Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision
Apple Valley Shopping Center Site
Town of LaGrange
Dutchess County, New York
Site Number 314084

December 2008

New York State Department of Environmental Conservation
David Paterson, *Governor* Alexander B. Grannis, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

Apple Valley Shopping Center Inactive Hazardous Waste Disposal Site
Town of LaGrange, Dutchess County, New York
Site No. 314084

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for the Apple Valley Shopping Center site, a Class 2 inactive hazardous waste disposal site. The selected remedial program was chosen in accordance with the New York State Environmental Conservation Law and is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the Apple Valley Shopping Center inactive hazardous waste disposal site, and the public's input to the Proposed Remedial Action Plan (PRAP) presented by the Department. A list of the documents is included as a part of the Administrative Record in Appendix B of the ROD.

Assessment of the Site

Actual or threatened releases of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, present a current or potential significant threat to public health and/or the environment.

Description of Selected Remedy

Based on the results of the Remedial Investigation and Feasibility Study (RI/FS) and subsequent data from other investigation activities for the Apple Valley Shopping Center site and the criteria identified for evaluation of alternatives, the Department has selected hydraulic containment using the existing groundwater extraction/treatment system with possible system enhancement and hydraulic containment with the continued operation, maintenance and monitoring (OM&M) of the on-site groundwater extraction and treatment system. The selected remedy will also include an investigation of off-site soil vapor and continued OM&M of sub-slab depressurization systems in some areas of the shopping center buildings to maintain acceptable indoor air quality. An environmental easement will be executed to prohibit consumption of on-site groundwater and restrict the property to commercial use.

The components of the remedy are as follows:

1. The existing remedy will be expanded with tasks that will include reassessment of subsurface conditions, which will include, but not be limited to delineation of zones of contamination, analysis of bedrock structure, and research on chemical oxidants applicable to site contaminants and site conditions

2. Based on the findings of the reassessment, a remedial design program will be implemented to provide the information necessary for the construction, operation, maintenance, and monitoring of the remedy. The enhancement may consist of one or more of the following:
    a. hydraulic/pneumatic fracturing of bedrock;
    b. one or more of the existing extraction wells will be relocated and/or screened at intervals to improve extraction of groundwater contaminants;
    c. additional extraction wells will be constructed to improve extraction of groundwater contaminants; and/or
    d. in-situ treatment of groundwater by injection of a chemical oxidant, selected via a pilot study, in to the identified source areas to reduce DNAPL and dissolved contamination in groundwater to the extent feasible, and to significantly reduce the dissolved concentrations of contaminants. Installation of a soil vapor extraction system to extract contaminant vapors from the source areas.

3. Continued periodic sampling of the on-site monitoring wells, the off-site monitoring well and up to six off-site residential wells as per the existing groundwater monitoring program. The sampling regimes for all of the wells, both monitoring and residential wells, will be subject to reevaluation based on data history and need. The need and frequency of sampling the wells will be determined by changes in sub-surface site conditions such as a decrease in contaminant concentrations or the type of change that will be expected after the remedy is implemented.

4. Operation of the components of the remedy will continue until the remedial objectives have been achieved, or until the Department determines that continued remediation is technically impracticable or not feasible.

5. Imposition of an institutional control in the form of an environmental easement that will require (a) limiting the use and development of the property to commercial use, which will also permit industrial use if local zoning permits; (b) compliance with the approved site management plan; (c) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH; and (d) the property owner to complete and submit to the Department a periodic certification of institutional and engineering controls.

6. Development of a site management plan which will include the following institutional and engineering controls: (a) continued operation and maintenance of the groundwater extraction and treatment system and any enhancements made to that system; (b) periodic monitoring of groundwater conditions to evaluate the effectiveness of the remedy and to monitor for potential off-site impacts; (c) continued operation and maintenance of the sub-slab

depressurization systems; (d) operation and maintenance of the soil vapor extraction system and chemical oxidation system (if implemented); (e) continued monitoring of indoor air and soil gas and evaluation of the potential need for further mitigation of vapor intrusion impacts; and (f) identification of any use restrictions on the site.

7. The property owner will provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or another expert acceptable to the Department, until the Department notifies the property owner in writing that this certification is no longer needed. This submittal will: (a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or compliant with Department-approved modifications; (b) allow the Department access to the site; and (c) state that nothing has occurred that will impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

8. An investigation of the potential for off-site soil vapor intrusion impacts will be conducted during the remedial design phase.

New York State Department of Health Acceptance

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

Declaration

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

DEC 11 2008

Date

Dale A. Desnoyers, Director
Division of Environmental Remediation

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Town of LaGrange, Dutchess County, New York
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SECTION 1: SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (Department), in consultation with the New York State Department of Health (NYSDOH), has selected this remedy for the Apple Valley Shopping Center. The presence of hazardous waste has created significant threats to human health and the environment that are addressed by this proposed remedy. As more fully described in Sections 3 and 5 of this document, improper material management has resulted in the disposal of a hazardous waste, the dry-cleaning solvent, tetrachloroethene, also known as perchloroethene (PCE). On-site soil and groundwater are contaminated with PCE and its breakdown products, trichloroethene (TCE) and cis-1, 2-dichloroethene (DCE). This contamination has resulted in:

- a significant threat to human health associated with exposure to contaminated groundwater.
- a significant threat to human health associated with exposure to contaminant soil vapor intrusion into on-site structures.
- a significant environmental threat associated with the impacts of contaminants to the groundwater resource.

To eliminate or mitigate these threats, the Department has selected continued hydraulic containment using the existing extraction/treatment system with possible system enhancement and sub-slab depressurization. The enhancement would be based on an assessment of subsurface conditions including a bedrock fracturing analysis. Enhancement could lead to hydraulic/pneumatic fracturing of bedrock, additional extraction wells, well relocation and/or in-situ chemical oxidation (ISCO). The proposed remedy will also include an investigation of off-site soil vapor and continued OM&M of sub-slab depressurization systems in some areas of the shopping center buildings to maintain acceptable indoor air quality. An environmental easement will be placed on the deed to prohibit consumption of on-site groundwater and restrict the property to commercial use.

The selected remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially promulgated standards and criteria that are directly applicable, or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, criteria and guidance are hereafter called SCGs.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Apple Valley Shopping Center (AVSC) site, Site # 314084, is located about seven miles east of the City of Poughkeepsie in the Town of LaGrange, Dutchess County (See Figure 1, Site Location Map). The approximately four acre site is situated at the southwest corner of the intersection of Freedom Plains Road (State Route 55) and Titusville Road (County Route 49). Route 55 has a mix of residential and commercial properties. The shopping center was constructed at the site in 1967 - 1968, and contains a number of businesses including restaurants, a bank, a grocery store, and a variety of retail stores (see Figure 2, Site Plan). A pizzeria presently occupies the former location of the dry cleaners. The front (north) portion of the site is covered with asphalt. The area behind the shopping center building, and the area of the groundwater contamination, is covered with weathered asphalt, gravel and hard-packed dirt. Beyond that, a wooded area lies uphill in the south east corner of the site and a wooded wetland with a small stream forms part of the southern site boundary. The Woodbridge Estates residential subdivision lies beyond the wetland.

An April 2008 fire caused significant damage to the grocery store. Part of the roof collapsed. A national chain pharmacy is still planned for the former location of the grocery store. As of May 2008, it is unclear if the building will be remodeled or demolished and reconstructed.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

Following a November 27, 1985 delivery of the dry-cleaning solvent, tetrachloroethene (PCE), to the former dry cleaners, there was a discrepancy between the 60 gallons that was reported to have been delivered and the 100 gallons that the dry cleaner said were received. A similar discrepancy of 9.5 gallons occurred on June 2, 1992. Anecdotal reports suggest that the PCE supplier employed poor material management techniques and other undocumented spills may have occurred.

PCE was stored at the dry cleaners in a 55-gallon drum that was kept inside, at the rear of the facility. The drum was moved in February 1991 and was found to be corroded and leaking onto the concrete floor.

A laundromat in the AVSC also had a coin operated dry-cleaning machine. The laundromat stored PCE in a 55-gallon drum in a back closet and received PCE from the same supplier as the dry cleaners.

3.2: Remedial History

A supply well, AV-1, was installed and put in to service when the shopping center was constructed in 1968. AV-1 was constructed behind what was to become the dry cleaner facility. Due to poor yield, use of AV-1 was discontinued in 1981and replaced by a new well, AV-2. All well locations are depicted in Figure 4.

In September 1988, AVSC supply well AV-2 was tested for volatile organic compounds (VOCs) by the Dutchess County Department of Health (DCDOH). The samples contained the VOCs PCE, trichloroethene (TCE), and cis-1, 2-dichloroethene (DCE). In 1988, a carbon filter system was installed to treat the shopping center's well water. In early 1989, a deeper well, AV-3, was installed on the shopping center property to the east of the grocery store. Treated water from AV-3 was used until 1992, when AV-2 was brought back on-line with a treatment system.

A residential well located in the Woodbridge Estates subdivision behind and just to the south of AVSC was sampled by the DCDOH in November 1988. The well contained PCE, TCE, and DCE at concentrations above NYS standards for public drinking water supplies.

The former supply well, AV-1, was sampled in September 1990. Laboratory analysis found PCE at 5,150 parts per billion (ppb), TCE at 74 ppb, DCE at 110 ppb, and 1,1,2-trichloroethane (TCA) at 45 ppb. The Department drinking water standard for each of these compounds is 5 ppb.

During the spring and summer of 1990, the DCDOH expanded its investigation of residential wells. Tap water samples were collected from 32 homes in the subdivision. Site related contaminants were detected in numerous residential wells at concentrations exceeding drinking water standards. The investigation results prompted the DCDOH to issue health advisories to affected residents in the subdivision. Beginning in 1990, effected residents were supplied with bottled water for drinking and cooking purposes.

In 1990, the Department added the Apple Valley Shopping Center site to New York State's Registry of Inactive Hazardous Waste Disposal Sites as a Class 2 site. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

A soil vapor investigation was conducted at the site in February 1991. Elevated levels of VOCs were detected in the soil vapor in the area behind the dry cleaners. VOCs were also detected in soil vapor behind the laundromat and in the former site septic leach field. A May 1993 soil gas investigation confirmed the findings of the 1991 investigation.

Soil sampling was conducted at the site on behalf of the AVSC owner and a tenant during three separate investigations in August 1991, April 1993, and January 1997. Low level chlorinated VOC contamination was detected behind and under the laundromat and in the septic leach field. Greater concentrations of soil contamination were detected beneath and behind the dry cleaner facility. However, PCE was detected above the soil cleanup standard in only one sample.

In September 1991, the site owner, James A. Klein entered into an order on consent with the United States Environmental Protection Agency (EPA). The order required Mr. Klein to install, maintain and monitor granular activated carbon (GAC) filter systems on eight of the impacted residential wells to remove the site-related contaminants from the well water prior to household use. The order also included construction and maintenance of two air stripper treatment systems. In 1992, two groundwater extraction and treatment systems consisting of air strippers were constructed to address groundwater contamination related to the site. One of the air strippers treated water from one residential well and provided treated water to the two adjacent residences located immediately behind the shopping center. The other air stripper was constructed on-site. The on-site system was designed to treat water for potable use by the shopping center and act as a groundwater extraction and treatment system. It serviced AVSC supply well AV-2 at 20 gallons per minute (gpm). Excess water was discharged to the adjacent wetland.

The constant pumping of the groundwater had helped to limit the migration of the contaminated groundwater from the site. In early 1999, the shopping center was placed on municipal water and all water treated by the on-site air stripper which has been upgraded and currently discharges to the wetland.

SECTION 4: ENFORCEMENT STATUS

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

Documented to date, the PRP for the site is James A. Klein, currently doing business as Apple Valley Corp.

As described above in Section 3.2, the PRP entered into an order on consent with the EPA on September 30, 1991 requiring installation, maintenance, and monitoring of groundwater treatment systems.

The PRP declined to implement the RI/FS at the site when requested to do so by the Department. Following the State-funded RI/FS, the Department and the Apple Valley Corp. entered into an order on consent on November 5, 2004. The order obligated the responsible party to implement an interim remedial measure (IRM) consisting of the construction, operation, maintenance and monitoring of the groundwater extraction and treatment system described below in Section 5.2.

The Department will approach Apple Valley Corp. and any other PRPs to implement the selected remedial action. If an agreement cannot be reached with the PRPs, the Department will evaluate the project and site conditions for further action under the State Superfund. The PRPs are subject to legal actions by the state for recovery of all response costs the state has incurred.

SECTION 5: SITE CONTAMINATION

A remedial investigation/feasibility study (RI/FS) has been conducted to evaluate the alternatives for addressing the significant threats to human health and the environment.

5.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site.

The RI was conducted between April 2001 and January 2002. The field activities and findings of the investigation are described in the February 2003 RI report entitled "Remedial Investigation (RI) Report, Apple Valley Shopping Center."

Eight subsurface soil samples were collected from areas in and around the laundromat, the former location of the dry cleaners, and the septic leach field.

Five bedrock groundwater monitoring wells were drilled and packer tested at sequential core-length intervals. The packer tests were conducted to investigate vertical variations in hydrogeologic conditions and to identify discrete zones of groundwater contamination. A sixth open borehole well was constructed at a down-gradient location. The bedrock cores from the wells constructed in the source areas were examined for the presence of site contaminants in the form of dense non-aqueous phase liquid (DNAPL). As a DNAPL, the liquid contaminants are immiscible and are denser than water and, therefore form a separate phase from the water. Subsequently, DNAPLs dissolve very slowly in groundwater and can provide a continuing source of groundwater contamination.

Three surface water and three sediment samples were collected from the wetland in the western portion of the AVSC property. Indoor air samples were collected from four businesses in the shopping center.

Since the completion of the RI and FS, a design investigation was conducted by the PRP for construction of an expanded groundwater extraction and treatment system. This included additional sampling of existing monitoring wells as well as the construction and sampling of two additional monitoring wells and three extraction (a.k.a. recovery) wells.

At the request of the Department and the New York State Health Department (NYSDOH) an investigation of indoor air impacts and sub-slab soil vapor commenced in January 2005 by the PRP. The latest data are summarized in the January 2007 letter report and discussed below in Section 5.1.2.

5.1.1: Standards, Criteria, and Guidance (SCGs)

To determine whether the soil, groundwater, surface water, sediment and indoor air contain contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater, drinking water, and surface water SCGs are based on the Department's "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.

- Soil SCGs are based on the Department's Cleanup Objectives Technical and Administrative Guidance Memorandum [TAGM] 4046, "Determination of Soil Cleanup Objectives and Cleanup Levels" and 6 NYCRR Subpart 375-6, "Environmental Remediation Programs."

- Sediment SCGs are based on the Department's "Technical Guidance for Screening Contaminated Sediments."

- Concentrations of VOCs in air were evaluated using the air guidelines provided in Section 3.4 of the NYSDOH guidance document titled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York," dated October 2006.

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized in Section 5.1.2. More complete information can be found in the January 2003 Remedial Investigation / Feasibility Study RI Report.

5.1.2: Nature and Extent of Contamination

This section describes the findings of the investigation for all environmental media that were investigated.

As described in the RI report, many soil, groundwater, surface water, sediment and indoor air samples were collected to characterize the nature and extent of contamination. Volatile organic compounds (VOCs) is the category of contaminants that exceed its SCGs at this site.

Chemical concentrations are reported in parts per billion (ppb) for water, parts per million (ppm) for waste, soil, and sediment. Air samples are reported in micrograms per cubic meter ($\mu g/m^3$).

Table 1 summarizes the degree of contamination for the contaminants of concern in groundwater, surface water, wetland sediment and indoor air and compares the data with the SCGs for the site. All of the environmental sampling locations are depicted in Figures 3 and 4. The following are the media which were investigated and a summary of the findings of the investigation.

Subsurface Soil

As shown in Figure 3, no compounds detected in on-site soils were found above their SCGs.

Tetrachloroethene (PCE), was detected in seven of the ten subsurface soil samples analyzed during the RI. None of the PCE concentrations detected in the subsurface soil samples exceeded the recommended soil clean up objective of 1.3 ppm for the protection of groundwater. The degradation products of PCE, tricholoroethene (TCE) and cis-1, 2-dichloroethene (DCE), were detected in some of the subsurface soil samples at concentrations below their respective SCGs.

Polycyclic aromatic hydrocarbons (PAHs); anthracene, fluoranthene, chrysene, and benzo(b)fluoranthene were detected at low concentrations that were less than their respective SCGs.

No site-related subsurface soil contamination of concern was detected in accessible soil above their respective SCGS during the RI/FS. Due to the active businesses, most areas under the laundromat and the pizzeria were unaccessible during the RI. Therefore, there may be impacted soil in these source areas that was not identified. Further subsurface soil samples collected during the construction of the extraction wells also found no contamination above SCGs. Therefore, no remedial alternatives need to be evaluated for subsurface soil.

Groundwater

Bedrock is about eleven feet below the ground surface in the source areas and, as discussed above, no significant soil contamination was detected in accessible soil. Therefore, the source of the groundwater contamination appears to be in the bedrock. PCE, in the form of dense non-aqueous phase liquid (DNAPL), is suspected to be present in the source areas, under and behind the former dry cleaners and the laundromat. Although no DNAPL was found during the RI, the continuous source of groundwater contamination is indicative of a DNAPL source in the bedrock.

All of the wells except MW-5 were tested at discrete depth intervals during construction. The wells in the source area behind the laundromat MW-4A, MW-4B and AV-1 had total VOC (PCE and related compounds) contamination at all depth intervals from the water table to 158 feet below the ground surface. The highest on-site concentration of 9,003 ppb for total VOCs was detected at 40.9 feet in MW-4A. PCE, the principal contaminant of concern, was also detected at its maximum concentration of 8,690 ppb at the same depth. MW-4B was constructed close to MW-4A to allow for deeper sampling in the source area.

In January 2002, groundwater samples were collected from the six monitoring wells and one piezometer. PCE was detected at concentrations of 1,400 ppb, 2,600 ppb, 1,900 ppb, and 5 ppb in four of the groundwater samples. The PCE concentrations greatly exceeded the groundwater SCG and NYSDOH drinking water standard of 5 ppb in all of the wells.

TCE was detected in three of the groundwater samples at concentrations of 48 ppb, 130 ppb, and 32 ppb. These concentrations exceed the groundwater SCG of 5 ppb. The same three wells exhibited the respective cis-1, 2-dichloroethene (DCE) concentrations of 27 ppb, 74 ppb, and 19 ppb. The groundwater and drinking water SCG for DCE is 5 ppb.

No semi-volatile organic compounds were detected in any of the groundwater samples collected during the RI.

During the construction of the groundwater extraction and treatment system IRM in late 2005, three extraction wells (RW-1, RW-2, and RW-3) and two additional monitoring wells were constructed. Total site-related VOCs were found at a maximum concentration of 4,742 ppb at the depth interval of 9-20 feet below the ground surface (bgs) in RW-1. In RW-2, the maximum concentration of site-related VOCs was 14,329 ppb at 40-50 feet bgs. Toluene was also detected in RW-2 at 213 ppb. Total VOCs in RW-3 were found at 2,300 ppb at 60-70 ft bgs.

Once the groundwater extraction system was placed online, a quarterly groundwater monitoring program of all of the recovery wells and the monitoring wells was initiated in February 2006. The August and December 2007 groundwater sampling events showed no discernable change in groundwater contaminant concentrations for the preceding 21 months. The history of the quarterly monitoring data is presented in Table 1A.

Groundwater contamination identified during the RI/FS and further documented in the later investigation and the quarterly monitoring program is currently being addressed by the groundwater extraction and treatment IRM described in Section 5.2. However, further assessment is necessary.

Surface Water

In November 2001, three surface water samples were collected from the adjacent wetland (see Figure 3).

The background sample collected in the drainage swale along the north side of NY Route 55 exhibited methyl-tert-butyl ether (MTBE) at a concentration of 12 ppb that exceeded the Department surface water standard of 10 ppb. MTBE is a gasoline oxygenator and is likely present due to surface water run off from nearby roads and parking lots. MTBE is not considered a site-related contaminant because this sample location is upgradient of site source areas and it is not a constituent of dry-cleaning solvents. No other VOCs were detected in the surface water samples.

No SVOCs were detected in the surface water samples above the analytical method detection limits.

No site-related surface water contamination of concern was identified during the RI/FS. Therefore, no remedial alternatives need to be evaluated for surface water.

Sediments

In November 2001, three sediment samples, shown in Figure 3, were collected from the wetland and drainage ditch in the southeast corner of the site and from a background location. All volatile organic analytical results for the three sediment samples were reported as non-detect.

Semi volatile compounds were detected in the background sediment sample collected upstream from the site. The concentrations of chrysene (5.8 ppm) and benzo(b)fluoranthene (6.5 ppm) exceeded their associated SCG value of 1.3 ppm. The SVOCs detected in SED-01 are polycyclic aromatic hydrocarbons (PAHs) that are products of incomplete combustion of petroleum based fuels and are also the primary component of asphalt and are washed from roadways by surface water runoff.

Sediment samples from the wetland also showed detectable concentrations of SVOCs. The likely source for these PAH compounds is surface water runoff from nearby roads and parking lots. These chemicals are not related to dry-cleaning processes and therefore are not considered contaminants of concern for the site.

No site-related sediment contamination of concern was identified during the RI/FS. Therefore, no remedial alternatives need to be evaluated for sediment.

Air

In June 2002, indoor air was sampled by the NYSDOH at two locations in the pizzeria, two locations in the laundromat, and two other tenant spaces at the shopping center. The sampling showed PCE concentrations above NYSDOH guidance values in the kitchen of the pizzeria and the rear storeroom of the adjacent liquor store. PCE was undetectable at the minimum detection limit of 5 $\mu g/m^3$ in the other locations

Due to the indoor air impacts detected in 2002, further indoor air and sub-slab soil vapor sampling has been conducted by the PRP under the Department's direction. In January 2005, indoor air and sub-slab soil gas samples were collected in the pizzeria, the grocery store, the pharmacy, and a vacant store front. The sampling locations are shown in Figure 5. Additional sampling points were added in February, April and November 2005. All of the sampling locations were sampled in June 2006 and January 2007.

The indoor air and soil gas sampling data to date are summarized in the February 20, 2007 letter report entitled, January 2007 Vapor Intrusion Sampling Results. Impacts in indoor air were observed in two locations in the eastern building of the shopping center, the pizzeria and the grocery store. In January 2005, a sub-slab soil vapor sample collected in the grocery store had a PCE concentration of

7,200 μg/m^3 and an indoor air sample had a PCE concentration of 9.7 μg/m^3. In June of 2006, the respective PCE concentrations were 386 μg/m^3 and 3.47 μg/m^3. In January 2007, the sub-slab PCE concentration had declined to 4.41 μg/m^3 and indoor air concentration had declined to 2.09 μg/m^3.

Sampling conducted in the pizzeria found sub-slab vapor concentrations of PCE at 160 μg/m^3 and TCE at 3.6 μg/m^3 in January 2005. Then, in January 2006, PCE was 307,000 μg/m^3 and TCE was 8,900 μg/m^3 beneath the slab. In August 2006, PCE was 20,800 μg/m^3 and TCE was 643 μg/m^3. The respective indoor air PCE and TCE concentrations were 28 μg/m^3 and non-detect in January 2005. Later, the respective indoor air concentrations of PCE and TCE were 584 μg/m^3 and 7.39 μg/m^3 in January 2006 and 44.7 μg/m^3 and non-detect in August 2006. January 2007 sampling showed further reductions to the respective PCE and TCE concentrations of 2.86 μg/m^3 and 0.316 μg/m^3 in soil vapor and 1.82 μg/m^3 and non-detect in indoor air. The large increase and subsequent decreases in sub-slab soil vapor and indoor air concentrations may have been due to the temporary shutdown, upgrade, and resumption of the groundwater extraction and treatment system.

In the western building, air impacts were observed in the pharmacy. This is likely due to the second source area at the laundromat. Unlike in the other building, the indoor air and sub-slab concentrations of PCE and TCE don't show a clear trend. The respective PCE and TCE concentrations peaked in indoor air in January 2006 at 172 μg/m^3 and 4.62 μg/m^3. The respective indoor concentrations were 1.16 μg/m^3 and 0.261 μg/m^3 in June 2006 and 22.9 μg/m^3 and 0.457 μg/m^3 in January 2007. The sub-slab soil vapor PCE data at the laundromat show no relative change. The most-recent, January 2007, sub-slab PCE concentration was 213 μg/m^3. The sub-slab TCE concentration has shown some reduction to 7.44 μg/m^3 in January 2007.

Soil vapor and indoor air contamination identified during the aforementioned investigations are being mitigated by the sub-slab depressurization systems installed in the grocery store and the pizzeria as an interim remedial measure (IRM) described in Section 5.2. Operation, maintenance and monitoring (OM&M) of the sub-slab depressurization systems will include annual sampling of the indoor air and the sub-slab soil vapors. Based on the decision matrices in the NYSDOH "Guidance for Evaluating Soil Vapor Intrusion in the State of New York," no mitigation action is presently required at the pharmacy. However, as per the guidance and based on data to-date, annual monitoring at the pharmacy will continue. If the findings of future air sampling show a need based on the aforementioned guidance, additional sub-slab depressurization systems will be installed or the existing systems will be supplemented, retrofitted or decommissioned as needed.

5.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or an exposure pathway can be effectively addressed before completion of the RI/FS. There were two IRMs conducted at the AVSC site, one to address groundwater contamination and a second to address indoor air impacts from site contaminants.

The first IRM was an upgrade to the existing groundwater extraction and treatment system that was installed in 1992 under the 1991 EPA consent order. As stated in the approved IRM work plan, the objective of the IRM is to accelerate the rate of contaminant removal from the source areas. The data do not demonstrate that this objective is being met. From the baseline groundwater sampling conducted in March 2006 before the groundwater system went online to the most recent sampling round in February 2008 there has been no demonstrated reduction in contaminant concentrations in on-site groundwater.

The original air stripper treated groundwater extracted from former supply well AV-2 at 20 gallons per minute (gpm). The upgraded system was placed into service on February 9, 2006 to treat a combined flow of groundwater pumped from AV-2 and the three new recovery wells, RW-1, RW-2, RW-3. The system currently consists of a stackable tray air stripper that is rated to operate at a flow range of 1 to 40 gpm. The air stripper configuration consists of a series of four shell/tray modules. Based on the results of pump tests, the pumping rate for each well was determined, resulting in a total flow rate of 22 gpm.

The quarterly groundwater monitoring will continue along with the operation of the treatment system. An effluent sample is also collected from the groundwater remediation system.

The second IRM consisted of mitigation measures taken at two locations in the shopping center to address current human exposures (via inhalation) to volatile organic compounds associated with soil vapor intrusion. In February 2006, one sub-slab depressurization system (SSDS) each was installed in the pizzeria and in the grocery store. The sub-slab depressurization systems depressurize the sub-slab environment relative to the indoor space, thus restricting the migration of contaminant vapors into the building. The site SSDSs consist of one or more points drilled through the floor slab, manifolded to an electric blower, and vented to the outside air. The locations of the SSDSs and the monitoring locations are shown in Figure 5.

As noted in Section 2, an April 2008 fire caused significant damage to the grocery store. Part of the roof collapsed. A national chain pharmacy is still planned for the former location of the grocery store. As of May 2008, it is unclear if the building will be remodeled or demolished and reconstructed. Regardless, an upgraded SSDS is planned if the new pharmacy occupies the building.

5.3: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in Section 6.1.4 of the RI report.

An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway are documented. An exposure pathway is considered a potential pathway when one or more of the elements currently do not exist, but could in the future.

Analytical results obtained during the remedial investigation indicate that, based on the level and frequency of exceedances of recommended cleanup objectives, VOCs are the primary contaminants of concern in site groundwater and soil.

Current and reasonable anticipated potential future exposures were evaluated for Site visitors (i.e., customers, employees, construction workers) and nearby residents from contaminants in groundwater, soil and soil vapor. The following discussion addresses the current/potential exposure pathways present at the Site:

Groundwater

Prior to connecting to public water, casual visitors and business employees/tenants to the site may have been exposed to contaminants in groundwater through ingestion of drinking water. Currently, exposure to contaminants in drinking water is not expected as the shopping center businesses are connected to public water. Exposure to contaminated groundwater through direct contact or incidental ingestion is not expected. During construction activities, workers could be exposed to contaminated groundwater through dermal contact and incidental ingestion.

An evaluation of off-site groundwater indicated that private water supplies were impacted by site related contaminants. Exposure to contaminants in groundwater at off-site residences occurred in the past through ingestion, dermal contact and inhalation of vapors while showering. Granulated activated carbon treatment systems were installed at homes where drinking water supplies were impacted by site-related contaminants above New York State drinking water standards. Currently, public water is available to these residences and a few homes have opted to connect. Two homes continue to have in-line water treatment systems. Routine analyses of other select private water supply samples do not indicate site-related contaminants above NYS drinking water standards. During activities where groundwater may be encountered, workers may be exposed to contaminants through dermal contact and incidental ingestion.

Soil and Sediment

Localized areas of on-site residual soil contamination exist at low levels. Dermal contact with, or incidental ingestion of, residual soil contamination is not expected as buildings and parking lots or hard pan gravel covers the area of concern. During construction activities, where soils are disturbed or removed, workers could be exposed to residual contaminant in soil through dermal contact or incidental ingestion.

Sediment data show no detection of site-related contaminants in wetland sediments.

Soil Vapor

An evaluation of sub-slab soil vapor and indoor air samples indicated that the indoor air of three businesses at the shopping center was impacted by site related contaminants. Mitigation and /or monitoring measure were implemented to minimize soil vapor intrusion into these spaces. Future exposure to soil vapors by visitors or employees/tenants is not expected as long as the systems remain in place and operational. Monitoring of the systems will provide information regarding the effectiveness of the systems to mitigate soil vapor intrusion. During construction activities, workers could be exposed to contaminated vapors that volatilize off of the groundwater.

While only low level contamination was detected in off-site groundwater there is a potential for contaminants to volatilize off of groundwater and enter into off-site residences. This potential pathway of exposure will be characterized as part of the remedy for this site.

5.4: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts include existing and potential future exposure pathways to fish and wildlife receptors, as well as damage to natural resources such as aquifers and wetlands.

Site contamination has significantly impacted the groundwater resource in the aquifer. A change in site conditions, such as discontinuing the active groundwater containment system, would result in groundwater contamination migrating beyond its current limits.

Sediment and surface water samples from the adjacent wetland and drainage ditch did not contain elevated levels of contaminants, therefore a viable exposure pathway to fish and wildlife receptors is not present under current site conditions. The groundwater contamination is at a deeper elevation than the wetland. Therefore, surface water discharges to the wetland are unlikely.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The remediation goals for this site are to eliminate or reduce to the extent practicable:

- exposures of persons at or around the site to PCE, TCE, DCE, and vinyl chloride in groundwater;

- exposures of persons at the site to PCE, TCE and DCE in indoor air from the intrusion of contaminated soil gas into occupied businesses at the shopping center; and

- the release of contaminants from the source area into groundwater that have created exceedances of groundwater quality standards.

Further, the remediation goals for the site include attaining to the extent practicable:

- removal or treatment of the DNAPL and/or the highly contaminated groundwater that is residing in the on-site bedrock and providing a continuous source of groundwater contamination;

- ambient groundwater quality standards in on-site groundwater; and

- NYSDOH indoor air quality guidelines.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the AVSC site were identified, screened and evaluated in the January 2003 FS report entitled "Feasibility Study (FS) Report, Apple Valley Shopping Center" which is available at the document repositories identified in Section 1.

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

7.1: Description of Remedial Alternatives

The following potential remedies were considered to address the contaminated groundwater, soil vapor, and indoor air at the site.

Alternatives 2, 3 and 4 contain common elements that include a site management plan (SMP). The SMP would include engineering and institutional controls. The engineering controls would consist of the implementation of the operation, maintenance and monitoring (OM&M) plans. For these three alternatives, an OM&M plan would be implemented for the sub-slab depressurization systems presently operating in the shopping center. For Alternatives 3 and 4, the SMP would also include direction for OM&M of the groundwater extraction and treatment system. The institutional controls for the site would be contained in an environmental easement.

The environmental easement would require compliance with the site management plan, restrict the use of groundwater, prohibit certain uses for the property and require that the property owner submit a periodic certification to demonstrate that the institutional and engineering controls remain in place and remain protective of human health and the environment.

Under all three alternatives, operation of the two sub-slab depressurization systems and periodic monitoring of the indoor air and sub-slab soil vapor would continue. The need for additional depressurization systems or expansion of the existing systems would be based on the continued evaluation of the monitoring data.

All three alternatives would also include continuation of the long-term groundwater monitoring program and an investigation of the potential for off-site soil vapor impacts. There is some variation between the alternatives.

Alternative 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. The existing containment / remedial systems (groundwater and sub-slab depressurization) would be discontinued. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Present Worth:	$297,000
Capital Cost:	$0
Annual Sampling: (Years 1-30):	$21,600

Alternative 2: Monitored Natural Attenuation

Present Worth:	$593,000
Capital Cost:	$0
Annual OM&M: (Years 1-30):	$34,000
Reevaluation and reporting every five years for 30 years:	$25,000

Monitored Natural Attenuation (MNA) is the observation of groundwater conditions over an extended time period to monitor the reduction of the volume and toxicity of contaminants in groundwater through naturally occurring processes in soil and groundwater.

The natural attenuation processes that can reduce contaminant concentrations in groundwater include dispersion, dilution, volatilization, adsorption, and biodegradation. The effectiveness and applicability of MNA is generally a complex function of subsurface conditions, residence time of contaminants, and proximity of down gradient receptors.

Under the MNA alternative, the existing containment/remedial system would be discontinued and no additional actions taken to remove or treat contaminated media or otherwise restrict the use of, or access to, these resources. Groundwater samples would be collected periodically from the on-site monitoring wells, one off-site monitoring well MW-5 and up to six off-site residential wells. The groundwater samples would be analyzed for site-related volatile organic compounds (VOCs) and the monitored natural attenuation parameters such as nitrate, sulfate, dissolved oxygen, iron, methane. Every five years, the effectiveness of the MNA would be reevaluated. The three extraction wells constructed for the groundwater treatment system could also be added to the monitoring program.

Alternative 3: Hydraulic Containment using Current Extraction and Treatment System with Sub-Slab Depressurization

Present Worth:	$861,000
Capital Cost:	$0
Annual OM&M (Years 1-30):	$36,000

Alternative 3 assumes that the existing hydraulic containment and groundwater treatment system and the two sub-slab vapor extraction systems installed in the shopping center would continue to operate.

Groundwater samples would be collected periodically from the four recovery wells, the on-site monitoring wells, one off-site monitoring well, and up to six off-site residential wells. The groundwater samples would be analyzed for the site related VOCs. The sampling regimes for all of the wells, both monitoring and residential, are subject to reevaluation based on data history and need. All changes to the groundwater sampling program must be approved by the Department and the NYSDOH.

This remedy would require financial assurance as a condition of accepting the institutional and engineering controls to ensure the long term implementation, maintenance, monitoring, and enforcement of those controls.

Alternative 4: Hydraulic Containment using Current Extraction/Treatment System with Possible System Enhancement and Sub-Slab Depressurization

Present worth:	$1,050,000 - $1,980,000
Capital cost:	$183,000 - $ 732,000
Annual groundwater monitoring (Years 1-30):	$23,000
Annual system operation & maintenance (Years 1-30):	$36,000 - $69,000

Alternative 4 would include all the elements of Alternative 3 and would also include possible enhancement of the existing groundwater extraction and treatment system, based on an assessment of subsurface conditions which would include, but not be limited to, delineation of zones of contamination, a bedrock fracturing analysis, and research on chemical oxidants applicable to site contaminants . Enhancement could lead to hydraulic/pneumatic fracturing of bedrock, additional extraction wells, well relocation and/or screening, and/or in-situ chemical oxidation (ISCO). If warranted by the assessment of subsurface conditions, a pilot study of ISCO would be conducted. The determination to employ ISCO would be based on the findings the pilot study.

In the event that ISCO is selected, additional tasks would include a bench-scale treatability study, injection point construction, reagent application and additional sampling to monitor the effectiveness of the ISCO injections. Installation of a soil vapor extraction (SVE) system would be considered to further utilize the wells constructed for the chemical oxidation injection. The SVE system would remove residual contamination existing in the soils in the source areas and, in conjunction with the existing sub-slab depressurization systems, would restrict the infiltration of vapors into the buildings.

Regardless of the enhancement method employed, the current groundwater extraction and treatment system would continue to operate and be maintained to ensure hydraulic containment of groundwater contaminants to the site to protect down-gradient receptors until contaminant concentrations have been acceptably reduced. Throughout the operation of the groundwater treatment system, all relevant extraction, monitoring and residential wells would be sampled periodically to monitor groundwater conditions until water quality standards are achieved.

Under this alternative, operation of the two sub-slab depressurization systems and periodic monitoring of the indoor air and sub-slab soil vapor would continue as long as indoor air and sub-slab sampling data show a need to do so based on NYSDOH guidance. The need for additional depressurization systems or expansion of the existing systems will be based on the continued evaluation of the monitoring data. An investigation of soil vapor will be conducted down gradient from the site in the area of residences that are or have been impacted by groundwater contamination associated with the site.

Due to the variability of the tasks involved with an assessment of the existing system and site conditions and because of the different possible system enhancements, the total implementation time is approximated to last six to eighteen months.

This remedy would require financial assurance as a condition of accepting the institutional and engineering controls to ensure the long term implementation, maintenance, monitoring, and enforcement of those controls.

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York State. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

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

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

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

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

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

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

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

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

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision. The costs for each alternative are presented in Table 2.

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

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the PRAP have been evaluated. The responsiveness summary (Appendix A) presents the public comments received and the manner in which the Department addressed the concerns raised.

In general, the public comments received were supportive of the selected remedy and requested clarification of various issues related to the project. However, several comments were received from representatives of the previous site owner in opposition to the selected remedy.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

Based on the Administrative Record (Appendix B) and the discussion presented below, the Department has selected Alternative 4, hydraulic containment using the current extraction/treatment system with possible system enhancement and sub-slab depressurization as the remedy for the Apple Valley Shopping Center site. The selected remedy will also include an investigation of off-site soil vapor and continued OM&M of sub-slab depressurization systems in some areas of the shopping center buildings to maintain acceptable indoor air quality. An environmental easement will be placed on the deed to prohibit consumption of on-site groundwater and restrict the property to commercial use. The selected remedy is based on the results of the RI, the evaluation of alternatives presented in the FS and groundwater and air data obtained since the completion of the RI.

Alternative 4 has been selected because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It will achieve the remediation goals for the site by continuing to contain contamination to the site with the existing hydraulic containment / groundwater extraction and treatment system and will pursue an enhancement of that system to facilitate the destruction of the contaminants. The system enhancement will begin with a study of on-site geologic conditions and, if the study supports ISCO as a practical enhancement, a pilot study of ISCO will be conducted prior to construction of the ISCO wells and the implementation of the ISCO injection program in the source areas. The ISCO wells will then be used for a soil vapor extraction (SVE) system to actively remove vapor-phase contamination from the source areas. The selected remedy will include hydraulic containment via continued operation of the groundwater extraction and treatment system, and the sub-slab depressurization systems will continue to operate in the on-site buildings. The sub-slab depressurization systems and/or the soil vapor extraction system will continue to operate as long as annual monitoring of indoor air and sub-slab vapor shows a continued need for vapor mitigation. The elements of the proposed remedy are described at the end of this section.

Site history since 1990 shows that the on-site groundwater contamination remains elevated after more than 16 years with no significant change in site conditions. Therefore, no action or a passive remedy would not meet the threshold criteria. Neither Alternative 1 (no action) nor Alternative 2 (monitored natural attenuation) meet the threshold criteria, protection of human health and the environment, nor compliance with New York State SCGs. Alternatives 1 and 2 would permit on-site exposures to workers and customers via indoor air contamination at the shopping center and off-site exposures to down-gradient residents via groundwater contamination. Alternatives 3 and 4 would both meet the threshold criteria discussed in Section 7.2. However, Alternative 4 would be a more dynamic remedy and would be expected to meet SCGs in a shorter period of time.

Alternative 3 would be effective in the short term because it is already being implemented to treat the groundwater contamination and containing it to the site. Alternative 3 would also mitigate indoor impacts within the shopping center with the existing sub-slab depressurization systems. Alternative 3 would have minimal short-term impacts because all of the major construction activities have been completed. Alternative 4 may have short-term impacts if the geophysical study or the pilot test require on-site drilling. There would also be short-term impacts during construction of additional extraction wells and/or ISCO injection wells and the construction of the SVE components. The short-term impacts associated with Alternative 4 would be offset by the increased efficiency of the remediation system and the subsequent decrease in long-term impacts.

The objectives of both Alternatives 3 and 4 are to remove all VOC contamination from the bedrock source area and reduce groundwater contaminant concentrations to less than SCGs. Therefore, both alternatives are capable of achieving long-term effectiveness and permanence. Alternative 4 would be expected to achieve the objectives much sooner.

Both Alternatives 3 and 4 would include continued operation of the groundwater extraction and treatment system which has been shown to contain the groundwater contamination to the site and therefore limit its mobility. Alternative 3 would reduce the toxicity and volume of the contamination by removing it over time. Alternative 4 would reduce the toxicity and volume by removing contaminated groundwater and, if ISCO is implemented, by destroying contamination in the bedrock source areas.

Alternative 3 is currently being implemented and would require little additional effort except maintenance and monitoring. The remediation process presented in Alternative 4 has been implemented at other sites. Alternative 4 would likely require additional drilling and may include one or more rounds of chemical oxidant injection, and the construction and operation of the SVE system. Drilling is a common activity at most site investigations and is employed in many site remedies. Chemical oxidation is commonly used to promote the destruction of VOCs in groundwater and soil. The chemical oxidants are mixed on site and pumped into the injection points.

SVE is commonly used to remove vapor-phase contaminants from soil and bedrock. The SVE system proposed for Alternative 4 would use the wells drilled for the chemical oxidation.

Of the two viable remedies, the calculations show Alternative 4 to be the most cost effective, as it would achieve the groundwater SCGs within a shorter time period. The groundwater extraction and treatment system of both Alternatives 3 and 4 would require a lot of electricity over a long period and may be impacted by energy cost increases. With system enhancement, Alternative 4 would be expected to operate for a shorter period and therefore use much less electricity and cost less to operate. Alternative 4 would cost about twice as much as Alternative 3, but would likely achieve the remedial goals much sooner and thereby mitigate potential human exposures.

The present worth cost to implement the remedy is estimated to range from $1,050,000 to $1,980,000. The cost to construct the remedy is presented as a range because of the possible enhancement scenarios. The lower estimate consists of the continued operation of the current systems with an assessment of geophysical conditions and a pilot study. Construction of additional extraction wells to supplement the current system would cost more. The maximum cost $1,980,000 is for the ISCO applications and construction of the associated wells, construction of the SVE system and the related OM&M. For the ISCO and SVE, the estimated average annual operation and maintenance cost is $69,000 The annual groundwater monitoring will cost approximately $23,000.

The components of the remedy are as follows:

1. The existing remedy will be expanded with tasks that will include reassessment of subsurface conditions, which will include, but not be limited to delineation of zones of contamination, analysis of bedrock structure, and research on chemical oxidants applicable to site contaminants and site conditions

2. Based on the findings of the reassessment, a remedial design program will be implemented to provide the information necessary for the construction, operation, maintenance, and monitoring of the remedy. The enhancement may consist of one or more of the following:
   a. hydraulic/pneumatic fracturing of bedrock;
   b. one or more of the existing extraction wells will be relocated and/or screened at intervals to improve extraction of groundwater contaminants;
   c. additional extraction wells will be constructed to improve extraction of groundwater contaminants; and/or
   d. in-situ treatment of groundwater by injection of a chemical oxidant, selected via a pilot study, in to the identified source areas to reduce DNAPL and dissolved contamination in groundwater to the extent feasible, and to significantly reduce the dissolved concentrations of contaminants. Installation of a soil vapor extraction system to extract contaminant vapors from the source areas.

3. Continued periodic sampling of the on-site monitoring wells, the off-site monitoring well and up to six off-site residential wells as per the existing groundwater monitoring program. The sampling regimes for all of the wells, both monitoring and residential wells, will be subject to reevaluation based on data history and need. The need and frequency of sampling the wells will be determined by changes in sub-surface site conditions such as a decrease in

contaminant concentrations or the type of change that will be expected after the remedy is implemented.

4. Operation of the components of the remedy will continue until the remedial objectives have been achieved, or until the Department determines that continued remediation is technically impracticable or not feasible.

5. Imposition of an institutional control in the form of an environmental easement that will require (a) limiting the use and development of the property to commercial use, which will also permit industrial use if local zoning permits; (b) compliance with the approved site management plan; (c) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH; and (d) the property owner to complete and submit to the Department a periodic certification of institutional and engineering controls.

6. Development of a site management plan which will include the following institutional and engineering controls: (a) continued operation and maintenance of the groundwater extraction and treatment system and any enhancements made to that system; (b) periodic monitoring of groundwater conditions to evaluate the effectiveness of the remedy and to monitor for potential off-site impacts; (c) continued operation and maintenance of the sub-slab depressurization systems; (d) operation and maintenance of the soil vapor extraction system and chemical oxidation system (if implemented); (e) continued monitoring of indoor air and soil gas and evaluation of the potential need for further mitigation of vapor intrusion impacts; and (f) identification of any use restrictions on the site.

7. The property owner will provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or another expert acceptable to the Department, until the Department notifies the property owner in writing that this certification is no longer needed. This submittal will: (a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or compliant with Department-approved modifications; (b) allow the Department access to the site; and (c) state that nothing has occurred that will impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

8. An investigation of the potential for off-site soil vapor intrusion impacts will be conducted during the remedial design phase.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation activities were undertaken to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

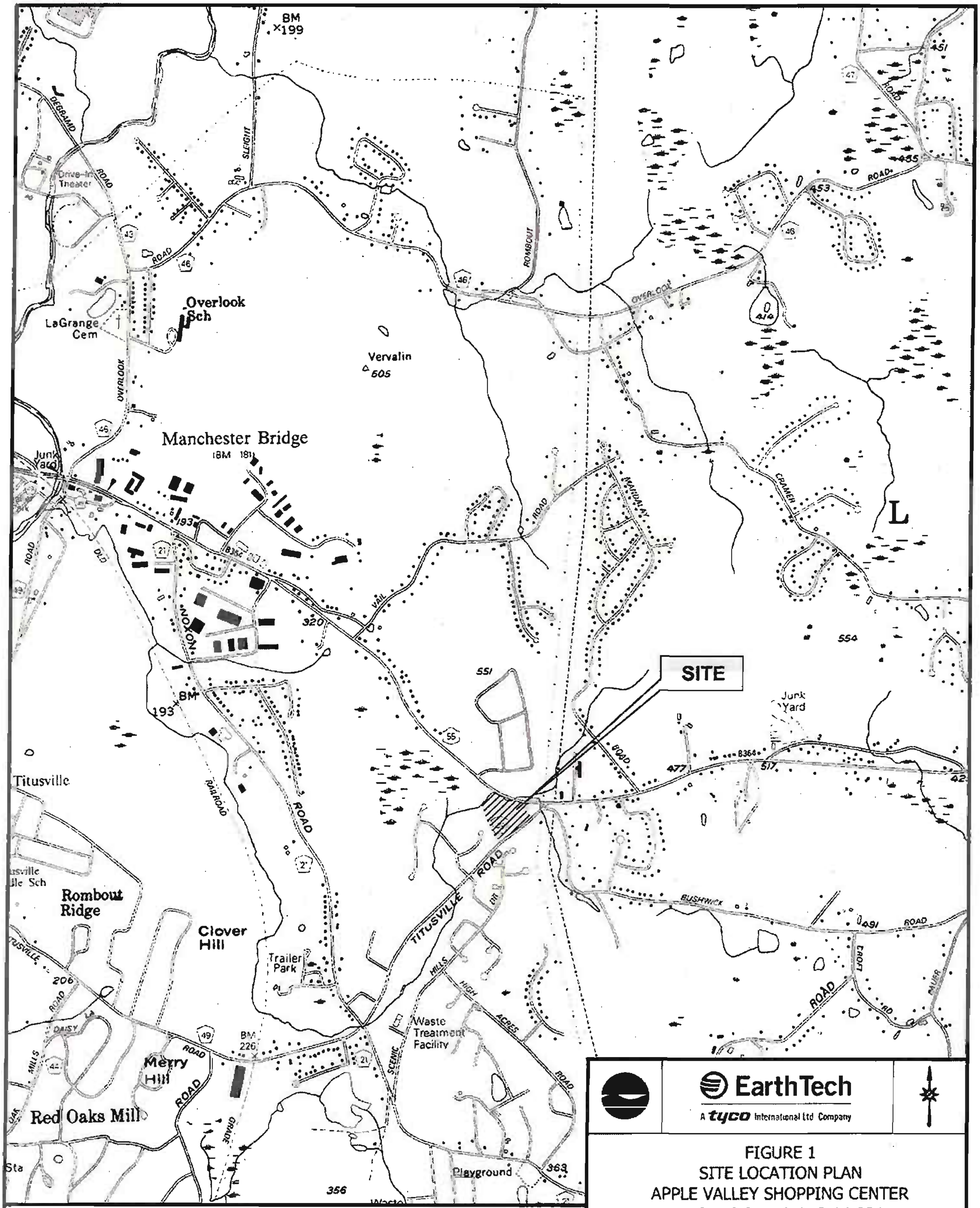
- Repositories for documents pertaining to the site were established.

- A public contact list, which included nearby property owners, elected officials, local media and other interested parties, was established.

- A fact sheet was mailed to the public contact list on February 27, 2008 to notify the public of the release of the PRAP, the public meeting, and the availability of documents in the repositories.

- A public meeting was held on March 6, 2008 to present and receive comment on the PRAP.

- A responsiveness summary (Appendix A) was prepared to address the comments received during the public comment period for the PRAP.



EarthTech

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FIGURE 1
SITE LOCATION PLAN
APPLE VALLEY SHOPPING CENTER
NYSDEC SITE NO. 3-14-084
TOWN OF LAGRANGE
DUTCHESS COUNTY, NEW YORK

MAP REFERENCE:
PROJECT LOCATION CAN BE FOUND ON THE NYSDOT 7.5 MIN. QUADRANGLE PLEASANT VALLEY SERIES

PLAN

SCALE: 1" = 2000'

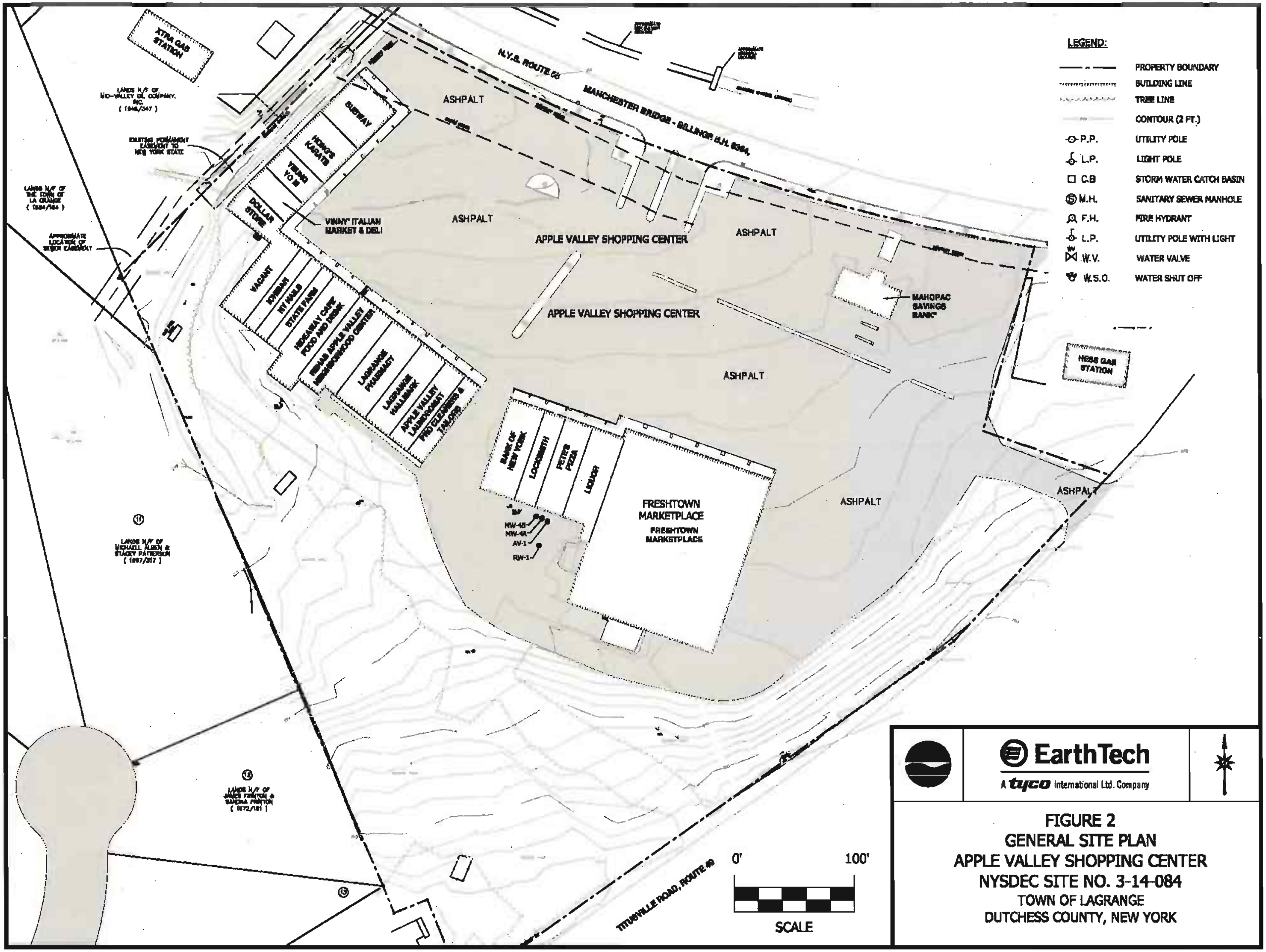

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FIGURE 2
GENERAL SITE PLAN
APPLE VALLEY SHOPPING CENTER
NYSDEC SITE NO. 3-14-084
TOWN OF LAGRANGE
DUTCHESS COUNTY, NEW YORK

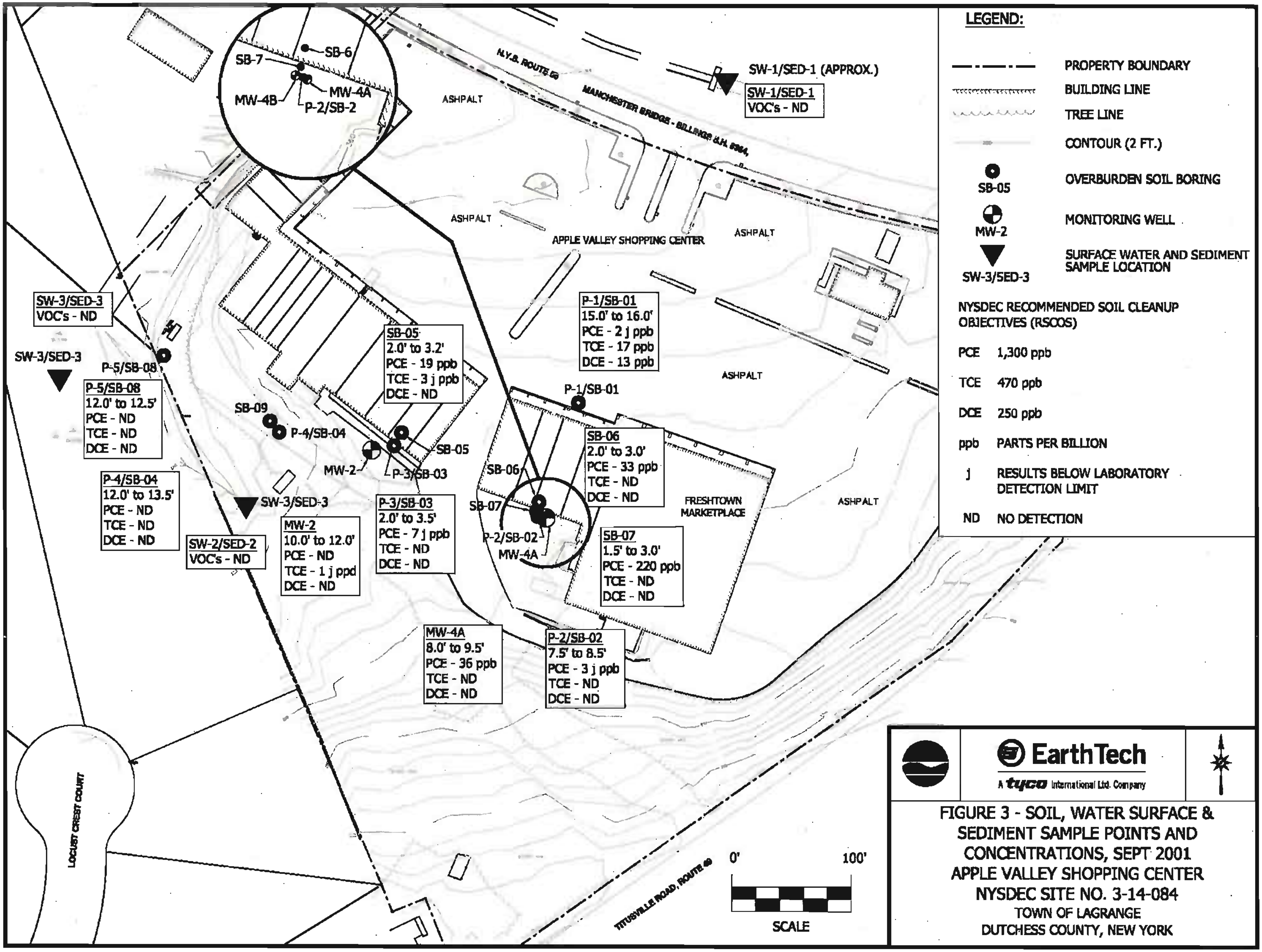

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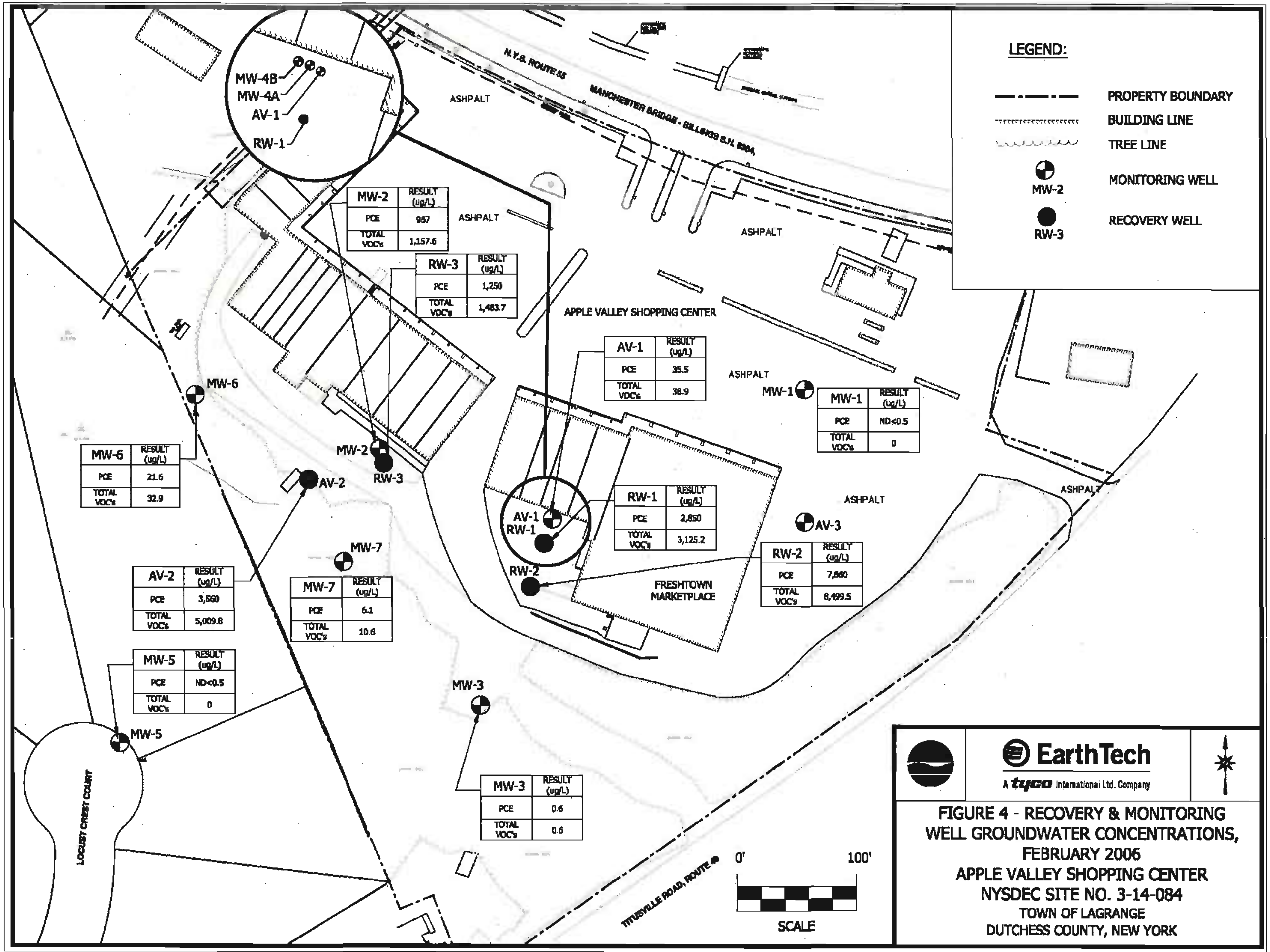
FIGURE 3 - SOIL, WATER SURFACE & SEDIMENT SAMPLE POINTS AND CONCENTRATIONS, SEPT 2001
APPLE VALLEY SHOPPING CENTER
NYSDEC SITE NO. 3-14-084
TOWN OF LAGRANGE
DUTCHESS COUNTY, NEW YORK



MW-2	RESULT (ug/L)
PCE	967
TOTAL VOC's	1,157.6

RW-3	RESULT (ug/L)
PCE	1,250
TOTAL VOC's	1,483.7

AV-1	RESULT (ug/L)
PCE	35.5
TOTAL VOC's	38.9

MW-1	RESULT (ug/L)
PCE	ND<0.5
TOTAL VOC's	0

RW-1	RESULT (ug/L)
PCE	2,850
TOTAL VOC's	3,125.2

RW-2	RESULT (ug/L)
PCE	7,860
TOTAL VOC's	8,499.5

MW-6	RESULT (ug/L)
PCE	21.6
TOTAL VOC's	32.9

AV-2	RESULT (ug/L)
PCE	3,560
TOTAL VOC's	5,009.8

MW-7	RESULT (ug/L)
PCE	6.1
TOTAL VOC's	10.6

MW-5	RESULT (ug/L)
PCE	ND<0.5
TOTAL VOC's	0

MW-3	RESULT (ug/L)
PCE	0.6
TOTAL VOC's	0.6

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FIGURE 4 - RECOVERY & MONITORING
WELL GROUNDWATER CONCENTRATIONS,
FEBRUARY 2006
APPLE VALLEY SHOPPING CENTER
NYSDEC SITE NO. 3-14-084
TOWN OF LAGRANGE
DUTCHESS COUNTY, NEW YORK

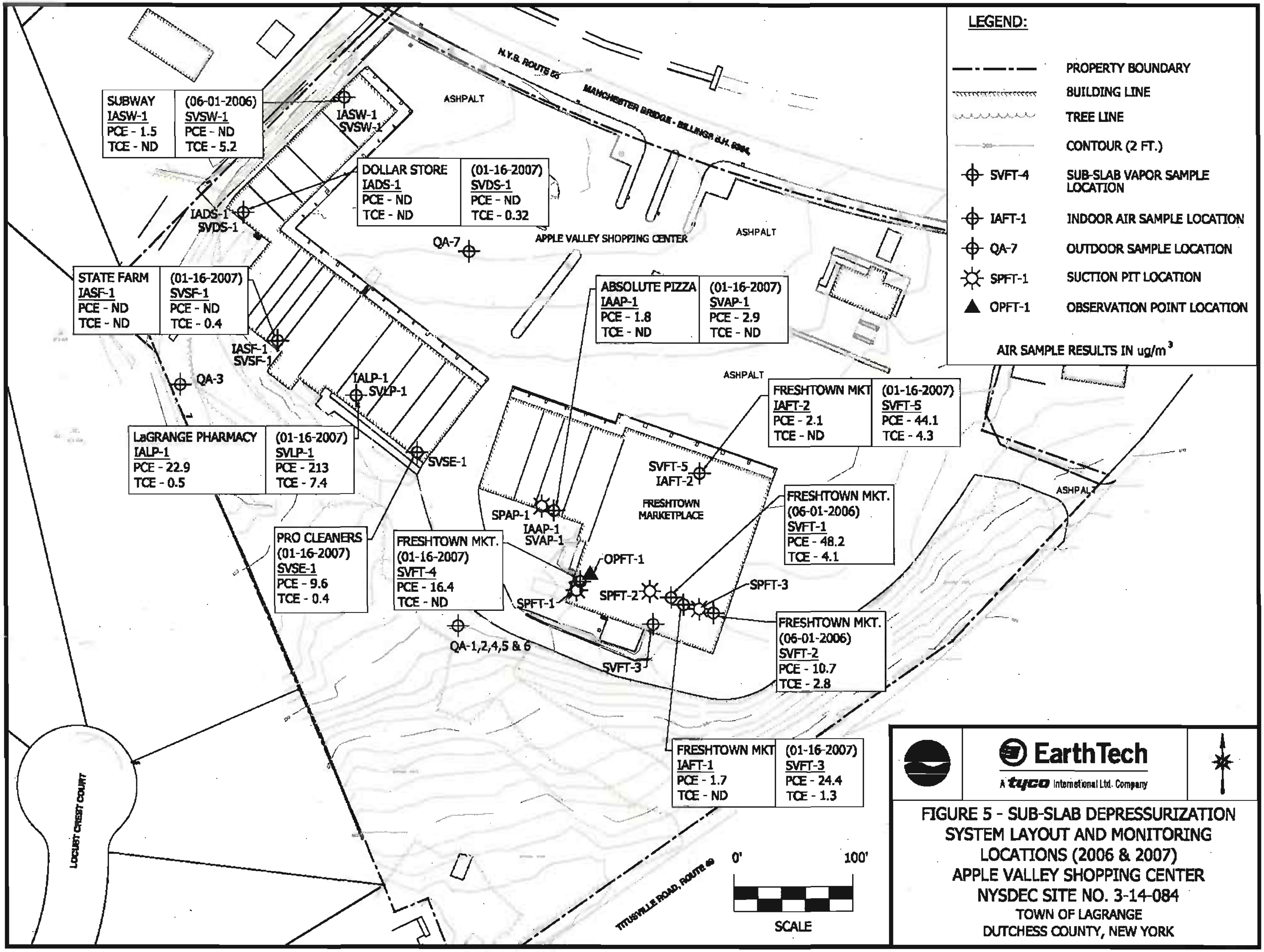

FIGURE 5 - SUB-SLAB DEPRESSURIZATION SYSTEM LAYOUT AND MONITORING LOCATIONS (2006 & 2007)
APPLE VALLEY SHOPPING CENTER
NYSDEC SITE NO. 3-14-084
TOWN OF LAGRANGE
DUTCHESS COUNTY, NEW YORK

TABLE 1
Nature and Extent of Contamination
June 2001 - January 2002

GROUNDWATER	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	tetrachloroethene	ND (10)* - 6,600	5	10 / 15
	trichlorethene	ND (10) - 200	5	7 / 15
	cis-1, 2-dichlorethene	ND (10) - 220	5	6 / 15

[a] ppb = parts per billion, which is equivalent to micrograms per liter, ug/L, in water;
ND = non detect

[b] SCG = standards, criteria, and guidance values

* The elevated detection limits are due to sample dilution that is necessary for accurate analyses.

Table 1A
Volatile Organic Compounds (VOCs) in Quarterly Groundwater Monitoring Samples
January 2006 through February 2008

Sample Identification	Dates Sampled	Chemical Constituent				
		tetrachloroethene (5 µg/L)	trichloroethene (5 µg/L)	cis-1, 2-dichloroethene (5 µg/L)	vinyl chloride (2 µg/L)	Total COC
extraction well RW-1	2-9-06	**2,850**	**119**	**53.6**	ND < 10	3,022.6
	3-9-06	**412**	**19.9**	**13.6**	ND < 1.0	445.5
	5-16-06	**394**	**21.0**	**19.0**	ND < 1.0	434
	8-22-06	**583**	**6.4**	**8.6**	ND < 2.5	598
	11-28-06	**265**	**7.7**	**10**	ND < 1.0	282.7
	12-11-06	**217**	**6.9**	**9.4**	ND < 2.5	233.3
	3-1-07	**591**	**7.4**	**5.4**	ND < 2.5	603.8
	5-29-07	**298**	**8.4**	ND < 10	ND < 1.0	306.4
	8-28-07	**763**	**9.1**	**5.2**	ND < 5.0	777.3
	11-28-07	**606**	**7.8**	**7.4**	ND < 25	621.2
	2-28-08	**1,400**	**14.0**	**18.4**	ND < 10	1,432.4

Table 1A (continued)
Volatile Organic Compounds (VOCs) in Quarterly Groundwater Monitoring Samples January 2006 through February 2008

Sample Identification	Dates Sampled	Chemical Constituent				
		Tetrachloroethene (5 µg/L)	Trichloroethene (5 µg/L)	cis-1,2-Dichloroethene (5 µg/L)	Vinyl Chloride (2 µg/L)	Total COC
extraction well RW-2	2-9-06	**7,860**	**132**	**148**	ND < 25 *	8,140
	3-9-06	**2,960**	**24.8**	**20.8**	ND < 10	3,005.6
	5-16-06	**1,800**	**12.2**	**20.1**	ND < 5	1,832.3
	8-22-06	**14,100**	**76**	**177**	ND < 50	14,353
	11-28-06	**3,340**	ND < 25	**25.5**	ND < 25	3,365.5
	12-11-06	**1,190**	**10.9**	**22.1**	ND < 5.0	1,223
	3-1-07	**5,100**	ND < 50	ND < 50	ND < 50	5,100
	5-29-07	**1,080**	**16.6**	ND < 10	ND < 10	1,096.6
	8-28-07	**325**	4.1	3.6	ND < 2.5	332.7
	11-28-07	**1,770**	ND < 10	ND < 10	ND < 10	1,770
	2-28-08	**4,700**	**30.5**	**46.0**	ND < 25	4,776.5

Table 1A (continued)
Volatile Organic Compounds (VOCs) in
Quarterly Groundwater Monitoring Samples
January 2006 through February 2008

Sample Identification	Dates Sampled	Chemical Constituent				
		Tetrachloroethene (5 µg/L)	Trichloroethene (5 µg/L)	cis-1,2-Dichloroethene (5 µg/L)	Vinyl Chloride (2 µg/L)	Total COC
extraction well RW-3	2-9-06	**1,250**	**102**	**88.8**	ND < 5.0	1,440.8
	3-9-06	**567**	**67.3**	**72.8**	**3.9**	711
	5-16-06	**538**	**53.8**	**99.4**	ND < 2.5	691.2
	8-22-06	**151**	**19.6**	**34.1 M**	ND < 2.5	204.7
	11-28-06	**451**	**49.5**	**103**	**4.0**	607.5
	12-11-06	**467**	**66.4**	**147**	**5.7**	686.1
	3-1-07	**494**	**59**	**75.3**	ND < 2.5	628.3
	5-29-07	**550**	**54.3**	**93.8**	**5.2**	703.3
	8-28-07	**657**	**69.7**	**121**	**4.4**	852.1
	11-28-07	**541**	**57.0**	**103**	ND < 5.0	701
	02-28-08	**618**	**53.0**	**99.7**	ND < 5.0	770.7

Table 1A (continued)
Volatile Organic Compounds (VOCs) in Quarterly Groundwater Monitoring Samples
January 2006 through February 2008

Sample Identification	Dates Sampled	Chemical Constituent				
		Tetrachloroethene (5 µg/L)	Trichloroethene (5 µg/L)	cis-1,2-Dichloroethene (5 µg/L)	Vinyl Chloride (2 µg/L)	Total COC
extraction well AV-2	2-9-06	**3,560**	**380**	**979**	ND < 10	4,919
	3-9-06	**90.7**	**11.0**	**19.5**	ND < 0.5	121.2
	5-16-06	**913**	**13.2**	**18.0**	ND < 2.5	944.2
	8-22-06	**28.4**	3.4	**9.9 M**	ND < 0.5	41.7
	11-28-06	**24.7**	3.5	**6.6**	ND < 0.5	34.8
	12-11-06	**28.5**	4.0	**9.2**	ND < 0.5	41.7
	3-1-07	**25.4**	4.0	**5.2**	ND < 0.5	34.6
	5-29-07	**26.0**	3.8	**6.1**	ND < 0.5	35.9
	8-28-07	**24.4**	ND < 0.5	**6.5**	ND < 0.5	30.9
	11-28-07	**13.2**	2.1	3.6	ND < 0.5	18.9
	2-28-08	**126**	**10.7**	**26.2**	ND < 0.5	162.9

Table 1A (continued) Volatile Organic Compounds (VOCs) in Quarterly Groundwater Monitoring Samples January 2006 through February 2008

Sample Identification	Dates Sampled	Chemical Constituent				
		Tetrachloroethene (5 µg/L)	Trichloroethene (5 µg/L)	cis-1,2-Dichloroethene (5 µg/L)	Vinyl Chloride (2 µg/L)	Total COC
monitoring well AV-1	1-16-06	**35.5**	1.4	2.0	ND < 0.5	38.9
	5-16-06	**13.9**	ND < 0.5	ND < 0.5	ND < 0.5	13.9
	8-23-06	**10.3**	0.6	0.8 M	ND < 0.5	11.7
monitoring well MW-1	1-17-06	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	0
	5-16-06	ND < 0.5	2.2	ND < 0.5	ND < 0.5	2.2
	8-22-06	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	0
	8-28-07	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	0
monitoring well MW-2	1-13-06	**967**	**95.7**	**94.9**	ND < 5.0	1,157.6
	5-16-06	**4,440**	**638**	**1,300**	ND < 25.0	6,378
	8-22-06	**2,710**	**390**	**943 M**	**24.2**	4,067.2
	8-28-07	**2,760**	**396**	**752**	**31.0**	3,939
monitoring well MW-3	1-16-06	0.6	ND < 0.5	ND < 0.5	ND < 0.5	0.6
	5-16-06	2.6	ND < 0.5	ND < 0.5	ND < 0.5	2.6
	8-23-06	4.3	ND < 0.5	ND < 0.5	ND < 0.5	4.3
	8-28-07	2.5	ND < 0.5	ND < 0.5	ND < 0.5	2.5

Table 1A (continued)
Volatile Organic Compounds (VOCs) in Quarterly Groundwater Monitoring Samples January 2006 through February 2008

Sample Identification	Dates Sampled	Chemical Constituent				
		Tetrachloroethene (5 µg/L)	Trichloroethene (5 µg/L)	cis-1,2-Dichloroethene (5 µg/L)	Vinyl Chloride (2 µg/L)	Total COC
monitoring well MW-5	1-18-06	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	0
	8-23-06	4.0	ND < 0.5	0.6 M	ND < 0.5	4.6
	3-5-07	2.0	ND < 0.5	ND < 0.5	ND < 0.5	2.0
	8-28-07	3.3	ND < 0.5	ND < 0.5	ND < 0.5	3.3
monitoring well MW-6	1-16-06	**21.6**	3.4	**7.9**	ND < 0.5	32.9
	5-16-06	**6.0**	0.6	ND < 0.5	ND < 0.5	6.6
	8-22-06	3.7	ND < 0.5	ND < 0.5	ND < 0.5	3.7
	8-28-07	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	0
monitoring well MW-7	1-16-06	**6.1**	3.6	0.9	ND < 0.5	10.6
	5-16-06	**34.0**	3.2	**7.3**	ND < 0.5	44.5
	8-22-06	**23.6**	2.8	**8.7 M**	ND < 0.5	35.1
	8-28-07	**12.5**	1.9	2.8	ND < 0.5	17.2

* The elevated detection limits are due to sample dilution that is necessary for accurate analyses.

Table 1B
Volatile Organic Compounds (VOCs) in Sub-Slab Vapor, Ambient Indoor Air, and Ambient Outdoor Air Samples
January 2005 through January 2008

Sample Identification		Dates Sampled	Constituent			
			Tetrachloroethene (μg/m^3)	Trichloroethene (μg/m^3)	cis-1,2-Dichloroethene (μg/m^3)	Vinyl Chloride (μg/m^3)
grocery store	SVFT-1 (sub-slab vapor)	1-26-05	***2,500***	13	ND < 0.82	ND < 0.82
		4-29-05	***1,400***	17	ND < 1.2	ND < 1.2
		6-1-06	48.2	4.14	ND < 7.46	ND < 4.82
		1-28-08	43.7	13.1	ND < 0.424	ND < 0.274
	SVFT-2 (sub-slab vapor)	4-29-05	8.7	ND < 0.71	ND < 0.71	ND < 0.71
		6-1-06	10.7	2.84	ND < 1.11	ND < 0.715
		1-28-08	13.8	3.01	ND < 0.400	ND < 0.259
	SVFT-3 (sub-slab vapor)	4-29-05	86	3.8	ND < 0.70	ND < 0.70
		6-1-06	47.6	***7.07***	ND < 7.46	ND < 4.82
		1-16-07	24.4	1.33	ND < 0.522	ND < 0.337
		1-28-08	18.8	4.00	ND < 0.393	ND < 0.254
	SVFT-4 (sub-slab vapor)	4-29-05	***7,200***	***210***	260	ND < 14
		6-1-06	***386***	ND < 0.771	ND < 14.3	ND < 9.23
		1-16-07	16.4	ND < 0.249	ND < 0.392	ND < 0.253
		1-28-08	85.9	1.48	ND < 0.393	ND < 0.254

Table 1B (continued)
Volatile Organic Compounds (VOCs) in Sub-Slab Vapor, Ambient Indoor Air, and Ambient Outdoor Air Samples
January 2005 through January 2008

Sample Identification		Dates Sampled	Constituent			
			Tetrachloroethene ($\mu g/m^3$)	Trichloroethene ($\mu g/m^3$)	cis-1,2-Dichloroethene ($\mu g/m^3$)	Vinyl Chloride ($\mu g/m^3$)
grocery store (continued)	SVFT-5 (sub-slab vapor)	6-1-06	***354***	***12.2***	ND < 7.46	ND < 4.82
		1-16-07	44.1	4.27	ND < 0.656	ND < 0.423
		1-28-08	59.4	6.11	ND < 0.404	ND < 0.261
	IAFT-1 (indoor air)	1-26-05	***9.7***	ND < 0.97	ND < 0.97	ND < 0.97
		4-29-05	***8.6***	ND < 0.74	ND < 0.74	ND < 0.74
		6-1-06	***3.47***	***0.267***	ND < 0.393	ND < 0.254
		1-16-07	1.70	ND < 0.249	ND < 0.391	ND < 0.252
		1-28-08	2.05	1.35	ND < 0.392	ND < 0.253
	IAFT-2 (indoor air)	6-1-06	***3.47***	***0.276***	ND < 0.393	ND < 0.254
		1-16-07	2.09	ND < 0.250	ND < 0.393	ND < 0.254
		1-28-08	2.28	ND < 0.256	ND < 0.404	ND < 0.261

Table 1B (continued)
Volatile Organic Compounds (VOCs) in Sub-Slab Vapor, Ambient Indoor Air, and Ambient Outdoor Air Samples
January 2005 through January 2008

Sample Identification		Dates Sampled	Constituent			
			Tetrachloroethene ($\mu g/m^3$)	Trichloroethene ($\mu g/m^3$)	cis-1,2-Dichloroethene ($\mu g/m^3$)	Vinyl Chloride ($\mu g/m^3$)
pizzeria	SVAP-1 (sub-slab vapor)	1-26-05	***160***	3.6	ND < 0.79	ND < 0.79
		1-17-06	***307,000E***	***8,990E***	277	ND < 1.27
		6-1-06	***119,000E***	***3,550E***	269	ND < 5.07
		8-7-06	***20,800E***	***643E***	34.5	ND < 7.25
		1-16-07	2.86	ND < 0.316	ND < 0.483	ND < 0.312
		1-28-08	6.59	1.85	ND < 0.412	ND < 0.266
	IAAP-1 (indoor air)	1-26-05	***26***	ND < 0.84	ND < 0.84	ND < 0.84
		1-17-06	***584E***	***7.39***	ND < 1.96	ND < 1.27
		6-1-06	***57.1***	***1.38***	ND < 2.49	ND < 1.61
		8-7-06	***44.7***	ND < 4.05	ND < 11.2	ND < 7.25
		1-16-07	1.82	ND < 0.294	ND < 0.463	ND < 0.299
		1-28-08	2.67	0.329	ND < 0.400	ND < 0.259

E - exceeds the calibration range of the laboratory equipment.

Table 1B (continued)
Volatile Organic Compounds (VOCs) in
Sub-Slab Vapor, Ambient Indoor Air, and Ambient Outdoor Air Samples
January 2005 through January 2008

Sample Identification		Dates Sampled	Constituent			
			Tetrachloroethene $(\mu g/m^3)$	Trichloroethene $(\mu g/m^3)$	cis-1,2-Dichloroethene $(\mu g/m^3)$	Vinyl Chloride $(\mu g/m^3)$
cleaners	SVSE-1 (sub-slab vapor)	1-26-05	14	ND < 0.64	ND < 0.64	ND < 0.64
		6-1-06	64.8	8.67	ND < 7.85	ND < 5.07
		1-16-07	9.59	0.442	ND < 0.393	ND < 0.254
	IASE-1 (indoor air)	1-26-05	ND < 0.69	ND < 0.69	ND < 0.69	ND < 0.69
		6-1-06	1.23	0.248	ND < 0.392	ND < 0.253
		1-16-07	ND < 8.92	ND < 3.33	ND < 5.22	ND < 3.37
pharmacy	SVLP-1 (sub-slab vapor)	1-26-05	***220***	10	ND < 0.85	ND < 0.85
		1-17-06	***166***	***42.1***	4.67	ND < 1.27
		6-1-06	***235***	***17.0***	ND < 7.85	ND < 5.07
		1-16-07	***213***	7.44	ND < 7.46	ND < 4.82
		1-28-08	***219***	11.0	ND < 0.475	ND < 0.307
	IALP-1 (indoor air)	1-26-05	1.5	ND < 1.5	ND < 1.5	ND < 1.5
		1-17-06	***172***	4.62	ND < 1.96	ND < 1.27
		6-1-06	1.18	0.261	ND < 0.392	ND < 0.253
		1-16-07	***22.9***	0.457	1.16	ND < 0.330
		1-28-08	2.14	4.26	ND < 0.561	ND < 0.363

Table 1B (continued)
Volatile Organic Compounds (VOCs) in Sub-Slab Vapor, Ambient Indoor Air, and Ambient Outdoor Air Samples
January 2005 through January 2008

Sample Identification		Dates Sampled	Constituent			
			Tetrachloroethene $(\mu g/m^3)$	Trichloroethene $(\mu g/m^3)$	cis-1,2-Dichloroethene $(\mu g/m^3)$	Vinyl Chloride $(\mu g/m^3)$
insurance company	SVSF-1 (sub-slab vapor)	11-29-05	ND < 3.35	ND < 2.66	ND < 1.96	ND < 1.27
		6-1-06	ND < 13.4	12.5	ND < 7.85	ND < 5.07
		1-16-07	ND < 0.731	0.395	ND < 0.428	ND < 0.276
	IASF-1 (indoor air)	11-29-05	ND < 3.35	ND < 2.66	ND < 1.96	ND < 1.27
		6-1-06	6.77	ND < 0.0212	ND < 0.392	ND < 0.253
		1-16-07	ND < 0.805	ND < 0.301	ND < 0.471	ND < 0.304
dollar store	SVDS-1 (sub-slab vapor)	11-29-05	ND < 3.35	ND < 2.66	ND < 1.96	ND < 1.27
		6-1-06	3.82	***9.15***	ND < 1.45	ND < 0.938
		1-16-07	ND < 0.765	ND < 0.286	ND < 0.448	ND < 0.289
	IADS-1 (indoor air)	11-29-05	ND < 3.35	ND < 2.66	ND < 1.96	ND < 1.27
		6-1-06	0.420	***1.41***	4.87	ND < 0.254
		1-16-07	ND < 0.704	ND < 0.262	ND < 0.412	ND < 0.266
sub shop	SVSW-1 (sub-slab vapor)	11-29-05	3.94	ND < 2.66	ND < 1.96	ND < 1.27
		6-1-06	ND < 12.7	5.15	ND < 7.46	ND < 4.82
	IASW-1 (indoor air)	11-29-05	ND < 3.35	ND < 2.66	ND < 1.96	ND < 1.27
		6-1-06	1.53	ND < 0.221	ND < 0.408	ND < 0.264

Table 2
Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
1 No Action	$0	$21,600	$297,000
2 Monitored Natural Attenuation	$0	$34,000 5-year reevaluation - $25,000	$593,000
3 Hydraulic Containment Using Current Extraction and Treatment System	$0	$36,000	$861,000
4 Hydraulic Containment using Current Extraction/Treatment System with Possible System Enhancement and Sub-Slab Depressurization	$183,000 - $732,000	$39,000 - $92,000	$1,050,000 - $1,980,000

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

Apple Valley Shopping Center
Town of Lagrange, Dutchess County, New York
Site No. 314084

The Proposed Remedial Action Plan (PRAP) for the Apple Valley Shopping Center site, was prepared by the New York State Department of Environmental Conservation (the Department) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on February 27, 2008. The PRAP outlined the remedial measure proposed for the contaminated groundwater and indoor air at the Apple Valley Shopping Center site.

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

A public meeting was held on March 6, 2008, which included a presentation of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP ended on March 28, 2008.

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

COMMENT 1: How long will the chemical oxidation remedy take?

RESPONSE 1: The In-Situ Chemical Oxidation (ISCO) remedy, if implemented (see response 38), will take approximately two or three years to implement. The implementation schedule and details will be determined during the design phase. There will likely be several rounds of chemical oxidant injections. Operation of the groundwater extraction and treatment system will continue during and after the chemical oxidation remedy to address residual contamination.

COMMENT 2: Are you saying that the VOCs will be converted to carbon dioxide and water?

RESPONSE 2: The specific byproducts are dependent on the specific chemical oxidant used. For example, potassium permanganate ($KMnO_4$), which is commonly used on the site-related contaminant because of its effectiveness on such compounds and the low exothermic chemical reactions, produces carbon dioxide, manganese oxides, potassium chloride salts, and hydrogen. The specific chemical oxidant will be selected during the remedial design.

COMMENT 3: I've lived here for 55 years, across from the site for 25 years. It used to be an apple orchard. Are DEC and NYSDOH going to be more proactive, so things like this don't happen again?

There is an active dry cleaner in the shopping mall.

RESPONSE 3: The U.S. Environmental Protection Agency and Department both have Resource Conservation and Recovery Act (RCRA) programs that regulate hazardous and toxic materials through the manufacturing, usage and disposal phases. This includes dry-cleaning solvents. Although certain regulated facilities are periodically inspected, leaks or spills may occur at any time. Therefore, the Department recommends that anyone with knowledge, report the discovery of any contamination or a release to the NYS Spill Hotline (1-800-457-7362) as soon as possible. Many dry cleaners presently use solvents other than the ones that impacted this site. The Department has been informed that the new dry-cleaning facility in the shopping center uses different a process with nonionic cleaning agents.

COMMENT 4: Is the Apple Valley Shopping Center a superfund site?

RESPONSE 4: Yes, it is listed as a Class 2 site in the New York State Registry of Inactive Hazardous Waste Disposal Sites. It's not on the federal list of Superfund sites (the National Priorities List).

COMMENT 5: Is the site the responsibility of EPA or the state? Is the local community responsible for the clean up costs? Who is going to pay the cost of this expensive remedy?

RESPONSE 5: As noted in Section 4.0 of the ROD, the potential responsible party has entered into separate orders of consent with the EPA and the Department. However, the remedy required under this ROD is being done pursuant to the NYS Superfund program, overseen by the Department. The local community will not be responsible for the remediation costs. The State or responsible parties will pay the remediation costs. Under the NYS Superfund program, the State attempts to identify potentially responsible parties (PRPs) to fund investigation and remediation of contaminated sites through an order on consent. An order on consent is a legally binding document between the State and the PRP. The remedy selected is not covered under the scope of the aforementioned IRM order on consent. The Department will approach Apple Valley Corp. and any other PRPs to implement the selected remedial action under another order on consent. If an agreement cannot be reached with the PRPs, the Department will implement the remedy using State funds. The PRPs are subject to legal actions by the state for recovery of all response costs the state has incurred.

COMMENT 6: Why haven't you conducted any sampling north of Route 55?

RESPONSE 6: Data show that groundwater flows in the opposite direction from Route 55. The on-site up-gradient monitoring well AV-1, in the parking lot in front of Freshtown, has not shown any site related contaminants. In 2002, the supply well in the bank building was sampled and found to be unimpacted by site contaminants. One residential well north of Route 55, directly across from the shopping center, was sampled circa 1985 by the Dutchess County Health Department. That well was also not contaminated.

COMMENT 7: I had a granulated activated carbon system on my well that was removed soon after I purchased my house. How often are wells monitored and how is it done? My well is directly adjacent to the shopping center. How do I find out my particular values/readings? Does it include specific data?

RESPONSE 7: The NYSDOH has a monitoring program in the Woodbridge Estates subdivision behind the shopping center. Most of the residential wells in the monitoring program have not shown contamination above public drinking water standards for many years. The State does not have standards for private water supplies, so public water standards are used. Specific questions on residential supply wells in the proximity of the AVSC should be directed to NYSDOH Public Health Specialist, Fay Navratil at 800-458-1158 ext 27880 or at fsn01@health.state.ny.us.

COMMENT 8: You state that all the residential wells pumping to supply the homes in this subdivision are drawing groundwater in that direction. If those wells were off-line and those homes went onto public water supply, would that make it easier to treat the groundwater back at AVCS?

RESPONSE 8: The groundwater extraction and treatment system currently operating at the site extracts at a maximum rate of approximately 21 gallons per minute, and sufficiently contains groundwater contamination to the site.

However, if all of the down-gradient residences were on public water, and the residential wells were not pumping groundwater during the chemical oxidation remedy, the on-site pumping rate may be decreased and allow for more contact time for the chemical oxidants in the source areas and facilitate the destruction of the contaminants in-place.

COMMENT 9: If part of the remediation strategy was to hook up these homeowners to the public water would it make any difference?

Earlier you mentioned that connecting the subdivision residences' to public water was cost prohibitive, it might kill two birds with one stone, if you were able to say that taking these wells off line would improve your groundwater extraction process.

RESPONSE 9: A reduction in down-gradient pumping and the subsequent reduction in groundwater migration may allow for adjustments to pumping rates and increased pumping from the wells directly in the source areas.

COMMENT 10: So if it is currently being contained at the site, when you say you are finding it at the residential wells, does it mean that you don't find it any more?

RESPONSE 10: No, there is residual contamination that has been observed in off-site private water supplies.

COMMENT 11: What oxidizer do you use?

RESPONSE 11: That will be decided during the design phase, if ISCO is implemented. There are a variety to choose from; potassium permanganate ($KMnO_4$) is commonly used on the site-related contaminant because of its effectiveness on such compounds and the low exothermic (heat releasing) chemical reactions.

COMMENT 12: How deep are you injecting and on what basis?

RESPONSE 12: The depth of the chemical oxidation injections would be based on the zones of greatest contamination. In the source area at the former location of the dry cleaner, the greatest contamination was found at 40 and 75 below grade. Therefore, the deepest injection well will likely be 75 feet below grade.

COMMENT 13: You spoke about decision matrices, regarding indoor air quality. I assume you sampled sub-slab as well as indoor air at the shopping center. What would that guidance tell you in terms of exposure levels? Are you looking at this in terms of residential exposure or transient exposure? I am curious as to how you would apply that based on the shopping plaza and how it would apply when you do your off-site sampling of the residences?

RESPONSE 13: Decision matrices are risk management tools, developed by the NYSDOH in conjunction with other agencies, to provide guidance on a case-by-case basis about actions that should be taken to address current and potential exposures related to soil vapor intrusion. The matrices are generic, therefore they are used in the decision making process for both residential and nonresidential environments. Exposure to a volatile chemical due to vapor intrusion does not necessarily mean that health effects will occur. Whether or not a person experiences health effects depends on several factors, including the length of exposure, the amount of exposure, the frequency of exposure, the toxicity of the volatile chemical and the individual sensitivity to the chemical.

COMMENT 14: Did you put in the sub-slab depressurizations system based on PCE or TCE?

RESPONSE 14: The primary contaminant of concern is PCE, and one of the breakdown products is TCE. When air samples are taken, they are analyzed for 50 to 60 compounds which include these site specific compounds. The sub-slab depressurization systems installed at and in the vicinity of the AVSC were all based on both PCE and TCE detections.

COMMENT 15: The alternatives put forth, or proposed, mention going off-site to do investigation of these homes. I also note that the worst case scenario involves testing in the winter months. You haven't selected a decision yet, and if you do at the end of the comment period, or shortly there after, you will lose a window to do this work until the next heating season.

RESPONSE 15: Soil vapor intrusion is more likely to occur when a building's heating system is in operation and doors and windows are closed. The heating season (generally November through March), therefore, is the optimal time to collect sub-slab and indoor air samples. Because contaminant levels found in off-site groundwater are very low, off-site soil vapor has not been an immediate concern. We expect to identify homes to sample in the next few months in order to evaluate the potential for soil vapor intrusion at off-site structures.

COMMENT 16: There are clean up objectives for groundwater and public drinking water standards. Are there standards for soil vapor and indoor air at residential, commercial and industrial sites? The vapor intrusion guidance is very complicated.

RESPONSE 16: New York State does not currently have any standards, criteria or guidance values for concentrations of compounds in soil vapor or sub-slab vapor. When evaluating indoor air data, the results are compared to background levels of volatile chemicals in indoor air, the NYSDOH guidelines for volatile chemicals in air, the NYSDOH's decision matrices and human health risks associated with exposure to the volatile chemical in air. The results of soil vapor, sub-slab vapor, indoor air and outdoor air samples are evaluated together taking into consideration several additional factors including nature and extent of contamination of all environmental media; factors that affect vapor migration and intrusion; completed or proposed remedial actions; source of contamination; background levels of volatile chemicals; relevant standards, criteria and guidance values and past, present and future site use.

COMMENT 17: So we have matrices with many variables? Are numbers calculated on a site specific basis? Is indoor air subject to a moving evolving standard?

RESPONSE 17: The decision matrices are generic risk management tools used to provide guidance on a case-by-case basis. Actions recommended in the matrices are based on the relationship between sub-slab vapor concentrations and corresponding indoor air concentrations. Actions provided in the matrices are specific to addressing both potential and current human exposures. Also see Response 13.

COMMENT 18: So if you find some micrograms per cubic meter of a certain compound in a house, you can't really say it is safe, it depends on how it fits into the whole modeling process?

RESPONSE 18: While there is information available that speaks to the potential health effects due to inhalation of specific chemical compounds, this information is generally based on acute or chronic exposure to elevated levels of a contaminant. Indoor air data alone is just a 'snapshot in time' of what is being detected in a building at the time of sampling. While toxicity values may be assigned to specific chemicals, often daily concentration of a chemical, exposure time, and sensitivity of individuals to an indoor air chemical is unknown. As noted above, numerous factors are taken into account when evaluating indoor air data and potential actions.

COMMENT 19: Indoor air is a lot more difficult than groundwater to understand, sample and characterize? For example, if you came to my house and collected a groundwater sample, and it was, say, 10 ppb of PCE, you can say this is bad. If you came back and it was below standards, you would say we found something above detection limits, but it is safe. But with the air models, with the matrices, it is a lot more complicated. If you did it outside the heating season, if the windows are closed, and your conditions are not right, you may have to come back later.

RESPONSE 19: Time of year, conditions in the building being sampled, occupancy of the building, and source of contamination are some of the factors that need to be taken into account when evaluating indoor air data and potential exposures. An evaluation of the results against these factors may indicate that followup sampling should be conducted during the heating season when windows remain shut and there is typically less indoor/outdoor air exchange.

COMMENT 20: Are you coming up with a time weighted average for vapor intrusion to see what someone might be exposed to?

RESPONSE 20: The Occupational Safety and Health Administration (OSHA) uses time-weighted average (TWA) in determining the allowable concentration of a substance to which most workers can be exposed without adverse effect averaged over a normal 8-hour workday or a 40-hour work week. TWA is not applicable in a residential or community-based setting.

COMMENT 21: Is my public water being affected by the contamination at this site?

RESPONSE 21: The public water system gets its water supply from multiple sources. The public water supply source closest to the site is the Titusville well field which is far from the site and is not impacted by site contaminants. Water supplied by the Titisville well field is tested regularly and meets all drinking water standards.

COMMENT 22: How is the flow going, is there a connection between the subject of discussion and the water I am getting?

RESPONSE 22: Your public water supply water is delivered through a system separate from the private supply wells. Generally, the pipes are above the watertable and are not as deep as the site-related contamination. Also, the public water supply system is under pressure, so if a pipe leaks, the water will exit the system - not enter. Under State law, public water supplies are regularly tested for many potential contaminants, including PCE and TCE.

COMMENT 23: Are Alternatives 1-4 as presented the only remedies that can be selected? Are there other options?

RESPONSE 23: The remedial alternatives are limited due to the presence of the buildings. Groundwater extraction and treatment is a common remedy for VOCs in groundwater once the source of that contamination is removed.

COMMENT 24: If we are concerned about the cost and potential dangers of the proposed remedy, why not consider bidding it out to save cost?

RESPONSE 24: Cost effectiveness was one of the factors considered when selecting the remedy, as noted in Section 7.2. If the State funds the remedy, the State would advertise for bids from contractors that do this type of work. It is assumed that a responsible party implementing the remedy would do the same.

COMMENT 25: Has there been any improvement in the groundwater from when we first started until now, based on recently sampling?

RESPONSE 25: No. The extraction wells were sampled in March 2006 to acquire baseline groundwater data before the extraction and treatment system went online. At that time, total VOC concentrations in the four extraction wells RW-1, RW-2, RW-3 and AV-2 were 446 ppb, 3,006 ppb, 711 ppb and 121 ppb respectively. The respective concentrations in the same extraction wells during the most recent sampling round in February 2008 were 1,432 ppb, 4,777 ppb, 771 ppb and 163 ppb.

COMMENT 26: How much contamination has been removed since the GW pump and treat system has started?

RESPONSE 26: Approximately 149 pounds or 11 gallons of VOCs were removed from the groundwater during the operation of the original extraction and treatment system which extracted from the former shopping center supply well AV-2. The approximation is based on an assumed constant concentration of 121 ppb as observed in AV-2 in March 2006 and a continuous pumping rate of 20 gallons per minute for more than 14 years. Based on the respective flow rates of 1.5, 0.7, 6.5 and 12.5 gallons per minute in extraction wells RW-1, RW-2, RW-3 and AV-2 stated in the groundwater OM&M plan and the respective total VOC concentrations of 621 ppb, 1770 ppb, 701 ppb and 18.9 ppb as observed on November 28, 2007, approximately 61 pounds or 4.5 gallons of VOCs were removed from February 2006 through February 2008.

COMMENT 27: Does the air stripper discharge directly to the atmosphere? Is a permit required?

RESPONSE 27: The air stripper discharges directly to the environment. The concentrations released to the environment are low, therefore a discharge permit is not required.

COMMENT 28: Comments 28 through 31 are from David Engel, Esq. attorney for James A. Klein, doing business as (d.b.a.) Apple Valley Corp. since December 1990.

We regard ourselves as important members of public. My client has spent many hundreds of thousands of dollars dealing with the site contamination which is not of his making. But, rather due to other PRPs, with whom we have undergone some litigations over the years.

The EPA consent order executed in September 1991 required my client to abate any threats to the public health and the environment particularly with respect with potential migration or mobilization of the contamination plume. Highest goal should be no harm, so any remedy should not increase chance of mobilizing contamination - this choice should be avoided. Alternative 3 would provide the best assurance of meeting the goal of providing no further risk to the public, public water, health or the environment.

Unlike DEC and DOH, my client has litigated this matter, went after the following parties: the Martinsons, the former owners of the laundromat; William J. Cook, who owned Apple Valley Dry Cleaners; Grand Union company; and the solvent delivery company, Morewhite

Mr. MacCabe made a reference to 160 gallon spill in Nov 85. Our records show it was about 60 gallons. The second spill associated with Morewhite was 10 gallons. We deposed everyone, went over rates of usage. There is no way to conclude that order of magnitude was 470 to 500 gallons.

RESPONSE 28: As defined in 6 NYCRR Part 375 and stated in Section 7.2 of this ROD and in all Records of Decision written by the Department as well as in EPA RODs, all remedies proposed and implemented by the Department must be evaluated using eight criteria. One criterion is reduction of toxicity, mobility or volume. Alternative 4 was selected because it is expected to reduce the volume and toxicity of the contamination much better that the other alternatives. Furthermore, the selected remedy will include continued operation of the current groundwater extraction and treatment system that has been, and is expected to continue to, contain groundwater contamination to the site and thereby prevent off-site migration of the contamination.

The Department has commenced actions to identify PRPs and take legal action where appropriate.. The amount of PCE estimated in the FS to have been present in the bedrock aquifer was a rough estimate based on more than 25 years of activities at the dry cleaner and laundromat that included poor storage, disposal and delivery methods as well as (at the time) ten years of the operation of two groundwater pump and treat systems with no reduction in contaminant concentrations.

The Department has revised its records to reflect that the November 1985 spill was 60 gallons, not 160 gallons.

COMMENT 29: We disagree with the State's conclusion that this site requires application of chemical oxidants to address a large quantity of DNAPL in the bedrock aquifer. We believe this selection is without foundation. And it will cost a lot of money. It assumes an effectiveness that is belied by the analysis in the FS.

RESPONSE 29: Historic data and the data associated with the current groundwater extraction and treatment system show no decrease in contaminant concentrations in groundwater. Essentially, the groundwater extraction and treatment system is operating as a containment system and is not reducing the toxicity of the groundwater contamination. Nor is it reducing the volume of the DNAPL source in any reasonable time frame. A decision to implement chemical oxidation or another measure to remove contamination will be based on an assessment of geologic conditions, and if warranted, a pilot test. Chemical oxidation would destroy much of the site contaminants in place and thereby reduce the threat of off-site exposure and reduce the operation period of the groundwater extraction and treatment system.

COMMENT 30: We urge the Department to reconsider and work with us, look at with the evidence, and see what this site requires. We think we have obtained hydraulic capture and mitigated any potential impacts to public health and the environment.

This is a Class 2 site. Class 2 represent a threat to public health and environment. This is the same classification put on this site 18 years ago when the problem came to light. Eighteen years ago there was contaminated groundwater in wells in the subdivision and contamination in the drinking water in the shopping center. There were no recovery wells and no vapor control system. There was no question that there was a clear danger to public health and the environment. Now after expenditure of hundreds of thousands of dollars, there are recovery wells and treatment systems in place. It is simply incorrect to say that this current situation is undifferentiated from the situation of 18 years ago. The site is not now a threat to the public health and the environment, and the department should recognize that and endorse the current treatment system, the remedy in place, as final remedies for this site. My client has been under a consent order with the USEPA for 17 years. Jim Klein d.b.a. Apple Valley Corp. is committed to maintain what is needed to protect public health and the environment and to fully address this site. No one is looking to walk away from it. We have serious issues with the costs associated with, and effectiveness of, strategies advocated by the Department. They are speculative and costly.

RESPONSE 30: This site is appropriately classified as a Class 2 site due to the highly elevated concentrations of volatile organic compounds in the groundwater and the soil vapor that continue to pose a threat to public health and the environment. Beyond the improved groundwater extraction system and the mitigation of off-site impacts, there is little difference in site conditions from 18 years ago. If the extraction system is shut down or if it should fail, off-site conditions would ultimately return to those first observed in 1990.

The applicable regulation, 6 NYCRR Part 375, provides the basis for the Department's determination of significant threat. Subpart 375-2.7, "Significant threat and Registry determinations," defines the criteria regarding site conditions and the site's environmental and human health impacts that are considered when determining if a site presents significant threat.

Among other criteria, Sections 375-2.7(a)(1)(v) and 375-2.7(a)(2) and 2.7(a)(3) apply to this discussion of significant threat determination. Section 375-2.7(a)(1)(v) states that a significant threat is present if the contaminants disposed at the site or coming from the site result in, or are reasonably foreseeable to result in . . . a significant adverse impact to public health, where the site is near residences, recreational facilities, public buildings or property, school facilities, places of work or worship, or other areas where individuals or water supplies may be present, and the New York State Department of Health has determined that the presence of contaminants on such site pose a significantly increased risk to the public health.

Sections 375-2.7(a)(2) and 2.7(a)(3) state that the Commissioner may also find that contaminants disposed at a site constitute a significant threat to the environment if, after reviewing the available evidence and considering the factors the Commissioner deems relevant set forth in this subdivision, the

Commissioner determines the contaminants disposed at the site or coming from the site result in, or are reasonably foreseeable to result in, significant environmental damage.

These two sections apply to this site for factors including, but not limited to the following: on-site groundwater contamination remains significantly above groundwater quality standards, resulting in the potential for further impacts to down gradient residential wells and the subsequent threat to residents; and due to the potential for further impacts to indoor air in the shopping center and the subsequent threat to occupants.

When the Department first began on-site RI activities in 2001, both of the air strippers were inspected. The on-site stripper that served AV-2 was clogged due to mineral deposits, it was leaking, and was barely functioning as a stripper. The off-site stripper that was operating to treat potable water for the two most impacted residences was not operating at all and water was just flowing over the top of the stripper.

The remedy selected is appropriate for the reasons set forth in Section 8 of this ROD.

COMMENT 31: I believe there is still one off-site stripper - treating 2 houses.

RESPONSE 31: See Response 30. That stripper was decommissioned by the Department in 2001 because it had not been maintained and wasn't working. The two residences are now on individual carbon filters.

COMMENT 32: There are still contaminated wells in my subdivision - 20 years later. We need a proactive approach to treat the problem, not the symptom of the problem. You haven't removed the problem. The contamination is still there 20 years later. The problem still exists. It hasn't gone away in more than 20 years. So, 20 years from today will there still be a problem that has to be treated?

RESPONSE 32: Comment noted. The selected remedy is intended to facilitate the destruction of the source areas and meet the State's requirements for remediation of hazardous wastes .

COMMENT 33: The off-site soil vapor investigation shouldn't be tethered only to Alternative 4. It should also be included in Alternative 3.

RESPONSE 33: Agreed. The ROD has been revised.

Chandru Malkani submitted an email (dated March 28, 2008) which included the following comments 34 through 36:

COMMENT 34: I believe DEC, NY should follow the last option, viz., chemical oxidation of PCE, in the groundwater. I do not share the view of the lawyer (Mr. Engel) present who claimed it would be hazardous. There are, as technical people know, chemicals available for oxidation that pose no threat.

Was this lawyer qualified to make the statement?

RESPONSE 34: Comment noted.

COMMENT 35: An important point that was missed by most at the (public) meeting was, how many gallons of PCE entered the groundwater / aquifer? There are no records because RCRA did not exist at the time; besides, a small dry cleaning operation could have been RCRA-exempt. Further, the amount of PCE that supposedly entered the groundwater is the difference between the records of the dry cleaner and the delivery company. Does anyone know what happened to the spent PCE? What prevented the dry cleaner from dumping the spent PCE in the backyard adding to the spillage on record?

RESPONSE 35: The Departments experiences have found that, generally speaking, undocumented spills, improper storage, application and disposal methods conducted over years of operation have often resulted in significant contamination to soil and groundwater, and subsequently soil vapor, at many dry-cleaning facilities. This is what the Department believes to have occurred at the Apple Valley Dry Cleaner and the laundromat.

COMMENT 36: In view of so many unknowns, it would be prudent of (the Department) to follow the option of oxidation, (namely) to protect the health of residents at potential risk, and to offset potential long term law suits.

RESPONSE 36: Comment noted

Mark Millspaugh of Sterling Environmental Engineering, P.C. submitted a letter (dated March 28, 2008) which included the comments 37 through 40:

COMMENT 37: The characterization of source areas in the FS is inaccurate. Figures 4-1 and 4-2 of the FS depict the assumed limits of DNAPL, impact at the Site. However, there is no evidence to support this assumption. The May 1993 soil gas survey established that the area of greatest impact is behind the building where Morwhite's vehicle parked during deliveries to the AVDC. Significantly this area is not even included within the assumed limits of DNAPL impact.

Source area characteristics and limits were accurately defined in the RM Work Plan, which was approved by the NYSDEC in October 2004 and attached to the Consent Order as Exhibit B. During the course of site investigations, several sources of the contaminants were identified. The principal source area is located approximately 15 to 20 feet south of the former Apple Valley Dry Cleaners (AVDC). This area was originally identified as a "hot spot" during the soil gas surveys conducted at the site. This "hot spot" was the location at which releases of PCE occurred in association with deliveries of solvent by Morwhite, Inc. of Albany, NY to the AVDC. Morwhite's deliveries were made using a hose and nozzle system. While other sources have been identified at the Site, it is clear that this "'hot spot" constitutes the primary source area at the Site. Morwhite delivery records indicate that a release of approximately 60 gallons occurred on November 27, 1985 in association with a delivery to the AVDC.

A witnessed release of PCE occurred on June 2, 1992, during a delivery to AVDC. Morwhite delivery records indicate that this release was approximately 9.5 gallons. Sampling of a bedrock monitoring well (MW-RCI) installed at the "hotspot" during the January 1997 reclassification investigation revealed concentrations of PCE at 23 mg/l (23,000 ppb).

The former AVDC facility operated as a commercial dry cleaning facility from 1968 to 1993. PCE was stored at the AVDC facility in a 55-gallon drum maintained by Morwhite until 1993. In February 1991, William Cooke, the owner of the AVDC, reported that he moved the drum for the first time in approximately 14 years. Upon lifting the drum, he observed a quantity of PCE under the drum. The exterior of the storage drum was visibly corroded and rusted and had several pinholes in the bottom. The delivery of PCE to such a defective container was contrary to the standard of care set forth in guidance documents provided to Morwhite by its suppliers, such as Dow Chemical. Testing of soil and soil gas from beneath the floor where the drum stood indicated that PCE released from the drum had entered the soils beneath the floor. The former Norgetown Laundromat (NL) contained a single dry cleaning machine. Within the NL, dry cleaning fluid was stored in a 55-gallon drum which was located on an unpaved floor in a rear closet. Morwhite also supplied PCE to Norgetown. Soil sampling established the presence of PCE in the soils of the unpaved floor within the NL. Spills during delivery at the location of the truck were suggested by the 1993 soil gas survey in the parking lot to the rear of NL. The estimate of PCE spills and estimate of DNAPL at the site as presented in the FS are inaccurate and unreliable.

The FS assumes that 540 gallons of PCE are present in bedrock fractures in the form of dense non-aqueous phase liquid (DNAPL). This volume of PCE is unsupported by the known facts and direct subsurface observations at and in the vicinity of the source area. These estimates are used in the FS and PRAP to justify supplementing the pump and treat remediation system with In-Situ Chemical Oxidation (ISCO); and they are used as the basis for scoping and designing the ISCO treatment process. While the NYSDEC has accepted the characterization of the source area by its approval of the IRM Work Plan, the NYSDEC has not attempted to actually calculate the amount of PCE originally spilled, nor has the NYSDEC attempted to estimate the amount of PCE and other Contaminants of Concern (COCs) recovered by the groundwater remediation system since 1992.

The record and testimony indicate that two PCE spills totaling 70 gallons occurred in November 1985 and June 1992, respectively, behind the former Apple Valley Dry Cleaner (now Pizza Pete's). When the actual amount of spilled PCE is considered (70 gallons), it is difficult to understand why the NYSDEC would commit hundreds of thousands of dollars to ISCO when the existing pump and treat system has been demonstrated to achieve both plume control and gradual removal of dissolved COCs.

Because neither the presence of DNAPL nor its location within the source area have been confirmed, further subsurface characterization would be required before designing or attempting ISCO. Such a source characterization boring/testing program for purposes of remedial design would entail completion of additional bedrock cores, packer tests, laboratory analyses, borehole geophysics, and other tasks. We estimate that this additional assessment work would cost no less than $150,000. These costs are not addressed in the PRAP. Even after such study is undertaken there will remain a significant risk that the study is inconclusive regarding the existence and location of DNAPL.

RESPONSE 37: The DNAPL source areas are approximated based on voluminous groundwater, soil gas and indoor air data collected over many years. The highest groundwater contaminant concentrations are in these two locations. Recent soil vapor and indoor air investigations show the greatest impacts at the former location of the dry cleaner. The Department does not dispute the occurrence of the Morwhite spills. These spills, and any undocumented Morwhite-related spills, would have occurred immediately behind or within the dry cleaner and the laundromat.

Due to the nature of vapors/gasses to naturally seek the path of least resistance when migrating, the presence of soil gas contamination in a specific area does not automatically identify it as a source area. When vapor contamination is present under a building or pavement, the highest vapor contamination is often observed beyond these structures. The Department and experienced environmental professionals use soil gas surveys as a screening tool to identify the presence of chemical contamination and, at best, approximate the source of contamination. The soil vapor investigations conducted in the 1990s do not identify an exact source area and certainly do not identify the only areas of contamination. Department experience has shown that dry cleaning facilities often used improper delivery, storage, distribution and disposal of PCE and PCE impacted wastes. Over the long-term operation of these facilities, these contaminants can accumulate in the sub-surface. Also, one would assume that the spills that occurred during deliveries would have been where the nozzle was placed in the PCE storage drums within the facilities. As documented in earlier reports and stated in the Sterling March 28, 2008 letter, for 14 years, the dry cleaner had stored PCE in a drum that was observed to be corroded with many small holes in the bottom. If the holes had been in the drum for many years and PCE had slowly leaked into the soil over a long period, the total volume of PCE seeping into soil may have been substantial.

When Earth Tech prepared the FS on behalf of the Department in 2003, the estimate of PCE present in the source areas was a rough approximation based on available data and assumptions. The Department has not stated this estimate as fact. The data do, however, support the conclusion that a large quantity of PCE is present at high concentrations in the source areas.

The Department plans for the implementation of a remedial design program to provide the information necessary for the construction, operation, maintenance, and monitoring of the chemical oxidation remedial program, if implemented.

COMMENT 38: Neither the FS nor the PRAP show that ISCO is feasible at this Site. Information derived from soil and bedrock borings and packer tests in the identified source area completed at AVSC is insufficient to design an ISCO treatment program. No DNAPL has been encountered in bedrock boreholes during packer tests or in bedrock cores in suspected source areas at AVSC. The success of ISCO depends entirely on the degree to which the oxidant can be delivered to the target contaminants. Injection of oxidant without first verifying the presence of DNAPL is certain to fail. As stated in the FS (p. 2-6):

> *System effectiveness is dependent on how well the permanganate can be dispersed and*

> *contacted with the contamination.*

The FS (p. 4-20) further acknowledges that:

> *There is insufficient data to clearly define the nature and extent of residual DNAPL in these source areas. More investigation points would be needed to confirm the presence of DNAPL and the extent of it.*

The FS indicated that oxidant injection wells in the bedrock treatment zone must be fractured in order to create the fracture interconnectivity required for ISCO. The FS (p. 3-6) states:

> *The fractured bedrock at the AVSC site poses some uncertainties for successful implementation of these in situ technologies. The lack of fracture interconnectivity is the major limiting factor affecting the success of in situ technologies at the AVSC site. ...Dispersion of chemical reagents in the impacted source area may be difficult due to the very low transmissivity and potential lack of connectivity of the flow paths. To overcome these difficulties enhanced fracturing is recommended to increase the migration and dispersion of the injected chemical reagents.* ***Therefore, fracture enhancement is considered as a prerequisite for in situ treatment*** (emphasis added).

Although the FS states that fracturing the DNAPL source area is a prerequisite for ISCO, the PRAP does not mention bedrock fracturing, and the NYSDEC now indicates that bedrock fracturing is not considered part of the scope of work for ISCO at this site. The estimated costs for bedrock fracturing have been deleted from the cost analysis of the ISCO alternative. However without bedrock fracturing the FS asserts that the proposed remedy will not work. The PRAP provides no justification to eliminating bedrock fracturing from the remedy. It is acknowledged in the FS that fracture density and interconnectivity are insufficient for injected oxidants to make contact with DNAPL, and, therefore, pneumatic fracturing of the injection zone is a prerequisite to ISCO and is specifically included as part of Alternative 5 in the FS (Alternative 4 in the PRAP).

Given that fracture density and lack of interconnectivity represent serious limitations to the effectiveness of in-situ treatment technologies, the effectiveness of chemical oxidation is likely to be minimal. The PRAP assumes that the additional costs and risks associated with ISCO are offset by the reduction in time and costs for groundwater remediation, but this assumption is only valid if chemical oxidation effectively eliminates a large amount of VOC's in the source zone.

ISCO is generally recognized as an ineffective remedy in low-permeability formations because of the difficulty of putting the injected oxidants into contact with contaminants. Fractured bedrock settings, such as AVSC, where fracture interconnectivity is problematic, are particularly unsuited to in-situ treatment approaches. The FS indicates that fracture density and interconnectivity is insufficient for ISCO to work. The FS states:

> *If the fractured media is not homogeneous enough to allow the oxidation fluids to reach*

> *all fractures containing DNAPL, then DNAPL could remain as a continuous source of contamination to groundwater. If a source of groundwater contamination remained, the current pump and treatment system would need to be operated for longer then the estimated 5 years.*

NYSDEC, however, does not include bedrock fracturing in the selected alternative, which would make it impossible to deliver the oxidant to the DNAPL.

Problems associated with ISCO ineffectiveness in fracturing bedrock settings are summarized in Fractured Rock: State of the Science and Measuring Success in Remedation; N.E. Kinener, Bedrock Bioremediation Center, University of New Hampshire; R.W. Masters, National Groundwater Association; L.B. Fournier, STAR Environmental, Inc.; September 2005:

> *Some of the most daunting challenges clearly are delivery and distribution of injected materials and/or recovery of contaminants in microfractures, low flow zones and rock matrices. While these delivery/recovery problems are not unique to fractured rock, they are often more difficult to overcome in this complex medium. It is too soon to determine if the promising technologies of ISCO and/or bioremediation will prove successful on the large scale in some of the more difficult/complex fractured rock environments where contaminants are bembedded in the rock matrix and in low flow zones.*
>
> *and,*
>
> *Pump and treat/hydraulic containment, in spite of the long-term commitment to O&M, may offer in some cases a better (more protective and cost effective) option than more experimental remedial technologies that have high uncertainty.*
>
> *and,*
>
> *In situ chemical oxidation (ISCO) especially with permanganate, is being tested most widely almost exclusively for the chlorinated solvents PCE and TCE. In most of these cases, ISCO has proven somewhat successful at the pilot scale and various larger scale test are being tried. Difficulties remain with the introduction and distribution of the oxidant in fractured rock and the extent of its long-term effectiveness in microfractures or with material residing in the rock matrix.*

RESPONSE 38: The FS provided an analysis of remedial alternatives that best apply to this site. In-situ chemical oxidation has been applied successfully at many VOC impacted sites in New York State as well as nationally. The Department agrees that bedrock fracturing would facilitate contact of the chemical oxidants with the DNAPL during the injection process. The Department intends to implement a remedy with no detrimental impacts to existing on-site structures. Alternative 4 has been revised from the PRAP to include an assessment of sub-surface conditions to determine the best approach to enhance the existing groundwater treatment system. Enhancement methods to be considered will include bedrock fracturing, additional extraction wells and/or screening existing wells and/or implementation or an ISCO program. If the remedy design finds that bedrock fracturing can be conducted without negative impacts to the buildings, it may be reintroduced as a function of the ISCO remedy.

COMMENT 39: Risks associated with ISCO are ignored in the PRAP. The uncertainties and risks associated with bedrock fracturing are not clearly or adequately discussed in the FS. Chief among these is the inability to control the direction and degree of fracturing that will occur. Alternative 5 of the FS, fracturing of the bedrock could result in uncontrolled remobilization of contamination, which might potentially expand the impacted area.

Drilling through suspected DNAPL source areas is risky. Boreholes completed for purposes of source zone assessment or for ISCO treatment are likely to create vertical pathways for downward migration of DNAPL. The installation of chemical oxidation injection wells will potentially expand the zone of contamination and make remediation more difficult and costly. Further, migration of DNAPL along borehole pathways potentially leads to misinformation about source zone characteristics and actual distribution of DNAPL.

Hydraulic fracturing (hydrofracking) is generally limited to widening existing fractures, and only within a very limited distance from the borehole. Explosive fracturing may create new fractures, but such fractures are unlikely to extend far from the borehole and are unlikely to result in the degree of fracturing and interconnectivity required for effective ISCO. The FS seems to favor pneumatic fracturing methods, but provides no specific basis for opinion.

Injection of potassium permanganate, or any oxidant, into a zone containing chlorinated solvents, produces carbon dioxide, which can entrain and carry vapors, which could worsen the vapor intrusion situation if the SVE system is not able to capture all of the vapors. Other byproducts of chemical oxidation are manganese dioxide, which can plug the bedrock openings needed for groundwater movement.

The Material Safety Data Sheets (MSDS) report that the specific chemicals proposed are strong oxidizers and are classified as "Dangerous". The FS states there is the possibility that injected reagent may ooze out of the ground. This may be a threat to utilities and building structures in the vicinity. Significant health and safety concerns are associated with applying oxidants (source USEPA). Fenton's Reagant can produce a significant quantity of explosive off-gas (source USEPA). Consequently, the USEPA requires that such chemical treatment injections obtain a permit, as set forth in its Underground Injection Control program. It is not certain that USEPA would issue a permit if there were potential for uncontrolled release of chemicals.

Fracturing of the bedrock to create interconnectivity may simply create more fractures for DNAPL to enter and adhere, which could ultimately render more DNAPL unrecoverable.

RESPONSE 39: The Sterling letter overstates any potential hazards associated with chemical oxidants and the injection thereof. All activities related to the chemical oxidation remedy will be done in moderation. If done, bedrock fracturing will be limited to the immediate source areas. Chemical oxidation injection, if implemented, will not be conducted with massive volumes introduced to the point that it will create excessive heat or oozing of oxidant out of the subsurface.

The ISCO injection points will be no deeper than the existing groundwater extraction wells. The depth of the chemical oxidation injections will be based on the zones of greatest contamination. In the source area at the former location of the dry cleaner, the greatest contamination was found at 40 and 75 below grade. Therefore, the deepest injection well will likely be 75 feet below grade.

Pneumatic fracturing methods are preferred in the FS over hydraulic methods to prevent forcing groundwater contamination beyond the influence of the extraction wells and to not cause a temporary decrease in groundwater contamination due to dilution caused by the introduction of large volumes of additional water.

The groundwater containment system will remain on-line throughout the entire process and long after to prevent off-site impacts.

Oxidizers oxidize. Therefore, they are dangerous to human health when inhaled or ingested or when one experiences dermal contact with the chemical. The handling and injection of the chemical oxidant will be conducted by a qualified contractor and will be overseen by the Department and a qualified environmental consulting firm. The Department has not considered using Fenton's Reagant at this site.

The USEPA regularly issues permits for the injection of chemical oxidants as a proven remedy for VOC contamination in soil and groundwater.

COMMENT 40: ISCO is unnecessary at this Site, and the existing pump and treat IRM is effective. The FS concludes that the current Hydraulic Containment remedy (FS Alternative 4) would be effective: "The potential migration of contaminants to sensitive downgradient receptors would be controlled/prevented by hydraulic containment, which is a reliable technology when properly maintained."

The PRAP is based upon a FS that is more than five (5) years old. It fails to recognize the effectiveness of the current IRM and the elimination of the significant threat to the environment and public health.

The PRAP fails to recognize that vapors have been fully mitigated as evidenced by the most recent subslab and indoor air monitoring. Comparison of soil vapor and indoor air measurements with NYSDOH guidance criteria indicate that no further vapor mitigation action is required, with the exception of ongoing monitoring, at any of the locations sampled.

It follows that the concept for ISCO treatment is not valid because: 1) The current groundwater extraction/treatment remedy is effective; and 2) There are risks associated with attempting an ISCO remedy; 3) The absence of adequate bedrock fractures would make ISCO infeasible; and 4) The presence of DNAPL has not been confirmed at this site.

Alternative 4 of the PRAP is justified by the NYSDEC on the unfounded possibility that DNAPLs are present. Bedrock cores examined during the installation of new recovery wells in 2005 showed no evidence of DNAPL. The FS erroneously assumes that 540 gallons of DNAPL may exist in the subsurface (see Page 4-20). This is without basis in fact or supposition based on Site history. As discussed, documentation of the release of approximately 70 gallons of solvent occurred at the site. The other two major sources of solvent combined would not equal half of that based on the results of the May 1993 soil gas survey. This suggests that an upper limit of approximately 100 gallons is a reasonable estimate of the total amount of solvent released on-Site. Significant reductions in that volume undoubtedly occurred during transport through the subsurface, including losses to soil gas, adsorption to soil particles and other retardation factors. Accordingly, it is reasonable to conclude that any DNAPL existing at the Site would be in an amount substantially less than 100 gallons. Further, any DNAPL that may reside at the Site would likely be resident within bedrock fractures and microfractures. This conclusion is supported by the fact that no DNAPL has ever been encountered during any site investigation activities.

As stated in the PRAP, "*Site history since 1990 shows that on-site groundwater contamination remains elevated after more than 16 years with no significant change in site conditions*". This assertion is demonstrably false. A groundwater extraction and treatment system has been in operation since 1992. That system achieved hydraulic control of the dissolved solvent plume and continuously removed contaminants of concern (COC) from groundwater in the extraction zone. In 2005, this system was upgraded and expanded to include groundwater extraction from directly within the PCE source area. Based upon system flow rates and measured concentrations of contaminants, we estimate that approximately 4.5 gallons of COCS were removed from groundwater via the pump and treat system between September 2001 and November 2005. Approximately 6.6 gallons of COCs were removed between February 2006 and February 2008.

Based on the volume of oxidizing chemical solution to be injected, substantial upgrade will be needed to treat unreacted chemical oxidation pumped from the ground. None of the capital or operational costs for treatment upgrades are included in the FS cost estimates.

Furthermore, the use of oxidizing agents will mobilize COCs and by-products of the oxidation reaction. As such, long-term pumping and treating of groundwater will be needed. The treatment system will need to remove COCs and ISCO byproducts. Because long-term pumping and treating will be necessary as part of an ISCO remedy, Alternative 5 will not achieve a significant reduction in the time required for groundwater extraction.

The recovery system and air stripper were substantially upgraded in 2005. The PRAP states that, "The current hydraulic containment, pumping and treatment system would continue to operate and be maintained to protect down gradient receptors..." The submersible pumps and controls of the current pump and treat system are not rated for use with strong chemical oxidizers. These chemicals will likely damage the existing groundwater recovery and treatment system components. If ISCO is attempted, the groundwater recovery and treatment system will require significant re-engineering or replacement so that it can handle unreacted oxidants.

The assumption that groundwater recovery will be shut down after five (5) years is unfounded.

Additionally, the cost of chemical oxidation is out of scale with any environmental or public health benefit especially given that the presence of DNAPLs has not been established. Note also that the estimated costs in the FS (in 2003 dollars) were not updated in the PRAP to account for inflation. Further certain necessary costs as described previously, were omitted. In reality ISCO is a much more expensive remedy than presented in the PRAP. The FS from five (5) years ago was reportedly updated for certain costs. The PRAP omitted the costs for certain services for no apparent reason when the actual trend is for prices to increase from year to year for labor, fuel, and services. Some examples of costs that were decreased include: pilot test; bedrock vapor extraction system installation; groundwater monitoring for first year; field sampling; sampling equipment, shipping, consumable supplies and sample analysis. Overall, the price was decreased $349,000 from 2003 to 2008. No explanation of this cost reduction is provided.

RESPONSE 40 As stated in Response 29 and further described in Response 30, historic data and the data associated with the current groundwater extraction and treatment system and show no decrease in contaminant concentrations in groundwater. For that factor alone, the Apple Valley Shopping Center site continues to pose a significant threat. Essentially, the groundwater extraction and treatment system is operating as a containment system and is not reducing the toxicity of the groundwater contamination, nor is it reducing the volume of the DNAPL source in any reasonable time frame.

The Department agrees, based on the most recent indoor air sampling at the shopping center, impacts from site contaminants to indoor air are presently mitigated. However, that mitigation is dependant on the continuous and long-term operation of the sub-slab depressurization systems. Also, due to the continued presence of VOC vapors in the subsurface near and beneath the shopping center, the threat to indoor air, and subsequently occupants of the shopping center, remains. Therefore, indoor air and sub-slab vapor is subject to additional monitoring and, if necessary, installation of additional sub-slab depressurization systems as per the New York State Department of Health October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York.

While the groundwater extraction and treatment system IRM has been containing the contamination to the site and the sub-slab depressurization systems (SSDSs) have mitigated indoor air impacts, the site remains a significant threat to public health and the environment, and is appropriately classified as a Class 2 site due to of the highly elevated concentrations of volatile organic compounds in the groundwater and the soil vapor, as previously stated.

The data presented in Table 1A of this ROD show that there has been no decrease in total VOCs in the source-areas extraction wells since the extraction and treatment system went online in March 2006. The SSDSs are subject to annual monitoring because sub-slab and indoor air conditions may change and additional mitigation measures may be necessary.

Additionally, as stated in Section 7.2 of this ROD and in all Department and EPA records of decision, one of the remedy evaluation criterion is reduction of the toxicity, mobility or volume of the contamination. The contamination mobility is presently limited by the existing energy-intensive IRMs but the volume of PCE contamination remains high and subsequently the contaminant toxicity has not diminished.

For the reasons stated above, a reassessment of subsurface conditions with possible enhancement of the existing groundwater extraction and treatment system has been deemed necessary by the Department. Along with the other possible enhancement methods discussed in this ROD, ISCO will still be considered as an enhancement to facilitate remediation of the site. Design of an ISCO alternative will include a bedrock fracture analysis. If the enhancement includes ISCO, the assessment, design and pilot study will address any need for expansion or retrofitting of the groundwater extraction and treatment system.

While DNAPL has not yet been encountered, the documented spills total 70 gallons, and as noted in response 37, improper disposal and storage may have contributed much more PCE contamination to the sub-surface. The presence of DNAPL or the lack thereof was not a driving force in the remedy selection. The presence of elevated concentrations of VOCs in the two source areas and the lack of any discernible reduction in those concentration illustrates the presence of sources of significant contamination that continue to impact groundwater and soil vapor. It also illustrates the need for a remedy that will facilitate the remediation of the site.

The selection of a remedy enhancement will be based on a detailed assessment of site conditions, including an evaluation of the bedrock structure, and a subsequent evaluation of enhancement alternatives. Also, compatibility with and impacts to the existing groundwater system will be considered and evaluated during the pilot study of the enhancement methods considered. The existing system will be modified as needed.

As stated in Response 30, when the Department first began on-site RI activities in 2001, both of the air strippers were inspected. The on-site stripper that served AV-2 was clogged due to mineral deposits, it was leaking, and was barely functioning as a stripper. The off-site stripper that was operating to treat potable water for the two most impacted residences was not operating at all and water was just flowing over the top of the stripper.

While the partial historical record documents 70 gallons of dry cleaning solvent spilled at the site, the data indicate that the estimate of 540 gallons in the subsurface may be conservative due to an incomplete site spill record and historical dry cleaning operations prior to 1985 that indicate a high probability of improper delivery, storage, handling and disposal methods that would have contributed to an accumulation of a large volume of the dry cleaning solvent in the subsurface.

The statement from Section 8 of the ROD that states, "Site history since 1990 shows that on-site groundwater contamination remains elevated after more than 16 years with no significant change in site conditions," is supported by the site data. The data are summarized in Table 1A in this ROD.

The Department agrees that it is unlikely that the groundwater recover system will be shut down 5 years after the existing remedy is enhanced. Alternative 4 has been revised accordingly.

The cost estimate range for Alternative 4 has been revised to incorporate capital and operational costs for the system enhancement, including possible treatment upgrades to the existing pump and treat system. The Department expects that the groundwater extraction and treatment system will continue to serve as a containment system during and after implementation of any system enhancement. Chemical oxidation or any other enhancement of the existing system is intended to reduce the volume and toxicity of the on-site contamination and reduce the operation time of the groundwater containment system.

Part of the reason for the difference in costs from the 2003 FS is the construction of seven monitoring wells proposed in the FS. Equivalent wells have since been constructed and therefore the approximately $166,000 cost is not included in this ROD. Also, fewer wells will be subject to periodic monitoring. Bedrock fracturing is not included in this ROD. Implementation of bedrock fracturing, if the remedial design finds it is feasible and will facilitate the chemical oxidation, will add approximately $60,000 to the costs of the remedy. Cost estimation for PRAPs and RODs is subject to many variables such as the costs of labor and materials, the length of time to complete a remedy and potential changes in the scope of work during the design stage or during implementation of the remedy. Also, as stated in Section 5.2.3.7 of TAGM 4030, Selection of Remedial Action at Inactive Hazardous Waste Sites, 'typically, the "study estimate" costs made during the FS are expected to provide an accuracy of +50 percent to -30 percent and are prepared using data available from the RI. Additionally, Section 3 of USEPA Publication # 9200.3-23FS, The Role of Cost in the Superfund Remedy Selection Process, states "Cost estimates at the detailed analysis stage should capture all remedial costs and, whenever possible, should provide an accuracy of +50 percent to -30 percent." The cost estimates in this ROD are within that range.

APPENDIX B

Administrative Record

Administrative Record
Apple Valley Shopping Center
Site No. 314084

1. Order on Consent, Index No. II-CERCLA-10224, between the United States Environmental Protection Agency and James A. Klein., executed on September 7, 1992.

2. Proposed Remedial Action Plan for the Apple Valley Shopping Center site, dated February 2008, prepared by the Department.

3. "Data Gap Investigation Report, Apple Valley Shopping Center, Site 3-14-084" February 3, 2000, prepared by Earth Tech.

4. "Remedial Investigation / Feasibility Study, RI Report, Apple Valley Shopping Center, Site 3-14-084" February 2003, prepared by Earth Tech of New York.

5. "Feasibility Study Report, Apple Valley Shopping Center, Site 3-14-084" January 2003, prepared by Earth Tech of New York.

6. Order on Consent, Index No. A4-0499-1003, between the Department and Apple Valley Corp., executed on November 5, 2004.

7. "Apple Valley Shopping Center Interim Remedial Measures Work Plan" July 2, 2004, prepared by Sterling Environmental Engineering, P.C.

8. Draft "Interim Remedial Report, Apple Valley Shopping Center" December 27, 2006, prepared by Conrad Geoscience Corp.

9. "Operation, Maintenance & Monitoring Plan for Groundwater Remediation, Apple Valley Shopping Center" February 6, 2008, prepared by Conrad Geoscience Corp.

10. Draft "Operation, Maintenance & Monitoring Plan for Vapor Intrusion Mitigation, Apple Valley Shopping Center" November 15, 2007, prepared by Conrad Geoscience Corp.

11. February 27, 2008 fact sheet.

12. Letter dated March 28, 2008 from Mark Millspaugh of Sterling Environmental Engineering, P.C.

13. Email dated March 28, 2008 from Chandru Malkani.