Five-Year Review Report
American Thermostat Superfund Site
Town of Catskill
Greene County, New York

Prepared by:

United States Environmental Protection Agency
Region 2
New York, New York

August 2008

EXECUTIVE SUMMARY

This is the second five-year review for the American Thermostat Superfund site, located in the Town of Catskill, Greene County, New York. While the remedy is currently protecting human health and the environment, because of nationwide concerns regarding vapor intrusion at residential properties located near sites with volatile organic compound-contaminated groundwater, a vapor intrusion survey will be conducted at residential properties located downgradient of the site. In addition, should the existing building be occupied or should there be new construction on the property, the vapor intrusion pathway should be evaluated.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name *(from WasteLAN)*: **American Thermostat**		
EPA ID *(from WasteLAN)*: **NYD001233634**		
Region: **2**	State: **NY**	City/County: **Town of Catskill/Greene 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: **9/25/1998**
Has site been put into reuse? ☐ **YES** ■ **NO** ☐ **N/A**	

REVIEW STATUS	
Lead agency: ■ **EPA** ☐ **State** ☐ **Tribe** ☐ **Other Federal Agency**	
Author name: **Christos Tsiamis**	
Author title: **Remedial Project Manager**	Author affiliation: **EPA**
Review period:** **09/26/2003 to 09/25/2008**	
Date(s) of site inspection: **05/22/2008**	
Type of review: ☐ **Post-SARA** ☐ **Pre-SARA** ☐ **NPL-Removal only** ☐ **Non-NPL Remedial Action Site** ☐ **NPL State/Tribe-lead** ☐ **Regional Discretion** ☐ **Statutory** ■ **Policy**	
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)*: **09/25/2003**	
Due date *(five years after triggering action date)*: **09/25/2008**	
Does the report include recommendation(s) and follow-up action(s)? ■ **yes** ☐ **no** Is human exposure under control? ■ **yes** ☐ **no** Is migration of contaminated groundwater stabilized? ■ **yes** ☐ **no** ☐ **not yet determined** Is the remedy protective of the environment? ■ **yes** ☐ **no** ☐ **not yet determined** Acres in use or suitable for use: restricted: **2 acres** unrestricted: **6 acres**	

Five-Year Review Summary Form (continued)

Other Comments on Operation, Maintenance, Monitoring, and Institutional Controls

This site has ongoing operation, maintenance, and monitoring activities as part of the selected remedy. As was anticipated by the decision documents, these activities are subject to routine modification and adjustment.

Issues, Recommendations, and Follow-Up Actions

Should the existing building be occupied or should there be new construction on the property, the vapor intrusion pathway should be evaluated. In addition, because of nationwide concerns regarding vapor intrusion at residential properties located near sites with volatile organic compound-contaminated groundwater, a vapor intrusion survey should be conducted at residential properties located downgradient of the site (see Table 13, attached).

Protectiveness Statement

The implemented Operable Unit (OU) 1 actions protect human health and the environment by providing residences with an alternate water supply. The implemented OU2 actions protect human health and the environment in the short-term by controlling exposure pathways that could result in unacceptable risks. The affected and potentially affected residences have been connected to a public water supply or provided with treatment systems and the existing building on the plant property is not currently in use. The soils have been remediated and allow for unlimited use and the groundwater extraction and treatment system is currently operating. In order for OU2 to be protective in the long-term and promote the reuse of the on-site building, a vapor intrusion study should be conducted. The site-wide remedy is protective in the short-term.

I. Introduction

This five-year review was conducted pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. §9601 *et seq.* and 40 CFR 300.430(F)(4)(ii) and 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 the implemented actions protect human health and the environment and that they function as intended by the decision documents. This document will become part of the site file.

This is the second five-year review for the American Thermostat site. In accordance with Section 1.3.2 of the five-year review guidance, a policy five-year review is triggered by the signature date of the Preliminary Close-Out Report (PCOR). The trigger for the first five-year review was September 25, 1998, the approval date of the PCOR. In accordance with Section 1.3.3 of the five-year review guidance, a subsequent five-year review is triggered by the signature date of the previous five-year review report. The trigger for this subsequent five-year review is the date of the previous five-year review report, which is September 25, 2003.

The site consists of two operable units (OUs). The first OU provided a clean water supply to residents near the site. The second OU covers source control and the cleanup of the contaminated groundwater. This five-year review covers both OUs. Based upon this five-year review, it has been determined that the groundwater contamination at the site is under control, that there is no exposure to human receptors from site-related contaminants, and that the remedy is protective of the environment.

II. Site Chronology

Table 1 (attached) summarizes the site-related events from discovery to construction completion.

III. Background

Physical Characteristics

The site is located in a rural residential area in the Town of Catskill, Greene County, New York, approximately 30 miles southwest of Albany and five miles west of the Village of Catskill. The approximately eight-acre site is bordered by Routes 23B and Route 23 on the north and south, respectively, by a residential property on the west, and by New York State-owned property on the east. The site contains the former American Thermostat building and the water treatment plant constructed for the implementation of the groundwater remedy.

The topography within the vicinity of the site may be characterized as gently rolling foothills of the Catskill Mountains which are deeply incised by stream channels. The site is located on a slight ridge overlooking Catskill Creek Valley. Immediately west of the facility is a small valley which includes Tributary B, a tributary of Catskill Creek. East of the facility is Tributary

A, which also flows into Catskill Creek, located approximately a quarter mile to the east of the site.

Site Geology/Hydrogeology

Regionally, the bedrock within Greene County consists of interbedded shales and sandstones of Devonian age, known as the Catskill Formation. The Catskill Formation is made up of four distinct bedrock groups. From oldest to youngest, these groups are Hamilton, Geneses, Sonya, and West Falls. The site lies within the Hamilton Group. In the vicinity of the site, groundwater is found between 5 to 8 feet below the ground surface in the overburden. The bedrock is at an average depth of 28-30 feet below the ground surface. The unconsolidated soils overlying the bedrock are primarily glacially-derived soils and sediments.

Land and Resource Use

The area surrounding the site is characterized as rural-residential. The American Thermostat Corporation was the only manufacturing facility in the area. There are a few full-time residences, vacation homes, and several small businesses in the vicinity of the site. Approximately 5,000 people live within a 3-mile radius of the site in low-density residential areas. Until a waterline was installed to protect the public from exposure to the contaminated groundwater, all homes within ½ mile of the site used private wells. At present, all residences and businesses within the immediate vicinity of the site receive water from the municipal supply of the Village of Catskill.

Catskill Creek is classified as a trout stream and has considerable recreational value to local and visiting fishermen. The Creek is also an auxiliary water supply for the Village of Catskill.

History of Contamination

From 1954 to 1985, the American Thermostat Corporation built thermostats for small appliances at the site. In 1981, NYSDEC discovered that American Thermostat employees were improperly disposing of chemicals at the site—workers had been pouring waste organic solvents down drains attached to an abandoned septic system for a number of years and they had been dumping solvents and sludges onto the parking lot. State health personnel tested wells in the vicinity of the site and found them to be contaminated with tetrachloroethylene (PCE) and trichloroethylene (TCE).

Initial Response

In February 1983, New York State entered into an interim consent order with American Thermostat Corporation and Amro Realty Corporation (the property owner) in which the companies agreed to clean up the site and its surroundings; install, monitor, and maintain carbon filter systems for five affected wells; supply bottled water for consumption by the affected residents; and monitor two groups of bordering private wells to determine whether any contamination had spread beyond the original affected area. However, when the company went out of business in May 1985, it stopped providing bottled water and abandoned the maintenance of carbon filtration systems at the affected homes. The State requested that EPA take over the maintenance of the water treatment systems, sample other private wells near the site, and provide bottled water and carbon filtration systems where necessary. In addition to undertaking the work requested by the State, EPA also installed three air stripping systems at the site. A system of seven extraction and reinjection wells and a soil vacuum extraction system were installed at the site in 1989 to accelerate the treatment of the groundwater.

Basis for Taking Action

The site is being addressed as two OUs. The first OU provided a clean water supply to residents near the site. The second OU covers source control and the cleanup of the contaminated groundwater.

Following the listing of the site on the National Priorities List in June 1986, EPA undertook a focused feasibility study (FFS) to evaluate alternative water supplies for the affected and potentially affected residences at the site.

In January 1988, EPA initiated a source control remedial investigation/feasibility study (RI/FS) to determine the nature and extent of contamination emanating from the site and to evaluate remedial alternatives. The RI concluded that the groundwater in the on-property overburden and bedrock aquifers and in the off-property bedrock aquifer was contaminated with volatile organic compounds (VOCs), primarily PCE and TCE. An estimated 26,000 square feet of soil at the site were also found to be contaminated with TCE and PCE down to a maximum depth of approximately 30 feet. Contamination was also detected in portions of the building located on-site.

IV. Remedial Actions

Remedy Selection

Based upon the results of the above-noted FFS, in January 1988, EPA signed a Record of Decision (ROD), calling for the extension of the existing Village of Catskill water district pipeline to the affected and potentially affected areas as an interim remedy.

On June 29, 1990, a ROD to control the source of the contamination was signed, selecting low temperature thermal desorption (LTTD) to treat the contaminated soil and extraction, air stripping, carbon adsorption, and reinjection for treating the contaminated groundwater. The ROD also called for the decontamination of the building by vacuuming, dusting, and wiping of approximately 67,000 square feet of the building floor, off-site disposal/treatment of the collected hazardous dust, removal and off-site disposal/treatment of 18 hazardous waste liquid drums stored in the building, and removal and off-site disposal/treatment of sludge from four drainage pits inside the building.

The ROD specified that approximately 7,000 cubic yards (CY) of soil above the water table exceeding 1.0 milligram per kilogram (mg/kg) for PCE and 0.4 mg/kg for TCE[1] were to be excavated and thermally treated by LTTD. Sampling conducted during the RD, however, revealed additional contamination both in the shallow soil (above the water table) and in the deep soil (from the water table down to bedrock). Since the source material would contribute to the existing groundwater contamination problem via leaching and direct contact (for soil below the water table), EPA concluded that remediating the additional shallow soil and the soil below the water table would be beneficial to the long-term groundwater cleanup. Based on the RD findings, it was concluded that approximately 13,000 CY of soil would need to be remediated as part of the source control remedy. These findings were documented in a July 1997 Explanation of Significant Differences (ESD).

Remedy Implementation

Alternate Water Supply

Although an alternate water supply remedy was selected in 1988, the design of the alternate water supply was not initiated by EPA's contractor, TAMS Consultants (TAMS), until July 1990. The delay in the initiation of the RD was due to lengthy negotiations between EPA, NYSDEC, the New York State Department of Health, and the Town and the Village of Catskill aimed at resolving several complex issues regarding the new water supply system and the development of a new water district.

The plans and specifications related to the construction of the alternate water supply were completed in September 1991. TAMS awarded a remedial action (RA) contract to F.C. Compagni Construction Company, Inc. to implement the remedy in October 1991. The construction of the alternate water supply, which included the installation of approximately 3.5 miles of pipeline and connections to 52 residences, started in May 1992 and was completed in November 1992. The Village of Catskill assumed responsibility for maintaining the alternate water supply system in accordance with an October 1991 memorandum of understanding between EPA and the Village of Catskill.

An RA Report associated with the alternate water supply was approved on December 29, 1992.

Building Decontamination

The building decontamination RD was initiated by TAMS in October 1990; the plans and specifications were completed in September 1991. TAMS awarded a contract to All-State Powervac, Inc. to implement the remedy in July 1992. The cleanup activities at the building were initiated on September 14, 1992 and were completed on September 29, 1992.
An RA Report associated with the building decontamination was approved on December 31, 1992.

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[1] Based on a risk assessment performed as part of the source control RI/FS, it was determined that soils containing less than 1.0 mg/kg of PCE and less than 0.4 mg/kg of TCE would present excess carcinogenic risks of no more than $1x10^{-6}$, falling within EPA's target risk range of 10^{-4} to10^{-6}.

Soil Remediation

The soil excavation and treatment RD was initiated by TAMS in October 1990; the plans and specifications related to the soil treatment were completed in September 1992. Following the RD completion, Foster Wheeler Environmental Corporation became EPA's contractor for the soil RA. In April 1993, Foster Wheeler Environmental Corporation awarded an RA contract to Williams Environmental Services, Inc. (Williams) to implement the soil remedy. Williams initiated the soil remediation in September 1993 and had completed the treatment of 12,670 CY of contaminated soil by May 1995. Prior to Williams' mobilization to the site, EPA conducted preconstruction deep soil sampling to define the outer limits of the contamination. Based on these results and on the findings of post-excavation wall and floor sampling performed by Williams during the execution of the soil remedy, EPA defined several areas for additional excavation and treatment both on the site and on the adjacent private property and estimated the total potential additional volume of contaminated soil to be 30,000 CY.

In the interest of assessing possible cost and schedule benefits, attempts were made to simply extend William's scope of work. However, based on independent cost estimates by Foster Wheeler Environmental Corporation and EPA and on initial soil remedy bidding information, Williams' proposal was deemed to be unacceptable. As a result, a new procurement process was initiated.

Foster Wheeler Environmental Corporation awarded an RA contract for the excavation and thermal treatment of the additional soil to O'Brien & Gere Technical Services, Inc. In October 1995, O'Brien & Gere Technical Services, Inc., initiated construction of the final phase of the soil remedy in December 1995 and completed all thermal treatment and backfill work by December 1996. The quantity of soil treated during this phase of the soil remedy was 25,644 CY. The total amount of contaminated source material remediated was 38,314 CY.

An RA Report associated with the soil remedy was approved on September 19, 1997.

Groundwater Remediation

The groundwater remediation RD was initiated by TAMS in October 1990; the plans and specifications related to the groundwater extraction and treatment were completed in September 1993. Initiation of the groundwater RA, though, had to be postponed until all soil RA activities at the site were completed. Following the RD completion, Foster Wheeler Environmental Corporation became EPA's contractor for the groundwater RA. In March 1997, Foster Wheeler Environmental Corporation awarded an RA contract to Fluor Daniel GTI, Inc. to implement the groundwater remedy. The construction of the groundwater remedy began in June 1997 and was completed in July 1998.

The groundwater management system includes extraction, injection, and monitoring wells installed in the overburden and bedrock aquifers, as well as residential monitoring wells. Initially, the groundwater management system consisted of 16 overburden extraction wells, 14 extraction bedrock wells, 14 injection wells, and 10 monitoring wells (a number of wells have been converted or eliminated as a result of optimization efforts). Sheets 1-4, attached, show the layout of the groundwater management system.

An RA Report associated with the groundwater remedy was approved on September 30, 1998.

Construction Completion

A PCOR was approved on September 25, 1998.

Institutional Controls Implementation

Since the OU1 ROD called for the extension of the existing Village of Catskill water district pipeline to the affected and potentially affected areas, institutional controls to restrict the installation of wells in the groundwater plume were not deemed necessary. The OU2 ROD did not call for institutional controls for the site proper since it was envisioned that the use of the property would be significantly encumbered by the groundwater extraction, treatment, and reinjection system until groundwater standards are achieved. Since the final remedy will allow for unrestricted use of the property, institutional controls following the completion of the remedy are not needed. Nevertheless, to obtain site access to the property to perform the remediation, long-term response action, and state operation and maintenance and to prevent the property owner's interference with these activities, in 1997, Amro Realty Corporation (the property owner) and the Estate of Harry Moskowitz (the former president and owner of American Thermostat Corporation) signed a *Declaration of Covenants, Conditions, and Restrictions* which, among other things, prohibits the use of the property in any manner by Amro Realty Corporation and the Estate of Harry Moskowitz unless EPA determines that such use would not adversely affect the integrity or effectiveness of the response action.

System Operations/Operation and Maintenance

In early 1999, after VOC contamination was detected in three residential bedrock wells to the west of Scotch Rock Road and in two wells at the Country Estates residential development, which were located beyond the previous limits of the contaminated groundwater plume, seven existing residential wells were included in the groundwater monitoring program[2]. By 2000, a total of nine residential wells were being monitored.
From 1998 to 2001, groundwater monitoring was conducted on a monthly basis in all wells. However, in an effort to optimize the groundwater management system, several measures were implemented over the years. Specifically, in September 2000, an injection well was converted

[2] In November 1998, the New York State Department of Health (NYSDOH) reported to EPA the detection of VOC contamination in two wells servicing the Country Estates residential development, located in the western boundary of the Town of Catskill. During sampling conducted by EPA and NYSDOH in December 1998 and January 1999, VOC contamination was detected in three additional residential wells to the west of Scotch Rock Road which, like the Country Estates wells, were located outside the previous limits of the contaminated groundwater plume. EPA installed carbon treatment systems on the Country Estates and three residential wells.

into an extraction well and an extraction well was deepened to access a zone of higher aquifer contamination. Starting in mid-2001, all of the overburden extraction wells, six monitoring wells, and eight bedrock extraction wells were being monitored semiannually, while the remaining bedrock extraction and monitoring wells and all nine residential wells continued to be sampled monthly. In October 2001, an injection well in the vicinity of the site, where high PCE concentrations were detected, was converted into an extraction well. Also, in 2001, pumping was discontinued at one overburden and two bedrock extraction wells that had reached the groundwater standards. As further optimization measures, the pumping at five bedrock extraction wells with very low contaminant concentrations was discontinued in December 2003. Also, the sampling of eight monitoring wells which no longer yielded useful information (because of low depths and/or low concentrations) was discontinued in late 2003.

Presently, the groundwater management system extracts water from nine bedrock and 14 overburden wells[3]. Groundwater monitoring in five bedrock extraction wells, six residential wells, and one monitoring well is performed on a quarterly basis. In addition, two wells that service the Country Estates development are monitored on a monthly basis. The remaining four bedrock wells and 14 overburden wells are monitored on a semiannual basis. Based on the review of the April 2008 sampling results, however, it was decided that three additional bedrock wells will now be sampled on a semiannual basis since their concentrations have stabilized at relatively low levels. The two remaining bedrock wells, which are located immediately downgradient of the source area, still have elevated concentrations of PCE. These wells will continue to be sampled on a quarterly basis.

From August 1998 to December 2003, the groundwater treatment plant operated at a pumping rate of approximately 70 gallons per minute (gpm). In December 2003, when the five bedrock wells with low contamination levels were taken offline in an effort to optimize the treatment system, the groundwater treatment plant began operating at a pumping rate ranging from 35 to 40 gpm. The system has consistently met groundwater cleanup levels and groundwater reinjection requirements. The treatment plant staffing includes an operator and a staff engineer. The operator is present at the site on a daily basis for eight hours, attending to equipment repairs and maintenance at the plant and at the well vaults, and performing the scheduled sampling of the wells. The plant engineer does not routinely visit the site, but performs occasional site inspections and prepares monthly project reports. The extraction and monitoring wells are sampled according to the schedule contained in the operation and maintenance (O&M) manual, as revised during subsequent optimizations of the system.

Routine maintenance of the system includes repairs of well pumps and process equipment at the treatment plant, backwashing of the multimedia filters and of the liquid carbon adsorption filter, pumping standing water from the well vaults, and replenishing treatment chemicals.

It is suggested that remedy optimization and enhancement measures continue.

[3] The overburden wells have been installed on the plant grounds to capture contaminated water at the source area and to prevent it from moving into the bedrock aquifer, which is the source of potable water in the area. The bedrock wells are located on and off the plant grounds.

With the completion of ten years of long-term response, NYSDEC will be assuming responsibility for O&M related to the groundwater remedy in October 2008.

The annual O&M costs are approximately $666,000; these costs are broken down in Table 2 (attached).

V. Progress since Last Five-Year Review

The first five-year review was conducted in September 2003 pursuant to OSWER Directive 9355.7-03B-P. This five-year review concluded that the implemented remedy continued to provide adequate protection of public health and the environment. While there were no recommendations, follow-up actions, or issues presented in the first five-year review, the first five-year review suggested that the vapor intrusion pathway be evaluated should the existing building be occupied or should there be new construction on the property. Since the existing building was not occupied nor was construction on the property planned during the review period, this vapor intrusion pathway was not evaluated.

During the first review period, vapor intrusion was not a concern at the nearby residential properties since contamination has not been detected in the overburden at off-property locations and the water table for the underlying contaminated bedrock aquifer is located approximately 75 feet below the ground surface. Because of nationwide concerns regarding vapor intrusion at residential properties located near sites with volatile organic compound-contaminated groundwater, during this review period, it was, however, decided that a vapor intrusion survey should be conducted at residential properties located downgradient of the site. A vapor intrusion survey of three residential properties located immediately downgradient of the property was scheduled for early 2008. Due to the lack of interest by these property owners and the inability to schedule other properties before the end of the heating season, the survey did not, however, take place. EPA intends to schedule the survey for the coming heating season.

VI. Five-Year Review Process

Administrative Components

The five-year review team consisted of Christos Tsiamis (remedial project manager [RPM]), Edward Modica (hydrogeologist), and Michael Sivak (risk assessor).

Community Involvement

The EPA Community Involvement Coordinator for the American Thermostat site, Kristen Skopeck, published a notice in the *Catskill Daily Mail*, a local newspaper, on April 19, 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 remedy for the site to ensure that the implemented remedy remains protective of public health and the environment and is functioning as designed. It was 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 RPM's address and telephone number for questions related to the five-year review process or the American Thermostat site.

Document Review

The documents, data, and information which were reviewed in completing the five-year review are summarized in Table 3 (attached).

Data Review

No data is presented for the residential wells along Scotch Rock Road and in the wells at the Country Estates residential development since contamination is no longer present.

An evaluation of total VOCs and PCE concentrations in 9 bedrock and 13 overburden extraction wells was conducted for the time period 1998-2008. Sample results for quarterly intervals were plotted and total VOCs trends were generated for each plot. A second set of plots was developed for the same group of extraction wells and VOC data but for the period 2004-2008. This was to record trends over a period in which groundwater flow and contamination distribution were not affected by changes made to the extraction system. During the early stages of the operation of the groundwater extraction and treatment operation, the system was periodically optimized, *e.g.,* wells that showed diminishing concentrations were shut down and the burden of contaminant removal was left to fewer wells. The last stage of well shut-downs occurred in late 2003. Hence, the period 2004-2008 should reflect groundwater flow and transport conditions that are not much disturbed by alterations to pumping strategy.

To help define the trends in the data, the Mann-Kendall Test was used. This test is a rank-based procedure that measures strength on a monotonic relationship between two variables; in this case, the groundwater concentration in a well at a point in time. Tables 4-6, attached, summarize the results from the Mann-Kendall Test.

Based on the results, most bedrock wells show decreases in contaminant concentrations over the period of operation. Bedrock extraction wells EW-6 and EW-14 (see Sheets 1-4 for the locations of the noted and subsequently referenced wells) show the strongest decreasing trends in terms of the tau coefficient and the slope of the trend line (statistical measurements). Each of these wells is located about 2,400 feet apart, with extraction well EW-6 being closest to the facility. For the 1998-2008 period, extraction wells EW-10, EW-11, and EW-12 show no contamination trend, a slightly increasing trend, and a weakly decreasing trend, respectively, in terms of the tau coefficient. The wells are located close together near Route 23B, about 1,400 feet from the facility. The plots for the 2004-2008 period for wells for extraction wells EW-11 and EW-12 show improved decreasing trends, possibly a reflection of well optimizations. Extraction well EW-9 show a modest decreasing trend for the 1998-2008 period. However, the trend analysis for this well, based on the 2004-2008 period, shows increasing contamination. Extraction wells EW-2 and EW-7 show moderately strong decreasing contamination trends for the 1998-2008 period and diminished decreasing trends for the 2004-2008 period. Extraction well EW-16 shows a weak decreasing trend for the 2002-2008 period and no trend for the 2004-2008 period. Extraction wells EW-2, EW-7, and EW-16 are located near the facility.

All extraction wells screened in the overburden aquifer are located close to the facility. Most of these wells show decreases in contaminant concentrations over the period of operation. Extraction well OW-7 indicates the strongest decreasing trend of the overburden wells in terms of the tau coefficient and slope of the trend line. Extraction wells OW-9 and OW-10 also indicate moderately good decreasing contamination trends for the 1998-2008 period, although extraction well OW-10 shows an increasing trend for the 2004-2008 period. Extraction well OW-5 is comparatively anomalous in showing a somewhat strongly increasing trend in contaminant concentration since the start of operation. Extraction wells OW-2 and OW-3, which show moderate to weak decreasing trends since 1998, show increasing trends for the 2004-2008 period. Extraction Wells OW-1, OW-6, OW-11, OW-13, OW-14, and OW-15 show moderately good decreasing trends for the 1998-2008 period and various trends for the 2004-2008 period. Well OW-16 shows a somewhat weak decreasing trend over the period of operation and no trend for the 2004-2008 period.

It should be noted that both the magnitude of VOC concentrations at the start of the extraction and treatment operation and the quantity of contaminant mass removed vary considerably among wells. These concentrations need to be considered from the perspective of the groundwater remedial objectives. For example, the highest PCE concentration in groundwater for extraction well EW-7 was 31,000 µg/l in 1998 and was reduced to about 1,000 µg/l by 2008. Whereas, the highest PCE concentration for extraction well EW-14 was about 3,800 µg/l in 2000 and was reduced to about 1 µg/l by 2008. Although there appear to be substantial reductions in VOC concentrations in extraction well EW-7, the concentrations that still persist in the vicinity of this well are above cleanup standards. Hence, more time is required to allow the system to further reduce contamination in this part of the aquifer. For extraction well EW-14, although less mass was removed during the period of operation than in extraction well EW-7, the current levels are close to the cleanup standard.

In summary, the monitoring well data collected since the commencement of the groundwater extraction and treatment shows an overall decreasing trend in the VOC contamination. Specifically, TCE and PCE concentrations in the majority of the extraction wells have been reduced by more than 90%. In the bedrock, reductions in the PCE concentrations ranged between 91-100% for all but one extraction well. This well, extraction well EW-16, had a low overall reduction in PCE concentration since 1998 (29%) and showed a significant increase since the last five-year review (from 2,000 micrograms per liter [µg/l] in April 2003 to 8,500 µg/l in April 2008.) This well, which is located immediately downgradient of the property, is downgradient of extraction well OW-5, which also showed a significant increase in PCE concentration during the same period (from 4,600 µg/l in 2003 to 9,100 µg/l in 2008)[4]. Overburden extraction wells OW-2 and OW-3, which showed moderate to weak decreasing trends since 1998, show increasing trends for the 2004-2008 period. For the remaining overburden wells, overall reductions in PCE concentration ranged from 61% to 99%.

Tables 8- 10, attached, summarize the above extraction well data and analysis.

To date, over 265 million gallons of contaminated groundwater have been treated and approximately 1.9 tons of VOCs have been removed from the groundwater. The average concentration of the PCE (the primary contaminant) in the influent to the treatment system was reduced by approximately 60% in the period from October 1998 to October 2002. It was

[4] It is possible that the increases are due to the desorption of contaminants in the site's saturated soil and residual contamination in soils located in close proximity to the building foundation, respectively.

further reduced by approximately 50% in the period between February 2004 and February 2008 following the discontinuation of extraction from five bedrock wells of low contaminant concentrations in December 2003 (see Table 11, attached).

Contamination levels in the extraction and monitoring wells should continue to be monitored at the site and the contamination trends should continue to be updated. However, wells that continue to show trends of increasing contamination or trends that do not decrease while remaining above the cleanup standard should be noted. The persistence of increasing or flat contamination trends indicate that further measures may need to be taken to reduce contamination in the aquifer where these wells are screened.

Site Inspection

On May 22, 2008, a 5-year review-related site inspection was conducted by Christos Tsiamis, the RPM, Michael Sivak (Risk Assessor), Emily Guyer (Tetra Tech FW), and Gerald Pratt (NYSDEC Project Manager).

Interviews

No interviews were conducted for this review.

Institutional Controls Verification

The 1997 *Declaration of Covenants, Conditions, and Restrictions* remain in force and are on file at the Greene County Clerk's office.

Other Comments on Operation, Maintenance, Monitoring, and Institutional Controls

Table 9 (attached) presents some comments and offers some suggestions.

VII. Technical Assessment

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

<u>Alternate Water Supply</u>

The 1988 ROD called for the extension of the existing Village of Catskill water district pipeline to the affected and potentially affected areas. The construction of the alternate water supply connected 52 affected and potentially affected residences to the Village of Catskill's water supply. The Village of Catskill is presently maintaining the alternate water supply system. The alternate water supply is functioning as intended by the 1988 ROD.

<u>Building Decontamination</u>

The 1990 ROD specified that, in order for the building to be utilized in the future, hazardous dust would have to be removed from contaminated surfaces, and all hazardous materials in drums and drainage pits in the building would be removed and disposed.

An inspection on September 29, 1992 verified that the building had been cleared of all debris, visible dust had been vacuumed from the floors, and the drainage pits had been power washed.

Presently, the building (which is in disrepair) is available for reuse contingent upon an evaluation of the vapor intrusion pathway.

Source Control

The 1990 ROD, as modified by the 1997 ESD, called for the cleanup of the contaminated soil at the site in order to eliminate the threat to human health from possible ingestion or dermal contact with the soil. The analytical results from post-excavation soil samples collected from the excavation limits indicated that the residual levels of PCE and TCE were well below the 1.0 mg/kg and 0.4 mg/kg target levels, respectively. Therefore, the remediation of the source of contamination has reduced contamination of site soils in the unsaturated zone to acceptable health-based levels.

Groundwater Restoration

The 1990 ROD called for the extraction and treatment of the contaminated groundwater so as to contain the migration of the contaminant plume and, in time, to achieve federal and state groundwater standards.

The Applicable or Relevant and Appropriate Requirements for groundwater cleanup include EPA's Maximum Contaminant Levels (MCLs) and New York State's groundwater quality standards. The action level established for PCE and TCE is 5 µg/l (proposed MCL and New York State's groundwater quality standard at the time of ROD issuance). Based on the analytical results associated with the groundwater management system influent and effluent VOC sampling and monitoring, it has been concluded that the groundwater management system is effectively treating the VOC-contaminated water to concentrations meeting the action levels.

The groundwater treatment system's effluent also meets all reinjection requirements.

Based upon the results of the five-year review, it has been concluded that the alternate water supply is functioning as intended by the 1988 ROD and that the groundwater extraction and treatment system is functioning as intended by the 1990 ROD.

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. Contaminated soil was treated to reduce the risk to receptors that may become exposed to contaminated soil and to remove a continuing source of contamination to the groundwater. The criteria for the cleanup were 1.0 mg/kg for PCE and 0.4 mg/kg for TCE. Post-excavation confirmatory samples indicated that this was achieved. While PCE and TCE toxicity values have changed since the ROD, the new risk-based concentrations (calculated to protect long-term exposure) indicate that the residual levels of PCE and TCE in the site soil do not pose an unacceptable risk.

The MCL for arsenic when the OU2 ROD was signed was 50 µg/l. The MCL was lowered to 10 µg/l in January 2006. As long as it has been in operation, the groundwater treatment system has consistently treated the arsenic in the extracted groundwater to less than 10 µg/l. There have been no other changes in the Applicable or Relevant and Appropriate Requirements and no additional new standards affecting the protectiveness of the groundwater remedy.

Fifty-two affected and potentially residential properties were connected to the Village of Catskill's public water supply in 1992.

In 1998, VOC contamination was detected in two wells servicing the Country Estates residential development and three residential wells along Scotch Rock Road. All of these wells are located outside the previous limits of the contaminated groundwater plume. EPA undertook emergency actions (installed carbon treatment systems) to provide temporary sources of clean drinking water to the affected residents. Although contamination is no longer present in the residential wells along Scotch Rock Road and in the wells at the Country Estates residential development, as a precautionary measure, EPA has been maintaining the treatment systems on the wells.

The concentrations of contaminants of concern in the groundwater at the site remain above the MCLs.

Certain exposure assumptions (*e.g.*, inhalation rates, soil ingestion rate) have changed since the baseline risk assessment was conducted in 1989; however these changes do not affect the remedy since residents are not utilizing contaminated groundwater for potable purposes.

The groundwater use is not expected to change during the next five years, the period of time considered in this review. Therefore, the groundwater remedy is protective, since routes of exposure have been interrupted or the groundwater is treated prior to use.

Soil vapor intrusion was also evaluated as a potential exposure pathway based on the conservative (health protective) assumption that residences are located above the maximum detected concentrations and utilized the health-based screening criteria provided in *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Pathway from Groundwater and Soils* (EPA, November 2002). This guidance provides calculations of concentrations in groundwater associated with indoor air concentrations at acceptable levels of cancer risk and noncancer hazard. This review compared the maximum detected concentrations of the chemicals of potential concern with the vapor intrusion screening criteria. The maximum concentrations detected in on-site wells exceeded the screening criteria for TCE, PCE, and vinyl chloride at the most protective screening level (10^{-6}) and the upper-bound of the acceptable risk (10^{-4}). Cis-1,2-dichloroethene and 1,2-dichloroethene (total) maximum concentrations detected on the plant property exceeded the screening criteria at the most protective screening level, but did not exceed the upper-bound risk level (10^{-4}). The results of this screening do not mean that there is an unacceptable risk associated with vapor intrusion in the existing building or in any buildings that might be constructed on the plant property in the future. Rather, this merely indicates that the vapor intrusion pathway should be evaluated should the existing building be occupied or should there be new construction on the property. In the instance of new construction, site-specific considerations, such as the type of building, the location of the building to the maximum detected concentration, and the subsurface characteristics of the site, would have to be evaluated.

With regard to the nearby residential properties, vapor intrusion was not previously a concern since contamination has not been detected in the approximately 30-foot overburden at off-property locations and the water table for the underlying contaminated bedrock aquifer is located approximately 75 feet below the ground surface. However, because of nationwide concerns regarding vapor intrusion at residential properties located near sites with volatile organic compound-contaminated groundwater, it was decided that a vapor intrusion survey should be conducted at residential properties located downgradient of the site. A vapor intrusion survey of three residential properties located immediately downgradient of the property was scheduled for early 2008. However, due to the lack of interest by these property owners and the inability to schedule other properties before the end of the heating season, the survey did not take place. EPA intends to schedule the survey for the coming heating season.

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

There is no information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

Based upon the results of the five-year review, it has been concluded that:

- The Village-supplied drinking water and the carbon treatment systems meet water quality standards;
- Site soils have been cleaned to protective levels;
- The building has been decontaminated;
- The groundwater extraction and treatment system is operating properly;
- The treated groundwater meets reinjection criteria;
- The fence around the site is intact and in good repair;
- The groundwater monitoring wells are functional; and

- There is no evidence of trespassing, vandalism or damage (to the extraction wells, monitoring wells, or fence).

EPA is continuing to see decreases in the levels of contamination in the groundwater in the vicinity of the site as a direct result of the groundwater extraction and treatment system. Three residential wells located to the west of Scotch Rock Road are the historical limits of the contaminated groundwater plume. PCE and TCE have not been detected in these wells since January 2006; there have, however, been sporadic detections of their breakdown products.

VIII. Issues, Recommendations, and Follow-Up Actions

Table 13 (attached) contains recommendations and follow-up actions which should ensure long-term protectiveness.

IX. Protectiveness Statement

The implemented OU1 actions protect human health and the environment by providing residences with an alternate water supply. The implemented OU2 actions protect human health and the environment in the short-term by controlling exposure pathways that could result in unacceptable risks. The affected and potentially affected residences have been connected to a public water supply or provided with treatment systems and the existing building on the plant property is not currently in use. The soils have been remediated and allow for unlimited use and the groundwater extraction and treatment system is currently operating. In order for OU2 to be protective in the long-term and promote the reuse of the on-site building, a vapor intrusion study should be conducted. The site-wide remedy is protective in the short-term.

X. Next Review

The next five-year review for the American Thermostat site should be completed before August 2013.

Approved:

George Pavlou, Acting Director — Date

Emergency and Remedial Response Division

Table 1: Chronology of Site Events	
Event	**Date(s)**
NYSDEC discovers improper disposal of chemicals at the site	1981
NYSDOH detects PCE and TCE contamination in wells in the vicinity of the site	1981
New York State enters into interim consent order with American Thermostat Corporation	1983
American Thermostat Corporation goes out of business	1985
Site is placed on National Priorities List	1986
Focused Feasibility Study for alternate water supply	1987
Record of Decision for alternate water supply	1988
Source control and groundwater Remedial Investigation/Feasibility Study initiation	1988
Record of Decision for source control	1990
Remedial design for alternate water supply	1991
Remedial design for building decontamination	1991
Completion of alternate water supply	1992
Completion of building decontamination	1992
Remedial design for soil remediation	1992
Remedial design for groundwater remedy	1993
Initiation of soil remediation	1993
Completion of Phase I of soil remediation	1995
Completion of Phase II of soil remediation	1996
Explanation of Significant Differences for soil remediation	1997
Initiation of construction for groundwater remedy	1997
Completion of construction for groundwater remedy, initiation of remedy	1998
Preliminary Site Close-Out Report	1998
First five-year review	2003

Table 2: Annual Costs	
Estimated Costs for Contract Performance	**Cost per Year**
Annual O&M costs (lump sum subcontract)	$497,000
Supervising contractor oversight costs	$169,000
Total estimated cost	$666,000

Table 3: Documents, Data, and Information Reviewed in Completing the Five-Year Review
• Record of Decision (alternate water supply), EPA, January 1988
• Record of Decision (source control), EPA, June 1990
• LTEVF Operations Reports, prepared by O'Brien & Gere, Inc. for Foster Wheeler Environmental Corporation, 1996
• Remedial Action Report (source control), Foster Wheeler Environmental, July 1997
• Explanation of Significant Differences, EPA, July 1997
• Remedial Action Report (groundwater remedy), Foster Wheeler Environmental, September 1998
• Well Informational Manual, Foster Wheeler Environmental, August 1998
• Preliminary Site Close-Out Report, EPA, September 1998
• Extraction, Monitoring, and Residential Well Sampling Data, 1998 - 2003
• Operations, Maintenance, and System Effectiveness Reports, prepared by IT Corporation
• Groundwater Remediation Monthly Progress Reports (September 1998-March 2003), prepared by Foster Wheeler Environmental, Inc. for EPA
• Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, EPA, November 2002
• First Five-Year Review, September 2003
• EPA guidance for conducting five-year reviews and other guidance and regulations to determine if any new applicable or relevant and appropriate requirements relating to the protectiveness of the remedy have been developed since EPA issued the ROD

Table 4: Mann-Kendall Test		
Well	**Kendall's Tau (τ) coefficient**	
	for 1998-2008	**for 2004-2008**
EW-2	-0.4012	-0.1326
EW-6	-0.6185	-0.1429
EW-7	-0.4467	-0.25
EW-9	-0.4133	+0.2381
EW-10	-0.004	-0.2381
EW-11	+0.0533	-0.7857
EW-12	-0.0456	-0.3676
EW-14	-0.741	-0.3204
EW-16	-0.24	0
OW-1	-0.4333	-0.5414
OW-2	-0.38	+0.2857
OW-3	-0.0435	+0.619
OW-5	+0.6733	+0.2857
OW-6	-0.3782	-0.7807
OW-7	-0.6933	-0.5556
OW-9	-0.5733	-0.3571
OW-10	-0.5333	+0.2857
OW-11	-0.4	-0.3571
OW-13	-0.4667	-0.2857
OW-14	-0.3933	+0.1429
OW-15	-0.4867	0
OW-16	-0.1267	0

Note: The Mann-Kendall Test is a rank-based procedure that measures strength on a monotonic relationship between two variables; in this case the groundwater concentration in a well (y) at point in time (x). The test produces the correlation coefficient Kendall's Tau (τ) for a data set. If all y values increase along with the x values, tau should equal +1. If all y values decrease along with the x values, tau should equal -1. The latter would be the case for concentrations that continually decrease with time. Generally, strong linear correlations are suggested by Tau values of +/- 0.7.

Table 5: Mann-Kendall Test (1998-2008)			
Wells	**Kendall's Tau(τ)**	**Z (deviation)**	**P (significance)[1]**
EW-2	-0.4012	3.4947	0.0005
EW-6	-0.6185	4.4304	0
EW-7	-0.4467	4.0041	0.0001
EW-9	-0.4133	2.896	0.0038
EW-10	-0.004	0.0264	0.9789
EW-11	+0.0533	0.3737	0.7086
EW-12	-0.0456	0.4026	0.6873
EW-14	-0.741	6.4542	0
EW-16	-0.24	1.6816	0.0927
OW-1	-0.4333	3.0361	0.0024
OW-2	-0.38	2.6625	0.0078
OW-3	-0.0435	0.2977	0.766
OW-5	+0.6733	4.7177	0
OW-6	-0.3282	2.5891	0.0096
OW-7	-0.6933	4.8578	0
OW-9	-0.5733	4.0171	0.0001
OW-10	-0.5333	3.7368	0.0002
OW-11	-0.4	2.8.026	0.0051
OW-13	-0.4667	3.2697	0.0011
OW-14	-0.3933	2.7559	0.0059
OW-15	-0.4867	3.4098	0.0007
OW-16	-0.1267	0.8875	0.3748

[1] Typically, P values less than 5% (0.05) are considered to be statistically significant

Table 6: Mann-Kendall Test (2004-2008)			
Wells	**Kendall's Tau(τ)**	**Z (deviation)**	**P (significance)[1]**
EW-2	-0.1326	0.6606	0.5089
EW-6	-0.1429	0.4949	0.6207
EW-7	-0.25	1.4005	0.1613
EW-9	+0.2381	0.7509	0.4527
EW-10	-0.2381	0.7509	0.4527
EW-11	-0.7857	2.7218	0.0065
EW-12	-0.3676	2.0596	0.0394
EW-14	-0.3204	1.6651	0.09549
EW-16	0	0	1
OW-1	-0.5414	1.9795	0.0478
OW-2	+0.2857	0.9897	0.3223
OW-3	+0.619	1.9524	0.0509
OW-5	+0.2857	0.9897	0.3223
OW-6	-0.7807	2.4623	0.0138
OW-7	-0.5556	2.2361	0.0253
OW-9	-0.3571	1.2372	0.216
OW-10	+0.2857	0.9897	0.3223
OW-11	-0.3571	1.2372	0.216
OW-13	-0.2857	0.9857	0.3232
OW-14	+0.1429	0.4949	0.6207
OW-15	0	0	1
OW-16	0	0	1

[1] Typically, P values less than 5% (0.05) are considered to be statistically significant

Table 7: Trichloroethylene and Tetrachloroethylene Concentrations in Bedrock Extraction Wells at the American Thermostat Superfund Site, Greene County, New York

Well Number	Highest Detected TCE Concentration Since 1998 (µg/l)[a]	April 2003 TCE Conc. (µg/l)	April 2008 TCE Conc. (µg/l)	Highest Detected PCE Concentration Since 1998 (µg/l)[a]	April 2003 PCE Concentration (µg/l)	April 2008 PCE Conc. (µg/l)
EW-1	120	ND	NS	490	ND	NS
EW-2	3,200	42	24	19,000	320	220
EW-3	400	NS	NS	100	NS	NS
EW-4	1,300	2.8	NS	5,800	2.1	NS
EW-5	2,600	14	NS	2,300	60	NS
EW-6	3,400	120	83	15,000	610	320
EW-7	4,200	3,000	420	32,000	4,700	1,000
EW-8	1,200	1.1	NS	200	0.89	NS
EW-9	1,900	220	120	18,000	1,200	380
EW-10	76	38	8	850	680	77
EW-11	180	8.9	11	1,300	3,400	48
EW-12	470[b]	110	100	5,000[b]	1,300	190
EW-13	82	0.43[c]	NS	10	0.89[c]	NS
EW-14	380	76	5.7	3,800	63	1
EW-15	17[d]	ND	NS	310[d]	2.3	NS
EW-16	5,500	1,600	2,600	12,000[e]	2,000	8,500

Notes:

a= highest detected concentration during first two years of operation
b= highest detected concentration since deepening of well on 9/00
c= (4/01) discontinued pumping and sampling
d= highest detected concentration since converted into extraction well on 9/00
e= highest detected concentration since converted into extraction well on 11/01
ND=not detected
NS=not sampled

Table 8: Trichloroethylene and Tetrachloroethylene Concentrations in Overburden Extraction Wells at the American Thermostat Superfund Site, Greene County, New York

Well Number	Highest Detected TCE Concentration Since 1998 (µg/l)	April 2003 TCE Concentration (µg/l)	April 2008 TCE Concentration (µg/l)	Highest Detected PCE Concentration Since 1998 (µg/l)	April 2003 PCE Concentration (µg/l)	April 2008 PCE Concentration (µg/l)
OW-1	1,100	120	37	19,000	780	260
OW-2	640	59	29	5,100	1,700	1,200
OW-3	850	530	220	22,000	16,000	8,600
OW-4	200	87[b]	NS	9,300	2,000[b]	NS
OW-5	5.5	ND	120	7,800	4,600	9,100
OW-6	19	8.1	7.6	270	120	33
OW-7	240	180	42	14,000	1,800	950
OW-8	1.2	0.53[a]	NS	8.9	4.2[a]	NS
OW-9	6.9	ND	5.7	1,200	280	350
OW-10	9.4	ND	5.9	1,400	470	380
OW-11	7,500	80	84	34,000	410	340
OW-12	1,300	22	6.8	1,600	140	19
OW-13	31	50	9.2	3,800	2500	900
OW-14	2,100	590	830	79,000	35,000	16,000
OW-15[d]	470	94	30	7,800	1,600	420
OW-16	770	7.8	8.9	5,600	200	72

Notes:

a= (4/01) discontinued pumping and sampling
b= (10/01) no longer being sampled
ND=not detected
NS=not sampled

Table 9: Percent Reduction of Tetrachloroethylene Concentrations in Bedrock Extraction Wells at the American Thermostat Superfund Site, Greene County, New York

Well Number	Highest Detected PCE Concentration Since 1998 (µg/l)[a]	April 2008 PCE Conc. (µg/l)	**Overall Reduction in PCE**	April 2003 PCE Concentration Since 1998 (µg/l)	April 2008 PCE Conc. (µg/l)	**Reduction in PCE since last 5-year review**
EW-1	490	NS (ND in 2003)	100 %	ND	NS	
EW-2	19,000	220	99.8 %	320	220	31.2 %
EW-3	100	NS (3.8 in 2003)	96.2 %	NS	NS	
EW-4	5,800	NS (2 in 2003)	99.9 %	2.1	NS	
EW-5	2,300	NS (5 in 2003)	99.8 %	60	NS	
EW-6	15,000	320	97.9 %	610	320	47.5 %
EW-7	32,000	1000	96.9 %	4700	1000	78.7 %
EW-8	200	NS (0.89 in 2003)	99.6 %	0.89	NS	
EW-9	18,000	380	97.9 %	1200	380	68.3 %
EW-10	850	77	90.9 %	680	77	88.7 %
EW-11	3,400[f]	48	98.6 %	3400	48	98.6 %
EW-12	5,000[b]	190	96.2 %	1300	190	85.4 %
EW-13	10	NS (0.89 in 2003)	91.1 %	0.89[c]	NS	
EW-14	3800	1	99.9 %	63	1	98.4 %
EW-15	310[d]	NS (2.3 in 2003)	99.3 %	2.3	NS	
EW-16	12000[e]	8500	29.2 %	2000	8500	INCREASE

Notes:
a= highest detected concentration during first two years of operation
b= highest detected concentration since deepening of well on 9/00
c= (4/01) discontinued pumping and sampling
d= highest detected concentration since converted into extraction well on 9/00
e= highest detected concentration since converted into extraction well on 11/01
f= the highest concentration during the first 2 years was 1300 ppb. However, even higher concentration was detected in April 2003
ND=not detected
NS=not sampled

Table 10: Percent Reduction of Tetrachloroethylene Concentrations in Overburden Extraction Wells at the American Thermostat Superfund Site, Greene County, New York						
Well Number	Highest Detected PCE Concentration Since 1998 (µg/l)	April 2008 PCE Concentration (µg/l)	**Overall Reduction in PCE**	April 2003 PCE Concentration Since 1998 (µg/l)	April 2008 PCE Concentration (µg/l)	**Reduction in PCE since last 5-year review**
OW-1	19,000	260	98.6 %	780	260	66.7 %
OW-2	5,100	1200	76.5 %	1700	1200	29.4 %
OW-3	22,000	8600	60.9 %	16000	8600	46.2 %
OW-4	9,300	NS		2000[b]	NS	
OW-5	7,800	9100	INCREASE	4600	9100	INCREASE
OW-6	270	33	87.8 %	120	33	72.5 %
OW-7	14,000	950	93.2 %	1800	950	47.2 %
OW-8	8.9	NS		4.2[a]	NS	
OW-9	1,200	350	70.8 %	280	350	INCREASE
OW-10	1,400	380	72.9 %	470	380	19.1 %
OW-11	34,000	340	99.0 %	410	340	17.0 %
OW-12	1,600	19	98.8 %	140	19	86.4 %
OW-13	3800	900	76.3 %	2500	900	64.0 %
OW-14	79000	16000	79.7 %	35000	16000	54.3 %
OW-15[d]	7800	420	94.6 %	1600	420	73.7 %
OW-16	5600	72	98.7 %	200	72	64.0 %

Notes:

a= (4/01) discontinued pumping and sampling
b= (10/01) no longer being sampled
ND=not detected
NS=not sampled

Table 11: Reduction of PCE Concentrations in Influent Tank at the American Thermostat Site Water Treatment Plant[a]		
Sample Date	PCE Concentration in Influent Tank (µg/l)	
October 1998	2,600	
October 2002[b]	1,100	
November 2003	1,100 – 1,200	
December 2003[c]	1,400 – 1,900	Transition
January 2004	1,500 – 1,800	Transition
February 2004[d]	2,000 - 2800	
March 2004	2,300 – 2,800	
April 2004	2,300 – 2,300	
Average	**2,417**	
November 2007[e]	940 – 1,200	
December 2007	1,200 - 880	
January 2008	1,200 – 1,400	
February 2008 40gpm	1,300 – 1,300	
Average	**1,177**	

Notes:

a: Presently, the influent tank combines water from 9 bedrock and 14 overburden extraction wells.
b: Treatment flow rates for Oct-Dec 2002 ranged from 68-73 gpm
c: As part of optimization, 5 bedrock wells with low contaminant concentrations were taken off-line. As a result, the treatment flow rate for December dropped to 39 gpm from an average of 64 gpm during the previous two months.
d: Treatment flow rates for Feb-April 2004 ranged from 32-37 gpm
e: Treatment flow rates for Nov 2007-Feb 2008 ranged from 36-40 gpm

Table 12: Other Comments on Operation, Maintenance, Monitoring, and Institutional Controls	
Comment	**Suggestion**
New York State now requires annual certifications that institutional controls that are required by RODs are in place and that remedy-related operation and maintenance (O&M) is being performed.	The monthly O&M reports should include a certification that remedy-related O&M is being performed and that the *Declaration of Covenants, Conditions, and Restrictions* are still in place.
Prior optimization and enhancement measures that have been performed at the site to date have increased operational efficiencies.	Opportunities for further remedy optimization and enhancement should be pursued.

Table 13: Recommendations and Follow-up Actions					
Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiver
					Current
On-property groundwater concentrations exceed screening values and vapor intrusion pathway not evaluated.	Before the existing building on the property is occupied or new on-site construction occurs, the vapor intrusion pathway should be evaluated.	EPA	EPA	To be determined	N
There are nationwide concerns regarding vapor intrusion at residential properties located near sites with volatile organic compound-contaminated groundwater.	A vapor intrusion survey will be conducted at residential properties located downgradient of the site during the next heating season. The data collected during the vapor intrusion investigation will be evaluated to determine if any actions are required.	EPA	EPA	October 2009	N

Table 14: Acronyms Used in this Document	
CY	Cubic Yards
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FFS	Focused Feasibility Study
GPM	Gallons per Minute
LTTD	Low Temperature Thermal Desorption
MCL	Maximum Contaminant Level
mg/kg	Milligram per Kilogram
µg/l	Micrograms per Liter
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Protection
NYSDOH	New York State Department of Health
O&M	Operation and Maintenance
OU	Operable Unit
PCE	Tetrachloroethylene
PCOR	Preliminary Close-Out Report
RA	Remedial Action
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
TCE	Trichloroethylene
VOCs	Volatile Organic Compounds