Five-Year Review Report

Town of Vestal
Third Five-Year Review Report

for

Vestal Water Supply Well 1-1 Superfund Site

Broome County, New York

September 2008

PREPARED BY:

U.S. Environmental Protection Agency
Region II
New York, New York

Five-Year Review Report

Table of Contents

List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminant of Concern
DCE	Dichloroethene
EPA	United States Environmental Protection Agency
FS	Feasibility Study
GAC	Granular Activated Carbon
gpm	Gallons Per Minute
LTRA	Long-Term Response Action
MCLs	Maximum Contaminant Levels
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
O&M	Operation and Maintenance
OU	Operable Unit
PCE	Tetrachloroethene
PID	Photoionization Detector
ppb	Parts Per Billion
ppm	Parts Per Million
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SVE	In-Situ Vacuum Extraction
TCA	1,1,1-Trichloroethane
TCE	Trichloroethene
UAO	Unilateral Administrative Order
ug/kg	Micrograms Per Kilogram

ug/l	Micrograms Per Liter
ug/m3	Micrograms Per Cubic Meter
USACE	United States Army Corps of Engineers
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

This is the third five-year review for the Vestal Water Supply Well 1-1 Superfund Site (Site) located in the Town of Vestal, New York. The remedies for the Site include treatment of contaminated groundwater via air stripping, and the treatment of contaminated soil via in-situ vacuum extraction in two distinct areas, i.e., Areas 2 and 4, both located in the Stage Road Industrial Park. Because the remedial action for groundwater requires more than five years to completion, this five-year review is being conducted as a matter of EPA policy. The triggering action for this policy review was the completion of the second five-year review for the Site on September 30, 2003.

The community is serviced by a public water purveyor that meets appropriate Federal and State drinking water standards and exposure to contaminated drinking water has been interrupted. The results of this five-year review find that the immediate threats from the Site have been addressed, the remedies are protective, and the groundwater cleanup goals are expected to be achieved through continued treatment of contaminated groundwater and natural processes.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Vestal Water Supply Well 1-1		
EPA ID *(from WasteLAN)*: NYD980763767		
Region: 2	**State:** NY	**City/County:** Town of Vestal, Broome County

SITE STATUS	
NPL status: ■ Final ☐ Deleted ☐ Other (specify)	
Remediation status (choose all that apply): ☐ Under Construction ■ Operating ■ Complete	
Multiple OUs?* ■ YES ☐ NO	**Construction completion date:** 9/11/2003
Has site been put into reuse? OU1 – N/A. OU2 – Yes.	

REVIEW STATUS	
Lead agency: ■ EPA ☐ State ☐ Tribe ☐ Other Federal Agency _____	
Author name: Sharon Trocher	
Author title: Remedial Project Manager	**Author affiliation:** EPA
Review period: 9/1/2003 to 8/31/2008	
Date(s) of site inspection: 5/5/2008	
Type of review: ■ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion ☐ Statutory	
Review number: ☐ 1 (first) ☐ 2 (second) ■ 3 (third) ☐ Other (specify) _____	
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#____ ☐ Construction Completion ■ Previous Five-Year Review Report ☐ Other (specify)	
Triggering action date *(from WasteLAN)*: 9/30/2003	
Due date (five years after triggering action date): 9/30/2008	
Does the report include recommendation(s) and follow-up action(s)? ☐ yes ■ no	
Is human exposure under control? ■ yes ☐ no	
Is contaminated groundwater under control? ■ yes ☐ no ☐ not yet determined	
Is the remedy protective of the environment? ■ yes ☐ no ☐ not yet determined	

* ["OU" refers to operable unit.]

Five-Year Review Summary Form (continued)

Issues, Recommendations, and Follow-Up Actions

The selected remedy for OU-1 is ongoing and needs to continue until remedial action objectives are met in groundwater. The remedy includes ongoing operation, maintenance and monitoring activities. Table 5 includes two comments and suggestions. Table 6 includes a recommendation concerning the SVE system for Area 4. Because the groundwater remedy should be capable of addressing any residual soil contamination, the recommendation for the SVE system for Area 4 is not expected to affect long-term protectiveness at the site.

Protectiveness Statement

The OU-1 and OU-2 remedial actions will restore soil and groundwater to allow for unlimited use without restriction. The implemented remedy for OU-1 and OU-2 protects human health and the environment because there are no exposure pathways that could result in unacceptable risks and none expected during remediation as long as the soils and groundwater continue to be remediated and monitored. Because all OUs are protective, the site is protective of human health and the environment.

Vestal Water Supply Well 1-1 Superfund Site
Town of Vestal, New York
Third Five-Year Review

I. Introduction

This third five-year review was conducted in accordance with the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (June 2001). The purpose of a five-year review is to ensure that implemented remedies are protective of public health and the environment and that they function as intended by the decision documents. This report will become part of the site file.

The U.S. Environmental Protection Agency (EPA) Region II, conducted the five-year review of the remedies implemented at the Vestal Water Supply Well 1-1 Superfund site (Site) in the Town of Vestal, New York. This review was conducted by the Remedial Project Manager (RPM) for the Site. This is the third five-year review for the Site.

The Site is being addressed in two phases, or operable units (OUs). OU1, which involves groundwater extraction and treatment, has been constructed and is currently operating. OU2 addresses two discrete sources (Area 2 and Area 4) of groundwater contamination. Remediation of the contaminated soil via in-situ vapor extraction (SVE) in Area 2 has been completed. A SVE system was also constructed to address the contaminated soil in Area 4 and was operated for approximately three years.

II. Site Chronology

See Table 1 for Site chronology.

III. Background

Physical Characteristics

Vestal Water Supply Well 1-1 is located in the Town of Vestal, Broome County, New York, about five miles southwest of the City of Binghamton, on the South Bank of the Susquehanna River (see Figure 1). The Site is generally flat and lies within the flood plain of the Susquehanna River. The western portion of the Site is located between the Susquehanna River and New York State Route 17 and includes a well field, a fire department training center, state-owned forest lands, and a recreational field. The eastern portion of the Site contains the Stage Road Industrial Park which is located approximately 1000 feet southeast of Well 1-1 (see Figure 2). The Stage Road Industrial Park contains several active industrial facilities. Several marshy areas and drainage ditches encompass and interlace the industrial park. Two areas, Areas 2 and 4 (see Figure 3), located in the industrial park are sources of groundwater contamination. Area 2 covers approximately one acre of land, formerly used as a truck parking area between Stage

Road and the abandoned Erie Lackawanna railroad tracks. Area 4 consists of a large one-story building; with an area covering approximately 60,000 square feet and an adjacent parking lot. The building was used to manufacture transformers and later electronic circuit boards. The circuit board manufacturing operations ceased in May 2002. Since 2007 to present day, the building is used to recycle electronic equipment. Approximately 27,000 people reside in the Town of Vestal, and approximately 17,000 rely on public water supplies for drinking water.

Land and Resource Use

Land use on the eastern portion of the area surrounding the Site evolved from agriculture to light and medium industrial. Land use on the western portion currently includes open spaces, a fire department training center and a well field. It is anticipated that the mix of land uses similar to that described above will continue into the future. The identified source areas were located in an industrial park of active light industrial properties. These properties are within the Stage Road Industrial Park and are zoned for commercial/light industry. These properties are likely to continue to be zoned and used for commercial/light industrial.

Well 1-1 is one of three production wells in Water District 1 that are intended to provide drinking water to several water districts in the Vestal area. In 1954, Well 1-1 was constructed with the capacity of 1.4 million gallons per day as a backup well to supplement the Vestal water supply which was provided at that time by the Town of Endicott, located across the Susquehanna River. A few years later, Water District 1 became an independent water supplier for the Town of Vestal, utilizing Wells 1-1, 1-2, and 1-3 with a combined capacity of 4.6 million gallons per day. In 1980, after significant concentrations of chlorinated solvents, primarily 1,1,1-trichloroethane (TCA), trichloroethene (TCE) and 1,2-dichloroethene (1,2-DCE) were discovered in Well 1-1, the well pumpage was diverted to the Susquehanna River. Well 1-2 became physically impaired in 1988, and has since been replaced by a new Well 1-2A. Before the construction of Well 1-2A, Well 1-3 had served for several years as the District's primary water supply. Additionally, reserve capacity is provided by an emergency interconnection to another Water District and holding tank in District 1.

The aquifer underlying the Site is extremely permeable, resulting in high production capacities; this characteristic also allows for the rapid migration of contaminants introduced to the aquifer. There also exist many variations in the subsurface geology in this area that give rise to highly complex groundwater hydrology. The direction of the shallow groundwater flow from the source area is generally from southeast to northwest.

History of Contamination

A chemical spill at the IBM plant in Endicott, New York in 1978 led to the development of a testing program of all drinking water wells in the vicinity for organic compounds. As a result of this testing program, chlorinated solvents were discovered in Well 1-1, and the well was taken out of service in 1980 and pumped to the Susquehanna River. A subsequent investigation determined that the presence of chlorinated solvents in Well 1-1 is not related to the spill at the

IBM plant. The source of the groundwater contamination was determined to be two areas located in the Stage Road Industrial Park. Area 2 was formerly used as a truck parking area located between Stage Road and the abandoned Erie Lackawanna railroad tracks. Area 4 is located in Stage Road Industrial Park where transformers and later on electronic circuit boards were manufactured.

Initial Response

After chlorinated organic solvents were discovered in Well 1-1, the well pumpage was diverted to the Susquehanna River in 1980 in order to hydraulically "capture" and discharge a plume of contaminated groundwater before the contaminants could reach the remainder of the well field. The New York State Department of Environmental Conservation (NYSDEC) commenced a remedial investigation/feasibility study (RI/FS) of the Site in April 1985 under a Cooperative Agreement with EPA. This investigation confirmed the presence of volatile organic compounds (VOCs) in the groundwater southeast and east of Well 1-1.

EPA proposed the Site for listing on the National Priorities List (NPL) on December 30, 1982 (47 FR 58476) and formally added it to the NPL on September 8, 1983 (48 FR 40658).

Basis for Taking Action

Based on the RI/FS performed by NYSDEC, EPA issued a Record of Decision (ROD) for OU1 which addressed the VOCs in the groundwater on June 27, 1986. The OU1 ROD also recommended that a second RI/FS be undertaken to evaluate suspected source areas of contamination upgradient of Well 1-1.

EPA assumed the lead role for the second operable unit source investigation and initiated the RI/FS in November 1988. The results of the RI/FS revealed significant VOC contamination in subsurface soils located in two areas in the Stage Road Industrial Park. Elevated concentrations of TCA, TCE, 1,2-DCE and tetrachloroethene (PCE) were detected in source Areas 2 and 4. The ROD for OU2 was signed on September 27, 1990 and addressed the two discrete source areas, Areas 2 and 4.

IV. Remedial Actions

Remedy Selection

The OU1 ROD, which addresses the contaminated groundwater at the Vestal Site, was signed on June 27, 1986, and the OU2 ROD, which addresses the source areas, was signed on September 27, 1990.

OU1

The following are the Remedial Action Objectives (RAOs) selected in the OU1 ROD to address groundwater contamination:

- Contain the plume of contamination to mitigate further contamination of public water supplies;
- Provide a safe, reliable drinking water supply to the Town of Vestal; and
- Ensure that the quality and best use of the Susquehanna River are not impaired.

The following are the major components of the selected remedy for the OU1 ROD:

- Construction of a packed column air stripping system on Well 1-1 in order to return the well to full service as Vestal Water District 1's primary water supply; and
- Initiation of a supplemental RI/FS to further investigate the extent of soil contamination in suspected source areas and to evaluate possible source control measures.

OU2

The following are the RAOs selected in the OU2 ROD to address soil contamination:

- Ensure protection of groundwater from the continued release of VOC contamination from soil;
- Ensure protection of Well 1-1 water quality from any inorganic groundwater contamination not addressed in the first operable unit, if necessary; and
- Ensure protection of human health, to construction workers who are potentially exposed to contaminated soils during excavation.

The following are the major components of the selected remedy for the OU2 ROD:

- In-situ vapor extraction of volatile organic contamination from soil in source Areas 2 and 4 within the Stage Road Industrial Park, followed by carbon adsorption, with subsequent treatment and disposal of contaminated carbon at a permitted off-site facility;
- A monitoring program to evaluate progress of the SVE remedy;
- A monitoring program to periodically assess inorganic contaminants in the aquifer upgradient of Well 1-1 (the decision to implement a monitoring program for <u>organic</u> contamination was contained in the EPA's June 27, 1986 ROD for OU1); and
- A contingency remedy for Well 1-1 involving treatment of inorganic contaminants and groundwater to be implemented, if necessary in the future.

The RAOs for the OU1 ROD had an ambiguity concerning the groundwater cleanup. One of the RAOs was "containing" the groundwater contamination. However, the ROD text indicated that the OU1 remedy would restore the aquifer, "At the present time, it is estimated that continued pumping of Well 1-1 will clean the aquifer in 20+ years…." The OU2 ROD reviewed the OU1 groundwater remedy and confirmed that no additional wells were necessary since Well 1-1

would provide for "aquifer restoration." Subsequent actions taken by the State and EPA were consistent with aquifer restoration. This ambiguity may be explained by an uncertainty, at the time of the OU1 ROD, as to the sources of the groundwater contamination and the effectiveness of the remedy to fully restore the aquifer. Consequently, the containment of groundwater contamination was important to the remedy at the time, but not inconsistent with an aquifer restoration. Throughout the remainder of this report, the RAO for OU1 will be considered aquifer restoration and the RAOs for the Site soils and groundwater will be considered to provide for unlimited use of the source area properties and the groundwater aquifer without any restrictions on exposures.

Remedy Implementation

EPA performed the remedial design/remedial action (RD/RA) for OU1 and for Area 2 of OU2 because no viable potentially responsible parties (PRPs) were identified. In March 1991, EPA issued a unilateral administrative order (UAO) to three PRPs for the performance of the RD/RA at Area 4. Although the Area 4 RD was completed in September 1994 pursuant to the UAO, the PRPs indicated that financial constraints would prevent their implementation of the RA; therefore, EPA assumed performance of the Area 4 RA. In May 1999, EPA negotiated an ability to pay settlement with the PRPs for past and future costs incurred by EPA.

OU1

The RD for the air stripper was approved by EPA in September 1987. The construction of the air stripping facility was started in May 1989 and completed by EPA in July 1990. However, due to problems at existing Well 1-1, EPA replaced Well 1-1 with a new well, Well 1-1A. The RD for Well 1-1A was completed in May 1992, and construction of Well 1-1A was completed in December 1993. Well 1-1A has a pumping maximum capacity of 1150 gallons per minute (gpm). The typical operating flow rate ranges from 350 to 550 gpm.

In March 1995, EPA issued a Remedial Action Report which determined that Well 1-1A and the associated air stripping facility were fully functional and operational as a potable water supply. However, the NYSDEC, which had previously agreed through a cooperative agreement with EPA to provide Long-Term Response Action (LTRA) for this facility, was unable to secure a contract with the Town of Vestal to perform LTRA on behalf of the State. In May 1995, the NYSDEC withdrew its request for a cooperative agreement to perform the LTRA. Therefore, EPA performed the LTRA to restore the aquifer and discharged the treated water to the Susquehanna River, since the Town of Vestal has indicated that it no longer requires treated water from Well 1-1A for potable purposes. Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), EPA can perform LTRA activities for only ten years after which the operation and maintenance of the groundwater treatment facility is transferred to the State. Since October 2006, NYSDEC assumed responsibility for operation and maintenance of the facility.

The monitoring for OU1 consists of both treatment plant performance monitoring and groundwater monitoring. The performance monitoring criteria are designed to monitor the performance of the air stripper treatment system and determine whether the treated water meets the requirements for discharge to the Susquehanna River. The performance evaluation requires monthly sampling and analysis of the influent and effluent of the Well 1-1A treatment system. The groundwater monitoring criteria are designed to monitor the effectiveness of capture of the groundwater contamination plume and to determine the progress of groundwater restoration and compliance with the groundwater quality standards. The evaluation requires annual sampling and analysis of groundwater from monitoring wells in the contamination plume area and measurements of groundwater elevation during sampling to develop a potentiometric surface map reflecting the current aquifer conditions.

OU2

The remedial designs of the SVE systems for Areas 2 and 4 were completed in September 1994. Construction of the SVE system for Area 2 started in October 1996. The SVE system was designed to remove VOCs from unsaturated soil. Initial concentrations of total compounds of concern (COCs) in untreated subsurface soil in Area 2 ranged from 40 to 150,000 parts per billion (ppb). The system was designed with horizontal wells (12) to treat the upper vadose zone and vertical wells (36) down to the groundwater. A semi-permeable Site cover consisting of six inches of clay was constructed over the treatment area to minimize vertical leakage of air. The extracted soil gas was treated using two vapor-phase granular activated carbon (GAC) canisters connected in series prior to release into the atmosphere. The SVE system operations began in January 1997, after installation and system start-up activities were completed. In December 1997, four additional vertical SVE wells were installed to enhance treatment of contaminated soil in the eastern portion of Area 2 for a total of 40 vertical wells. The SVE system operation was terminated in November 2000, after the results of the Interim Soil Sampling Program confirmed that the SVE system successfully achieved ROD cleanup goals. Actual operation of the SVE system was for approximately 30 months since the system was shut down for four extended periods due to operating problems that occurred as a result of extremely high rainfall and subsequent elevation of the groundwater table. The volume of treated soil was approximately 17,000 cubic yards or 47.6 million pounds of soil. The total targeted VOCs removed were approximately 1,046 pounds.

EPA and the U.S. Army Corps of Engineers (USACE) have determined that the remediation of contaminated soil in Area 2 has been completed and met the cleanup goals specified in the OU2 ROD. In addition, construction in Area 2 was performed consistent with the RD Final Performance Specifications and conforms to the remedy selected in the OU2 ROD.

Soil sampling was performed in September and October 2001 in Area 4 to further delineate the area of contamination and to refine the remedial design completed in September 1994. The highest initial concentrations of COCs detected in the untreated subsurface soil in Area 4 were 2,840 parts per million (ppm) of TCE and 2,250 ppm of TCA. Construction of the SVE system was started on April 1, 2003 and was completed on June 27, 2003. SVE system construction activities included installation of 55 vertical wells and an air conduit network assembly,

installation of condensate water discharge lines, construction of two distribution buildings, electrical hook-up, connection of distribution buildings to existing equipment building located in Area 2, and upgrading the equipment in the equipment building (see Figure 4). The manifolds and individual well piping were constructed for rotational flexibility between injection and withdrawal of air to allow increased control of air flow within the treatment area. The SVE system was fully automated and designed to be operated 24 hours per day, 7 days per week. The SVE system was similar to the SVE system used in Area 2. The extracted soil gas was treated using two vapor-phase GAC canisters connected in series prior to release into the atmosphere.

In February 2005 and September/October 2005, EPA conducted soil and groundwater sampling at the Site to evaluate the progress of the SVE system in cleaning-up Area 4 due to the low VOC contaminant removal rates. The results of the sampling showed that very high levels of VOCs still remained in the deep unsaturated and the shallow saturated zones. The SVE system cannot remove VOCs from fine-grained sediments which exist at the Site or from the saturated zone without being enhanced. The SVE system was shut down in January 2006 and is being reevaluated.

In preparing to enhance the SVE system, EPA conducted further soil and groundwater sampling to fully delineate the horizontal and vertical extent of VOC contamination remaining at the Site in August 2006, November 2007, and May/July 2008. The results of the sampling revealed that the VOCs TCA and TCE were the most prevalent and exhibited the highest concentrations. The highest concentrations of VOCs in soil occurred in the 15 to 20-foot depth range. The VOCs were detected in two areas of the parking lot, located on the south side of the building, underneath the building and in the northeast corner of the Site. The highest level of contamination detected in the parking lot was nearly 24,000 ppm of TCA and 13 ppm of TCE at 16 feet below ground surface. The extremely high VOC contamination (in the thousands of ppm) appears to be limited to an area approximately 20 feet long by less than 10 feet wide in the eastern area of the parking lot and approximately 25 feet by 20 feet in the western area of the lot. Significant levels of VOCs were also detected beneath the building, at levels as high as 83 ppm of TCA and in the northeast corner of the Site, at levels as high as 15.9 ppm of TCA and 18 ppm of TCE. EPA determined that the SVE system is unable to address the remaining VOC contamination in fine-grained soils without enhancing the SVE treatment system.

System Operation/Operation and Maintenance

OU1

NYSDEC's contractor is conducting the long-term operation and maintenance activities for the air stripping facility according to the October 2006 Final Operation and Maintenance (O&M) Manual approved by NYSDEC and EPA. EPA's contractor conducted the long-term operation and maintenance activities for the air stripping facility from October 1996 to October 2006. The primary activities associated with O&M include the following:

- Inspection and maintenance of Well 1-1A pump packing, pre-lube line and pump motor oil and check for pump vibration/heat;

- Inspection, maintenance and lubrication of motors and pumps and inspection of blowers' air filters;
- Periodic manual removal of calcium carbonate deposits from several key locations where the deposition impedes flow;
- Inspection of tower packing, clearwell level and record flow rate;
- Verification that the high level and low level shut-off switches for the clearwell are working properly;
- Verification that the motor control center and the alarm/control panel are working properly, and inspection and testing the auto dial-out system; and
- Monthly sampling of plant influent and effluent, and annual sampling of groundwater monitoring wells.

Since the last Five-Year Review report (the Second Five-Year Review, September 2003), the groundwater treatment facility was shut down twice for an extended period. In 2006, prior to transferring the Site to the State, major repairs were performed at the treatment facility which included replacing the air stripper packing, and cleaning the distribution tray and demister. The groundwater treatment facility was shut down from July 24th to August 3, 2006 in order to complete these repairs. From June 29th to October 29, 2004, the groundwater treatment facility was shut down due to a burnt-out blow-off valve activator. Additional repairs performed at the treatment facility which required insignificant shut-down periods involved installation of a cathodic protection system on Well 1-1A in October 2003 to counteract the corrosion damage from electrolysis due to two adjacent cathodic protection systems. In December 2005, the treated groundwater was rerouted to the collection basin instead of pumping the effluent directly to the river to save on the cost of electricity and repairs to the effluent piping caused by fouling of calcium carbonate deposits. In 2007, a significant decrease in the pumpage rate was observed at the facility. However, the groundwater contamination plume is still being captured. NYSDEC conducted testing of Well 1-1A and determined that the well needs to be redeveloped and the pump may need to be replaced (see Table 5).

Annual O&M costs for OU1 include operation and maintenance of the air stripping facility, sampling and monitoring efforts, utilities, and major repairs; the associated costs are shown in Table 2. As seen in Table 2, the annual O&M costs were slightly higher in 1998, 1999, 2002 and 2006. The additional O&M costs incurred in these years were associated with providing a budget estimate and procuring long-term response subcontractors, replacing Well 1-1A pump, replacing for a second time Well 1-1A pump and repairing and installing monitoring wells, and replacing the air stripper packing, respectively. The O&M costs are well below the originally estimated annual amount of $540,000 since the level of effort, the subcontractor's actual O&M cost, and the maintenance of the treatment facility were all less than anticipated.

OU2

The SVE system for Area 2 operated from January 1997 until November 2000 when the operation was terminated after the system successfully achieved ROD cleanup goals. O&M activities for the Area 2 SVE system were similar to the O&M activities for the Area 4 SVE

system which are discussed below. O&M costs for O&M activities for the Area 2 and 4 SVE systems are shown in Table 3a and 3b, respectively, and include operation and maintenance of the SVE system, sampling and monitoring efforts, repairs and utilities.

USACE, who provides oversight for EPA for the project, and its contractor performed the long-term operation and maintenance activities for the SVE system in Area 4 from startup in June 2003 until the SVE system was shut down in January 2006. The primary O&M activities associated with Area 4 included the following:

- Inspect, maintain and lubricate motors, heat exchangers and discharge and purge pumps;
- Inspect the piping system and all control and relief valves;
- Remove any sediment from the water knock-out tank and verify that the low-level and high-level shut-off switches are working properly;
- Sample process air and monitor system parameters, including pressures, vacuums, flow rates and temperatures;
- Evaluate the analytical data to determine if the system needs to be reconfigured to obtain optimal performance of the system; and
- Verify that the control system is working properly. Inspect the sensor switches, control relays, and programmable logic controller on a quarterly basis. Also, inspect and test the auto dial-out system monthly.

Mechanical and operational changes were made to the system based on parameter monitoring and off-gas sampling data. The startup well field configuration was modified when the contaminant removal yields dropped substantially for an extended period of time. The well field configuration was changed in February 2004, April 2005 and November 2005 to increase treatment effectiveness and efficiency. Since January 2006, the system equipment was only briefly turned on twice a month to keep the system functional.

Institutional Controls

The remedial action objectives for the Site soils and groundwater provide for unlimited use of the source area properties and the groundwater aquifer without restrictions on exposures. There are no institutional controls included in the selected final remedies. The source area soil cleanup is complete in Area 2. The groundwater cleanup is ongoing. The groundwater remedy did not include any "interim" actions, including institutional controls. At the time of the ROD, the use of the public water supply appeared to be universal in the area. This was probably because of local requirements mandating the use of the public water supply. In any case, that situation appears to remain and is anticipated to continue until the aquifer is restored. Consequently, no "interim" institutional controls were included in the remedy and none are anticipated at this time. EPA is undergoing a national review of institutional controls at Superfund sites. If it is subsequently decided that institutional controls should be included in the CERCLA remedy for this Site, EPA will issue an appropriate remedy decision document explaining any significant differences in the final or "interim" remedy.

Progress Since the Last Five-Year Review

The previous Five-Year Review report recommended that the remedial actions for OU1 and OU2 be continued and that the treated water discharged from the groundwater treatment facility be rerouted to the collection basin instead of pumping the effluent directly to the river. Construction of a new discharge pipeline was completed in January 2006, and remedial actions for OU1 and OU2 are still being implemented.

The previous Five-Year Review report also recommended evaluating the possibility of vapor intrusion into buildings constructed over the plume using the health-based screening criteria provided in EPA's Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. This evaluation was conducted and the results are discussed under **Question B** of Section **VII. Technical Assessment**.

VI. Five-Year Review Process

Administrative Components

The five-year EPA review team consisted of Sharon Trocher (RPM), Marian Olsen (human health risk assessor), Mike Clementson (ecological risk assessor), Rich Krauser (hydrologist) and Angela Carpenter (Section Chief). Payson Long is the NYSDEC Project Manager. This is an EPA-lead Site. NYSDEC's contractor for the OU1 LTRA is Malcolm Pirnie, Inc. (Malcolm Pirnie), and EPA's contractors for OU2 are EPA's Environmental Response Team (ERT) and USACE. USACE procured Sevenson Environmental Services Inc. (Sevenson) to implement the OU2, Areas 2 and 4 remedial actions. ERT procured Lockheed Martin Technology Services to conduct the soil and groundwater sampling in Area 4, and Sevenson is operating the SVE system.

Community Involvement

The EPA Community Relations Coordinator for the Site, Cecilia Echols, published a notice in the *Press & Sun-Bulletin*, on February 11, 2008, notifying the community of the initiation of the five-year review process. The notice indicated that EPA would be conducting a five-year review of the remedies for the Site to ensure that the implemented remedies remain protective of public health and the environment and are functioning as designed. The notice also indicated that once the five-year review is completed, the results will be made available in the local Site repository. In addition, the notice included the Remedial Project Manager's address and telephone for questions related to the five-year review process or the Site. A similar notice, notifying the public that the review was completed will be sent when this five-year review is finished. The Town of Vestal was also notified that EPA was initiating a five-year review of the remedies for the Site.

Document Review

This five-year review consisted of a review of relevant documents including O&M records and monitoring data (see Section XI).

Data Review

Groundwater Monitoring

The air stripper treatment system is monitored to determine its performance and whether the treated water meets the requirements for discharge to the Susquehanna River. Groundwater samples of the influent and the effluent of Well 1-1A's air stripper have been collected and analyzed for VOCs on a monthly basis by EPA from November 1996 to October 2006. Since October 2006, NYSDEC's contractor has collected groundwater samples on a monthly basis. Since the last five-year review, performance monitoring data indicate that the influent exceeds the surface water discharge criteria for Site volatile organic compounds of concern while the treated effluent meets the surface water discharge criteria for all VOCs. These results indicate that the air stripper is effectively treating the water pumped from Well 1-1A to applicable criteria. To date, approximately 3.0 billion gallons of groundwater have been treated at Well 1-1A.

The groundwater monitoring criteria are designed to monitor the effectiveness of capture of the groundwater contamination plume and to determine the progress of groundwater restoration and compliance with the groundwater quality criteria. The groundwater monitoring program includes annual groundwater sampling of groundwater monitoring wells located upgradient and side-gradient of Well 1-1A which are analyzed for VOCs (see Figure 3). The program also includes yearly sampling at three groundwater monitoring wells located in close proximity to Well l-1A and monitoring of the influent and effluent of the air stripper at Well 1-1A. These samples are analyzed for inorganic compounds to measure any inorganic groundwater contamination and to determine if inorganic treatment is needed at Well 1-1A.

Table 4 summarizes the total VOC concentrations detected in monitoring wells during the annual groundwater monitoring sampling. In the August 2007 groundwater sampling event, the maximum concentration of total VOCs was 1,037 ppb in the sample collected from the shallow monitoring well S-11. Only one groundwater sample (Well 1-29) collected from the deep groundwater monitoring well network contained VOCs at concentrations greater than the groundwater drinking water standards (see Figure 3 for location of monitoring wells). The results of the groundwater monitoring data indicate that the pumping rate at Well 1-1A was effectively capturing the contaminated groundwater plume with minimal or no lateral migration of Site COCs. Based on the groundwater sampling results, it can be concluded that continued pumping and treatment are required for remediation of groundwater contamination and that the current pumping rate at Well 1-1A is effectively capturing the contaminated groundwater plume. As shown by the performance monitoring discussed above, the groundwater plume is being effectively treated by the air stripper at Well 1-1A.

Since the last five-year review, the groundwater monitoring data indicate that the inorganic levels for site-related contaminants detected in the groundwater collected from three monitoring wells located in close proximity to Well 1-1A and the influent and effluent of the air stripper for site-related contaminates are below the groundwater quality criteria and that inorganic treatment at Well 1-1A is not needed.

Source Control Monitoring

Initial concentrations of total COCs in untreated subsurface soil in Area 2 ranged from 40 to 150,000 ppb. Upon completion of SVE system operations, the concentration of total COCs in subsurface soil was reduced to below 76 ppb. Based on analytical results of the soil samples, EPA concluded that the SVE system successfully treated soil in Area 2 to below ROD cleanup goals.

The construction of the SVE system in Area 4 was initiated on April 1, 2003 and was completed on June 27, 2003. Qualified operations technicians visited the Site on a weekly basis to monitor system performance of the SVE system. During these Site visits, complete system maintenance was performed. In addition, parameter monitoring and a full round of off-gas samples were collected and analyzed using a photoionization detector (PID) on a monthly basis. A full round of off-gas samples included each individual SVE withdrawal well and total system samples (upstream, between and after carbon units). The total system samples were also sent off-site to a laboratory for VOC analysis. Parameter monitoring consisted of taking pressure, vacuum, flow rate, and temperature readings at various points throughout the system. On a quarterly basis, a full round of off-gas sampling was collected and shipped to an off-site laboratory for gas chromatograph analysis for VOCs. The data collected was used to 1) assess the operating condition of the SVE system, 2) evaluate system performance, 3) substantiate operational changes to increase system efficiency, 4) determine when the carbon and air quality control system require replacement, and 5) determine when interim and post-treatment soil sampling events should be collected. Data collected was also being used to troubleshoot any problems which may occur to the system. Mechanical and operational changes were made to the system based on parameter monitoring and off-gas sampling data.

From June 2003 to January 2006, approximately 2,300 pounds of TCA and TCE have been removed from the subsurface soil. The SVE system operated for approximately 80 percent of the time or for approximately 25 months during this period. Reasons for the system shutdowns included routine maintenance, excessive moisture in the well lines, replacement of equipment damaged due to power surges and polarity reconfigurations.

Site Inspections

OU1

A Site inspection was performed on May 5, 2008. The following parties were in attendance.

Payson Long, NYSDEC
Gerald Pratt, NYSDEC
Sharon Trocher, EPA
Jeremy Wyckoff, Malcolm Pirnie, Inc.

The inspection of the groundwater treatment facility found a well-maintained and functional facility. As previously mentioned, the groundwater treatment facility is operating at a decreased pumping rate. The plant was operating at 154 gpm. NYSDEC is planning to redevelop Well 1-1A and replace Well 1-1A pump, if needed. All the monitoring wells were inspected by Malcolm Pirnie in August 2007 at NYSDEC's request and repairs to the wells were made, as needed. During this Site inspection, two monitoring wells were inspected and found to be properly secured and acceptable for use in groundwater monitoring.

OU2

A Site inspection for OU2 was not performed since the SVE system was shut down.

Interviews

No interviews were conducted for this review. However, EPA or its contractors have been in contact with the Town of Vestal regarding major events, such as shut-down of the air stripper for major repairs, transfer of the operation of the groundwater treatment facility to NYSDEC, and location of a local repository for Site documents. During these conversations, the Town of Vestal did not express any major concerns regarding the remedial actions at the Site.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Yes, the remedy is functioning as intended based on the OU1 and OU2 RODs. The only possible exception is Area 4 where the limited capacity of the SVE system to remove VOCs from the fine-grained sediments requires a reevaluation of this system (see Table 6).

The remedy for OU1 involved containing the groundwater plume of contamination to mitigate further contamination of public water supplies; providing a safe reliable backup drinking water supply to the Town of Vestal, if needed; and ensuring the quality and best use of the Susquehanna River are not impaired. The review of documents, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and the results of the Site inspections indicate that the air stripper is functioning as intended by the ROD. The packed column air

stripper was designed to reduce COCs from levels well above their maximum detected concentrations to less than one ppb, which is below the groundwater quality criterion of five ppb for site-related contaminants. The air stripper is performing as designed as verified by review of the monthly sampling data collected since November 1996 from the plant influent and effluent. Additionally, the groundwater plume of contamination is effectively being captured as determined by annual sampling and hydraulic monitoring of the groundwater monitoring wells.

The goals of the OU2 ROD included ensuring protection of groundwater from the continued release of VOC contamination from soil; ensuring protection of Well 1-1A water quality from any inorganic groundwater contamination not addressed in the first operable unit, if necessary; and ensuring protection of human health of on-site workers and construction workers who may be exposed to contaminated soils during excavation by interrupting potential exposures. The soil sampling confirmed that the SVE system in Area 2 successfully treated the contaminated soil to ROD cleanup goals. However, the SVE system was highly vulnerable to water infiltration, resulting in frequent system shutdowns. The SVE wells in Area 4 were modified to minimize system shut-down due to high water table levels. The SVE system in Area 4, which was based on the design of the Area 2 SVE system, will not be able to achieve the ROD cleanup goals due to the VOC contaminants being located in the fine-grained sediments and the shallow saturated soil at the Site (see Table 6). The SVE system needs to be reevaluated to make sure that the soil cleanup objectives in Area 4 are consistent with the groundwater remediation goals and can be best achieved by the enhancement of the SVE system. The ROD cleanup goals for the soil are conservative and well below the NYSDEC objectives for unrestricted site use.

Operation and maintenance of the groundwater treatment facility and the SVE system have, on the whole, been effective in meeting the remedial goals for both OU1 and OU2. As previously mentioned, four major repairs have been performed at the groundwater treatment facility since the last five-year review report. It is expected that as these facilities continue to operate, additional repairs due to normal wear will be required.

Overall, the remedies are functioning as intended in the original decision documents with the exception of Area 4 where further evaluation of the SVE system is required.

Question B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the time of the remedy still valid?

There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. The land use for the Site is expected to remain industrial over the next five years, the period of time considered in this review. The land use considerations and potential exposure pathways considered in the baseline human health risk assessment are still valid.

- ***Are the (1) exposure assumptions and toxicity data (2) used at the time of the remedy selection still valid?***

a. Groundwater. The original risk assessment identified unacceptable risks from the ingestion of contaminated drinking water among community residents. Currently, nearby residents are on public water supplies, which have interrupted this exposure pathway. The remedy is protective for the direct ingestion route of exposure under current and future conditions. The contaminants of concern identified in the original ROD for groundwater (OU1) were primarily volatile organic contaminants, TCE and TCA.

The remedy for the Site has prevented pollutants from entering the Susquehanna River by capturing and treating the contaminated plume prior to discharging the groundwater to the River, and provided a backup public drinking water supply to the Town of Vestal, if needed. Further, the results of the groundwater monitoring data indicate that the pumping rate at Well 1-1A was effectively capturing the contaminated groundwater plume with minimal or no lateral migrations of Site COCs.

b. Soil. The original risk assessment identified unacceptable risks to the future construction worker exposed through ingestion and dermal contact with the contaminated soil and inhalation of volatile organic compounds. Many of the exposure assumptions used in the original risk assessment would be comparable to those used in an assessment today. As described above, the Area 2 SVE system was run from December 1997 to November 2000 when the system was terminated. The results of the Interim Soil Sampling Program confirmed that the SVE system successfully achieved ROD cleanup goals. EPA determined that the SVE system is unable to address the remaining VOC contamination in fine-grained soils in Area 4 without enhancing the SVE treatment system.

c. Vapor Intrusion. As a result of the previous five-year review, a soil vapor intrusion study was conducted at the facility. In April 2007, EPA conducted an investigation at 200 Stage Road (the Area 4 industrial building) to determine if indoor air might be impacted by the intrusion of VOC vapors resulting from groundwater and soil contamination existing beneath the Site building. The process of assessing the indoor air quality included testing the soil gas levels beneath the concrete slab of the Area 4 building to see if any vapors have been created by the contamination in the underlying groundwater and soil and testing the actual indoor air quality. EPA collected and tested 41 subslab and 18 indoor air locations within the Area 4 building. The subslab and indoor air samples were collected over a 24-hour period. The results of the subslab samples indicated that VOC vapors are collecting beneath the building foundation. EPA's review of the indoor air samples shows that in 2 of the 18 samples, TCE concentrations exceeded the New York State Department of Health air criterion of 5 micrograms per cubic meter (ug/m3) for residences, the level at which adverse health effects are not anticipated. (There are not any health-based vapor intrusion screening criteria for industrial buildings.) Based on the transient nature of the building occupancy, the high ventilation and air exchange rates in the warehouse

building, and a review of all of the indoor air data, EPA does not believe that the indoor air concentrations pose chronic health concerns. The results of this investigation were shared with the current building owner. EPA plans to continue monitoring the subslab and indoor air concentrations to ensure that conditions do not change (see Table 5).

- ***Are the Cleanup Values Selected in the ROD Still Valid?***

a. Groundwater. The original ROD for OU1 selected the federal drinking water standards, MCLs in groundwater for TCE and TCA. In the original ROD, the state MCL for TCE was 10 micrograms per liter (ug/l); it was subsequently changed to 5 ug/l (NYS Part 703 Surface and Groundwater Quality Standards and Groundwater Effluent Limitations) which is comparable to EPA's MCL. The federal MCLs for these chemicals have not changed since the ROD was signed and the MCLs remain protective.

b. Soil. The original ROD for OU2 selected soil remediation goals that were designed to reduce the impacts to groundwater and also reduce the potential future risk from human exposure to excavated soils. The remedial goals were 140 micrograms per kilogram (ug/kg) for TCE; 170 ug/kg for TCA; and 188 ug/kg for 1,2-DCE (Area 2). The removal of VOCs from the Area 2 soil has removed this potential route of exposure. The original remediation goals are lower than residential concentrations for these same contaminants calculated using current exposure and toxicity values. The remediation goals remain protective.

The remedy to address the contaminated soil in Area 2 has been completed and met the specified cleanup goals in the OU2 ROD. The remedy to address the contaminated soil in Area 4 has been constructed and operated from June 2003 to January 2006. The SVE system will be reevaluated. This remedy is designed to address the impacts of contaminants in soil as a source to groundwater.

Question C: has any other information come to light that could call into question the protectiveness of the remedy?

No ecological targets were identified in the RODs and none were identified during the five-year review, and therefore, monitoring of ecological targets is not necessary. There is no other information that calls into question the protectiveness of the remedies.

Technical Assessment Summary

According to the data reviewed and the Site inspections, the remedies are functioning as intended by the RODs with the exception of the Area 4 SVE system, which will need to be enhanced. The Area 4 SVE system is not currently operating and removing VOCs from subsurface soils to protect the groundwater from the leaching of VOC contaminants from the soil. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedies. The cleanup levels cited in the RODs have not yet been met for OU1 or for OU2, Area 4. The RAOs are still valid and are currently being met for OU1, and were met for OU2, Area 2. The groundwater contamination plume is being contained and treated prior to discharge

to the Susquehanna River to prevent degradation of water quality. The groundwater monitoring wells are functional, and the annual groundwater sampling data from these wells and the OU1 plant influent indicate that treatment for inorganics at Well 1-1A is not necessary.

Currently, there is no human or environmental exposure to, or ingestion of, contaminated groundwater and soil, and no exposures expected during the next five years. The groundwater contamination is being addressed under OU1 through pumping and treating to reduce the levels of contamination to appropriate Federal and State standards. The community is serviced by public water that meets appropriate Federal and State standards, and the pathway of potential exposure if no public water supply were available has been interrupted. Potential impacts of contaminated soil on groundwater were addressed under OU1, Area 2 through removal of VOCs via a SVE system. Site remedial action at OU2, Area 4 is ongoing and is expected to fully protect human health and the environment when it is completed. Currently, there is no exposure to VOC vapors resulting from contaminated groundwater and soil above levels at which adverse health effects are anticipated. Vapor intrusion of VOC vapors into the indoor air of the Area 4 building will continue to be monitored.

VIII. Issues, Recommendations, and Follow-Up Actions

The selected remedy for OU-1 is ongoing and needs to continue until remedial action objectives are met in groundwater. The remedy includes ongoing operation, maintenance and monitoring activities. Table 5 includes two comments and suggestions. Table 6 includes a recommendation concerning the SVE system for Area 4. Because the groundwater remedy should be capable of addressing any residual soil contamination, the recommendation for the SVE system for Area 4 is not expected to affect long-term protectiveness at the Site.

IX. Protectiveness Statement

The OU-1 and OU-2 remedial actions will restore soil and groundwater to allow for unlimited use without restriction. The implemented remedy for OU-1 and OU-2 protects human health and the environment because there are no exposure pathways that could result in unacceptable risks and none expected during remediation as long as the soils and groundwater continue to be remediated and monitored. Because all OUs are protective, the Site is protective of human health and the environment.

X. Next Review

The next five-year review for the Vestal Water Supply Well 1-1 Site is required by September 2013, five years from the date of this review.

Approved by: Date:

George Pavlou, Acting Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency

XI. Bibliography for Vestal Water Supply Well 1-1 Superfund Site

1. Water Supply Well 1-1 Superfund Site, Remedial Investigation, OU1, Ecology and Environment, Inc., May 1986

2. Water Supply Well 1-1 Superfund Site, Contamination Risk Assessment, OU1, Ecology and Environment, Inc., May 1986

3. Vestal Water Supply Well 1-1 Superfund Site, Record of Decision, OU1, June 27, 1986

4. Vestal Water Supply Well 1-1 Superfund Site, Final Supplemental Remedial Investigation, OU2, Ebasco Services Inc., May 1990

5. Water Supply Well 1-1 Superfund Site, Final Supplemental Feasibility Study Report. Ebasco Services Inc., May 1990

6. Vestal Water Supply Well 1-1 Superfund Site, Record of Decision, OU2, June 27, 1990

7. Vestal Water Supply Well 1-1 Superfund Site, Groundwater Monitoring Plan, OU1, Morlando Construction Enterprises, Inc., July 12, 1990

8. Comprehensive Five-Year Review Guidance, U.S. Environmental Protection Agency, EPA 540-R-01-007, June 2001

9. Water Supply Well 1-1 Superfund Site, Final Pre-Remediation Geoprobe Sampling Summary Report, OU2, Area 4, Envirogen, Inc., March 21, 2002

10. Vestal Water Supply Well 1-1 Superfund Site, Monthly Progress Reports, OU1, June 2003 through December 2006

11. Vestal Water Supply Well 1-1 Superfund Site, Five-Year Review Report, U.S. Environmental Protection Agency, September 30, 2003

12. Vestal Water Supply Well 1-1 Superfund Site, In-Situ Soil Vapor Extraction System Operation and Maintenance Manual, OU2, Area 4, Sevenson Environmental Services, Inc., October 2003

13. Vestal Water Supply Well 1-1 Superfund Site, In-Situ Soil Vapor Extraction System Installation and Start-up Report, OU2, Area 4, Envirogen/Shaw E&I, Inc., December 2003

14. Vestal Water Supply Well 1-1 Superfund Site, Annual Effectiveness Monitoring Reports, OU1, TETRA TECH EC, Inc., 2004, 2005 and 2006

15. Vestal Water Supply Well 1-1 Superfund Site, Interim Soil Sampling Event Report #1, Full Scale In-Situ Soil Vapor Extraction System, OU2, Area 4, Sevenson Environmental Services, Inc., March 2005

16. Vestal Water Supply Well 1-1 Superfund Site, Interim Soil Sampling Event #2 Report, In-Situ Soil Vapor Extraction System, OU2, Area 4, Sevenson Environmental Services, Inc., November 2005

17. Vestal Water Supply Well 1-1 Superfund Site, Quarterly Progress Report No. 9, OU2, Area 4, Sevenson Environmental Services, Inc., December 2005

18. Trip Report – Soil Gas Sampling, Vestal Chlorinated Hydrocarbon Source Assessment/Remedy Site, Vestal, New York, Work Assignment # 0-198, OU2, Area 4, Lockheed Martin Technology Services, July 2006

19. Vestal Water Supply Well 1-1 Superfund Site, Final Operations & Maintenance Manual, OU1, TETRA TECH EC, Inc., Revised October 2006

20. Vestal Chlorinated Hydrocarbon Source Assessment/Remedy Site, Vestal, New York, Work Assignment # 0-198, Trip Report – Soil and Groundwater Sampling, OU2, Area 4, Lockheed Martin Technology Services, February 2007

21. Vestal Water Supply Well 1-1 Superfund Site, Trip Report – Soil Vapor Intrusion Study, OU2, Area 4, Lockheed Martin Technology Services, July 2007

22. Vestal Water Supply Site Quarterly Report and Annual Groundwater Sampling Summary, OU1, Malcolm Pirnie, Inc., November 2007

23. Vestal Water Supply Site Quarterly Report, Fourth Quarter 2007, OU1, Malcolm Pirnie, Inc., February 2008

24. Trip Report – Soil Gas Sampling, Vestal Chlorinated Hydrocarbon Source Assessment/Remedy Site, Vestal, New York, Work Assignment # 0-198, OU2, Area 4, Lockheed Martin Technology Services, April 2008

Table 1
Chronology of Site Events

Event	Date
Volatile organic contamination detected at Well 1-1 and well taken off- line	1980
NPL listing	9/8/83
Remedial Investigation/Feasibility Study (RI/FS) completed - OU1	5/86
ROD selecting OU1 remedy signed	6/27/86
Remedial design approved for air stripper - OU1	9/29/87
Superfund State Contract signed	11/2/88
Start of construction of air stripper – OU1	5/31/89
RI/FS completed - OU2	5/90
Completion of construction of air stripper - OU1	6/10/90
ROD selecting OU2 remedy signed	9/27/90
Unilateral Administrative Order issued - OU2, Area 4	3/29/91
Remedial design completed for Well 1-1A - OU1	5/92
Start of construction of Well 1-1A – OU1	9/10/92
Completion of construction of Well 1-1A - OU1	12/31/93
Remedial design completed - OU2, Areas 2 & 4	9/30/94
Remedial Action Report for groundwater remedy approved - OU1	3/30/95
Start of construction of soil vapor extraction system (SVE) - OU2, Area 2	10/11/96
Start of LTRA for OU1	10/15/96
Completion of construction of SVE – OU2, Area 2	1/18/97
First Five-Year Report signed	9/30/98
Cost Recovery Consent Decree entered - OU2, Area 4	5/26/99
Completion of SVE remediation - OU2, Area 2	11/20/00
Remedial Action Report for SVE approved - OU2, Area 2	5/15/01
Start of construction of SVE - OU2, Area 4	4/1/03
Completion of construction of SVE - OU2, Area 4 signifying completion of all Site construction activities	6/27/03
Preliminary Close-Out Report signed	9/11/03
Operation of the groundwater treatment facility transferred to NYSDEC-OU1	10/16/06
Shut down of SVE system – OU2, Area 4	1/20/06

Table 2

Annual System Operations/O&M Costs for OU1

Dates		Total Cost rounded to nearest $1,000
From	To	
1/1997	12/1997	$227,000
1/1998	12/1998	$295,000
1/1999	12/1999	$261,000
1/2000	12/2000	$231,000
1/2001	12/2001	$188,000
1/2002	12/2002	$307,000
1/2003	12/2003	$238,000
1/2004	12/2004	$274,000
1/2005	12/2005	$261,000
1/2006	12/2006	$432,000[a]

[a]Cost includes upgrading the air stripper, such as replacement of the packing. The operation of the groundwater treatment facility was transferred to NYSDEC on October 16, 2006.

Table 3a

Annual System Operations/O&M Costs for OU2, Area 2

Dates		Total Cost rounded to nearest $1,000
From	To	
1/1997	12/1997	$274,000
1/1998	12/1998	$85,000 [a]
1/1999	12/1999	$352,000
1/2000	12/2000	$237,000 [a]

[a] The 1998 and 2000 actual costs are much lower than expected since the SVE system was shut down for approximately six and four months, respectively, as a result of extremely high rainfall and subsequent elevation of the groundwater table. During shut down, O&M costs including maintenance, field personnel, monthly soil vapor sampling, utilities, carbon changes and the disposal of water were not incurred.

Table 3b

Annual System Operations/O&M[a] Costs for OU2, Area 4

Dates		Total Cost Rounded to Nearest $1,000
From	To	
7/2003[b]	12/2003	$93,000
1/2004	12/2004	$254,000
1/2005	12/2005	$262,000[c]
1/2006	12/2006[d]	$100,000
1/2007	12/2007[d]	$52,000

[a]O&M – Operation and Maintenance.

[b]Construction of the SVE system was completed on June 27, 2003.

[c]Cost includes a Management and Supervision Fee of $21,000 and additional cost to award a new contract to Sevenson for O&M in a shutdown mode.

[d]Facility was shut down on January 20, 2006. Since January 2006, the SVE system was operated twice a month for a short period of time to exercise the equipment. Site maintenance was continued.

Table 4 – Total VOC Concentration (ug/L) in Monitoring Wells

Monitoring Well Identification	August 2007 (tenth)	June 2006 (ninth)	June 2005 (eighth)	June/July 2004 (seventh)	May 2003 (sixth)	October 2002 (fifth)	June 2001 (fourth)	June 2000 (third)	June 1999 (second)	November 1997 (first)
Well S-1	3	ND	3.72	3.19	2.9	22.26	NS	NS	NS	NS
Well S-2	157	188.34	185.59	409.98	741	533.68	807	1472	994	504.9*
Well S-6	41*	66	69.3	62.36	78	55.35*	NS	NS	NS	NS
Well S-7	224	131.45	210.9	164.26	286	1445.3	NS	NS	NS	561.22
Well S-8	6	5.48	19.7	2.57	0.1	35.5	NS	NS	NS	NS
Well S-11	1,037	833.78	1172.35*	2049.25	394	467.9	417	4154	383	441.7
Well EB-31	56	54.5	90.31	119.9	62	97.62	81	79	67	106
Well EB-33	61	46.65	75.34	70.55	176	355.35	552	833	1321	1285.23
Well EB-41	10	3.74	14.56	9.69*	8.4	31.2	8	6	6	4.6
Well EB-42	ND	0.46	1.52	0.67	1.5	ND	ND	1	ND	1
Well 1-22	NS	NS	NS	NS	1.8	ND	NS	NS	NS	NS
Well 1-23	ND	NS	NS	NS	NS	NS	ND	ND	ND	1
Well 1-24	ND	4.12	5.02	5.84	6.6	ND	5	9	4	8.33
Well 1-25	NS	0.81	ND	0.38	NS	NS	NS	NS	NS	NS
Well 1-25A	NS	0.41	0.97	0.49	NS	NS	NS	NS	NS	NS
Well 1-28	NS	NS	NS	NS	NS	NS	ND	NS	NS	NS
Well 1-28A	NS	NS	NS	NS	NS	NS	ND	NS	NS	NS
Well 1-29	27	120.7*	170.5	125.5	200	175.7	NS	58.5*	217*	249.3
Well 1-29A	39	42.44	50.3	45.85	49	43.86	51	NS	69	97.4
Well 1-30	ND	ND	1.6	ND	NS	NS	ND	ND	ND	1
Well 1-30A	ND	ND	ND	ND	NS	NS	ND	NS	NS	NS
Well 1-32	ND	0.58	ND	ND	0.6	ND	NS	NS	NS	NS
Well 1-32A	ND	ND	1.7	ND	0.1	ND	NS	NS	NS	NS
Total VOCs	1,662	1494.68	1544.69	2665.88	1389.5	1485.75	1870	6554	2775	2351.76

(initial) - indicates annual effectiveness report

NS - Not Sampled

* - Average of duplicate data

ND - Not Detected

Monitoring wells 1-23, 1-28, and 1-28A were not sampled in October 2002, May 2003, and June/July 2004 because they are not required to be sampled by the ROD.

Monitoring well 1-30 was not sampled in October 2002 and May 2003 because it is not required to be sampled by the ROD. Total VOCs are calculated using the results of monitoring wells S-2, S-11, EB-31, EB-33, EB-41, EB-42, 1-24.

Table 4 – Total VOC Concentration (ug/L) in Monitoring Wells

Monitoring Well Identification	November 1996 (initial)									
Well S-1	NS									
Well S-2	1572.5									
Well S-6	NS									
Well S-7	380									
Well S-8	ND									
Well S-11	5131									
Well EB-31	128.5									
Well EB-33	2384.4									
Well EB-41	ND									
Well EB-42	2									
Well 1-22	NS									
Well 1-23	NS									
Well 1-24	3.6									
Well 1-25	NS									
Well 1-25A	NS									
Well 1-28	NS									
Well 1-28A	NS									
Well 1-29	963									
Well 1-29A	30									
Well 1-30	ND									
Well 1-30A	NS									
Well 1-32	NS									
Well 1-32A	NS									
Total VOCs	9220									

(initial) - indicates annual effectiveness report

NS - Not Sampled

* - Average of duplicate data

ND - Not Detected

Monitoring wells 1-23, 1-28, and 1-28A were not sampled in October 2002, May 2003, and June/July 2004 because they are not required to be sampled by the ROD.

Monitoring well 1-30 was not sampled in October 2002 and May 2003 because it is not required to be sampled by the ROD. Total VOCs are calculated using the results of monitoring wells S-2, S-11, EB-31, EB-33, EB-41, EB-42, 1-24.

Table 5

Comments and Suggestions

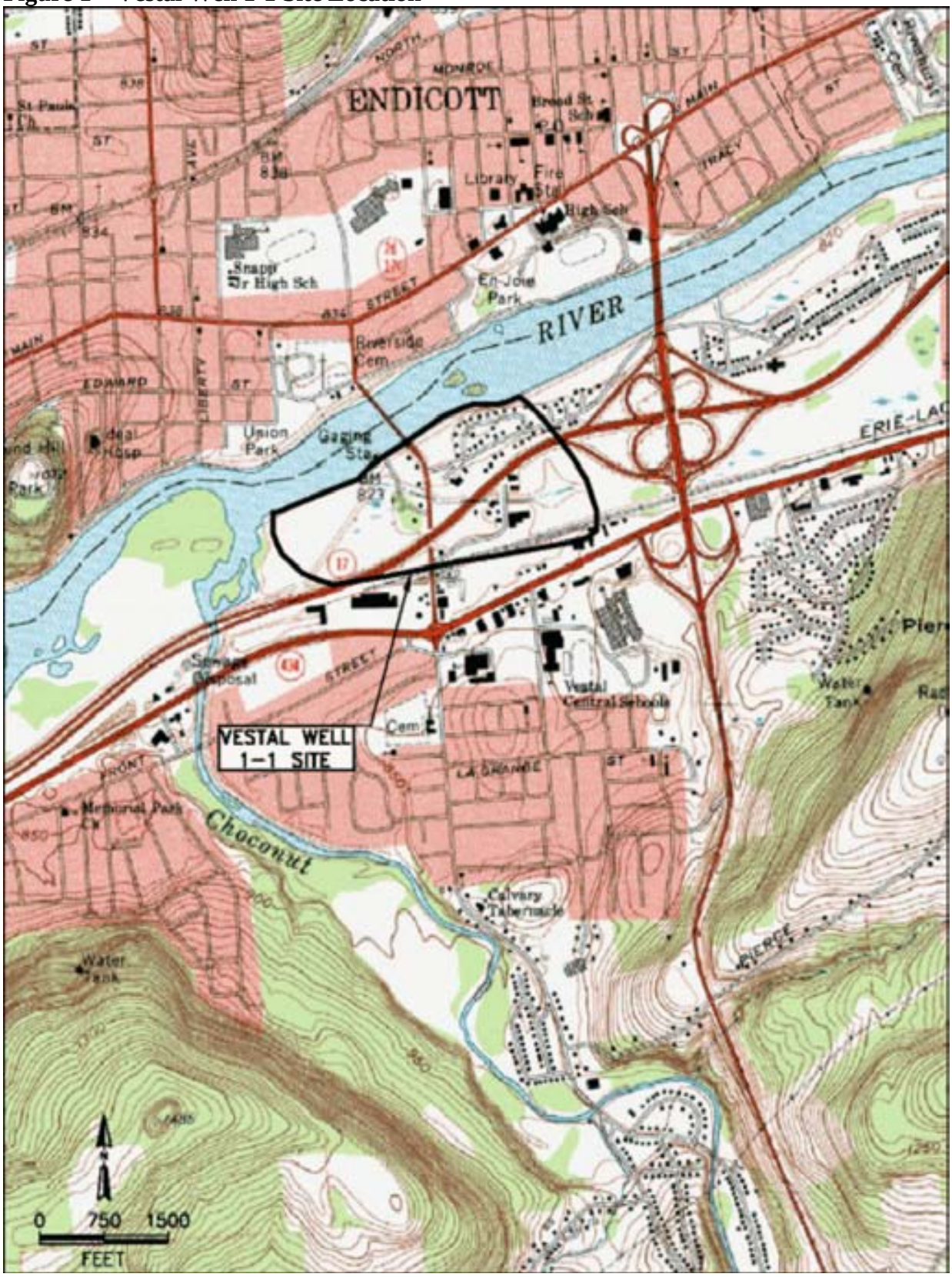
Comments	Suggestions
The pumping rate at Well 1-1A has significantly decreased over the last year.	Redevelop Well 1-1A and replace Well 1-1A pump, if needed.
The results of previous subslab sampling indicate that VOC vapors are collecting beneath the building foundation.	Conduct indoor air and subslab sampling at 200 Stage Road to monitor for intrusion of VOC vapors resulting from groundwater and soil contamination existing beneath the building.

Table 6

Table for Listing Recommendations and Follow-up Actions

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness (Y/N)	
				Current	Future
Area 4 SVE system currently shut down. SVE system needs to be reevaluated and restarted, if appropriate.	EPA/USACE	EPA	12/31/2010	No	No

Figure 1 – Vestal Well 1-1 Site Location



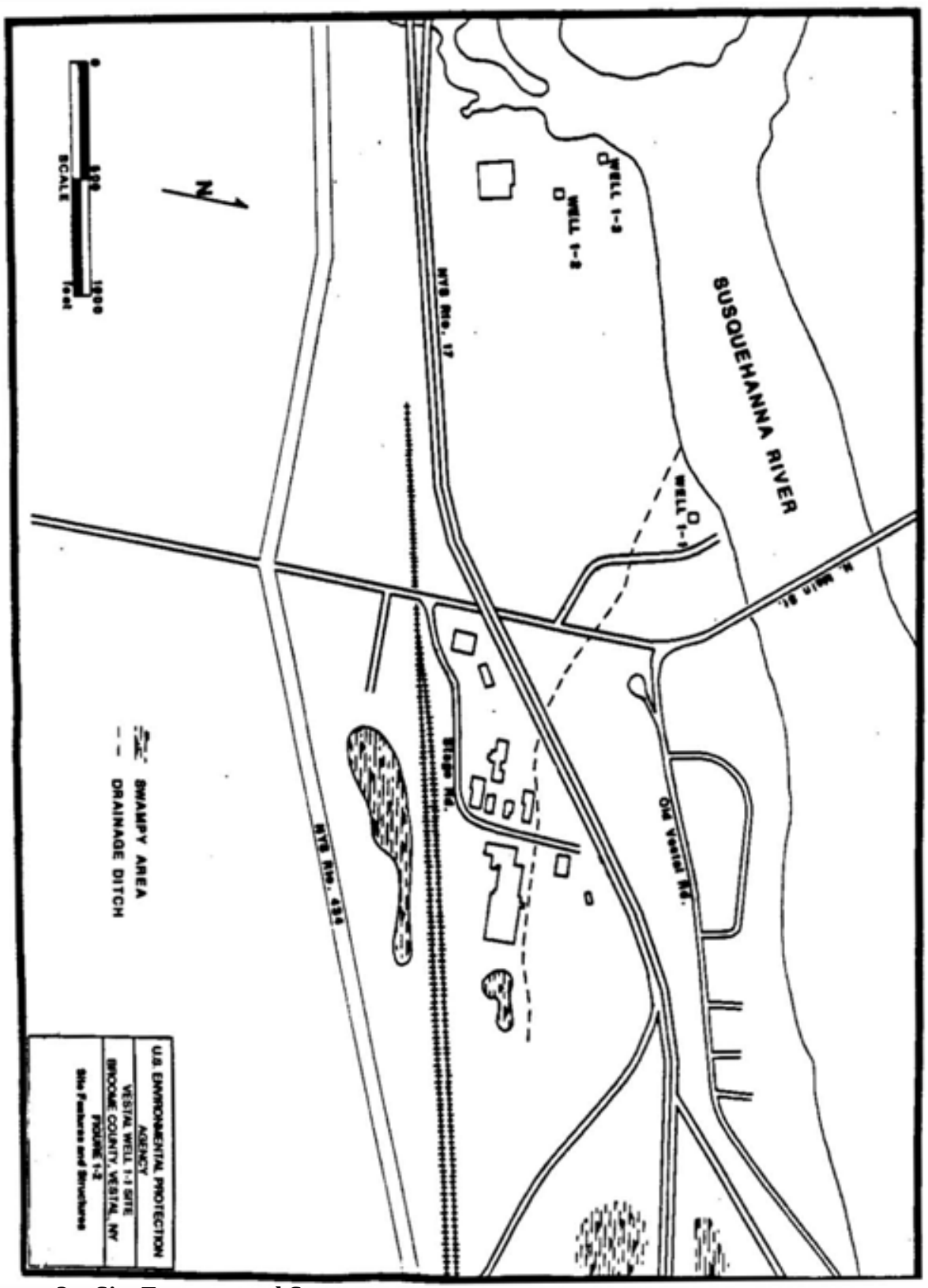


Figure 2 – Site Features and Structures

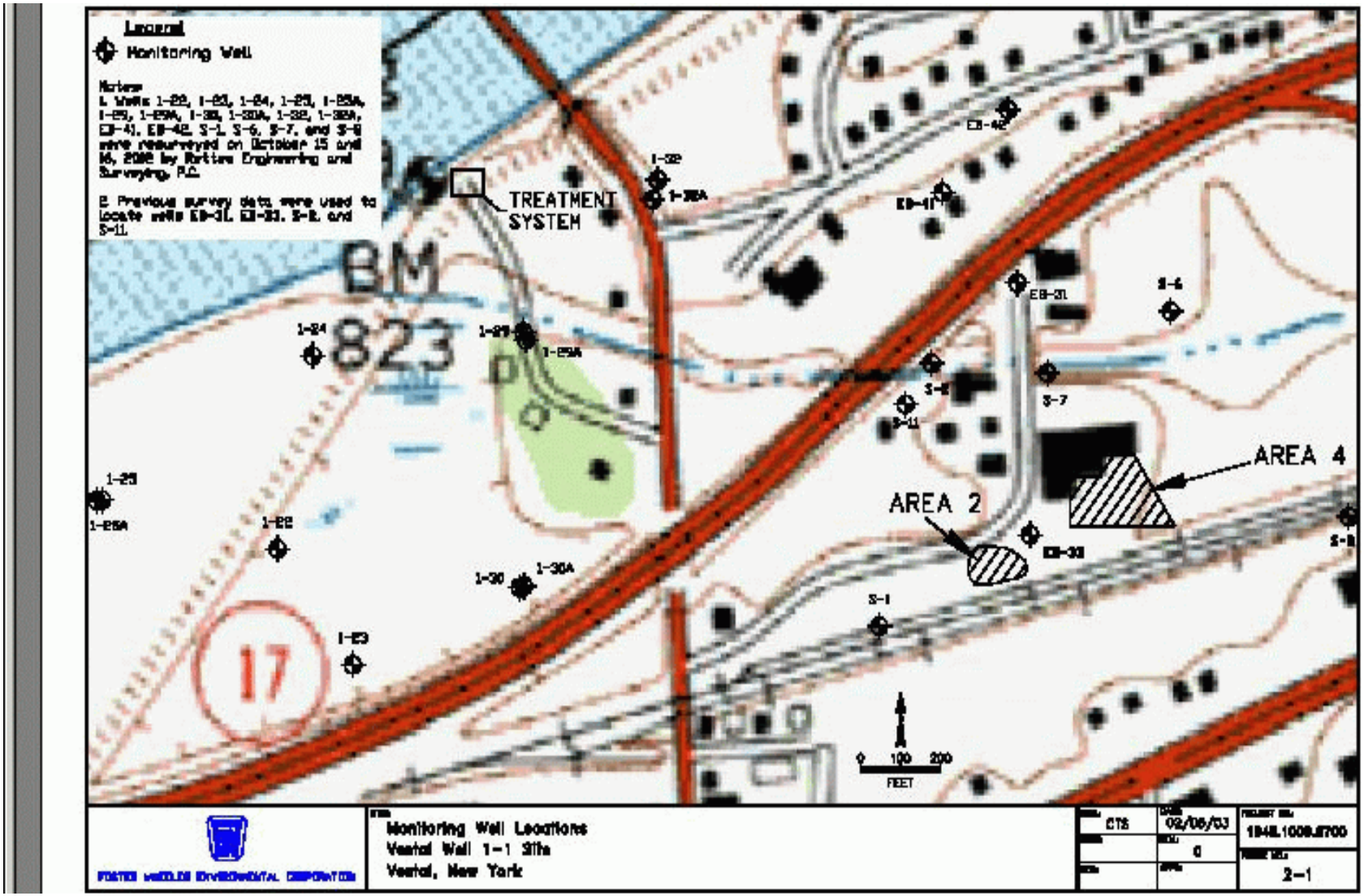


Figure 3 – Monitoring Well Locations

Figure 4 – Area 4 SVE System