FOURTH FIVE-YEAR REVIEW REPORT
ADDENDUM
AMERICAN THERMOSTAT SUPERFUND SITE
TOWN OF CATSKILL
GREENE COUNTY

Prepared by:
United States Environmental Protection Agency
Region 2

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Date

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I. Introduction

A five-year review (FYR) addendum is, generally, completed for remedies where a protectiveness determination is deferred until additional information can be obtained. When deferring protectiveness in a FYR report, the Environmental Protection Agency (EPA) typically provides a timeframe for when the information will be obtained and a protectiveness statement can be made. FYR addenda present the progress since the FYR and protectiveness determinations for the remedies where the statement was deferred.

The June 2019 FYR concluded that, prior to making operable unit (OU) 2 and sitewide protectiveness determinations, reconfirmation that the south south-west portion of the bedrock plume is contained by the groundwater extraction and treatment system was needed, a determination as to whether the groundwater contaminant plume is impacting Catskill Creek's surface water and/or sediments needed to be made, and a reevaluation of a residence with a soil vapor intrusion (SVI) issue in the past had to be performed to assess if additional actions were needed to mitigate exposure. Additionally, the conceptual site model (CSM) needed to be updated to determine whether the remedial action objectives (RAOs) can be achieved.

This document summarizes mitigation work that was performed and evaluates data obtained since the June 2019 FYR and provides OU2 and sitewide protectiveness statements.

II. Progress Since Last Five-Year Review

Summarized below are the findings related to the four outstanding recommendations from the 2019 FYR.

Reconfirmation that the south south-west portion of bedrock plume is contained by groundwater extraction and treatment system

The 2019 FYR recommended that monitoring wells M-9, MW-112, and MW-113 be sampled and gauged to confirm that the southern portion of the plume has not migrated beyond extraction well EW-5. It was also recommended that monitoring well M-8, located across Route 23, be sampled and gauged to confirm that impacted groundwater in the vicinity of injection well IW-9 is not migrating beyond Route 23. If site-related contaminants of concern were detected in any of the above-noted wells, the FYR indicated that additional groundwater samples may need to be collected to confirm the boundaries of the plume. See Figures 1-3 for the locations of the referenced monitoring wells, extraction wells, and injection wells.

Monitoring wells M-8 and M-9 were sampled in January 2020. Monitoring wells MW-112 and MW-113 were sampled in July 2020.

In monitoring well M-8, cis-1,2-dichloroethene (cis-1,2-DCE) was detected at a concentration of 7.1 micrograms per liter (µg/L), while it is below the federal MCL of 70 µg/L, it is above the New York groundwater quality standard of 5 µg/L. Tetrachloroethene (PCE) and trichloroethene (TCE) were found at concentrations lower than the 5 µg/L standards for each chemical (0.98 µg/L and 1

µg/L, respectively). Site-related contaminants were not found in monitoring well M-9. The results from monitoring well MW-112, which had concentrations of PCE and TCE below their respective 5 µg/L standards, do not indicate significant overburden contaminant migration to the southeast along the southern edge of the site property. PCE was detected in monitoring well MW-113 at a concentration of 940 µg/L. Monitoring well MW-113 will need to be monitored moving forward, as there is residual source material near this well —77 milligrams per kilogram (mg/kg) PCE was observed in saturated soils in 2012. The residual source material is likely contributing to the persistently elevated PCE concentrations in the groundwater.

Recent adjustments to the pumping strategy of extraction wells have enhanced on-site volatile organic compound (VOC) mass removal when compared to previous years. The VOCs removed per gallon of water treated increased by 48% between 2017 and 2019, and in 2019, the treatment system removed 267 pounds of VOC, the largest VOC mass since 2011, while pumping approximately 6 million gallons less.

Contaminant concentration trends in downgradient monitoring wells outside the extraction network capture zone will be monitored moving forward to ensure that contamination is not escaping the source area.

The detection of cis-1,2-DCE at 7.1 µg/L at monitoring well M-8 along the southwestern plume edge likely indicates contaminant migration beyond the extraction well network. However, the concentration in this well is only marginally above the MCL of 5 µg/L, and there have been recent changes to the pumping strategy which have affected the position of the plume and contaminant transport across the site. Declining VOC concentrations in future sampling events at monitoring well M-8 would indicate that the plume is contained within the extraction network capture zone. Persistent exceedances or increases in concentrations would indicate continued contaminant migration away from the extraction and monitoring network. If this is the case, further investigation and monitoring within this area of the plume would be necessary to define the extent of contamination and the migration pathways to this area.

Because the state has made several changes in the pumping regime recently, it is difficult to predict long-term trends. Future sampling events to be evaluated in the next FYR will confirm that the south southwest portion of the plume is contained.

NYSDEC will continue sampling in 15-month intervals.

Determination as to whether groundwater contaminant plume is impacting Catskill Creek's surface water and/or sediments

The FYR recommended sampling in Catskill Creek to confirm that the plume is not impacting surface water or sediments. Three surface water samples were collected from the Creek to the northeast of the site. Sample locations were spaced approximately 50-75 meters apart and sediment was sampled at two of these points. No analyte detections occurred within the sample sets other than the suspected laboratory contaminants acetone and methylene chloride. Based upon the sample results, it was concluded that the plume is not impacting surface water or sediments in Catskill Creek.

Reevaluation of residence with prior SVI issue to assess if additional actions are needed to mitigate exposure

Because of increased groundwater contaminant concentrations in the vicinity of a residence with an SVI issue in the past,[6] the residence[7] was reevaluated to assess if additional actions were needed to mitigate exposure via SVI. Specifically, while the sump cover was an adequate form of mitigation in the past, there was concern that it may not be able to prevent indoor air impacts due to a bad seal and cracks in the slab and the fact that hydraulic capture has increased groundwater concentrations in the vicinity of this residence, thereby increasing the potential for SVI exposure. Accordingly, the New York State Department of Environmental Conservation (NYSDEC) collected an indoor air and sump water sample in March 2020. The indoor air concentration was 1.6 $\mu g/m^3$ of PCE, which is below EPA's conservative residential vapor intrusion screening level (set at a hazard quotient of 1 and 10^{-6} cancer risk). The sump water PCE concentration was 880 µg/L, which exceeds EPA's upper bound residential vapor intrusion screening level for groundwater (set at a hazard quotient of 1 and 10^{-4} cancer risk) and indicates the potential for unacceptable risk from vapor intrusion in the absence of mitigation measures.

NYSDEC, in consultation with NYSDOH, replaced the sump[8]and sealed cracks in the floor in October 2020. While it is likely that replacing the sump and sealing the cracks in the floor eliminated the potential exposure pathway, this could not be confirmed by sampling. When NYSDEC returned to the property for SVI sampling, the basement had flooded with 52 inches of water, preventing SVI sampling from being performed. After conducting dewatering activities and several inspections, NYSDEC determined that the flooding likely caused damage to the electrical system and the electrical service to the residence was shut off. It could not be determined how the flooding occurred, but it does not appear to be associated with the sump pump replacement. Although the water was pumped from the basement, the power is still off and an electrical panel upgrade is needed before it can be turned back on. Additionally, due to the flooding, there is a large amount of miscellaneous items that were stored in the basement that now cover most of the floor. It is not clear when the electrical panel upgrade will be performed.

After the basement was dewatered, the pump was confirmed to be operable during NYSDEC's inspection (it was run off a generator, demonstrating that it was still in working condition). Because the indoor air sample had a low concentration of PCE below the Air Guidance value before the above-noted work was performed and the house is currently unoccupied (and not occupied during the heating season by the current owner), there is no current or potential exposure to unacceptable levels of VOCs at the property at this time. Nevertheless, follow up SVI sampling (or indoor air sampling, due to the high water table in this area) should be performed once the electrical issues are resolved and the property is permanently reoccupied, preferably during the heating season. Additional repairs may be needed to prevent future flooding and to repair damage caused by flooding. It is not clear when the property will be reoccupied.

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[6] In 2012, the sump water at this residence showed elevated concentrations of site-related VOCs. Although indoor air results did not show a current unacceptable exposure, as a precautionary measure, the New York State Department of Health (NYSDOH) recommended that a cover be installed on the sump to limit the potential for any future exposures. A sump cover was installed in 2013.

[7] The owner only resides at this property on the weekends in the summer.

[8] The sump pump (provided by the homeowner) was also replaced at this time.

CSM updated to determine whether RAOs can be achieved

The FYR recommended that a statistical analysis of the remedy using current groundwater concentrations be used to update the CSM to determine if RAOs can be met. The CSM as outlined in the 2013 Remedial Systems Optimization (RSO) Implementation Activities Report partially attributes the persistently elevated contaminant of concern concentrations within overburden and bedrock wells to the migration of residual source contamination within the overburden to the bedrock. This statement is supported by high concentrations in the overburden extraction wells (maximum 2020 concentration of 11,000 µg/L in extraction well OW-3), as well as the results of the RSO investigation, which found PCE contamination in shallow soils and below the water table well in excess of the 1 mg/kg cleanup goal beneath and in the vicinity of the American Thermostat buildings (up to 150 mg/kg in SB-106, near Building 3).[9] The continued existence of this residual source area in the soil may prevent the site from achieving the OU2 RAO to "ensure protection of groundwater from the continued release of contaminants from soils," and is likely affecting the efficacy of the extraction and treatment system as a means of restoring the groundwater on-site.

Additionally, it is suspected that residual source material may extend south of Route 23. If contamination in the overburden south of Route 23 enters the groundwater and descends into the bedrock, monitoring well M-9 will detect potential contaminant migration to the southeast. To further delineate the plume along its southwestern edge and to ensure that any residual contamination south of the site property that may enter the bedrock is being captured by the extraction well network, it may be appropriate to install a bedrock monitoring well on the south side of Route 23, east of Tributary B and south of extraction well EW-6. To the northwest, if concentrations do not decrease below standards at monitoring well MW-8, an additional monitoring well may be necessary downgradient of this well.

A survey of the saturated overburden south of Route 23 could be implemented as a means of optimizing remedy performance via the further identification of residual source material (in addition to that which has been identified on the site property itself) which has led to the persistent elevated concentrations.

Analysis of PCE concentrations within active bedrock extraction wells since 2013 shows a significantly decreasing trend within only one well (extraction well EW-9). Significantly increasing concentrations are observed in two wells (extraction wells EW-6 and EW-7). PCE concentrations in extraction wells EW-6 and EW-7 between April 2013 and January 2020 increased from 360 µg/L and 260 µg/L, to 570 µg/L and 3,900 µg/L, respectively. Analyses indicated neither significantly increasing nor decreasing trends for PCE concentrations at extraction wells EW-2 and EW-16. PCE was detected at concentrations of 570 µg/L in extraction well EW-2 (October 2018) and 2,400 µg/L in EW-16 (January 2020) during the most recent measurements at each well. The trends in these extraction wells are likely influenced by adjustments made to the pumping strategy which were designed to maintain hydraulic control of the area surrounding the source zone, as opposed to treating the entirety of site-related

[9] During the remedial action, EPA attempted to locate the source of the contamination in extraction well OW-3 with borings at multiple locations inside the building; a significant source was not found.

contamination presently within the area (see below).

Amongst the active overburden extraction wells, a significantly decreasing PCE concentration trend was only observed in extraction well OW-5 since 2013. In extraction well OW-5, the concentration dropped from a maximum concentration of 14,000 µg/L in April 2013, to a concentration of 4,200 µg/L in January 2020. The other active overburden wells exhibited neither significantly increasing nor decreasing trends, were generally quite variable from measurement to measurement, and had detections of PCE at concentrations between 240 µg/L (extraction well OW-16) and 11,000 µg/L (extraction well OW-3) in 2020.

Concentrations in a selection of monitoring wells in key positions, including extraction wells EW-5, EW-12, IW-8, and IW-9, are generally stable or show no statistically significant trend. Mann-Kendall analysis shows likely increasing concentrations in extraction well EW-13 north/northwest of the American Thermostat property, where 29 µg/L PCE was detected in January 2020. Monitoring well M-5, which is located to the northeast of extraction well EW-13 and is screened approximately 155 feet above extraction well EW-13, has continually recorded non-detectable concentrations of PCE since 2013, although the most recent sampling event detected PCE daughter products cis-1,2-DCE and vinyl chloride at concentrations of 14 µg/L and 4.6 µg/L, respectively. It is unclear if transmissive fractures directly connect these two wells. Monitoring these downgradient wells is of paramount importance to ensure containment of the source area.

III. Recommendations and Follow-Up Actions

Table 1, below, presents a recommendation and follow-up action for this FYR addendum.

Table 1: Issues and Recommendations

<table>
<tr><th colspan="5">Issues/Recommendations</th></tr>
<tr><td colspan="5">OU(s) without Issues/Recommendations Identified in the Five-Year Review:</td></tr>
<tr><td colspan="5">OU1</td></tr>
<tr><td rowspan="3">OU(s):

OU2</td><td colspan="4">Issue Category: Monitoring</td></tr>
<tr><td colspan="4">Issue: While it is likely that replacing the sump and sealing the cracks in the floor has eliminated the potential exposure pathway, this could not be confirmed by sampling due to the flooding of the basement followed by electrical panel issues.</td></tr>
<tr><td colspan="4">Recommendation: Follow up SVI sampling should be performed during the heating season, once the electrical panel issues are resolved, to confirm repairs to the sump cover and floor sealing have been effective.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Party Responsible</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>State</td><td>EPA</td><td>4/30/2022</td></tr>
<tr><td>OU(s):</td><td colspan="4">Issue Category: Remedy Performance</td></tr>
</table>

OU2				
	Issue: The continued existence of this residual source area in the soil may prevent the site from achieving the OU2 RAO to "ensure protection of groundwater from the continued release of contaminants from soils," and is likely affecting the efficacy of the extraction and treatment system as a means of restoring the groundwater on-site.			
	Recommendation: Investigate options for addressing residual source material.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	12/31/2022
OU(s): **OU2**	**Issue Category: Remedy Performance**			
	Issue: Recent monitoring indicates that the source area is mostly contained. However, PCE was detected in monitoring well MW-113 at a concentration of 940 µg/L.			
	Recommendation: Continue to monitor of downgradient wells in the south south-west area of the site. If concentrations appear to be increasing, consider additional monitoring wells in the vicinity of EW-6 and/or MW-8.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	12/31/2022

Other Findings

In addition, the following suggestions were identified during the FYR and may improve management of operation and maintenance, but do not affect current and/or future protectiveness.

The amount of water being pumped and the amount of downtime at each well are important parameters for remedy performance assessment. Elevation set point information for individual extraction wells should be provided, including any adjustments made during a given reporting period.

IV. Protectiveness Statement

Based on the new information and actions taken since the fourth FYR's completion date, the OU2 and sitewide protectiveness statements for the site are being revised as follows:

OU2

"The implemented OU2 remedy is protective in the short-term because all exposure pathways have been addressed. To be protective in the long-term, follow up SVI sampling should be performed during the heating season, once the electrical panel issues are resolved, to confirm repairs to the sump cover and floor sealing have been effective; options for addressing residual source material need to be investigated and continued monitoring of downgradient wells is needed to determine whether additional monitoring points are needed to confirm containment."

Sitewide

"The implemented sitewide remedy is protective in the short-term because all exposure pathways have been addressed. To be protective in the long-term, follow up SVI sampling should be performed during the heating season, once the electrical panel issues are resolved, to confirm repairs to the sump cover and floor sealing have been effective; options for addressing residual source material need to be investigated and continued monitoring of downgradient wells is needed to determine whether additional monitoring points are needed to confirm containment."

V. Next Review

The next five-year review for the American Thermostat Superfund site should be completed before June 26, 2024.

Note: EW-9 was inactive at time of water level collection.

CE-2 NM
CE-1 NM
M-6 221.66
EW-14 NM
EW-13 167.43
M-5 171.46
EW-15 225.03
EW-12 199.91
EW-11 168.36
M-4 167.73
EW-10 222.89
EW-8 146.19
IW-10 230.06
IW-8 181.44
IW-9 154.25
EW-9 158.21
EW-7 154.64
EW-4 154.3
M-8 251.05
EW-16 120.16
EW-2 160.29
EW-6 162.94
EW-3 154.69
EW-5 257.16
M-9 170.5

Tributary B
Tributary A

220
200
180
160
140
240

Legend

- Bedrock Well
- Active Extraction Well
- Interpreted Bedrock Groundwater Contour, feet above mean sea level
- Interpreted Groundwater Flow Direction

Depth to Water measurements collected October 29, 2018.
NM - Well not measured.
Inferred groundwater gradient.

N
0 160 320 Feet

Greene County digital orthoimagery (2013) obtained from New York State GIS Clearinghouse at: https://gis.ny.gov

Prepared/Date: BRP 01/30/19
Checked/Date: NV 01/30/19

ANNUAL REPORT (2018)
AMERICAN THERMOSTAT SITE 420006
SOUTH CAIRO, NEW YORK

MACTEC

OCTOBER 2018 INTERPRETED BEDROCK POTENTIOMETRIC SURFACE (PUMPING)
Project 3612112204 Figure●

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Figure 1

MW-108
233.77

OW-1

MW-109
245.8

OW-2

OW-3

OW-5

OW-6

OW-7

OW-12

240

OW-11

OW-9

MW-104
228.5

OW-10

OW-13

OW-15

OW-14

OW-16

MW-113
252.36

Tributary A

MW-112
255.29

240

Legend

- Overburden Well
- Active Extraction Well
- Interpreted Bedrock Groundwater Contour, feet above mean sea level
- Interpreted Groundwater Flow Direction

Depth to Water measurements collected October 29, 2018.
NM - Well not measured.
Inferred groundwater gradient.

N

0 40 80 Feet

Greene County digital orthoimagery (2013) obtained from New York State GIS Clearinghouse at: https://gis.ny.gov

Prepared/Date: BRP 01/30/19
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ANNUAL REPORT (2018)
AMERICAN THERMOSTAT SITE 420006
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OCTOBER 2018 INTERPRETED OVERBURDEN POTENTIOMETRIC SURFACE (PUMPING)
Project 3612112204 Figure●

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Figure 2

Note: EW-9 was inactive at time of LTM sample collection. Pumping at EW-9 resumed on 11/30/18 and a sample was collected on 12/28/18.

CE-2
1.6 J

CE-1
NS

M-6
ND

M-5
ND

EW-13
32

5
10

M-4
ND

EW-11
ND

EW-12
4.8

Tributary B

5
10
100
500
1000
5000

EW-8
ND

IW-10
ND

IW-8
0.55 J

EW-9
13

IW-9
550

EW-7
6900

EW-16
1100

EW-4
ND

EW-6
730

EW-2
150

EW-3
ND

EW-5
340

Legend

- Bedrock Well
- Active Extraction Well
- PCE Isocontour

N

0 65 130
Feet

Samples collected between 10/30/2018 and 10/31/2018, with EW-9 collected on 12/28/2018 (see note above).
Value corresponding to location represents concentration of PCE (ug/L)

Greene County digital orthoimagery (2013) obtained from New York State GIS Clearinghouse at: https://gis.ny.gov

Prepared/Date: BRP 01/08/19
Checked/Date: NV 01/08/19

ANNUAL REPORT (2018)
AMERICAN THERMOSTAT SITE 420006
SOUTH CAIRO, NEW YORK

MACTEC

BEDROCK GROUNDWATER PCE PLUME
OCTOBER 2018

Project 3612112204

Figure 3

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