatment

ISVE would result in the removal of a high percentage of the TCE that is believed to be entrained in the soil. The contaminant would be extracted from the soil in the vapor phase, sorbed onto activated carbon to achieve air stream removal, and the carbon would be transported off site for treatment and disposal or regeneration in accordance with regulations. Therefore, the volume of soil contaminated with TCE would be reduced. Because ISVE would reduce TCE concentrations significantly, the extent of residual contamination after the treatment would be limited. Therefore, the potential for gravity drainage induced migration from soil to groundwater would be less. Also, at reduced overall concentrations, the potential for vapor phase migration by molecular diffusion driven by concentration gradients, or by vapor flow driven by pressure gradients caused by changes in barometric pressure, would be less. Therefore, the mobility of any residual TCE in the subsurface would also be reduced.

Short-Term Effectiveness

Risk due to inhalation of organic vapors generated during the operation of the ISVE system would exist for construction workers and the public. This risk would be mitigated by multiple measures. First, the ISVE system would be secured. Second, the system would be visited on a periodic basis by a trained operator who would use field instruments to check for fugitive emissions. Third, the captured vapors would be entirely enclosed within sealed vessels and pipes, would be treated with primary and secondary carbon units, and after treatment would be discharged through a vertical stack designed to meet emission requirements.

Other short-term impacts would include the risk of an increase in equipment noise within the CCA and the risk of fire. The noise would be mitigated by insulating the interior of the remediation shed that would house the vacuum and treatment systems. The fire potential

would be mitigated by isolating the shed in the yard at a distance from other structures and by designing the shed interior as a hazardous location with all appropriate interior equipment to be intrinsically safe or explosion proof.

It is anticipated that the measures planned under Alternative S-2 could be completed/implemented within 2 months subsequent to initiation. The ISVE remedial action effort would begin upon completion of the construction and that effort would be ongoing for an estimated treatment period of 3years.

Implementability

- Technical Feasibility

ISVE is well established and is a known viable technology for the removal of VOCs in the unsaturated zone in reasonably permeable soils. Based upon the results of field permeability testing, it has been concluded that ISVE is a viable technology for the CCA. There is sufficient space in the Cutlery yard for all of the subsurface and aboveground ISVE utilities. All of the components for this technology are commercially available and easy to obtain. The needed wells, remediation compound, equipment, carbon units, and utilities can be installed and operated with standard and readily available equipment, materials, and methods.

- Administrative Feasibility

Implementation of ISVE, because the system would be located in a secure remediation compound, would not require site access restrictions other than to the compound. The off-site transportation of the carbon unit for treatment and disposal or regeneration would require compliance activity by the carbon supplier.

- Availability of Services and Materials

ISVE would require equipment, materials and supplies, carbon units and suppliers, remediation compound materials and installation, ISVE wells, observation wells, utility trenches, a power drop, and various controls, instruments, and accessories. All of these items are readily available from multiple vendors.

Costs

The total capital cost for this alternative at the CCA is estimated to be $364,000. The annual O&M costs associated with this alternative are estimated to be $36,000.

Data in support of the cost estimate are provided in Appendices A and B.

Alternative S-3: Excavation/Off-Site Disposal

Description

Alternative S-3 involves excavation of TCE-contaminated soils, protection of adjacent structures during excavation, post-excavation confirmatory sampling, backfilling, and restoration. Alternative S-3 is formulated as a remedial alternative that would address the RAOs by excavation and removal of contaminated soils. Because the contaminated soils would be removed from the site, there would be no need for institutional controls, five-year reviews, or long-term monitoring.

Excavation would proceed at the area identified in Figure 3 for the CCA. It is anticipated that approximately 3,000 cubic yards of soil would be removed from the CCA. Depending on soil properties adjacent to buildings, bracing may be needed to facilitate the excavation while protecting adjacent buildings.

Upon completion of the excavation to the planned depths, post-excavation confirmatory TCE soil sampling would be performed. In the event that soils with contaminant concentrations exceeding action levels were encountered during the post-excavation sampling, these soils would also be excavated.

After excavation of contaminated soils, the excavations would be backfilled with select fill and compacted, and the surface would be restored to its original condition.

It should be noted that the estimated soil excavation and removal could be greater, due to the inclusion of any contaminated soils encountered during the sampling and during the post-excavation confirmatory sampling.

Any excavated debris would be decontaminated and transported off site for disposal in accordance with disposal regulations. The excavated soil would be subjected to analysis for disposal parameters. The soils would then be containerized and trucked off-site for treatment and disposal.

Assessment

Overall Protection of Human Health and the Environment

This alternative would prevent human and ecological exposure to contaminants in the soils and the migration of contaminants from soil to groundwater.

Compliance with ARARs

This alternative would meet the action level with respect to TCE at the CCA since the source of contamination would be removed from the site for off-site treatment and disposal. This alternative would also be completed in compliance with action- and location-specific ARARs. There are no floodplains, wetlands or endangered species present at the CCA that would be impacted by implementation of this alternative.

Alternative S-3 activities would all be performed in accordance with appropriate criteria, advisories, and guidances. This alternative fulfills the RAOs because it prevents human exposure to TCE in the surface and subsurface soils at the CCA, and mitigates the migration of TCE from soil to groundwater.

Long-Term Effectiveness and Permanence

The excavation and removal of TCE-contaminated soils which exceed action levels from the CCA, followed by backfilling and restoration, would prevent human exposure to soil contaminants and mitigate the migration of TCE from soil to groundwater by removal of the TCE-contaminated soils. Therefore, Alternative S-3 would provide a long-term effective means of addressing the RAOs, and would not result in adverse impacts to streams, wetlands, or floodplains.

Reduction of Toxicity, Mobility, or Volume through Treatment

Soils with contaminant concentrations in excess of action levels for TCE would be excavated and removed from the site, treated on an as-needed basis, and properly disposed of. It would result in a significant reduction of the volume of TCE-contaminated soil.

Short-Term Effectiveness

The potential public health threats to workers and persons in nearby areas would be managed using engineered controls to minimize dust and fugitive emissions and by restricting public access to the area during remediation. Soil erosion controls would also be implemented to mitigate impacts to nearby waterways.

It is anticipated that the remedial effort would be complete within three months. Because the contaminated soils would be excavated and removed from the site, there would be no need for institutional controls, five-year reviews, or long-term monitoring.

Implementability

- Technical Feasibility

All of the components of this remedial alternative are well developed and commercially available. Excavation, sheeting and bracing (if necessary), any associated pavement and concrete demolition, testing, containerizing, trucking, off-site treatment and disposal, backfilling and compaction, and restoration can be performed with standard and readily available equipment, materials and methods.

While soil excavation is technically feasible, there are several site-specific complications related to this remedial approach. There is only one narrow, steep roadway into the back of the property. This roadway splits a severely deteriorated portion of the CCA building and a residence. Since the buildings are very close to the road, trucks moving into and out of the site would have to proceed slowly and carefully to minimize vibration and to ensure

that neither of the structures is hit. Since there is only one road, there would likely be a traffic bottleneck with dump trucks coming to pick up dirt and others bringing in backfill. Since there would be insufficient room on-site to create a significant excavation stockpile, it is likely that the excavation and backfilling would need to be performed incrementally. At the same time, post-excavation sampling and rapid turnaround analyses would need to be integrated into the process. Once the excavation effort approached the on-site buildings, the work would need slow down. In particular, the excavation of the contaminated soil in the courtyard area would be difficult, since there is very little clearance between the two buildings. There would be a need to monitor for VOCs and dust during the excavation, especially since this is a residential neighborhood. There is also contaminated soil underneath the floor of one building that would require excavation, potentially affecting the integrity of the building. Since the excavation effort would likely take several months to complete, the ongoing commercial use of the buildings would be affected in that they may not be accessible.

- Administrative Feasibility

The implementation of Alternative S-3 would require public access restrictions during the remediation process. It would be necessary to procure an off-site treatment and disposal facility(s) to handle the types and volumes of debris and soils that are to be excavated and removed from the site. Coordination with state and local agencies would be required. The transportation of hazardous waste to an off-site facility would require appropriate permits and coordination with the United States Department of Transportation and with the local traffic department. Traffic control plans would be required before remediation. The off-site treatment and disposal facility(s) selected would have to be in compliance with federal and state regulations.

- Availability of Services and Materials

Permitted treatment and disposal facilities are available with sufficient capacity for landfilling the materials that are to be removed. Earthwork, sheeting and bracing, waste handling, transportation, and testing services are readily available.

Costs

The total capital costs for implementing this alternative at the CCA is $876,000. There are no O&M costs associated with this alternative.

Data in support of the cost estimate is provided in Appendix C.

4.3 Comparative Analysis of Soil Remedial Alternatives

Overall Protection of Human Health and the Environment

Alternative S-1 would not be protective of human health and the environment, since it would not actively address the contaminated soils, which present unacceptable risks of

exposure and are a source of groundwater contamination. Alternatives S-2 and S-3 would be protective of human health and the environment, since each alternative relies upon a remedial strategy or treatment technology capable of eliminating human exposure and removing the source of groundwater contamination.

Compliance with ARARs

There are currently no federal or state promulgated standards for contaminant levels in soils. However, EPA is utilizing New York State soil cleanup objectives as specified in the soil TAGM (which are used as TBC criteria).

Since the contaminated soils would not be addressed under Alternative S-1, it would not comply with the soil cleanup objectives. Alternatives S-2 and S-3 would attain the soil cleanup objectives specified in the TAGM.

Alternative S-3 would involve the excavation of contaminated soils and would, therefore, require compliance with fugitive dust and VOC emission regulations. In addition, this alternative would be subject to New York State and federal regulations related to the transportation and off-site treatment/disposal of wastes. In the case of Alternative S-2, compliance with air emission standards would be required for the ISVE system. Specifically, treatment of off-gases would have to meet the substantive requirements of New York State Regulations for Prevention and Control of Air Contamination and Air Pollution (6 NYCRR Part 200, *et seq.*) and comply with the substantive requirements of other state and federal air emission standards.

Long-Term Effectiveness and Permanence

Alternative S-1 would involve no active remedial measures and, therefore, would not be effective in eliminating the potential exposure to contaminants in soil and would allow the continued migration of contaminants from the soil to the groundwater. Alternatives S-2 and S-3 would both be effective in the long term and would provide permanent remediation by either removing the contaminated soils from the site or treating them in place.

Based upon the results of field permeability testing, it has been concluded that ISVE would likely be effective in removing TCE from the soils within the CCA under Alternative 2. Pilot-scale treatability testing would be required for the purpose of identifying the configuration and number of vacuum extraction wells and evaluating and characterizing the extracted soil vapors and determining the radius of influence and other performance parameters. These data would be used in the system design evaluation, and the system performance would be monitored with extracted vapor measurements and soil borings. Alternative S-2 would generate treatment residuals which would have to be appropriately handled. Alternatives S-1 and S-3 would not generate such residuals.

The action alternatives would maintain reliable protection of human health and the environment over time.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative S-1 would provide no reduction in toxicity, mobility or volume. Under Alternative S-2, the toxicity, mobility, and volume of contaminants would be reduced or eliminated through on-Site treatment. Under Alternative S-3, the toxicity, mobility, and volume of the contaminants would be eliminated by removing the contaminated soil from the property.

Short-Term Effectiveness

Alternatives S-1 does not include any physical construction measures in any areas of contamination and, therefore, would not present any potential adverse impacts to on-property workers or the community as a result of its implementation. Alternative S-2 could result in some adverse impacts to on-property workers through dermal contact and inhalation related to the installation of ISVE wells through contaminated soils. Alternative S-3 could present some limited adverse impacts to on-property workers through dermal contact and inhalation related to excavation activities. Noise from the treatment unit and the excavation work associated with Alternatives S-2 and S-3, respectively, could present some limited adverse impacts to on-property workers and nearby residents. In addition, interim and post-remediation soil sampling activities would pose some risk. The risks to on-property workers and nearby residents under all of the alternatives could, however, be mitigated by following appropriate health and safety protocols, by exercising sound engineering practices, and by utilizing proper protective equipment.

Alternative S-3 would require the off-Site transport of contaminated soil (approximately 190 truck loads), which would potentially adversely affect local traffic and may pose the potential for traffic accidents, which in turn could result in releases of hazardous substances.

For Alternative S-3, there is a potential for increased stormwater runoff and erosion during construction and excavation activities that would have to be properly managed to prevent or minimize any adverse impacts. For this alternative, appropriate measures would have to be taken during excavation activities to prevent transport of fugitive dust and exposure of workers and downgradient receptors to VOCs.

Since no actions would be performed under Alternative S-1, there would be no implementation time. It is estimated that Alternative S-2 would require three months to install the ISVE system and three years to achieve the soil cleanup objectives. It is estimated that it would take three months to excavate and transport the contaminated soils to an EPA-approved treatment/disposal facility under Alternative S-3

Implementability

Alternative S-1 would be the easiest soil alternative to implement, as there are no activities to undertake.

Both Alternatives S-2 and S-3 would employ technologies known to be reliable and that can be readily implemented. Based upon the results of field permeability testing, it has

been concluded that ISVE is a viable technology for the CCA. Since the groundwater table is located less than 10 feet bgs, groundwater upwelling could potentially occur with the ISVE wells, which could fill the well screens and reduce or eliminate soil vapor flow. Equipment, services, and materials needed for Alternatives S-2 and S-3 are readily available, and the actions under these alternatives would be administratively feasible. Sufficient facilities are available for the treatment/disposal of the excavated materials under Alternative S-3.

While soil excavation under Alternative S-3 is technically feasible, there are several site-specific complications related to this remedial approach. There is only one narrow, steep roadway into the back of the property. This roadway splits a severely deteriorated portion of the CCA building and a residence. Since the buildings are very close to the road, trucks moving into and out of the site would have to proceed slowly and carefully to minimize vibration and to ensure that neither of the structures is hit. Since there is only one road, there would likely be a traffic bottleneck with dump trucks coming to pick up dirt and others bringing in backfill. Since there would be insufficient room on-site to create a significant excavation stockpile, it is likely that the excavation and backfilling would need to be performed incrementally. At the same time, post-excavation sampling and rapid turnaround analyses would need to be integrated into the process. Once the excavation effort approached the on-site buildings, the work would need slow down. In particular, the excavation of the contaminated soil in the courtyard area would be difficult, since there is very little clearance between the two buildings. There would be a need to monitor for VOCs and dust during the excavation, especially since this is a residential neighborhood. There is also contaminated soil underneath the floor of one building that would require excavation.

The ISVE installation under Alternative would result in minimal physical disturbance to the site relative to excavation.

Monitoring the effectiveness of the ISVE system under Alternative S-2 would be easily accomplished through soil and soil-vapor sampling and analysis. Under Alternative S-3, determining the achievement of the soil cleanup objectives could be easily accomplished through post-excavation soil sampling and analysis.

Cost

The estimated capital, operation, maintenance, and monitoring (OM&M), and present-worth costs for each of the alternatives are presented in the table, below.

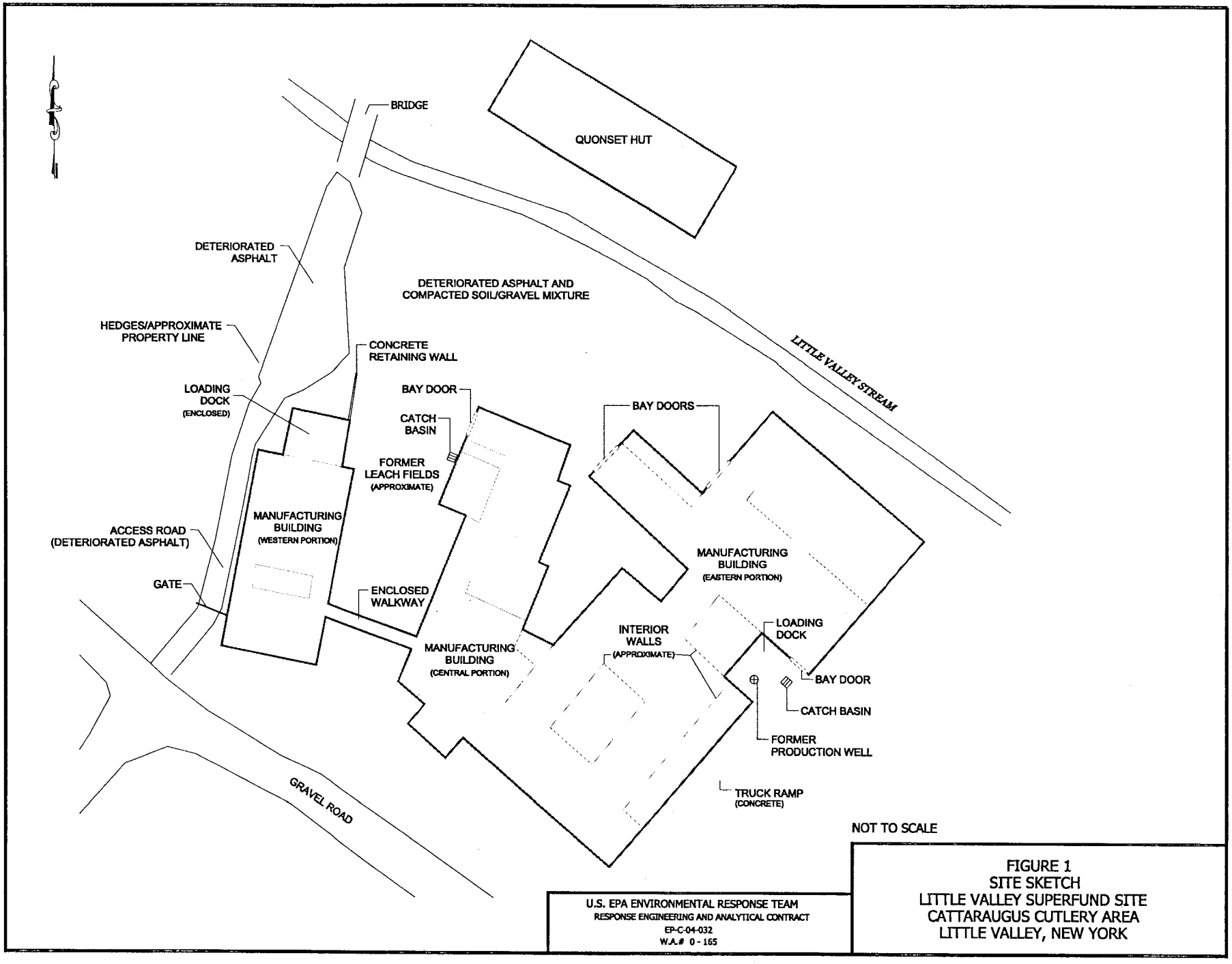
Alternative	Capital	Annual OM&M	Total Present-Worth
S-1	$0	$0	$0
S-2	$413,000	$36,000	$507,000

S-3	$876,000	$0	$876,000

As can be seen by the table, there are no annual OM&M costs associated with the Alternatives S-1 and S-3. The present-worth cost associated with Alternative S-2 was calculated using a discount rate of seven percent and a three-year time interval.

As can be seen by the cost estimates, Alternative S-1 is the least costly soil alternative at $0. Alternative S-3 is the most costly soil alternative at $876,000.

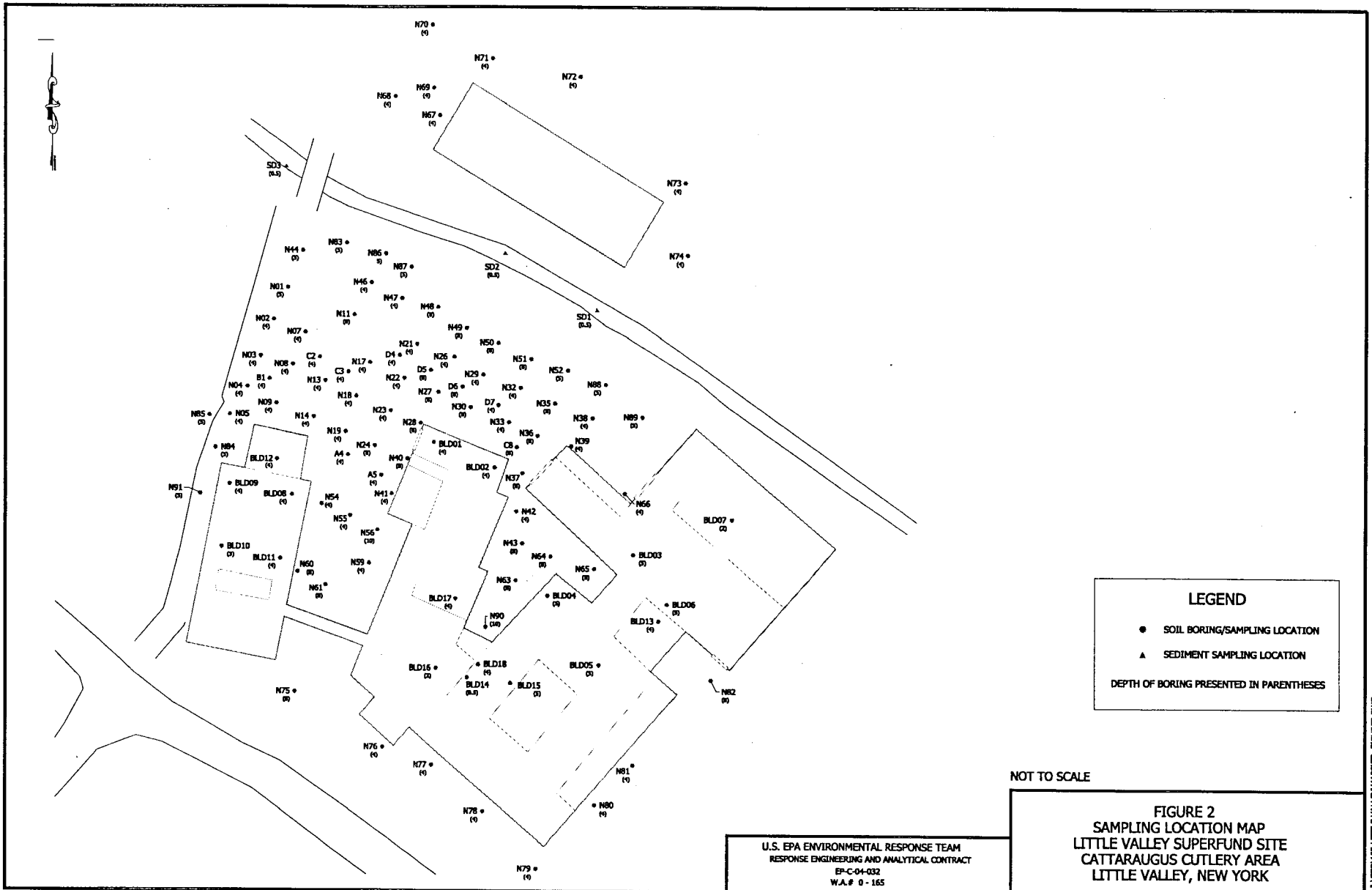
Figures

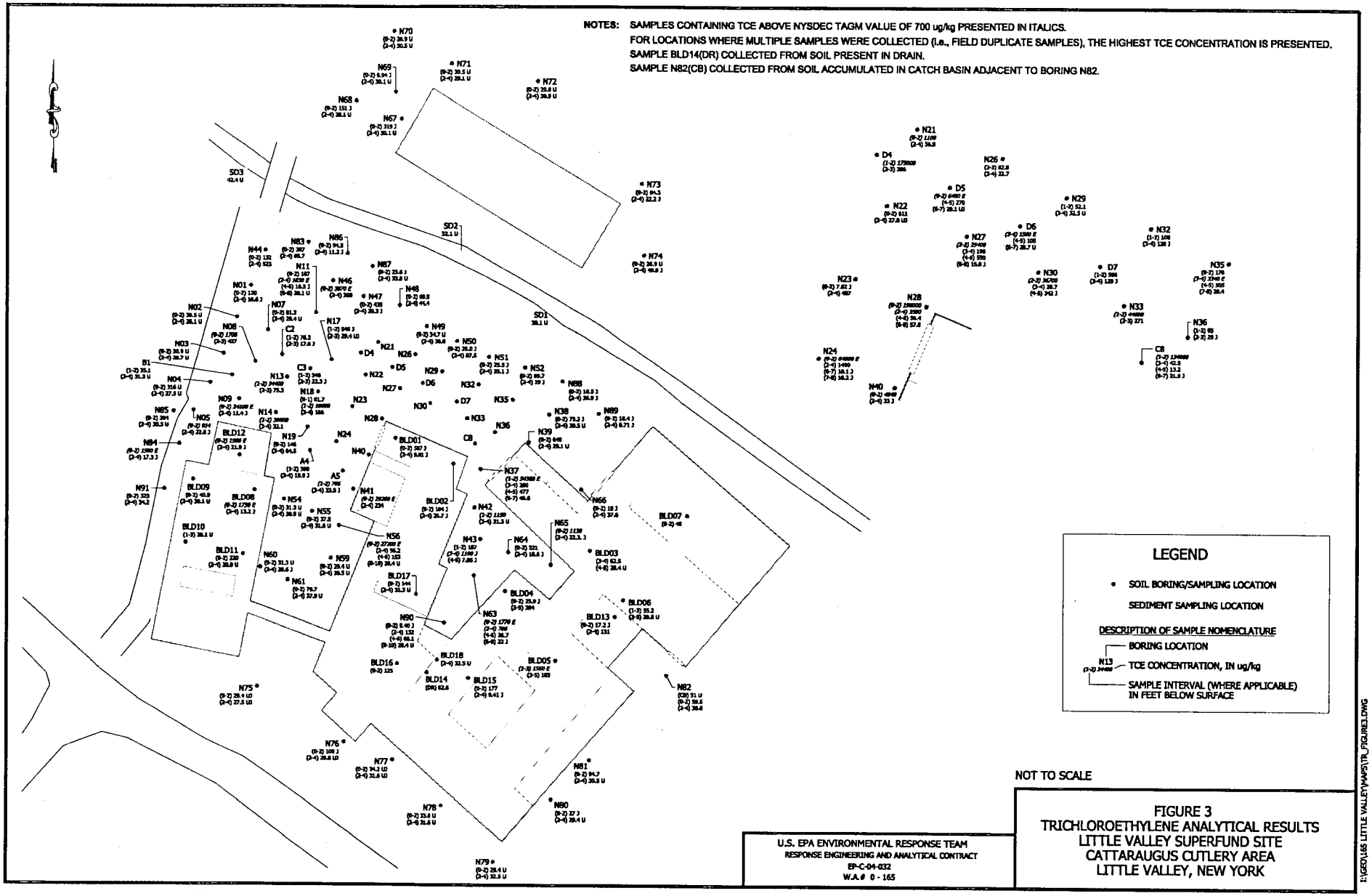


U.S. EPA ENVIRONMENTAL RESPONSE TEAM
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
EP-C-04-032
W.A.# 0 - 165

FIGURE 1
SITE SKETCH
LITTLE VALLEY SUPERFUND SITE
CATTARAUGUS CUTLERY AREA
LITTLE VALLEY, NEW YORK

I:\GEO\165 LITTLE VALLEY\MAPS\FIGURE1.DWG


LEGEND
SOIL BORING/SAMPLING LOCATION
SEDIMENT SAMPLING LOCATION
DEPTH OF BORING PRESENTED IN PARENTHESES
NOT TO SCALE
U.S. EPA ENVIRONMENTAL RESPONSE TEAM
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
EP-C-04-032
W.A.# 0 - 165
FIGURE 2
SAMPLING LOCATION MAP
LITTLE VALLEY SUPERFUND SITE
CATTARAUGUS CUTLERY AREA
LITTLE VALLEY, NEW YORK
I:\GED\165 LITTLE VALLEY\MAPS\TR_FIGURE2.DWG


NOTES: SAMPLES CONTAINING TCE ABOVE NYSDEC TAGM VALUE OF 700 ug/kg PRESENTED IN ITALICS.
FOR LOCATIONS WHERE MULTIPLE SAMPLES WERE COLLECTED (i.e., FIELD DUPLICATE SAMPLES), THE HIGHEST TCE CONCENTRATION IS PRESENTED.
SAMPLE BLD14(DR) COLLECTED FROM SOIL PRESENT IN DRAIN.
SAMPLE N82(CB) COLLECTED FROM SOIL ACCUMULATED IN CATCH BASIN ADJACENT TO BORING N82.
LEGEND
SOIL BORING/SAMPLING LOCATION
SEDIMENT SAMPLING LOCATION
DESCRIPTION OF SAMPLE NOMENCLATURE
BORING LOCATION
N13
TCE CONCENTRATION, IN ug/kg
SAMPLE INTERVAL (WHERE APPLICABLE) IN FEET BELOW SURFACE
NOT TO SCALE
U.S. EPA ENVIRONMENTAL RESPONSE TEAM
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
EP-C-04-032
W.A.# 0 - 165
FIGURE 3
TRICHLOROETHYLENE ANALYTICAL RESULTS
LITTLE VALLEY SUPERFUND SITE
CATTARAUGUS CUTLERY AREA
LITTLE VALLEY, NEW YORK
I:\GEO\165 LITTLE VALLEY\MAPS\TR_FIGURE3.DWG

Tables

Table 1
Concentrations of TCE in Soil, Cattaraugus Cutlery Area–Remedial Investigation Results

Location Depth	SBCCA1 13'-15'	SBCCA1 28'-30'	SBCCA1 30'-32'	SBCCA1 35'-37'	SBCCA2 12'-14'	SBCCA2 14'-16'	SBCCA2 16'-18'	SBCCA2 18'-20'	SBCCA2 20'-22'	SBCCA3 0'-2'	SBCCA3 13'-15'	SBCCA3 18'-20'	SBCCA3 23'-25'	SBCCA3 28'-30'	SBCCA3 40'-42'	MWCCA-4 0"-2"
Volatile Organics (ug/kg)																
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--
1,2-Dichloroethene (total)	--	--	--	--	--	--	--	--	--	--	3 J	--	--	--	--	NA
Trichloroethene	--	3 J	4 J	11 J	7 J	10 J	--	7 J	9 J	18	70	28	45	23	2 J	--

SUMMARY OF DETECTED SOIL CONSTITUENTS FROM CATTARAUGUS CUTLERY AREA

Location Depth	MWCCA-4 4'-6'	MWCCA-4 10'-12'	MWCCA-4 14'-16'	MWCCA-4 20'-22'	MCBCCA-4 24'-26'	MWCCA-4 30'-32'	MWCCA-4 34'-36'	MCCCA-4 40'-42'	MWCCA-4 44'-46'	MWCCA-5 0"-2"	MWCCA-5 1.5'-2'	MWCCA-5 5'-7'	MWCCA-5 10'-12'	MWCCA-5 10'-12' Duplicate	MWCCA-5 15'-17'
Volatile Organics (ug/kg)															
cis-1,2-Dichloroethene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	--	36	27	32	24	--	--	--	--	1200 D	72000 D	41	91	140	120

SUMMARY OF DETECTED SOIL CONSTITUENTS FROM CATTARAUGUS CUTLERY AREA

Location Depth	MWCCA-5 20'-22'	MWCCA-5 25'-27'	MWCCA-5 30'-32'	MWCCA-5 35'-37'	MWCCA-5 40'-42'	MWCCA-5 45'-47'	Drain Material (near CCA5)	MWCCA-6 0"-2"	MWCCA-6 5'-7'	MWCCA-6 10'-12'	MWCCA-6 15'-17'	MWCCA-6 20'-22'	MWCCA-6 25'-27'	MWCCA-6 30'-32'	MWCCA-6 30'-32' Duplicate
Volatile Organics (ug/kg)															
cis-1,2-Dichloroethene	--	--	--	--	--	--	--	--	--	--	--	--	5 J	--	5 J
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	58	76	8 J	--	--	--	53 J	--	--	13 J	70	220	680 D	93	220

SUMMARY OF DETECTED SOIL CONSTITUENTS FROM CATTARAUGUS CUTLERY AREA

Location Depth	MWCCA-6 35'-37'	MWCCA-6 40'-42'	MWCCA-6 45'-47'	MWCCA-7 0"-2"	MWCCA-7 5'-7'	MWCCA-7 10'-12'	MWCCA-7 15'-17'	MWCCA-7 20'-22'	MWCCA-7 25'-27'	MWCCA-7 25'-27' Duplicate	MWCCA-7 30'-32'	MWCCA-7 30'-32' Duplicate	MWCCA-7 35'-37'	MWCCA-7 40'-42'
Volatile Organics (ug/kg)														
cis-1,2-Dichloroethene	--	--	--	--	--	--	--	--	--	--	--	NA	--	--
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	--	5 J	--	--	26	28	17	22	67	48	70	NA	4 JN	--

SUMMARY OF DETECTED SOIL CONSTITUENTS FROM CATTARAUGUS CUTLERY AREA

Location Depth	MWCCA-7 45'-47'	CCAGEO-1 0'-1'	CCAGEO-1 6'-8'	CCAGEO-1 16'-18'	CCAGEO-1 26'-28'	CCAGEO-2 0'-1'	CCAGEO-2 6'-8'	CCAGEO-2 18'-20'	CCAGEO-2 25'-27'	CCAGEO-3 0'-1'	CCAGEO-3 8'-10'	CCAGEO-3 20'-22'	CCAGEO-3 25'-27'	CCAGEO-4 0'-1'	CCAGEO-4 8'-10'
Volatile Organics (ug/kg)															
cis-1,2-Dichloroethene	--	--	--	3 J	7 J	--	--	--	1 J	--	--	0.7 J	4 J	--	0.5 J
1,2-Dichloroethene (total)	NA														
Trichloroethene	--	3 J	2 J	86	110	14	1 J	71	27	6 J	9 J	70	120	40	190 J

SUMMARY OF DETECTED SOIL CONSTITUENTS FROM CATTARAUGUS CUTLERY AREA

Location / Depth	CCAGEO-4 16'-18'	CCAGEO-4 22'-24'	CCAGEO-5 0'-1'	CCAGEO-5 0'-1' Duplicate	CCAGEO-5 2'-4'	CCAGEO-5 6'-8'	CCAGEO-5 20'-22'	CCAGEO-6 0'-1'	CCAGEO-6 1'-2'	CCAGEO-6 12'-14'	CCAGEO-6 22'-24'
Volatile Organics (ug/kg)											
cis-1,2-Dichloroethene	--	--	--	--	--	--	--	--	830 J	--	--
1,2-Dichloroethene (total)											
Trichloroethene	72	150	110 D	96 J	550 D	84	87 D	73	11000 D	170 D	26

NOTES:

Samples were also collected from location SBCCA1 at the following depth intervals (bgs): 0 to 2 feet, 6 to 8 feet, 8 to 10 feet, 18 to 20 feet and 23 to 25 feet. No constituents were detected in these samples.

Samples were also collected from location SBCCA2 at the following depth intervals (bgs): 0 to 2 feet, 6 to 8 feet, 10 to 12 feet, 30 to 32 feet, 32 to 34 feet, and 38 to 40 feet. No constituents were detected in these samples.

A sample was also collected from location SBCCA3 at a depth interval (bgs) of 2 to 4 feet. No constituents were detected in this sample.

See Figure 5 for sampling locations.

Shaded values exceed their most conservative criteria value for comparison (see Table 1):

Exceeds human health - based values.

Exceeds ecological-based values.

Exceeds state values.

Exceeds two or more of the above values.

"J" qualifier indicates estimated concentration value.

"D" qualifier indicates concentration value from a dilution analysis.

"R" qualifier indicates rejected value (unusable).

"B" qualifier (for metals only) indicates concentration is between contract required quantitation limit and instrument detection limit.

"K" qualifier indicates estimated concentration value, biased high.

"L" qualifer indicates estimated concentration value, biased low.

"--" indicates not detected.

"NA" indicates not analyzed/not applicable.

"NC" indicates no criteria comparison value available.

TABLE 2
ANALYTICAL RESULTS OF TRICHLOROETHYLENE IN SOIL
LITTLE VALLEY SUPERFUND SITE
CATTARAUGUS CUTLERY AREA
LITTLE VALLEY, NEW YORK

SAMPLE LOCATION	REAC SAMPLE NO.	RESULT	QF	RL
LV-BLD1(0-2)	0-0165-0302	587	J	36.2
LV-BLD1(2-4)	0-0165-0303	9.01	J	30.9
LV-BLD2(0-2)	0-0165-0304	67.5	J	31.6
LV-BLD2(0-2)D	0-0165-0305	104	J	32.9
LV-BLD2(2-4)	0-0165-0306	25.7	J	30.5
LV-BLDG3(3-4)	0-0165-0637	62.5		34.7
LV-BLDG3(4-5)	0-0165-0638	28.4	U	28.4
LV-BLDG4(0-2)	0-0165-0639	25.9	J	36.8
LV-BLDG4(3-5)	0-0165-0640	394		37.3
LV-BLDG5(1-3)	0-0165-0641	**1560**	**E**	32.1
LV-BLDG5(3-5)	0-0165-0642	103		35.7
LV-BLDG6(1-3)	0-0165-0643	55.2		36.8
LV-BLDG6(3-5)	0-0165-0644	29.8	U	29.8
LV-BLDG6(3-5)D	0-0165-0645	30.1	U	30.1
LV-BLDG7(0-2)	0-0165-0646	40		30.1
LV-BLDG8(0-2)	0-0165-0647	**1730**	**E**	29.1
LV-BLDG8(2-4)	0-0165-0648	13.2	J	32.9
LV-BLDG9(0-2)	0-0165-0649	40.9		34.7
LV-BLDG9(2-4)	0-0165-0650	30.1	U	30.1
LV-BLDG9(2-4)D	0-0165-0651	30.1	U	30.1
LV-BLDG10(1-3)	0-0165-0652	28.1	U	28.1
LV-BLDG11(0-2)	0-0165-0653	220		33.3
LV-BLDG11(2-4)	0-0165-0654	31.3	U	31.3
LV-BLDG11(2-4)D	0-0165-0655	30.9	U	30.9
LV-BLDG12(0-2)	0-0165-0656	**1560**	**E**	31.3
LV-BLDG12(2-4)	0-0165-0657	21.9	J	31.6
LV-BLDG13(0-2)	0-0165-0658	17.2	J	33.3
LV-BLDG13(2-4)	0-0165-0659	131		33.3
LV-BLDG14(DR)	0-0165-0660	62.6		31.6
LV-BLDG15(0-2)	0-0165-0661	177		33.8
LV-BLDG15(2-4)	0-0165-0662	9.41	J	31.6
LV-BLDG16(0-2)	0-0165-0663	125		29.75
LV-BLDG17(0-2)	0-0165-0664	144		31.3
LV-BLDG17(2-4)	0-0165-0665	31.3	U	31.3
LV-BLDG17(2-4)D	0-0165-0666	31.3	U	31.3
LV-BLDG18(2-4)	0-0165-0667	32.5	U	32.5
LV-A4(1-2)	0-0165-0094	56.6		6.1
LV-A4(1-2)D	0-0165-0095	388		27.5
LV-A4(3-4)	0-0165-0096	30.5	UJ	30.5
LV-A4(3-4)D	0-0165-0097	19.9	J	31.3
LV-A5(1-2)	0-0165-0091	86.4		5.95

TABLE 2
ANALYTICAL RESULTS OF TRICHLOROETHYLENE IN SOIL
LITTLE VALLEY SUPERFUND SITE
CATTARAUGUS CUTLERY AREA
LITTLE VALLEY, NEW YORK

SAMPLE LOCATION	REAC SAMPLE NO.	RESULT	QF	RL
LV-A5(1-2)D	0-0165-0092	**766**		30.1
LV-A5(3-4)	0-0165-0093	33.5	J	31.3
LV-B1(1-2)	0-0165-0034	35.1		5.88
LV-B1(3-4)	0-0165-0035	31.3	U	31.3
LV-C2(1-2)	0-0165-0036	76.2		5.62
LV-C2(2-3)	0-0165-0037	17.6	J	33.3
LV-C3(1-2)	0-0165-0038	346		29.4
LV-C3(2-3)	0-0165-0039	22.3	J	32.5
LV-C8(1-2)	0-0165-0076	**134000**		5560
LV-C8(3-4)	0-0165-0077	42.5		30.5
LV-C8(4-5)	0-0165-0078	13.2		5.81
LV-C8(6-7)	0-0165-0079	31.9	J	29.4
LV-D4(1-2)	0-0165-0043	**175000**		11200
LV-D4(2-3)	0-0165-0044	386		30.5
LV-D5(0-2)	0-0165-0045	**6480**	**E**	112
LV-D5(4-5)	0-0165-0046	270		30.1
LV-D5(6-7)	0-0165-0047	29.1	UJ	29.1
LV-D6(3-4)	0-0165-0048	**1560**	**E**	31.3
LV-D6(4-5)	0-0165-0049	105		7.35
LV-D6(6-7)	0-0165-0050	28.7	U	28.7
LV-D7(1-2)	0-0165-0066	208		6.67
LV-D7(1-2)D	0-0165-0067	586		34.2
LV-D7(3-4)	0-0165-0068	129	J	30.5
LV-N01(0-2)	0-0165-0605	120		32.1
LV-N01(2-4)	0-0165-0606	16.6	J	36.2
LV-N02(0-2)	0-0165-0210	38.5	U	38.5
LV-N02(2-4)	0-0166-0211	28.1	U	28.1
LV-N03(0-2)	0-0165-0212	30.9	U	30.9
LV-N03(2-4)	0-0165-0213	29.4	U	29.4
LV-N03(2-4) D	0-0165-0214	28.7	U	28.7
LV-N04(0-2)	0-0165-0215	316	U	316
LV-N04(2-4)	0-0165-0216	27.5	U	27.5
LV-N05(0-2)	0-0165-0217	**914**		35.7
LV-N05(2-4)	0-0165-0218	22.6	J	30.5
LV-N07(0-2)	0-0165-0219	81.3		37.3
LV-N07(2-4)	0-0165-0220	29.4	U	29.4
LV-N08(0-2)	0-0165-0032	**1700**		59.5
LV-N08(2-3)	0-0165-0033	427		36.8
LV-N09(0-2)	0-0165-0029	**24100**	**E**	294
LV-N09(0-2)D	0-0165-0030	**20000**	**E**	298
LV-N09(3-4)	0-0165-0031	11.4	J	29.4

TABLE 2
ANALYTICAL RESULTS OF TRICHLOROETHYLENE IN SOIL
LITTLE VALLEY SUPERFUND SITE
CATTARAUGUS CUTLERY AREA
LITTLE VALLEY, NEW YORK

SAMPLE LOCATION	REAC SAMPLE NO.	RESULT	QF	RL
LV-N11(0-2)	0-0165-0221	187		28.1
LV-N11(2-4)	0-0165-0222	**1830**	**E**	32.9
LV-N11(4-6)	0-0165-0223	18.3	J	31.6
LV-N11(6-8)	0-0165-0224	28.1	U	28.1
LV-N13(1-2)	0-0165-0024	**34400**		1140
LV-N13(2-3)	0-0165-0025	75.3		32.5
LV-N14(1-2)	0-0165-0026	**39000**		1200
LV-N14(1-2)D	0-0165-0027	**33000**		1300
LV-N14(3-4)	0-0165-0028	32.1		5.56
LV-N17(1-2)	0-0165-0040	58.7		5.49
LV-N17(1-2)D	0-0165-0041	546	J	27.5
LV-N17(2-3)	0-0165-0042	29.4	UJ	29.4
LV-N18(0-1)	0-0165-0021	81.7		5.75
LV-N18(1-2)	0-0165-0022	**10600**		309
LV-N18(3-4)	0-0165-0023	166		30.5
LV-N19(0-2)	0-0165-0019	146		6.1
LV-N19(3-4)	0-0165-0020	64.5		6.67
LV-N21(0-2)	0-0165-0059	142		5.75
LV-N21(0-2)D	0-0165-0060	**1100**		28.1
LV-N21(2-4)	0-0165-0061	56.9		34.2
LV-N22(0-2)	0-0165-0007	611		32.9
LV-N22(2-4)	0-0165-0008	27.8	UJ	27.8
LV-N23(0-2)	0-0165-0005	7.82	J	5.62
LV-N23(2-4)	0-0165-0006	487		35.7
LV-N24(0-2)	0-0165-0013	**64600**	**E**	1180
LV-N24(2-4)	0-0165-0014	**1490**		135
LV-N24(6-7)	0-0165-0015	10.1	J	28.7
LV-N24(7-8)	0-0165-0016	18.2	J	28.1
LV-N26(2-3)	0-0165-0062	62.8		5.75
LV-N26(3-4)	0-0165-0063	22.7		6.41
LV-N27(2-3)	0-0165-0009	**25400**		167
LV-N27(3-4)	0-0165-0010	196		5.75
LV-N27(4-6)	0-0165-0011	550		29.4
LV-N27(6-8)	0-0165-0012	15.8	J	29.1
LV-N28(0-2)	0-165-0001	**198000**		6020
LV-N28(2-4)	0-0165-0002	**3590**		340
LV-N28(4-6)	0-0165-0003	56.4		27.2
LV-N28(6-8)	0-0165-0004	57.8		28.4
LV-N29(1-2)	0-0165-0064	52.1		5.95
LV-N29(3-4)	0-0165-0065	32.5	U	32.5
LV-N30(2-3)	0-0165-0069	**36700**		1220

TABLE 2
ANALYTICAL RESULTS OF TRICHLOROETHYLENE IN SOIL
LITTLE VALLEY SUPERFUND SITE
CATTARAUGUS CUTLERY AREA
LITTLE VALLEY, NEW YORK

SAMPLE LOCATION	REAC SAMPLE NO.	RESULT	QF	RL
LV-N30(3-4)	0-0165-0070	28.7		5.81
LV-N30(4-5)	0-0165-0071	342	J	29.8
LV-N32(1-2)	0-0165-0072	108		6.41
LV-N32(3-4)	0-0165-0073	128	J	31.3
LV-N33(1-2)	0-0165-0074	**44600**		1190
LV-N33(2-3)	0-0165-0075	271		35.2
LV-N35(0-2)	0-0165-0201	178		33.3
LV-N35(3-4)	0-0165-0202	**1690**	**E**	34.7
LV-N35(3-4)D	0-0165-0203	**3340**	**E**	34.7
LV-N35(4-5)	0-0165-0204	505		31.3
LV-N35(7-8)	0-0165-0205	29.4		29.1
LV-N36(1-2)	0-0165-0080	65		6.02
LV-N36(2-3)	0-0165-0081	29	J	32.9
LV-N37(1-2)	0-0165-0082	**39000**		1190
LV-N37(1-2)D	0-0165-0083	**54300**	**E**	595
LV-N37(3-4)	0-0165-0084	280		29.8
LV-N37(4-5)	0-0165-0085	477		30.5
LV-N37(6-7)	0-0165-0086	46.6		5.81
LV-N38(0-2)	0-0165-0206	73.2	J	29.4
LV-N38(2-4)	0-0165-0207	30.5	U	30.5
LV-N39(0-2)	0-0165-0208	649		33.3
LV-N39(2-4)	0-0165-0209	29.1	U	29.1
LV-N40(0-2)	0-0165-0017	**4040**		305
LV-N40(2-4)	0-0165-0018	33	J	33.3
LV-N41(0-2)	0-0165-0248	**29200**	**E**	34.7
LV-N41(2-4)	0-0165-0249	234		31.6
LV-N42(1-2)	0-0165-0087	**1150**		30.1
LV-N42(3-4)	0-0165-0088	31.3	U	31.3
LV-N43(1-2)	0-0165-0089	187		5.88
LV-N43(3-4)	0-0165-0090	**1190**	**J**	31.3
LV-N43(4-6)	0-0165-0268	7.05	J	28.1
LV-N44(0-2)	0-0165-0607	103		31.3
LV-N44(0-2)D	0-0165-0608	132		30.5
LV-N44(2-4)	0-0165-0609	523		32.1
LV-N46(0-2)	0-0165-0225	**3070**	**E**	28.1
LV-N46(2-4)	0-0165-0226	239		32.5
LV-N46(2-4)D	0-0165-0227	308		32.5
LV-N47(0-2)	0-0165-0228	435		30.9
LV-N47(2-4)	0-0165-0229	20.3	J	31.3
LV-N48(0-2)	0-0165-0230	69.5		29.4
LV-N48(2-4)	0-0165-0231	44.4		32.1

TABLE 2
ANALYTICAL RESULTS OF TRICHLOROETHYLENE IN SOIL
LITTLE VALLEY SUPERFUND SITE
CATTARAUGUS CUTLERY AREA
LITTLE VALLEY, NEW YORK

SAMPLE LOCATION	REAC SAMPLE NO.	RESULT	QF	RL
LV-N49(0-2)	0-0165-0234	34.7	U	34.7
LV-N49(2-4)	0-0165-0235	36		33.8
LV-N50(0-2)	0-0165-0238	25	J	34.2
LV-N50(2-4)	0-0165-0239	76.2		33.3
LV-N50(2-4)D	0-0165-0240	87.5		33.8
LV-N51(0-2)	0-0165-0243	25.5	J	33.8
LV-N51(2-4)	0-0165-0244	25.1	J	32.9
LV-N51(2-4)D	0-0165-0245	21.2	J	32.5
LV-N52(0-2)	0-0165-0614	59.3		41
LV-N52(0-2)D	0-0165-0615	69.7		41.7
LV-N52(2-4)	0-0165-0616	19	J	33.8
LV-N52(2-4)D	0-0165-0617	16.2	J	34.2
LV-N54(0-2)	0-0165-0255	31.3	U	31.3
LV-N54(2-4)	0-0165-0256	30.9	U	30.9
LV-N55(0-2)	0-0165-0250	37.5		30.1
LV-N55(2-4)	0-0165-0251	31.6	U	31.6
LV-N56(0-2)	0-0165-0252	**27200**	**E**	35.2
LV-N56(2-4)	0-0165-0253	43.8		32.5
LV-N56(2-4)D	0-0165-0254	56.2		32.9
LV-N56(4-6)	0-0165-0631	153		28.1
LV-N56(8-10)	0-0165-0632	28.4	U	28.4
LV-N59(0-2)	0-0165-0257	29.4	U	29.4
LV-N59(2-4)	0-0165-0258	30.5	U	30.5
LV-N60(0-2)	0-0165-0264	31.3	U	31.3
LV-N60(2-4)	0-0165-0265	28.6	J	30.5
LV-N61(0-2)	0-0165-0259	79.7		32.1
LV-N61(2-4)	0-0165-0260	37.9	U	37.9
LV-N63(0-2)	0-0165-0270	**1770**	**E**	32.9
LV-N63(2-4)	0-0165-0271	**786**		37.3
LV-N63(4-6)	0-0165-0272	26.7	J	28.4
LV-N63(6-8)	0-0165-0273	11.6	J	28.4
LV-N63(6-8)D	0-0165-0274	22	J	28.1
LV-N64(0-2)	0-0165-0275	321		32.1
LV-N64(2-4)	0-0165-0276	18.6	J	30.5
LV-N65(0-2)	0-0165-0279	**1130**		30.9
LV-N65(2-4)	0-0165-0280	22.3	J	29.4
LV-N66(0-2)	0-0165-0283	19	J	29.8
LV-N66(2-4)	0-0165-0284	37.6		34.7
LV-N67(0-2)	0-0165-0285	319	J	29.1
LV-N67(2-4)	0-0165-0286	30.1	U	30.1
LV-N68(0-2)	0-0165-0287	151	J	29.1

TABLE 2
ANALYTICAL RESULTS OF TRICHLOROETHYLENE IN SOIL
LITTLE VALLEY SUPERFUND SITE
CATTARAUGUS CUTLERY AREA
LITTLE VALLEY, NEW YORK

SAMPLE LOCATION	REAC SAMPLE NO.	RESULT	QF	RL
LV-N68(2-4)	0-0165-0288	28.4	U	28.4
LV-N68(2-4)D	0-0165-0289	28.1	U	28.1
LV-N69(0-2)	0-0165-0290	8.94	J	27.8
LV-N69(2-4)	0-0165-0291	30.1	U	30.1
LV-N70(0-2)	0-0165-0292	26.9	U	26.9
LV-N70(2-4)	0-0165-0293	30.5	U	30.5
LV-N71(0-2)	0-0165-0294	30.5	U	30.5
LV-N71(2-4)	0-0165-0295	29.1	U	29.1
LV-N72(0-2)	0-0165-0296	29.8	U	29.8
LV-N72(2-4)	0-0165-0297	30.9	U	30.9
LV-N73(0-2)	0-0165-0298	84.3		33.3
LV-N73(2-4)	0-0165-0299	22.2	J	32.9
LV-N74(0-2)	0-0165-0300	26.9	U	26.9
LV-N74(2-4)	0-0165-0301	49.9	J	32.1
LV-N75(0-2)	0-0165-0307	30.1	UJ	30.1
LV-N75(0-2)D	0-0165-0308	29.4	UJ	29.4
LV-N75(2-4)	0-0165-0309	27.5	UJ	27.5
LV-N76(0-2)	0-0165-0312	108	J	34.2
LV-N76(2-4)	0-0165-0313	29.8	UJ	29.8
LV-N77(0-2)	0-0165-0314	34.2	UJ	34.2
LV-N77(2-4)	0-0165-0315	31.6	UJ	31.6
LV-N78(0-2)	0-0165-0316	33.8	U	33.8
LV-N78(2-4)	0-0165-0317	32.1	U	32.1
LV-N78(2-4)D	0-0165-0318	31.6	U	31.6
LV-N79(0-2)	0-0165-0319	29.4	U	29.4
LV-N79(2-4)	0-0165-0320	32.5	U	32.5
LV-N79(2-4)D	0-0165-0321	33.3	U	33.3
LV-N80(0-2)	0-0165-0322	27	J	28.7
LV-N80(2-4)	0-0165-0323	29.4	U	29.4
LV-N81(0-2)	0-0165-0324	94.7		30.5
LV-N81(2-4)	0-0165-0325	30.5	U	30.5
LV-N82(CB)	0-0165-0331	51	U	51
LV-N82(0-2)	0-0165-0326	59.6		30.9
LV-N82(2-4)	0-0165-0327	38.8		28.1
LV-N82(2-4)D	0-0165-0328	28.1	U	28.1
LV-N83(0-2)	0-0165-0610	387		34.2
LV-N83(2-4)	0-0165-0611	65.7		31.3
LV-N84(0-2)	0-0165-0601	**1590**	**E**	31.6
LV-N84(2-4)	0-0165-0602	17.3	J	34.2
LV-N85(0-2)	0-0165-0603	384		32.1
LV-N85(2-4)	0-0165-0604	30.5	U	30.5

TABLE 2
ANALYTICAL RESULTS OF TRICHLOROETHYLENE IN SOIL
LITTLE VALLEY SUPERFUND SITE
CATTARAUGUS CUTLERY AREA
LITTLE VALLEY, NEW YORK

SAMPLE LOCATION	REAC SAMPLE NO.	RESULT	QF	RL
LV-N86(0-2)	0-0165-0612	94.5		34.2
LV-N86(2-4)	0-0165-0613	11.2	J	32.9
LV-N87(0-2)	0-0165-0618	23.6	J	32.9
LV-N87(2-4)	0-0165-0619	33.8	U	33.8
LV-N88(0-2)	0-0165-0620	10.5	J	32.9
LV-N88(2-4)	0-0165-0621	36.9	J	38.5
LV-N89(0-2)	0-0165-0622	18.4	J	35.2
LV-N89(2-4)	0-0165-0623	8.71	J	32.9
LV-N90(0-2)	0-0165-0624	9.4	J	35.7
LV-N90(2-4)	0-0165-0625	29.9	J	33.3
LV-N90(2-4)D	0-0165-0626	132		33.3
LV-N90(4-6)	0-0165-0627	68.1		29.8
LV-N90(8-10)	0-0165-0628	28.4	U	28.4
LV-N91(0-2)	0-0165-0629	323		29.1
LV-N91(2-4)	0-0165-0630	34.2		33.8
LV-SD1	0-0165-0501	30.1	U	30.1
LV-SD2	0-0165-0502	32.1	U	32.1
LV-SD2D	0-0165-0503	35.7	U	35.7
LV-SD3	0-0165-0504	42.4	U	42.4

Notes: All results in micrograms per kilogram (ug/kg).
Shaded results indicate locations where the concentration of TCE exceeded the NYSDEC TAGM value of 700 ug/kg.
Sample LV-BLDG14(DR) collected from soil in interior drain.
Sample LV-N82(CB) collected from soil in catch basin adjacent to boring N82.

NYSDEC = New York State Department of Environmental Conservation
TAGM = Technical and Administrative Guidance Memorandum
TCE = Trichloroethylene
QF = Data qualifying code
RL = Laboratory reporting limit
U = Compound not detected above RL
J = Compound is present above RL; value is estimated due to limitations identified during data validation review
UJ = Compound is not present above RL; value is estimated due to limitations identified during data validation review
E = Compound is present at a concentration above the highest linear standard; value is estimated

Appendix A

Air Permeability Testing Results

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
2890 WOODBRIDGE AVENUE
EDISON, NEW JERSEY 08837

TECHNICAL MEMORANDUM

DATE: July 20, 2006

SUBJECT: Little Valley Superfund Site
Little Valley, Cattaraugus County, New York

U.S. EPA Air Flow Test Study - Final

FROM: Louis DiGuardia, On-Scene Coordinator
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EXECUTIVE SUMMARY

During the period April 15, 2006 through May 16, 2006, the U.S. Environmental Protection Agency Removal Action Branch (EPA-RAB), with support from the U.S. Environmental Response Team/Response Engineering and Analytical Contract (ERT/REAC) and the Emergency & Rapid Response Services (ERRS) contractor, Earth Tech, Inc., performed an Air Flow Study at the Little Valley Superfund Site, former Cattaraugus Cutlery Area (CCA), Little Valley, New York. Data generated from this Air Flow Study would provide an indication of whether Soil Vapor Extraction (SVE) technology could successfully be used to remediate soils contaminated with volatile organic compounds (VOCs), specifically trichloroethylene (TCE).

Six soil vapor extraction/monitoring wells were installed in the contaminated area by ERT/REAC from 7 to 12 feet below the surface (bgs). in-addition to a horizontal test trench (dimensions 20 ft. length by 2 ft. deep) installed by the EPA ERRS contractor.

A 15 horsepower (HP) rotary lobe blower, capable of generating 500 scfm at 5 inches mercury vacuum was used to conduct site operation tests. Air flow and vapor concentration data was collected during test operations from each well and from the combined air stream of all six wells and the horizontal trench.

The results of the testing indicated that air flow rates, contaminant concentration levels and the radius of influence of the SVE extraction/monitoring wells were suitable to support full-scale SVE Pilot test

operations. Air flow rates measured at each well under a range of vacuum levels, combined with manometer readings from adjacent wells and piezometers, indicated that contaminated sub-surface soils are suitable for the application of SVE technology. Air flow rates ranged from 5 to 70 scfm. The average radius of influence of the extraction wells ranged from 5 feet to more than 16 feet. The extraction trench exhibited a flow rate of 182 scfm and a radius of influence of more than five feet.

Contaminant concentrations in the field were monitored with a photo ionization detector (PID) and supplemented with laboratory analysis using method analysis TO-15. SUMMA canisters were collected from each test well, trench and the entire system. Samples were collected under a range of vacuum levels and over several hours to monitor changes in concentration with time of operation. In general, air concentrations of TCE ranged from 7.69 parts per million (ppm) for SVE-6 to 48.7 ppm for SVE-3. The TCE composite air concentrations from all SVE extraction wells (SVE 1-6) and the extraction trench was 5.8 ppm. Without the extraction trench the TCE composite air concentration was 15.6 ppm. The TCE composite air concentrations from shallow wells (SVE 1-4) and the deep extraction wells (SVE 5-6) were 12.5 ppm, and 14.3 ppm, respectively.

INTRODUCTION

Based upon the findings of the ERT/REAC Trip Report (June 2, 2006), which identified extensive TCE-contamination of subsurface soils in the former Cattaraugus Cutlery Area (CCA), and concerns with an excavation remedy. The U.S. EPA Remedial Program, in discussions with the New York State Department of Environmental Conservation (NYSDEC), identified the need for an air flow study to determine if the on-site TCE contamination could be addressed through Soil Vapor Extraction (SVE) technology. Data generated by this air flow study and SVE Pilot (if warranted) would provide an indication of whether SVE technology could successfully be used to remediate the TCE contaminated soil. If successful, that information would be used in developing a Record of Decision for remediation of the soil.

In February 2006, the EPA Remedial Program requested RAB to implement the proposed Air Flow Study and SVE Pilot Study (if warranted) utilizing the EPA Self-Contained SVE (500 CFM) System. The current availability of this system and other factors made the air flow study and potential SVE piloting of this system particularly cost-effective.

SITE BACKGROUND

The Little Valley Superfund Site is comprised of a plume of TCE-contaminated groundwater that extends several miles between Little Valley and Salamanca, Cattaraugus County, New York. The ERT/REAC Trip Report (June 2, 2006) identified extensive TCE contamination of subsurface soils at the former CCA, located at 300-306 Sixth Street in Little Valley, New York (see Figure 1).

The CCA is comprised of several parcels historically and currently zoned for commercial and industrial use. Since around 1900, activities at the CCA have included the manufacture of cutlery and voting machines, stamping of metal automobile and window parts, and more recently, the storage of commercial and industrial goods.

During three separate field sampling events conducted by ERT/REAC in August, September, and November 2005, and summarized in the June 2, 2006 Report, "Subsurface Soils Sampling, Little Valley Superfund Site (Cattaraugus Cutlery Area), Little Valley, New York", approximately 105 soil boring locations were advanced around the former CCA manufacturing buildings and Quonset hut using a Geoprobe® Systems (Geoprobe) direct-push device. Soil borings were also advanced inside the former manufacturing buildings. The REAC Laboratory analyzed 299 samples for Target Compound List (TCL) volatile organic compounds.

Based upon the findings of this ERT/REAC Trip Report, which identified extensive TCE contamination of

subsurface soils at the former CCA, and concerns with an excavation remedy, the U.S. EPA Remedial Program identified the need for an Air Flow study to determine if on-site TCE soil contamination could be addressed through SVE technology.

SVE Technology and Conceptual Design

SVE is a process whereby soil gas is extracted from the pore spaces within the soil, effectively reducing the mass and mobility of contamination. The extracted soil gas is treated to remove contaminants prior to discharge to the atmosphere. SVE is particularly suited to the treatment of VOC-contaminated soil. Air flow studies are generally recommended to test and effectively design the proposed SVE system at the Site.

Information suggested to be collected and evaluated during an air flow study includes: soil gas sampling and analysis, air permeability testing, and physical and chemical soil analysis.

A conceptual engineering design of the study for the Site will consist of an array of vacuum extraction wells/drains positioned in appropriate locations and constructed in a manner that minimizes stagnation zones and short-circuiting to the atmosphere. The system flow rate will be constrained by soil permeability and the extent to which cleanup is controlled by diffusion. Above a certain flow rate, cleanup time of a diffusion-controlled SVE system cannot be significantly reduced. The flow rate and the well/drain array will be used to specify the appropriate vacuum blower(s) and manifold(s).

VOC emissions to the atmosphere will be estimated based on the VOC distribution in the soil which will be measured during pre-design activities. An appropriate treatment technology (i.e., thermal oxidation, vapor phase granular activated carbon, etc.) will be used based on the estimated amount, concentration and type of VOC atmospheric emissions. The conceptual design will address monitoring requirements and operation and maintenance (O&M) for a potential pilot.

U.S. EPA AIR FLOW STUDY OPERATIONS

The following tasks were performed for the implementation of the air flow study:

Mobilization of Support Crew, Services and Material

Prior to initiating site activities, general sites preparation was undertaken involving the following tasks:

a. Mobilization of contractor and establishment of support zone, contamination reduction zone and exclusion zone. Utility search for the identification of all underground utilities. Areas with high levels of VOCs were preliminarily surveyed and staked.
b. Draft and finalize sampling, operation, and safety plans as well as contingency plans for the proposed air flow study;
c. Preparation for the collection of an appropriate number of soil gas and soil samples from the contaminant source areas and undertake bench scale treatability tests (if applicable) to determine the most effective air flow and potential SVE design.
d. Preparation for field tests monitoring the following parameters: pressure vs. distance to indicate radius; VOC concentration in groundwater indicating impact areas; CO_2 and O_2 levels in soil vapor to indicate biological activity; dissolved oxygen in water; and water levels before and during tests in order to determine whether air flow is causing mounding of the water table (if applicable).
e. Initiation of the solicitation, selection and securing of, as per contract requirements, subcontractors to provide the following: geoprobe borings for subsurface delineation and installation of SVE extraction and monitoring wells; heavy equipment for general operations; support zone accouterments and laboratory services.
f. Draft and finalize air monitoring/sampling plans to be implemented during sampling and SVE well installation activities to monitor and control off-site migration of airborne contaminants.
g. Preparation and solicitation, as per contract requirements, for subcontractors to provide mobilization of the EPA Self-Contained SVE unit, inclusive of all associated equipment

(e.g. blowers, piping, off-gas vapor phase carbon vessels, etc.) to the Little Valley Site for the Air Flow Study.

U.S EPA SVE EXTRACTION/MONITORING WELL INSTALLATION

During the period April 10-12, 2006, ERT/REAC at the request of the EPA Removal Program, installed six SVE extraction/monitoring wells using their in-house Geoprobe direct-push device. The locations were specified by the EPA On-Scene Coordinator (OSC) based on the results of previous investigations (ERT/REAC June 2006). The four shallow wells were constructed of schedule-80 PVC, with 0.001 inch continuous-slotted screen from 2 to 7 feet bgs, with a 2-foot riser. The two deep wells were screened from 2 to 12 feet bgs, with a 2-foot riser. These wells came with a pre-packed sand filter to expedite installation. The wells were finished with a bentonite seal from 2 feet bgs to the surface. The cuttings generated during the well installations were transferred into 55-gallon steel drums and will be sampled for disposal characterization.

An evaluation of soil cores collected by ERT/REAC during the installation indicated that the contaminated soils were primarily fill material that was used to raise the elevation at the rear of the site between the stream and the manufacturing buildings. The contaminated soils in this area appear to be primarily randomly-placed, coarse fill materials containing angular gravel and few fines or clays. As a general rule, this material exhibits good air flow characteristics.

U.S. EPA SELF-CONTAINED SVE (500 CFM) SYSTEM

Air flow studies were performed utilizing the U.S. EPA self-contained SVE (500 CFM) System, which is pre-wired with all integral piping, and controls included. The SVE system consists of an explosive-proof, positive displacement blower rated at 500 CFM air flow at five inches of mercury. The blower is fitted with a discharge silencer. The system is fitted with a knockout tank designed for air/water separation and comes with a progressive cavity discharge pump. Discharge from the knockout tank goes to an aqueous phase granular activated carbon filter for treatment prior to discharge. A particulate filter, vacuum relief valve, and vacuum gauge is present on the blower inflect.

Field operation of the self-contained SVE system for air flow studies required only the connection of influent and effluent piping, temporary electrical service connections, calibration of monitoring instruments, and testing of the programmable logic controller (PLC).

The control system is fully automated and fail-safe, requiring only periodic operator attention for major fault conditions and scheduled preventive maintenance.

A SCADA-type software system is provided for remote control and monitoring capabilities. Data logging capabilities are provided for all monitoring and control devices, along with motor run times and alarm conditions. The enclosure is equipped with sound-dampening materials such that external noise levels are below 60 decibels (dB). Off-gas treatment from the SVE system is provided by two, 2,000 lb vapor-phase, granular activated carbon vessels arranged in series.

Field operations for the air flow study began with the mobilization of the U.S. EPA self-contained SVE System to the Little Valley Site in May 2006,.

Operation tests were initiated during the week of May 15, 2006, with the completion of electrical connections, piping of influent and effluent lines, and calibration of monitoring instruments.

AIR FLOW TEST PROCEDURES

As previously stated, six SVE test wells were installed by ERT/REAC in the most highly contaminated area of the site. Four of the wells are seven feet deep and two of the wells are 12 feet deep. Wells SVE-1 through SVE-4 are seven feet deep and wells SVE-5 and SVE-6 are 12 feet deep. Each well was equipped with a two inch ball valve to control the applied vacuum and ports to monitor vacuum and collect air

samples. The location of the wells in relation to the building is shown on Figure 2.

Each well was connected to an eight-inch diameter main air header by a two-inch line. The main header was connected to the SVE unit which was capable of producing 500 scfm at five inches mercury vacuum. An air vent with two, 2-inch gate valves was used to provide inlet air to the SVE when in operation to cool the blower and control the vacuum applied to the individual wells and the total system. The system was capable of providing from 4 to 5.7 inches of mercury vacuum under all testing conditions.

A TSI Model 8386 VelociCalc Plus was used to measure the air flow, air velocity and air temperature at each well. A RAE System Multi-RAE Plus was used to measure CO, H_2S, VOC, O_2, and LEL quantities in the air stream.

In general, the following steps describe how data was collected from each sampling location after the SVE unit was powered on:

1. A pressure gauge was attached to the wellhead.
2. The VelociCalc probe was inserted into the 2-inch piping between the well and the eight-inch main vacuum header. The probe was secured such that position and orientation would provide the most reliable data. This data was recorded.
3. A Hi-flow sampler intake line was connected to a barb fitting on the well piping and the effluent tubing from the sampler was connected to a tedlar sampling bag.
4. The ball valve at the wellhead was completely opened.
5. A second downstream valve was opened enough to provide a predetermined vacuum pressure as read on the pressure gauge. This pressure was recorded.
6. Using the high flow sampler, a sample bag was filled.
7. The sample bag was then connected to the Multi-RAE Plus.
8. The Multi-RAE Plus was allowed to stabilize. This data was recorded.

Individual well monitoring began on May 15th at 11:10 AM, approximately one hour after the SVE system had been powered. Prior to monitoring, the Multi-RAE was calibrated. Initially, the vacuum pressure was adjusted to one inch of mercury vacuum by closing the ball valve on the well head. Three readings were taken at this pressure. Each reading was taken approximately 10 minutes apart. After gathering these three readings, the same sampling schedule was used at a vacuum pressure of two inches of mercury. Finally, only one reading was taken at three inches of mercury vacuum. All data parameters were recorded for these seven readings.

After the vacuum was increased to four inches of mercury vacuum, data was collected only from the VelociCalc Plus, as it was difficult to fill a sample bag with the High Flow Sampler at vacuums above three inches of mercury. Generally, these next readings were taken at four and five inches of mercury vacuum pressure. In some cases, it was not possible to attain a vacuum pressure of five inches of mercury, so a reading was taken with both valves completely open. In those situations where we obtained vacuum pressures greater than five inches mercury, readings were collected for both the five inch vacuum pressure setting and also with the valves completely opened.

Both valves were closed after the highest obtained vacuum pressure setting was obtained. The wellhead valve was then opened fully. The second downstream valve was opened in increments as previously described; however, only one reading was taken at each vacuum pressure setting, and these readings came solely from the VelociCalc Plus. These readings have been identified as "Pres. vs. Flow" in Table 1 (comment section), which documents all system monitoring events performed. Periodically, the wells were rechecked with the Multi-RAE Plus to monitor contaminant levels. The valves were adjusted for ease of sampling and no pressure or VelociCalc measurements were taken on these trials. Sampling from wells SVE-6, SVE-5, SVE-4 and SVE-3 was completed on May 15, 2006.

On May 16^{t}, 2006, system monitoring began at 8:04 AM, shortly after the SVE system was powered. There were some difficulties encountered while calibrating the Multi-RAE Plus with the isobutylene which have been attributed to low pressure in the gas canister.

First, PID data was collected from the SVE wells that had been completed the previous day and then the same monitoring schedule was used for wells SVE-2 and SVE-1. HORZ-1, the horizontal well, was monitored after SVE-1. Next, Multi-RAE Plus readings were taken at SVE 1-6 Several trials of composite readings were then taken at points labeled SVE-1234 and SVE-56 with the horizontal well both on and off. For these measurements, the pressure gauge was attached to the port labeled COMPOSITE. The vacuum pressure was adjusted and VelociCalc readings were recorded. This data is presented in Table 1.

Manometer readings were also taken between wells and from piezometers installed at various distances from individual wells. The vacuum readings varied from ¼ inch to 3 inches of mercury. In general, the average radius of influence of the vacuum on each individual well was greater than 10 feet except for SVE-1, which had a radius of influence of 5 feet. SVE-2 had a radius of influence of more than 16 feet.

CONCLUSIONS

The results of the testing indicated that air flow rates, contaminant concentration levels and the radius of influence of the SVE extraction/monitoring wells were suitable to support full-scale SVE Pilot test operations. Air flow rates measured at each well under a range of vacuum levels, combined with manometer readings from adjacent wells and piezometers, indicated that contaminated subsurface soils are suitable for the application of SVE technology. Air flow rates ranged from 5 scfm up to 70 scfm. The average radius of influence of the extraction wells ranged from 5 feet to more than 16 feet. The extraction trench exhibited a flow rate of 182 scfm and a radius of influence of more than five feet.

Contaminant concentrations in the field were monitored with a PID and supplemented with laboratory analysis using method analysis TO-15. SUMMA canisters were collected from each test well and the entire system. Samples were collected under a range of vacuum levels and over several hours to monitor changes in concentration with time of operation. In general, air concentrations of TCE ranged from 7.69 parts per million (ppm) for SVE-6, to 48.7 ppm for SVE-3. The TCE composite air concentrations from all SVE extraction wells (SVE 1-6) and the extraction trench wase 5.8 ppm. Without the extraction trench the TCE composite air concentration was 15.6 ppm. The TCE composite air concentrations from shallow wells (SVE 1-4) and the deep extractions wells (SVE 5-6) were 12.5 ppm and 14.3 ppm, respectively (See Tables 2 and 3).

Engineering Recommendations

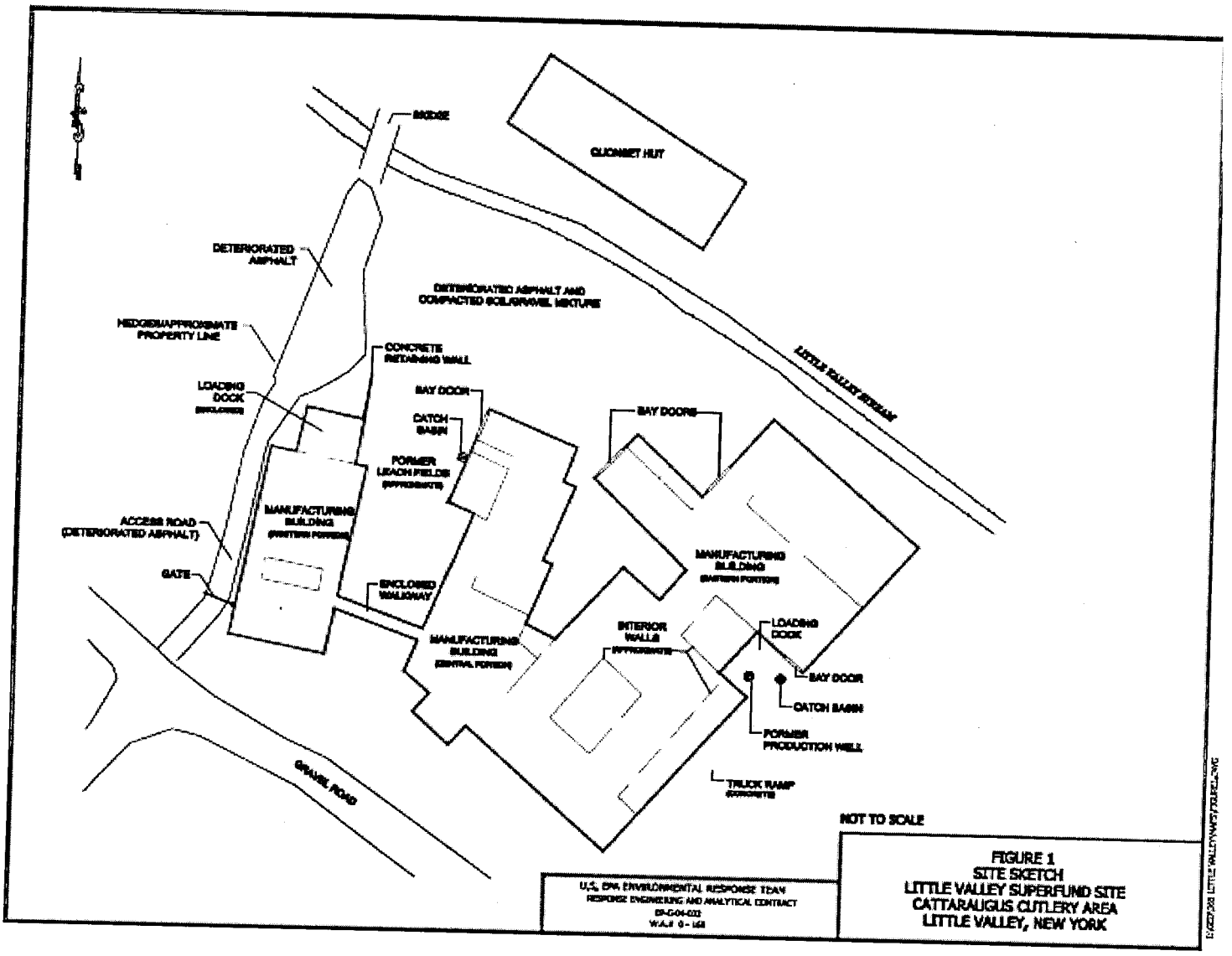
Based upon the results of the air flow testing performed at the site we have the following recommendations for design of a pilot SVE system.

- The locations of additional wells for SVE pilot operations should be based upon the results of the most recent soil sampling results (ERT/REAC June 2006).
- Assume a radius of influence of 10 feet for horizontal wells.
- The vertical wells performed adequately and are recommended for the expanded system design. Although the horizontal well worked, because of the high air flow rates that were in the achieved in the vertical wells, it is not needed at this time. It is recommended to continue the use of seven-foot deep wells using five feet of pre-packed screen identical to the existing seven-foot wells.

- Core samples should be collected during installation of the wells and examined for the presence of clay soils. SVE-1 is installed in an area with a higher concentration of clay soil and as a result has only a 5-foot radius of influence. If excessive clay soils are encountered during well installation, it must be assumed that the radius of influence of the SVE well is five feet rather than ten feet and the spacing between wells must be decreased. This can be further evaluated during SVE pilot operations.
- Assume approximately 25 SCFM per well on average for the system.
- The blower must be designed to maintain at least 3.5 to 4 inches of mercury vacuum on the system.
- Due to the good air flows and reasonable radius of influence for the existing wells it does not appear that paving of the site is necessary at this time. It is recommended that the pilot system be installed and performance monitored before a decision is made on paving. In addition, since the majority of the contamination is in the top two feet of soil at the site, the downward draft of air from the atmosphere may aid in contaminant removal. Paving may slow the downward air flow and lengthen site remediation.

cc: J. Singerman, EPA-NYRPB
File

C: Little Valley – Technical Memorandum – Air Flow Test Report - Final - 7-20-06


BRIDGE
CULVERT HUT
DETERIORATED ASPHALT
DETERIORATED ASPHALT AND COMPACTED SOIL/GRAVEL MIXTURE
HEDGES/APPROXIMATE PROPERTY LINE
CONCRETE RETAINING WALL
LOADING DOCK
BAY DOOR
CATCH BASIN
BAY DOORS
LITTLE VALLEY STREAM
FORMER LEACH FIELDS
MANUFACTURING BUILDING
ACCESS ROAD (DETERIORATED ASPHALT)
GATE
ENCLOSED WALKWAY
MANUFACTURING BUILDING
INTERIOR WALLS
LOADING DOCK
BAY DOOR
CATCH BASIN
FORMER PRODUCTION WELL
TRUCK RAMP
GRAVEL ROAD
NOT TO SCALE
U.S. EPA ENVIRONMENTAL RESPONSE TEAM
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
EP-C-04-033
W.A.# 0 - 168
FIGURE 1
SITE SKETCH
LITTLE VALLEY SUPERFUND SITE
CATTARAUGUS CUTLERY AREA
LITTLE VALLEY, NEW YORK

INSTALLED SVE WELL LOCATIONS

EarthTech
A Tyco International Ltd. Company

Table 1. SVE Monitoring Activity for Vacuum Pressure, VelociCalc and PID Readings
Little Valley Superfund Site, NY - Air Flow Testing Operations

Sample Location	Date (mm/dd/yy)	Time (000)	Vacuum Pressure (In. Hg)	Velocity (ft/min)	Flow (SCFM)	Temp. (°F)	CO (ppm)	H2S (ppm)	VOC (ppm)	O2 (%)	LEL (%)	Comment
SVE-6	5/15/06	11:10	0.5		2.50	60.8	0	0	19.2	18.3	0	SVE started at ~
SVE-6	5/15/06	11:21	0.5		3.20	63.4	0	0	17.0	18.3	0	
SVE-6	5/15/06	11:31	0.5		8.00	63.4	0	0	17.0	18.3	0	
SVE-6	5/15/06	11:35	1	583	12.30	63.3						Pump Malfunctic
SVE-6	5/15/06	11:40	1	580	12.50	62	0	0	12.2	18.4	0	
SVE-6	5/15/06	11:45	1	640	13.70	62.8	0	0	10.3	18.4	0	
SVE-6	5/15/06	11:50	1	445	9.35	62.8	0	0	9.2	18.6	0	
SVE-6	5/15/06	11:55	1	485	10.40	63.4	0	0	8.7	18.6	0	
SVE-6	5/15/06	12:02	2	565	12.35	62.2	0	0	6.1	18.7	0	
SVE-6	5/15/06	12:12	2	650	13.90	60.7	0	0	5.5	18.8	0	
SVE-6	5/15/06	12:22	3	245	5.35	59.3	0	0	5.4	18.9	0	
SVE-6	5/15/06	12:32	3	243	5.25	58.9	0	0	5.5	19.0	0	
SVE-6	5/15/06	12:38	0.5	46	1.02	58.2						Pres. Vs. Flow (U
SVE-6	5/15/06	12:40	1	102	2.28	57.8						Pres. Vs. Flow (U
SVE-6	5/15/06	12:41	2	182	4.00	57.5						Pres. Vs. Flow (U
SVE-6	5/15/06	12:42	3	244	5.40	57.4						Pres. Vs. Flow (U
SVE-6	5/15/06	12:44	3.9		6.45	57.2						Pres. Vs. Flow (U
SVE-6	5/15/06	12:45	4	303	6.55	57.1						Pres. Vs. Flow (Up
SVE-6	5/15/06	12:46	5	337	7.35	56.9						Pres. Vs. Flow (Up
SVE-6	5/15/06	12:48	5.7	392	8.65	56.8						Pres. Vs. Flow (Up
SVE-6	5/15/06	12:49	0.5	52	1.00	56.8						Pres. Vs. Flow (Do
SVE-6	5/15/06	12:50	1	124	2.67	56.8						Pres. Vs. Flow (Do
SVE-6	5/15/06	12:51	2	241	5.25	56.8						Pres. Vs. Flow (Do
SVE-6	5/15/06	12:52	3	309	6.75	56.8						Pres. Vs. Flow (Do
SVE-6	5/15/06	12:53	4	375	8.20	56.8						Pres. Vs. Flow (Do
SVE-6	5/15/06	12:54	5	417	9.10	56.8						Pres. Vs. Flow (Do
SVE-6	5/15/06	12:55	5.7	438	9.50	56.8						Pres. Vs. Flow (Do
SVE-5	5/15/06	13:05	2	267	575	56.8	0	0	6.2	18.9	0	
SVE-5	5/15/06	14:55	1	150	3.20	54.0	0	0	26.0	18.4	0	
SVE-5	5/15/06	15:05	1	124	2.70	53.1	0	0	26.4	18.4	0	
SVE-5	5/15/06	15:15	1	115	2.53	52.9	0	0	26.9	18.4	0	
SVE-5	5/15/06	15:21	2	242	5.25	52.3	0	0	25.6	18.5	0	
SVE-5	5/15/06	15:31	2	248	5.40	52.6	0	0	26.6	18.6	0	
SVE-5	5/15/06	15:41	2	245	5.30	53.1	0	0	27.6	18.6	0	
SVE-5	5/15/06	15:42	4	405	8.80	52.3						Pres. Vs. Flow (Up)
SVE-5	5/15/06	15:43	5	472	10.30	52.3						Pres. Vs. Flow (Up)
SVE-5	5/15/06	15:43	5.3	510	11.20	52.2						Pres. Vs. Flow (Up)
SVE-5	5/15/06	15:45	5		11.40							Pres. Vs. Flow (Down
SVE-5	5/15/06	15:46	4		10.10							Pres. Vs. Flow (Down
SVE-5	5/15/06	15:47	3		8.45							Pres. Vs. Flow (Down
SVE-5	5/15/06	15:48	2		6.55							Pres. Vs. Flow (Down
SVE-5	5/15/06	15:48	1		4.27							Pres. Vs. Flow (Down
SVE-6	5/15/06	15:51	3	323	7.05	52.9	0	0	27.1	18.7	0	For Comparison w/ S
SVE-4	5/15/06	16:20					0	0	12.5	19.1	0	For Comparison w/ S
SVE-4	5/15/06	16:35	1	162	3.55	51.7	0	0	48.4	18.7	0	Vacuum Pres. Droppe inches Hg
SVE-4	5/15/06	16:46	1	180	3.94	51.3	0	0	44.3	18.5	0	
SVE-4	5/15/06	16:56	1	170	3.69	51.0	0	0	44.6	18.6	0	
SVE-4	5/15/06	17:06	2	270	5.90	51.1	0	0	43.7	19.0	0	

SVE-4	5/15/06	17:16	2	269	5.90	50.8	0	0	43.4	19.1	0	
SVE-4	5/15/06	17:32	2	278	6.00	50.7	0	0	43.8	19.2	0	For comparison w/
SVE-4	5/15/06	17:42	3	420	9.20	50.9	0	0	40.8	19.4	0	
SVE-4	5/15/06	17:43	4	690	14.65	51.0						Pres. Vs. Flow (Up
SVE-4	5/15/06	17:44	4.9	1160	26.10	51.0						Pres. Vs. Flow (Up
SVE-5	5/15/06	18:01					0	0	20.2	19.7	0	Checked PID Rea
SVE-6	5/15/06	18:09					0	0	10.3	19.9	0	Checked PID Rea
SVE-4	5/15/06	18:10	5	1675	36.50	51.0						Pres. Vs. Flow (Up
SVE-4	5/15/06	18:11	4	1475	32.30	51.0						Pres. Vs. Flow (Dc
SVE-4	5/15/06	18:11	3	1235	27.00	51.0						Pres. Vs. Flow (Dc
SVE-4	5/15/06	18:12	2	960	21.00	51.0						Pres. Vs. Flow (Dc
SVE-4	5/15/06	18:13	1	595	13.00	51.0						Pres. Vs. Flow (Dc
SVE-3	5/15/06	18:36	1	137	3.00	50.8	0	0	86.2	19.0	0	0.25 inch influence feet from well heac
SVE-3	5/15/06	18:48	1	128	2.75	51.1	0	0	82.0	19.2	0	
SVE-3	5/15/06	18:58	1	124	2.67	51.1	0	0	78.4	19.4	0	
SVE-3	5/15/06	19:08	2	265	5.80	51.2	0	0	73.5	19.6	0	
SVE-3	5/15/06	19:18	2	265	5.80	51.3	0	0	69.7	19.7	0	
SVE-3	5/15/06	19:31	2	265	5.75	50.6	0	0	63.6	19.9	0	For comparison w/
SVE-3	5/15/06	19:41	3	428	9.30	51.0	0	0	60.7	20.0	0	
SVE-3	5/15/06	19:42	4	630	13.80	50.9						Pres Vs. Flow (Up
SVE-3	5/15/06	19:42	5	875	18.60	50.9						Pres Vs. Flow (Up
SVE-3	5/15/06	19:43	5	1040	23.60	50.8						Pres. Vs. Flow (Dc
SVE-3	5/15/06	19:45	4	960	20.80	50.8						Pres. Vs. Flow (Dc
SVE-3	5/15/06	19:46	3	790	17.30	50.8						Pres. Vs. Flow (Dc
SVE-3	5/15/06	19:46	2	595	12.90	50.8						Pres. Vs. Flow (Dc
SVE-3	5/15/06	19:47	1	307	6.70	50.8						Pres. Vs. Flow (Dc
SVE-4	5/15/06	19:55					0	0	21.8	19.8	0	
SVE-5	5/15/06	19:56					0	0	20.2	19.5	0	
SVE-6	5/15/06	20:00					0	0	10.1	20.2	0	
SVE-3	5/16/06	8:04					2	0	27.4	20.5	0	SVE started at ~ 8 calibrating PID, res
SVE-4	5/16/06	8:08					1	0	7.2	20.9	0	
SVE-5	5/16/06	8:12					1	0	16.3	19.3	0	
SVE-6	5/16/06	8:15					1	0	11.0	19.6	0	
SVE-2	5/16/06	8:26	1	600	13.10	50.8	0	0	44.0	20.0	0	
SVE-2	5/16/06	8:40	1	520	11.20	49.7	0	0	33.0	20.1	0	
SVE-2	5/16/06	8:50	1	510	11.30	49.3	0	0	29.2	20.3	0	
SVE-2	5/16/06	9:19	2	1245	27.30	52.7	0	0	25.5	20.2	0	For comparison w/
SVE-2	5/16/06	9:32	2	1310	28.50	58.2	0	0	24.0	20.3	0	
SVE-2	5/16/06	9:46	2	1280	28.00	53.1	0	0	21.9	20.5	0	
SVE-2	5/16/06	9:56	3	1965	43.00	53	0	0	21.6	20.5	0	
SVE-2	5/16/06	9:58	4	2660	58.00	53.1						Pres Vs. Flow (Up)
SVE-2	5/16/06	10:00	4.5	3060	67.50	53						Pres Vs. Flow (Up)
SVE-2	5/16/06	10:01	1	850	18.50	52.8						Pres. Vs. Flow (Do
SVE-2	5/16/06	10:03	2	1750	38.30	52.8						Pres. Vs. Flow (Do
SVE-2	5/16/06	10:05	3	2360	51.50	52.8						Pres. Vs. Flow (Do
SVE-2	5/16/06	10:06	4	2955	65.00	52.7						Pres. Vs. Flow (Do
SVE-2	5/16/06	10:07	4.5	3270	70.50	52.6						Pres. Vs. Flow (Do
SVE-1	5/16/06	10:16	1	37	0.8	53.3	0	0	54.9	20.2	0	Vacuum breaker se
SVE-1	5/16/06	10:26	1	35	0.67	54	0	0	61.1	20.1	0	
SVE-1	5/16/06	10:36	1	33	0.70	55.7	0	0	60.9	20.2	0	
SVE-1	5/16/06	10:46	2	88	2.00	56.4	0	0	47.8	20.5	0	For comparison w/
SVE-1	5/16/06	10:56	2	85	1.93	55.7	0	0	45.5	20.5	0	
SVE-1	5/16/06	11:06	2	91	2.05	54.4	0	0	44.1	20.5	0	
SVE-1	5/16/06	11:16	3	142	3.05	55.7	0	0	54.1	20.5	0	

SVE-1	5/16/06	11:20	4	196	4.25	56.2						Pres Vs. Flow (Up
SVE-1	5/16/06	11:22	5	229	5.00	56.2						Pres Vs. Flow (Up
SVE-1	5/16/06	11:23	1	61	1.30	56.3						Pres. Vs. Flow (Dc
SVE-1	5/16/06	11:24	2	119	2.64	56.8						Pres. Vs. Flow (Dc
SVE-1	5/16/06	11:24	3	160	3.56	57.4						Pres. Vs. Flow (Dc
SVE-1	5/16/06	11:25	4	212	4.64	57.5						Pres. Vs. Flow (Dc
SVE-1	5/16/06	11:26	5	240	5.27	57.5						Pres. Vs. Flow (Dc
HORZ-1	5/16/06	11:36	1	5910	129	58.7	0	0	7.5	20.5	0	
SVE-6	5/16/06	11:42					0	0	12.3	19.7	0	
SVE-5	5/16/06	11:45					0	0	16.5	19.4	0	
SVE-4	5/16/06	11:48					0	0	11.3	20.0	0	
HORZ-1	5/16/06	11:50	1.7	8320	182	58.2	0	0	4.9	20.4	0	For comparison w/
SVE-3	5/16/06	11:55					0	0	19.9	20.9	0	
SVE-2	5/16/06	11:58					0	0	15.3	20.5	0	
SVE-1	5/16/06	12:03					0	0	33.7	20.6	0	
SVE-56	5/16/06	12:18		140	27.9	58.2						HORZ-1 OFF
SVE-56	5/16/06	12:20		124	23.8	57.6						HORZ-1 ON
SVE-1234	5/16/06	12:22		1455	287	57.1						HORZ-1 ON
SVE-1234	5/16/06	12:23		715	138	56.6						HORZ-1 OFF
SVE-56	5/16/06	12:28					0	0	11.7	19.9	0	
SVE-56	5/16/06	12:46		180	35.7	61.0						HORZ-1 OFF
SVE-1234	5/16/06	12:51	4.0		155							HORZ-1 OFF
SVE-1234	5/16/06	12:52	4.5		164							HORZ-1 OFF
SVE-1234	5/16/06	12:53	5.0		173							HORZ-1 OFF
SVE-1234	5/16/06	12:54	5.5		180							HORZ-1 OFF
SVE-1234	5/16/06	13:00	3.0		320							HORZ-1 ON
SVE-1234	5/16/06	13:01	3.5		350							HORZ-1 ON
SVE-1234	5/16/06	13:01	4.0		369							HORZ-1 ON
SVE-1234	5/16/06	13:02	4.5		392							HORZ-1 ON
SVE-1234	5/16/06	13:02	5.0		422							HORZ-1 ON
SVE-1234	5/16/06	13:03	5.7		433							HORZ-1 ON
SVE-56	5/16/06	13:05	5.5		38							HORZ-1 OFF
SVE-56	5/16/06	13:05	5.0		35							HORZ-1 OFF
SVE-56	5/16/06	13:06	4.5		34							HORZ-1 OFF
SVE-56	5/16/06	13:07	4.0		32							HORZ-1 OFF

Table 2. SUMMA Sample Results of TCE Concentrations Compared with VOC Concentrations from PID During SVE Pilot Test Monitoring - *Little Valley Superfund Site - Air Flow Testing Operations*

Sample Location	SVE-1	SVE-2	SVE-3	SVE-4	SVE-5	SVE-6	HORZ-1
Canister ID	000039	000055	000061	000049	000064	000120	000053
Date	5/16/06	5/16/06	5/15/06	5/15/06	5/15/06	5/15/06	5/16/06
Time	10:42	9:05	19:25	17:28	15:55	16:25	11:51
P_o	-28" Hg	-28" Hg	-28" Hg	-28" Hg	-27" Hg	-28"Hg	-28" Hg
P_f	-3" Hg		-6" Hg	-3" Hg		-5" Hg	-2" Hg
REAC Sample #	44766	44765	44764	44763	44761	44762	44767
TCE Conc. From SUMMA (ppbv)	31300	16800	60000	32300	21300	6940	1750
Total VOC Conc. From SUMMA Results (ppbv)	33491	17930	60912	32910	21675	7381	2048
VOC Conc. From PID (ppbv)	47800	25500	63600	43800	27100	12500	4900

SUMMA data taken from analysis sent to Lou DiGuardia from Chris Sklaney on June 2, 2006 at 1:30pm

(Revised: 7/20/06)

Table 3 - Air Toxic Target Compound Results forSumma Canister Samples
Little Valley, Little Valley, New York, WA# R1A00165

Sample Number	Method Blank		44772		44761		44762			
Sample Location	060530-1		TB-60516		SVE-5		SVE-6			
Dilution Factor	1		1		25		25			
Compounds	Results ppbv	RL ppbv	Results ppbv		RL ppbv	Results ppbv	RL ppbv	Results ppbv		RL ppbv
Propylene	U	0.160	0.240		0.160	U	4.00	U		4.00
Dichlorodifluoromethane	U	0.160	U		0.160	U	4.00	U		4.00
Chloromethane	U	0.160	U		0.160	U	4.00	U		4.00
Dichlorotetrafluoroethane	U	0.160	U		0.160	U	4.00	U		4.00
Vinyl Chloride	U	0.160	U		0.160	U	4.00	U		4.00
1,3-Butadiene	U	0.160	U		0.160	U	4.00	U		4.00
Bromomethane	U	0.160	U		0.160	U	4.00	U		4.00
Chloroethane	U	0.160	U		0.160	U	4.00	U		4.00
Acetone	0.160	0.160	0.600		0.160	32.0	4.00	40.0		4.00
Trichlorofluoromethane	U	0.160	U		0.160	U	4.00	2.00	J	4.00
Isopropyl Alcohol	U	0.160	U		0.160	U	4.00	U		4.00
1,1-Dichloroethene	U	0.160	U		0.160	U	4.00	U		4.00
Methylene Chloride	U	0.160	0.200		0.160	U	4.00	U		4.00
Trichlorotrifluoroethane	U	0.160	U		0.160	U	4.00	U		4.00
trans-1,2-Dichloroethene	U	0.160	U		0.160	U	4.00	U		4.00
1,1-Dichloroethane	U	0.160	U		0.160	U	4.00	U		4.00
MTBE	U	0.160	U		0.160	U	4.00	U		4.00
Vinyl Acetate	U	0.160	U		0.160	U	4.00	U		4.00
2-Butanone	U	0.160	0.160		0.160	162	4.00	173		4.00
cis-1,2-Dichloroethene	U	0.160	U		0.160	130	4.00	7.00		4.00
Ethyl Acetate	U	0.160	U		0.160	U	4.00	U		4.00
Hexane	U	0.160	U		0.160	U	4.00	U		4.00
Chloroform	U	0.160	U		0.160	7.00	4.00	2.00	J	4.00
Tetrahydrofuran	U	0.160	U		0.160	150	4.00	213		4.00
1,2-Dichloroethane	U	0.160	U		0.160	U	4.00	U		4.00
1,1,1-Trichloroethane	U	0.160	U		0.160	U	4.00	U		4.00
Benzene	U	0.160	U		0.160	U	4.00	U		4.00
Carbon Tetrachloride	U	0.160	U		0.160	U	4.00	U		4.00
Cyclohexane	U	0.160	U		0.160	U	4.00	U		4.00
1,2-Dichloropropane	U	0.160	U		0.160	U	4.00	U		4.00
1,4-Dioxane	U	0.160	U		0.160	U	4.00	U		4.00
Trichloroethene	U	0.160	0.200		0.160	21300	200	6940		80.0
Heptane	U	0.160	U		0.160	U	4.00	U		4.00
cis-1,3-Dichloropropene	U	0.160	U		0.160	U	4.00	U		4.00
Methyl Isobutyl Ketone	U	0.160	U		0.160	U	4.00	U		4.00
trans-1,3-Dichloropropene	U	0.160	U		0.160	U	4.00	U		4.00
1,1,2-Trichloroethane	U	0.160	U		0.160	U	4.00	U		4.00
Toluene	U	0.160	U		0.160	U	4.00	U		4.00
2-Hexanone	U	0.160	U		0.160	U	4.00	U		4.00
Dibromochloromethane	U	0.160	U		0.160	U	4.00	U		4.00
1,2-Dibromoethane	U	0.160	U		0.160	U	4.00	U		4.00
Tetrachloroethene	U	0.160	U		0.160	11.0	4.00	4.00		4.00
Chlorobenzene	U	0.160	U		0.160	U	4.00	U		4.00
Ethylbenzene	U	0.160	0.0400	J	0.160	U	4.00	U		4.00
m&p-Xylene	U	0.160	0.120	J	0.160	U	4.00	U		4.00
Bromoform(Tribromomethane)	U	0.160	U		0.160	U	4.00	U		4.00
Styrene	U	0.160	0.0400	J	0.160	U	4.00	U		4.00
1,1,2,2-Tetrachloroethane	U	0.160	U		0.160	U	4.00	U		4.00
o-Xylene	U	0.160	0.0800	J	0.160	U	4.00	U		4.00
Ethyltoluene	U	0.160	0.0400	J	0.160	U	4.00	U		4.00
1,3,5-trimethylbenzene	U	0.160	0.0400	J	0.160	U	4.00	U		4.00
1,2,4-Trimethylbenzene	U	0.160	0.0400	J	0.160	U	4.00	U		4.00
1,3-Dichlorobenzene	U	0.160	0.0400	J	0.160	U	4.00	U		4.00
1,4-Dichlorobenzene	U	0.160	0.0400	J	0.160	U	4.00	U		4.00
1,2-Dichlorobenzene	U	0.160	0.0400	J	0.160	U	4.00	U		4.00

Results are in part per billion by volume (ppbv)
A = Assumed volume
U = None detected at or above the limit of quantitation
B = Concentration less than 5 times the reported blank result
J = Result is considered estimated

Table 3 - Air Toxic Target Compound Results forSumma Canister Samples
Little Valley, Little Valley, New York, WA# R1A00165

Sample Number	44763		44764		44765		44766		44767	
Sample Location	SVE-4		SVE-3		SVE-2		SVE-1		TREN-1	
Dilution Factor	25		25		25		25		25	
Compounds	Results ppbv	RL ppbv	Results ppbv	RL ppbv	Results ppbv	RL ppbv	Results ppbv	RL ppbv	Results ppbv	RL ppbv
Propylene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Dichlorodifluoromethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Chloromethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Dichlorotetrafluoroethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Vinyl Chloride	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,3-Butadiene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Bromomethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Chloroethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Acetone	41.0	4.00	23.0	4.00	51.0	4.00	58.0	4.00	9.00	4.00
Trichlorofluoromethane	2.00 J	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Isopropyl Alcohol	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,1-Dichloroethene	U	4.00	3.00 J	4.00	U	4.00	3.00 J	4.00	U	4.00
Methylene Chloride	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Trichlorotrifluoroethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
trans-1,2-Dichloroethene	U	4.00	34.0	4.00	51.0	4.00	51.0	4.00	U	4.00
1,1-Dichloroethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
MTBE	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Vinyl Acetate	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
2-Butanone	234	4.00	313	4.00	446	4.00	391	4.00	20.0	4.00
cis-1,2-Dichloroethene	U	4.00	42.0	4.00	73.0	4.00	173	4.00	4.00	4.00
Ethyl Acetate	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Hexane	U	4.00	1.00 J	4.00	U	4.00	U	4.00	U	4.00
Chloroform	3.00 J	4.00	4.00	4.00	2.00	4.00	2.00 J	4.00	U	4.00
Tetrahydrofuran	305	4.00	463	4.00	455	4.00	470	4.00	230	4.00
1,2-Dichloroethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,1,1-Trichloroethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Benzene	U	4.00	3.00 J	4.00	U	4.00	U	4.00	U	4.00
Carbon Tetrachloride	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Cyclohexane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,2-Dichloropropane	U	4.00	U	4.00	U	4.00	U	4.00	7.00	4.00
1,4-Dioxane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Trichloroethene	32300	200	60000	200	16800	200	31300	200	1750	4.00
Heptane	U	4.00	3.00 J	4.00	U	4.00	U	4.00	U	4.00
cis-1,3-Dichloropropene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Methyl Isobutyl Ketone	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
trans-1,3-Dichloropropene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,1,2-Trichloroethane	U	4.00	4.00	4.00	U	4.00	U	4.00	U	4.00
Toluene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
2-Hexanone	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Dibromochloromethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,2-Dibromoethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Tetrachloroethene	24.0	4.00	19.0	4.00	22.0	4.00	33.0	4.00	26.0	4.00
Chlorobenzene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Ethylbenzene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
m&p-Xylene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Bromoform(Tribromomethane)	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Styrene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,1,2,2-Tetrachloroethane	U	4.00	U J	4.00	U	4.00	U	4.00	U	4.00
o-Xylene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Ethyltoluene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,3,5-trimethylbenzene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,2,4-Trimethylbenzene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,3-Dichlorobenzene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,4-Dichlorobenzene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,2-Dichlorobenzene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00

Results are in part per billion by volume (ppbv)
A = Assumed volume
U = None detected at or above the limit of quantitation
B = Concentration less than 5 times the reported blank result
J = Result is considered estimated

Table 3 - Air Toxic Target Compound Results forSumma Canister Samples
Little Valley, Little Valley, New York, WA# R1A00165

Sample Number	44763		44764		44765		44766		44767	
Sample Location	SVE-4		SVE-3		SVE-2		SVE-1		TREN-1	
Dilution Factor	25		25		25		25		25	
Compounds	Results ppbv	RL ppbv	Results ppbv	RL ppbv	Results ppbv	RL ppbv	Results ppbv	RL ppbv	Results ppbv	RL ppbv
Propylene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Dichlorodifluoromethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Chloromethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Dichlorotetrafluoroethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Vinyl Chloride	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,3-Butadiene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Bromomethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Chloroethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Acetone	41.0	4.00	23.0	4.00	51.0	4.00	58.0	4.00	9.00	4.00
Trichlorofluoromethane	2.00 J	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Isopropyl Alcohol	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,1-Dichloroethene	U	4.00	3.00 J	4.00	U	4.00	3.00 J	4.00	U	4.00
Methylene Chloride	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Trichlorotrifluoroethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
trans-1,2-Dichloroethene	U	4.00	34.0	4.00	51.0	4.00	61.0	4.00	U	4.00
1,1-Dichloroethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
MTBE	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Vinyl Acetate	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
2-Butanone	234	4.00	313	4.00	446	4.00	391	4.00	20.0	4.00
cis-1,2-Dichloroethene	U	4.00	42.0	4.00	73.0	4.00	173	4.00	4.00	4.00
Ethyl Acetate	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Hexane	U	4.00	1.00 J	4.00	U	4.00	U	4.00	U	4.00
Chloroform	3.00 J	4.00	4.00	4.00	2.00	4.00	2.00 J	4.00	U	4.00
Tetrahydrofuran	305	4.00	463	4.00	495	4.00	1470	4.00	230	4.00
1,2-Dichloroethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,1,1-Trichloroethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Benzene	U	4.00	3.00 J	4.00	U	4.00	U	4.00	U	4.00
Carbon Tetrachloride	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Cyclohexane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,2-Dichloropropane	U	4.00	U	4.00	U	4.00	U	4.00	7.00	4.00
1,4-Dioxane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Trichloroethene	32300	200	60000	200	16900	200	31300	200	1750	4.00
Heptane	U	4.00	3.00 J	4.00	U	4.00	U	4.00	U	4.00
cis-1,3-Dichloropropene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Methyl Isobutyl Ketone	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
trans-1,3-Dichloropropene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,1,2-Trichloroethane	U	4.00	4.00	4.00	U	4.00	U	4.00	U	4.00
Toluene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
2-Hexanone	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Dibromochloromethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,2-Dibromoethane	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Tetrachloroethene	24.0	4.00	19.0	4.00	22.0	4.00	33.0	4.00	28.0	4.00
Chlorobenzene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Ethylbenzene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
m&p-Xylene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Bromoform(Tribromomethane)	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Styrene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,1,2,2-Tetrachloroethane	U	4.00	U J	4.00	U	4.00	U	4.00	U	4.00
o-Xylene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
Ethyltoluene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,3,5-trimethylbenzene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,2,4-Trimethylbenzene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,3-Dichlorobenzene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,4-Dichlorobenzene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00
1,2-Dichlorobenzene	U	4.00	U	4.00	U	4.00	U	4.00	U	4.00

Results are in part per billion by volume (ppbv)
A = Assumed volume
U = None detected at or above the limit of quantitation
B = Concentration less than 5 times the reported blank result
J = Result is considered estimated

Appendix B

Cost Calculations for Alternative S-2
In-Situ Soil Vapor Extraction

APPENDIX B
Cost Calculations for Alternative S-2
In-Situ Soil Vapor Extraction
Little Valley Site
Little Valley, Cattaraugus County, New York

I. Capital Costs	Unit Cost		Quantity	Cost
Pilot Test/Design				
Workplan, HASP	$ 10,000	ea.	1	$ 10,000
Wells	$ 5,000	ea.	5	$ 25,000
Portable Steam Generator, GAC	$ 5,000	ea.	1	$ 5,000
Field Testing	$ 6,000	ea.	1	$ 6,000
Air Monitoring & Analysis	$ 5,000	ea.	1	$ 5,000
				$ 51,000
Extraction				
Extraction/Monitoring Wells	$ 3,000	ea.	15	$ 45,000
Trenching (SVE lines)	$ 20	/LF	400 LF	$ 8,000
Piping	$ 10	/LF	600 LF	$ 6,000
Subslabs - On-site structures	$ 1,000	ea.	10	$ 10,000
				$ 69,000
Treatment				
Treatment Building & Slab	$ 35,000	ea.	1	$ 35,000
Process Equipment	$ 35,000	ea.	1	$ 35,000
Vapor Phase Carbon	$ 10,000	ea.	2	$ 20,000
Power Source	$ 10,000	ea.	1	$ 10,000
Process Piping & Valves	$ 10,000	ea.	1	$ 10,000
System Control	$ 10,000	ea.	1	$ 10,000
Air Cooler/Electrical	$ 10,000	ea.	1	$ 10,000
Post Treatment Sampling & Analysis	$ 30,000	ea.	1	$ 30,000
				$ 160,000
Per Diem/Lodging	5,000		1	$ 5,000
Excavation	$ 4,000	/day	1 days	$ 4,000
Backfilling and Grading	$ 30	/ cy	60 cy	$ 1,800
Disposal (non-Haz., 55 cy)	$ 70	/ ton	60 tons	$ 4,200
				$ 15,000
			Subtotal for SVE System Capital	$ 295,000
			Admin./Constr. Mgmt. (10%):	$ 29,500
			Engineering (10%):	$ 29,500
			Contingency (20%):	$ 59,000
			Subtotal Estimated Capital Cost :	**$ 413,000**

Annual Operating Costs (Pilot)	Unit Cost		Quantity	Cost
General O & M	$ 1,000	/month	12 months/yr	$ 12,000
Electricity ($0.15 KW HR)	$ 500	/month	12 months/yr	$ 6,000
GAC Replacement	$ 1,000	/month	12 months/yr	$ 12,000
Air Monitoring	$ 500	/month	12 months/yr	$ 6,000
			Subtotal Estimated Annual Operating Cost:	**$ 36,000**

PRESENT-WORTH COST (3 YEARS):

PW = C+ 1/i -1/i(1+i) n x [O&M]

PW = present-worth
C = capital cost
O&M = annual O&M cost
i = discount rate (7%)
n= number of years (3 yrs)

PW = $413,000+ (2.6) x $36,000 = $506,600

Appendix C

Cost Calculations for Alternative S-3
Excavation and Off-Site Disposal

APPENDIX C
Cost Calculations for Alternative S-3
Excavation and Off-Site Disposal
Little Valley Site
Little Valley, Cattaraugus County, New York

I. Capital Costs		Unit Cost		Quantity		Cost
Excavation, Backfilling and Dewatering						
Labor and equipment only	$	118,000	ea.	1	$	118,000
					$	118,000
Backfill						
Material	$	12	/ton	4,000	$	48,000
					$	48,000
Building Demolition and Debris Removal						
Labor and equipment only (includes debris, asphalt, and concrete removal)	$	13,000	ea.	1	$	13,000
					$	13,000
Drum/Debris Investigation						
Labor and equipment only	$	6,000	ea.	1	$	6,000
					$	6,000
Engineering Work (Buildings)						
Structural inspection w/report	$	10,000	ea.	1	$	10,000
Plan implementation	$	20,000	ea.	1	$	20,000
					$	30,000
Restoration						
Concrete pads	$	25,000	ea.	1	$	25,000
Asphalt	$	25,000	ea.	1	$	25,000
Septic system	$	25,000	ea.	1	$	25,000
Buried electric line	$	20,000	ea.	1	$	20,000
					$	95,000
Transportation and Disposal						
Labor only	$	2,000	ea.	1	$	2,000
Soil	$	51	/ton	3,750	$	191,250
Debris	$	130	/ton	250	$	32,500
Drums (inc. analytical)	$	1,000	ea.	3	$	3,000
Water		$0.50	/gal..	20,000	$	10,000
					$	238,750
Post-excavation Sampling and Analytical						
ERT	$	40,000	ea.	1	$	40,000
					$	40,000
Travel						
Lodging and Per Diem	$	24,000	ea.	1	$	24,000
					$	24,000

Subtotal for Excavation option	$	612,750
Admin./Constr. Mgmt. (13%):	$	79,658
Engineering (10%):	$	61,275
Contingency (20%):	$	122,550
Subtotal Estimated Capital Cost :	**$**	**876,233**

Note: There are no annual O&M costs associated with this alternative.