SIXTH FIVE-YEAR REVIEW REPORT FOR GE MOREAU SUPERFUND SITE SARATOGA COUNTY, NEW YORK

Prepared by

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Region 2
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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DCE	Dichloroethylene
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five-Year Review
GE	General Electric Company
HI	Hazard Index
ICs	Institutional Controls
MCL	Maximum Contaminant Level
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	Operation and Maintenance
OBG	O'Brien & Gere Engineers, Inc.
PCB	Polychlorinated biphenyl
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
ROD	Record of Decision
RPM	Remedial Project Manager
TBC	To be considereds
TCE	Trichloroethylene
UU/UE	Unlimited Use/Unrestricted Exposure
VOC	Volatile Organic Compound

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the sixth FYR for the GE Moreau Superfund Site (Site). The triggering action for this statutory review is the completion date of the previous FYR. The FYR has been prepared because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of one OU, which will be addressed in this FYR. OU1 addresses the former evaporation pit, groundwater, and surface water for the Site.

The Site's FYR was led by Thomas Mongelli, EPA Remedial Project Manager. Participants included Sharissa Singh, EPA hydrogeologist, Larisa Romanowski, EPA community involvement coordinator, Marian Olsen, EPA human health risk assessor, Mindy Pensak, EPA ecological risk assessor, Kelly Duval, New York State Department of Environmental Conservation (NYSDEC), and Jacquelyn Nealon, New York State Department of Health (NYSDOH). The relevant entities such as the potentially responsible party (PRP) and officials for the Town of Moreau were notified of the initiation of the FYR. The FYR began on January 8, 2018.

Site Background

The Site is located just west of Fort Edward Road in the Town of Moreau, Saratoga County, New York, approximately 40 miles north of Albany and less than one mile from the Hudson River. The Site is in a semirural setting with single-family residences nearby. Reardon Brook runs within 5,000 feet of the Site. The Site is bordered on the west by a former sand pit with a small ponded area and to the north by both undeveloped and developed land. To the east, the remainder of the General Electric Company (GE) property is undeveloped and extends approximately 1,200 feet to the entrance on Fort Edward Road. To the south, a utility right of way (power lines) runs adjacent to the southern border of the property, and beyond there is some vacant land between the power lines and residences along Bluebird Road.

An approximately 10-acre fenced hazardous waste containment/treatment system area is located on the western end of the 26-acre property, which is owned by GE. There is also an approximately 4,800-foot long by 2,000-foot wide groundwater contaminant plume extending from the containment system southward under Bluebird Road.

From 1958 to 1968, the Site property was used by GE for the disposal of industrial waste. A 30- by 40-foot evaporation pit received approximately 452 tons of waste material, including trichloroethylene (TCE), polychlorinated biphenyls (PCBs), spent solvents, oils, sludge, and other miscellaneous waste. The

dirt roads on the property leading to the pit were treated with PCB-contaminated oil as a dust suppressant. Investigations at the Site began in 1977 by NYSDEC.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: GE Moreau		
EPA ID: NYD980528335		
Region: 2	**State:** NY	**City/County:** Town of Moreau/Saratoga County
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Thomas Mongelli		
Author affiliation: EPA		
Review period: 1/8/2018 - 7/31/2018		
Date of site inspection: 8/8/2018		
Type of review: Statutory		
Review number: 6		
Triggering action date: 9/30/2013		
Due date *(five years after triggering action date)*: 9/30/2018		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

From 1983 to 1985, GE conducted the remedial investigation/feasibility study (RI/FS). The RI report identified a plume of volatile organic compounds (VOCs), primarily TCE and its daughter products, emanating from the former evaporation pit and extending to an erosional escarpment at the southern boundary of the Moreau aquifer (the uppermost groundwater aquifer underlying the Site). The plume was found to have a maximum width of approximately 2,000 feet and a length of approximately 4,800 feet with a maximum TCE concentration of 81,000 micrograms per liter (µg/L) (the Maximum Contaminant Level [MCL] for TCE is 5 µg/L). The lower portion of the Moreau aquifer had a maximum reported concentration of TCE of 1,800 µg/L.

At the time that the RI/FS study was prepared, guidance on risk assessment in the Superfund program was being developed. As a result, factors other than risk were used in the decision-making process. However, the risk-based concentration associated with residential exposures to groundwater at a level of 10^{-4} is 44 µg/L and the concentration associated with a non-cancer Hazard Index (HI) = 1 is 2.6 µg/L. The maximum concentration of TCE exceeds the risk range and goal of protection of an HI = 1.

At the downgradient edge of the plume, the contaminated groundwater discharges to surface water streams that converge to form Reardon Brook. TCE and 1,2-dichloroethylene (DCE) were detected in Reardon Brook, which feeds New Reservoir, one of the Village of Fort Edward's public water supply reservoirs.

The RI also identified PCB-contaminated soils along the dirt roads leading to the former evaporation pit from Fort Edward Road. The highest level of PCBs detected was 3,000 milligrams per kilogram (mg/kg) at the ground surface. Lower levels (up to 42 mg/kg) were detected to a depth of six inches.

To evaluate potential risks from exposure to contaminated soils, the maximum concentration in soil was compared to both residential and industrial risk based screening levels for cancer risks and non-cancer hazards. Both the 3,000 mg/kg and 42 mg/kg concentrations exceeded the residential risk-based concentrations of 22 mg/kg and 1 mg/kg associated with cancer risks at 10^{-4} (or 1 excess cancer in 10,000) and the goal of protection of a noncancer HI = 1. Under an industrial exposure scenario, the maximum concentration of 3,000 mg/kg exceeded the concentration of 74 mg/kg associated with a cancer risk of 10^{-4} and the concentration of 11 mg/kg associated with an HI = 1. The concentration of 42 mg/kg in surface soils exceeded the noncancer HI = 1 of 11 mg/kg.

A screening level ecological risk assessment was not performed at the time of the ROD.

Response Actions

On September 23, 1980, GE entered into an agreement with NYSDEC related to seven GE sites to perform investigative activities and to develop and implement remedial programs for the sites. The remedial actions that were ultimately implemented at the GE Moreau Site included the removal of drums, installation of a soil-bentonite cutoff wall around the former evaporation pit (keyed at depth into low permeability glaciolacustrine clays), installation of a low-permeability clay cap around the former evaporation pit (keyed into the soil-bentonite cutoff wall), and installation of new fencing around the former evaporation pit. GE also installed an air stripper treatment facility at Reardon Brook to treat contaminated groundwater after it discharges to surface water (natural gradient flushing). In 1982, activated carbon filters were installed in approximately 70 homes within the downgradient contaminant plume area after the discovery of elevated TCE concentrations in groundwater near the Site.

In September 1983, the Site was added to the Superfund National Priorities List. In November 1983, EPA entered into an Administrative Order on Consent (Index No. II CERCLA-30201) with GE, in which GE agreed to, among other things, conduct a remedial investigation/feasibility study (RI/FS) at the site, design and construct the remedy selected by the EPA, and conduct post-remediation operation and maintenance (O&M).

In July 1985, pursuant to and Administrative Order on Consent issued by EPA, GE removed approximately 8,600 cubic yards of PCB-contaminated soils identified during the RI and placed them under the clay cap noted above.

EPA signed a Record of Decision (ROD) for the site on July 13, 1987. The major components of the selected remedy include:

- Utilization of the soil-bentonite cutoff wall around the former evaporation pit to contain the source of groundwater contamination;
- Continued monitoring of 18 downgradient wells to ensure that the slurry wall is containing the source of groundwater contamination and monitoring of 29 wells to determine if changes are occurring in the size and direction of the plume;
- Utilization of the air stripping system to remove volatile organic compounds from Reardon Brook;
- Removal of PCB-contaminated soil adjacent to the former evaporation pit and placement of these soils within the slurry wall;
- Provision for a public water supply system to approximately 100 residences affected or potentially affected by the plume of contaminated groundwater; and
- Institutional controls (ICs) to restrict the withdrawal of groundwater from the aquifer in the vicinity of the groundwater plume until the groundwater standards are met.

The remedial action objectives (RAOs) established for the Site are:

- Provide a safe drinking water supply for residents whose drinking water wells have been adversely impacted by groundwater contamination emanating from the Site;
- Ensure that the existing groundwater plume does not adversely affect other areas;
- Remediate the water quality of Reardon Brook feeding the public water supply reservoir of the Village of Fort Edward; and
- Reduce the potential for exposure to PCB-contaminated soils.

An explanation of significant differences (ESD) was issued in February 1994 that called for the enhancement of the containment system by creating and maintaining an inward hydraulic gradient between the containment system and the surrounding aquifer to reduce exfiltration. Specifically, the objective of the enhancement was to lower and maintain the water level elevation inside the containment system to be at least 0.5 feet lower than the elevation of the aquifer outside the system.

In 1989, EPA’s Robert S. Kerr Environmental Research Laboratory began a review of the groundwater restoration remedy selected in the ROD. EPA's reevaluation included modeling that provided estimates that the cleanup of the groundwater at the Site may take 200 years or more regardless of the remedial method employed. Considering these constraints, EPA determined that it was necessary to waive the groundwater Applicable or Relevant and Appropriate Requirements (ARARs) for the area of the plume, based on the technical impracticability of attaining cleanup standards within a reasonable period, given the Site-specific circumstances. The area of the plume within the Moreau aquifer was defined as being approximately 4,800 feet long and about 2,000 feet wide at its widest point, with an average depth of approximately 60 feet. The waiver, issued pursuant to §121(d)(4)(c) of CERCLA and §300.430(f)(l)(ii)(C)(3) of the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300, was documented in an October 1994 ESD, waived the federal or state drinking water standards for TCE, vinyl chloride, cis-1,2-DCE, trans-1,2-DCE, total trihalomethanes, and methylene chloride.

Status of Implementation

In November 1985, an air stripping system was put into operation on Reardon Brook, approximately 2,000 feet downstream of the erosional escarpment and 700 feet upstream of the Fort Edward Water Supply Treatment Plant. The system is designed to treat surface water flows of up to 400 gallons per minute.

In September 1987, EPA approved GE's final design documents for the extension of public water supply and distribution facilities to affected and potentially affected homes in the vicinity of the contaminated groundwater plume. By June 1990, 93 single-family residences, one school, and one trailer park were connected to the alternative water supply. In 2001, the Town of Moreau extended public water supply lines to include all the houses located in the vicinity of the plume.

Institutional Controls

Table 1: Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Site-use	Yes	Yes	Site-wide	Restrict the use of parts of four parcels at the site to only cleanup related activities	Permanent Easement by Appropriation, NYSDEC, May 1986
Groundwater	Yes	Yes	Entire Plume Area	Restricts the withdrawal of groundwater in the vicinity of the plume until groundwater ARARs are met	Local Law No. 1 of 2001, Chapter 145, Article IV, Water District No. 4 Rules and Regulations, Town of Moreau, May 2001

Systems Operations/Operation & Maintenance

O&M activities at the Site include monthly site inspections to ensure site security (*e.g.*, perimeter fencing, gates, and locks) and erosion control measures remain satisfactory, as well as monthly water level measurements to ensure an inward hydraulic gradient is maintained within the containment system. Grass is mowed on an as needed basis.

Groundwater monitoring for VOCs is conducted on an annual or semiannual basis for six and 23 wells, respectively. See Figure 1 for a depiction of the groundwater monitoring locations. Surface water monitoring was previously conducted on a semiannual basis but, as of spring 2017, is being conducted annually following discussions between EPA and GE related to surface sampling events conducted in fall 2014 and spring 2016 to address recommendations in the previous FYR report. The current surface water monitoring program includes annual sampling for VOCs at eight locations (SW-2, SW-6, SW-9, SW-11, X-5, Christie Reservoir, Dority Reservoir, and Sanderspree Reservoir) as well as two surface water collection boxes (Collection Box 1 and Collection Box 2) which will be sampled every five years

beginning in spring 2020. See Figure 4 for a depiction of the surface water monitoring locations. The Reardon Brook air stripper continues to operate and influent and effluent samples are collected monthly.

Potential site impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the Site.

III. PROGRESS SINCE THE LAST REVIEW

The protectiveness determinations from the last FYR are summarized in Table 2, below.

Table 2: Protectiveness Determinations/Statements from the 2013 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Short-term Protective	The implemented remedial actions currently protect human health and the environment in the short-term. To be protective in the long-term, further delineation of the plume and an update to the conceptual Site model is necessary.
Sitewide	Short-term Protective	The implemented remedial actions currently protect human health and the environment in the short-term. To be protective in the long-term, further delineation of the plume and an update to the conceptual Site model is necessary.

The previous FYR had recommendations and follow-up actions and suggestions. The status of the recommendations and follow-up actions and suggestions are summarized in Tables 3 and 4, respectively, below.

Table 3: Status of Recommendations from the 2013 FYR

Issue	Recommendations and Follow-Up Actions	Status
The northwestern and downgradient portion of the plume need to be fully delineated and vertical characterization of the confining unit and bedrock aquifer is needed.	Install monitoring wells or piezometers or take other appropriate actions to delineate the northwestern and downgradient portion of the plume and vertically characterize (i.e., thickness, lateral extent, depth, etc.) the confining unit and bedrock aquifer	**Status: Partially Complete** In 10/2014, GE's contractor, O'Brien & Gere Engineers, Inc. (OBG), collected groundwater samples from nine groundwater monitoring wells in three well clusters located near the northwestern portion of the contaminated groundwater plume. No site-related VOCs were detected in six of the nine wells. Two wells were found to have concentrations of TCE and 1,2-DCE below their MCL of 5 µg/L, each. One well was found to have TCE concentrations just slightly above its' MCL at 5.5 µg/L. In 7/2016, OBG installed and collected groundwater samples from three temporary groundwater monitoring points near the base of the topographic escarpment to delineate the toe of the contaminated groundwater plume. No site-related VOCs were detected at two of the three points. One point was found to have concentrations of TCE and 1,2-DCE at 11 and 4.6 µg/L, respectively.

		In 9/2016, OBG submitted updated TCE isoconcentration maps for the Site depicting the shallow, intermediate, and deep portions of the Moreau aquifer, separately. Furthermore, an agreement was reached to have these separate maps updated and submitted to EPA every five years with the next such submittal in 2020. Investigation and delineation of any impacts to the bedrock aquifer are still needed and will be identified as a recommendation in this FYR report. The 9/2017 sampling at four downgradient residential bedrock supply wells did not reveal any detections of Site-related VOCs, indicating that at this time there is no known exposure from potentially contaminated bedrock groundwater. However, only one round of sampling has been conducted for these wells. Continued monitoring is needed to confirm this conclusion.
Confirmation is needed that all the groundwater is discharging into the Reardon Brook.	Collect surface water samples, install monitoring wells or piezometers and/or take other appropriate actions along the base of the escarpment to confirm that all the groundwater is discharging into the Reardon Brook (i.e. that there are no additional groundwater seeps from the plume downgradient of the escarpment and/or surface water body impacts).	**Status: Complete** In 11/2014, surface water samples were collected from 23 locations based on the results of site reconnaissance conducted in 10/2014. Ten of the sampled locations exhibited detectable concentrations of site-related contaminants, including one location with detectable concentrations of vinyl chloride. In 5/2016, surface water samples were collected from a subset (19 locations) of the locations used in the 11/2014 sampling event. Similar results were obtained in both events and, as discussed above, surface water sampling frequency was changed to an annual basis, and the number of locations was reduced to eight locations. See Figure 4.
Assumption that the plume is stable and not migrating (vertically or laterally) needs to be verified for current conditions.	Update the conceptual site model.	**Status: Complete** In 9/2016, GE provided separate isoconcentration contour maps for TCE in the shallow, intermediate, and deep portions of the Moreau aquifer using data from the spring 2014 groundwater monitoring event and agreed to generate new contour maps every five years with the next such scheduled to be generated based on the spring 2020 groundwater monitoring results.

Table 4: Other Comments on Operation, Maintenance, Monitoring and Institutional Controls

Comment/Suggestion	Status
New York State now requires annual certifications that ICs that are required by RODs are in place and that remedy-related O&M is being performed. The last quarter's Maintenance and Monitoring Program Reports should include a certification that remedy-related O&M is being performed and that the permanent easement and Local Law No. 1 of 2001, Chapter 145, Article IV, Water District No. 4 Rules and Regulations, are still in place.	**Status: Complete** Beginning with the 2013 4th Quarter Maintenance and Monitoring Program Quarterly Report received on January 14, 2014
Since the issuance of the technical impracticability waiver in the 10/1994 ESD, advances in groundwater remediation technologies have emerged which may enhance the monitored natural attenuation of the groundwater at the site. These technologies include, but are not limited to, in-situ chemical oxidation, bioaugmentation and air sparging. It may be beneficial to study the application of one or more of the noted technologies at the Site.	**Status: Not Completed** To date, groundwater treatment technologies have not been considered for the site. However, this suggestion remains valid.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On October 2, 2017, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 31 Superfund sites in New York and New Jersey, including the GE Moreau site. The announcement can be found at the following web address:

https://www.epa.gov/sites/production/files/2017-10/documents/five_year_reviews_fy2018_final.pdf

In addition to this notification, a notice of the commencement of the FYR was sent to local public officials. The notice was provided to the Town of Moreau by email on February 21, 2018, with a request that the notice be posted in the municipal offices and on the Town of Moreau webpage. The notice was also shared with the Town and Village of Fort Edward. The purpose of the public notice was to inform the community that EPA would be conducting a FYR to ensure that the remedy implemented at the site remains protective of public health and the environment and is functioning as designed. In addition, the notice included contact information, including addresses and telephone numbers, for questions related to the FYR process or the Site.

Once the FYR is completed, the results will be made available on EPA's GE Moreau site webpage (www.epa.gov/superfund/ge-moreau) and at the Site repositories, which are Crandall Library, 251 Glen Street, Glens Falls, NY 1280; Moreau Town Hall, Town Clerk's Office, 61 Corner of Hudson & 5th Streets, South Glens Falls, NY 12801; Fort Edward Library, 23 East Street, Fort Edward, NY 12801; and the EPA Region 2, Superfund Records Center, 290 Broadway, 18th Floor, New York, NY 10007.

Data Review

Containment Area Hydraulic Gradient Monitoring

To ensure an inward hydraulic gradient is maintained within the containment area, water level measurements are collected and compared monthly between one well inside the containment area (RW-1) and one well outside of the containment area (OW-5). The performance criterion established in the February 1994 ESD is the maintenance of a 0.5 ft elevation difference between these two wells (i.e., the water level in OW-5 should be 0.5 ft higher than RW-1). Since the completion of the last dewatering event in October 2014, groundwater elevations have risen in RW-1 from 318.48 ft above mean sea level (amsl) to a maximum of 320.58 ft amsl in both October 2017 and May 2018. At the same time, the water levels observed in OW-5 have decreased from 321.24 ft amsl to a low of 319.49 ft amsl in February 2017. The most recent water level measured in OW-5 in June 2018 was 320.92 ft amsl. Water levels exhibit seasonal fluctuations, increasing during the spring and decreasing during the summer and fall. Over the past five years, the 0.5 ft performance criterion was not met from November 2016 to February 2017 and again from January 2018 to May 2018.

Groundwater

Moreau Aquifer – Shallow Groundwater

Monitoring of shallow groundwater in the Moreau aquifer (See Figure 1) includes the following wells: DGC-21S, located upgradient of the contaminated groundwater plume, DGC-11S, DGC-22S, and DGC-3S, located along the centerline of the plume, DGC-18S, DGC-16S, and DGC-2S, located along the east side of the plume, and DGC-8S, DGC-1S, TM-2, and TM-C, located along the west side of the plume. Additionally, monitoring well FE-1 is located at the base of the escarpment marking the end of the Moreau aquifer where groundwater discharges to surface water.

Consistent with historical results, no VOCs were detected in upgradient well DGC-21S during this review period. Along the centerline of the plume, concentrations of TCE in well DGC-11S have ranged from 1.23 µg/L to a maximum of 781 µg/L in the November 2017 sampling event. However, TCE concentrations in the most recent sampling event in May 2018 had decreased to 187 µg/L. Concentrations of 1,2-DCE in this well have ranged from non-detect to 11.1 µg/L and vinyl chloride has not been detected over the past five years. TCE concentrations in well DGC-22S have ranged from 1.4 to 19.7 µg/L, while 1,2-DCE was only detected in 2013 at a maximum of 4 µg/L, and vinyl chloride was not detected over the past five years. Neither TCE, 1,2-DCE, nor vinyl chloride have been detected in DGC-3S over the past five years.

Along the eastern side of the plume, neither TCE, 1,2-DCE, nor vinyl chloride have been detected in wells DGC-16S and DGC-2S over the past five years. Along the western side of the plume, neither TCE, 1,2-DCE, nor vinyl chloride have been detected in wells DGC-8S, DGC-1S, or TM-C over the past five years. In well TM-2, TCE and 1,2-DCE were only detected once in May 2017 at concentrations of 6.4 and 1.9 µg/L, respectively.

Groundwater monitoring results near the erosional escarpment have decreased, in general, during the review period, although with significant variation over that time with concentrations of TCE in monitoring well FE-1, an artesian well at the base of the erosional escarpment, having decreased from 700 µg/L in 2014 to 388 µg/L in 2017, while peaking at a concentration of 1,200 µg/L in 2016.

Moreau Aquifer – Intermediate Groundwater

Monitoring of intermediate groundwater in the Moreau aquifer (See Figure 2) includes the following wells: DGC-21I, located upgradient of the contaminated groundwater plume, DGC-11I, DGC-22I, and DGC-3I, located along the centerline of the plume, DGC-18I and DGC-2I, located along the east side of the plume, and DGC-8I, DGC-1I, DGC-25Ia, DGC-25Ib, and TM-5, located along the west side of the plume.

Consistent with historical results, no VOCs were detected in upgradient well DGC-21I during this review period. Along the centerline of the plume, TCE concentrations in well DGC-11I have ranged from 370 to 1,600 µg/L over the past five years with wide fluctuations between consecutive monitoring events most recently as 2017 where TCE concentrations were observed to be 1,050 and 523 µg/L in the May and November sampling events, respectively. 1,2-DCE concentrations in this well have ranged between 4.57 and 25 µg/L, while vinyl chloride concentrations have been stable, ranging from 1.1 to 2.6 µg/L. TCE and 1,2-DCE concentrations in DGC-22I have generally decreased over the past five years with concentrations decreasing from 2,320 to 780 µg/L for TCE and 875 to 187 µg/L for 1,2-DCE. Vinyl chloride has decreased from a high of 131 µg/L in 2013 to non-detect levels over the past three sampling events. Contaminant levels DGC-3I are much lower with TCE concentrations ranging between 1.35 and 14 µg/L over the past five years, only sporadic low-level detections of 1,2-DCE, and no detections of vinyl chloride.

On the east side of the plume, well DGC-2I has only had sporadic detections of TCE over the past five years with a maximum concentration of 4 µg/L. On the west side of the plume, TCE concentrations in well DGC-8I have generally increased over the past five years from a minimum of 12.5 to a maximum of 45.3 µg/L in the most recent sampling event. However, 1,2-DCE and vinyl chloride have not been detected in this well. Well DGC-1I has not had any TCE, 1,2-DCE, or vinyl chloride detections over the past five years. DGC-25Ia has only had two low level detections of TCE over the past five years, while DGC-25Ib has had TCE concentrations between 6.1 and 13.1 µg/L, 1,2-DCE concentrations between 1.05 and 5.6 µg/L, and two vinyl chloride detections of 1.1 and 1.5 µg/L over the past five years. Concentrations of TCE and 1,2-DCE have generally decreased in TM-5 from 18.9 to 3.8 µg/L and 4.36 to 1.8 µg/L, respectively. Vinyl chloride was only detected once at a concentration of 1.0 µg/L in the past five years.

Moreau Aquifer – Deep Groundwater

Monitoring of deep groundwater in the Moreau aquifer (See Figure 3) includes the following wells: DGC-21D, located upgradient of the contaminated groundwater plume, DGC-11D, DGC-22D, and DGC-3D, located along the centerline of the plume, DGC-18D, DGC-16D, and DGC-2D, located along the east side of the plume, and DGC-8D and DGC-1D, located along the west side of the plume.

Consistent with historical results, no VOCs were detected in upgradient well DGC-21D over the past five years. Along the centerline of the plume, well DGC-11D has consistently had the highest concentrations of TCE with concentrations ranging from 4,540 to 7,500 µg/L. However, 1,2-DCE concentrations have shown a decreasing trend ranging from a maximum of 34.6 µg/L to 9.3 µg/L in the most recent sampling event. TCE concentrations have generally decreased in DGC-22D from a maximum of 6,670 µg/L to 2,300 µg/L in May 2017. 1,2-DCE and vinyl chloride concentrations have shown similar decreases ranging from 2,590 to 773 µg/L and 335 to 57.5 µg/L, respectively. TCE concentrations in well DGC-3D have fluctuated over the past five years, increasing from 1,280 µg/L in October 2013 to 3,400 µg/L in May 2015 before decreasing again to 1,090 µg/L in the most recent sampling event. 1,2-DCE

concentrations have followed a similar trend, increasing from 243 µg/L in October 2013 to 780 µg/L in November 2015 before decreasing to 186 µg/L in the most recent sampling event.

Along the east side of the plume, neither TCE, 1,2-DCE, nor vinyl chloride have been detected in DGC-16D over the past five years while concentrations have remained stable in DGC-2D ranging between 21.9 to 31.6 µg/L for TCE and 1.1 to 2.2 µg/L for 1,2-DCE. On the west side of the plume, TCE concentrations in DGC-8D have remained stable, ranging from 32.4 to 40 µg/L over the past five years, while 1,2-DCE concentrations have generally decreased from 23 to 9.4 µg/L. Vinyl chloride detections in this well have ranged from 1.1 to 2.3 µg/L. There have been no detections of either TCE, 1,2-DCE, or vinyl chloride in well DGC-1D over the past five years.

Moreau Aquifer – DGC-18 Well Cluster

Access to monitoring wells DGC-18S, DGC-18I, and DGC-18D has been denied by the property owners since April 2011. Therefore, no groundwater quality samples were collected from these wells since 2011. Neither TCE, 1,2-DCE, nor vinyl chloride were detected in these three wells from 1984 through 2010.

Moreau Aquifer – Toe of Plume Sampling and Delineation

In July 2016, groundwater samples were collected from three temporary well points near the base of the erosional escarpment where groundwater discharges to surface water. One of these temporary well points, designated TP-3, was located near the former location of DGC-13, with two additional well points, TP-2 and TP1, extending to the north-northeast of this location. No VOCs were detected in either TP-1 or TP-3, while TP-2 was observed to have TCE and 1,2-DCE concentrations of 11 and 4.6 µg/L, respectively. These results were used to define the toe of the contaminated groundwater plume, and additional sampling in this area should be used in the future to ensure the toe of the plume continues to be defined.

Moreau Aquifer – Northwest Plume Sampling and Delineation

In October 2014, groundwater samples were collected from three monitoring well clusters on the northwest side of the contaminated groundwater plume. Clusters TM-6 and DGC-23 are located just west-southwest of DGC-8, while the DGC-14 cluster is located near the Moreau Elementary School on Bluebird Road. No VOCs were detected in wells DGC-14S, DGC-14I, DGC-14D, DGC-23S, TM-6S, and TM-6D. TCE and 1,2-DCE were detected in well DGC-23I at maximum concentrations of 3.8 and 1.4 µg/L, respectively, and TCE was detected in well TM-6I at a concentration of 1.8 µg/L. These concentrations are below the 5 µg/L MCL for both TCE and 1,2-DCE. Monitoring well DGC-23D was observed to have a maximum concentration of 1,2-DCE of 3.8 µg/L, again below the MCL, and a maximum TCE concentration of 5.5 µg/L, which is slightly above the 5 µg/L MCL.

Moreau Aquifer – PCB Sampling

Three monitoring well clusters, DGC-8, DGC-11, and DGC-21, in addition to regular VOC sampling, are sampled every five years for PCBs. The DGC-21 well cluster is located upgradient of the containment area and contaminated groundwater plume, while the DGC-8 and DGC-11 well clusters are located just downgradient of the containment area and slightly west and east of the centerline of the contaminated groundwater plume, respectively. Historically, PCBs had not been detected in these wells. However, in

May 2015, PCBs were detected in each of these nine wells at concentrations ranging from 0.0523 µg/L for Aroclor-1260 in well DGC-11S to 1.43 µg/L for Aroclor-1242 in wells DGC-11I. This prompted an additional sampling event in September 2015. During the September 2015 sampling event, split samples were collected from six of the wells and submitted to separate laboratories for analysis. Again, PCBs were detected in six of the nine wells, though at generally lower concentrations ranging from 0.0255 µg/L for Aroclor-1260 in well DGC-8I to 1.01 µg/L for Aroclor-1221 in well DGC-11I. A third sampling event was performed at all nine wells in June 2016. The results were non-detect for all nine wells during this third sampling event, consistent with historical results. The next PCB sampling event is scheduled for 2020.

Bedrock Aquifer

As part of a response to a recommendation in the previous FYR report, an investigation into the use of private supply wells in the bedrock aquifer from homes in the vicinity of the Site along Fort Edward Road and Reservoir Road was conducted. After consultation with EPA, GE sampled bedrock supply wells at four residences in December 2017. The samples were analyzed for site-related VOCs (*i.e.* TCE, 1,2-DCE, and vinyl chloride). No site-related VOCs were detected in any of the groundwater samples. Bedrock wells were not installed within the boundary of the contaminated groundwater plume in the Moreau aquifer at the time of the ROD due to concerns over accidental introduction of contaminants from the Moreau aquifer into the bedrock aquifer. Advances in monitoring well technology would now allow such wells to be installed.

Groundwater Summary

While concentrations of VOCs have decreased significantly in the Moreau aquifer since the RI, several wells still exhibit VOC concentrations several orders-of-magnitude over their MCLs. As discussed above, recent sampling conducted near the toe of the contaminated groundwater plume in conjunction with the regular groundwater monitoring program has fully defined the extent of contamination in the Moreau aquifer. Samples should continue to be collected from the toe of the plume in the future to ensure the full extent of the plume continues to be accurately delineated. Additionally, recent sampling of residential bedrock supply wells has indicated that there is no current known exposure to VOCs from bedrock groundwater. However, additional bedrock investigations should be completed in the vicinity of the contaminated groundwater plume to confirm that the bedrock aquifer has not been impacted.

Surface Water

Prior to 2014, surface water samples were collected semiannually from Reardon Brook, which begins south of the erosional escarpment, and from several reservoirs and surface water collection boxes downstream of the air stripper. The reservoir and collection box samples were composited into two samples and analyzed for VOCs. Results from historically sampled Reardon Brook location X-5 ranged from a maximum of 120 µg/L and 46 µg/L of TCE and 1,2-DCE, respectively, in November 2015, to a minimum of 36.7 µg/L and 5.9 µg/L of TCE and 1,2-DCE, respectively, in May 2017. Samples are collected monthly from the influent and effluent of the Reardon Brook air stripper. Over the past five years, TCE and 1,2-DCE have been detected in the air stripper effluent on 11 occasions, the maximum observed concentrations of TCE and 1,2-DCE in the air stripper effluent were 10.4 µg/L and 3.1 µg/L, respectively, in January 2016.

In November 2014, surface water samples were collected from 21 locations in seeps and streams originating near the erosional escarpment (see Figure 4), as well as the influent and effluent of the Reardon Brook air stripper. Eight of the sampling locations and the air stripper influent were found to have detections of TCE. Six of these locations also had detections of 1,2-DCE. The highest TCE concentration, 190 µg/L at sampling location SW-6, and the highest 1,2-DCE concentration, 82 µg/L at sampling location SW-5, were both in an unnamed stream north of Reardon Brook, which originates near the erosional escarpment. Vinyl chloride was also detected at SW-5 at a concentration of 9.1 µg/L. In March 2016, samples were collected from a subset of 14 surface water locations used in the November 2014 sampling event, as well as from five reservoirs and two collection boxes located downstream of the Reardon Brook air stripper. During this event, the highest concentrations of TCE and 1,2-DCE were both observed at SW-5 at concentrations of 150 µg/L and 34 µg/L, respectively. Vinyl chloride was not detected in any sample. Due to the similarities in the results from these two sampling events (*i.e.*, sampling locations with detections in the first event had detections in the second event and vice versa), the surface water sampling program was modified to include annual sampling from five seep/stream locations, namely SW-2, SW-6, SW-9, SW-11, and X-5, as well as the Chrisite, Dority, and Sanderspree Reservoirs. Collection Boxes 1 and 2 will be sampled every five years. In general, streams originating within the footprint of the contaminated groundwater plume are found to exhibit detectable concentrations of TCE and 1,2-DCE, while those originating outside of the footprint of the plume do not. Reardon Brook exhibits detectable concentrations of VOCs both entering and exiting the Unnamed Pond. It is unknown if all of the surface water in the Unnamed Pond flows to Reardon Brook or if other surface water bodies could be impacted east of the pond.

Site Inspection

The inspection of the Site was conducted on 8/8/2018. In attendance were Thomas Mongelli, EPA, Kelly Duval of the NYSDEC, Matt Calacone of GE, and Janet Forsell of O'Brien & Gere. The purpose of the inspection was to assess the protectiveness of the remedy.

The site inspection included observations of the containment area, the Reardon Brook air stripper, and surface water collection locations. All areas were observed to be properly secured. Fencing was in good condition and gates were securely locked. Access roads to the containment area and air stripper were well maintained. No erosion was observed at the containment area. The air stripper was observed to be functional. All observed monitoring wells were locked and in good condition.

V. TECHNICAL ASSESSMENT

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

The primary objectives of the implemented remedy are to control the source of contamination at the Site, reduce and minimize the migration of contaminants into the groundwater and surface water, and minimize any potential human health and ecological impacts resulting from the exposure to contamination at the Site. These objectives were accomplished by, among other things, the installation of a containment system, removal of the PCB-contaminated surface soils and placement in the containment system, treatment of the groundwater plume after it discharges into Reardon Brook, provision of a public water supply system to residences affected or potentially affected by the plume of contaminated groundwater, and ICs to restrict the withdrawal and use of contaminated groundwater. Regarding the latter, the Town of Moreau adopted

Local Law No.1 of 2001, which established Water District No.4 and prohibited and restricted the use of groundwater in the water district and a permanent easement restricts the usage of the Site. The Town has also adopted a local requirement that any new construction overlying or near the groundwater plume must install a vapor mitigation system.

The current groundwater monitoring program includes 29 monitoring wells to monitor changes in the size and direction of the plume in the unconsolidated aquifer that is included in the technical impracticability waiver. The data collected during the review period indicates that the contaminant concentrations in the plume are generally stable or decreasing, although concentrations of Site-related contaminants in many wells remain far higher than their MCLs. Furthermore, recent sampling results from monitoring wells DGC-11S and DGC-11I show dramatic increases and decreases, respectively, in VOC concentrations over a short period of time (*i.e.,* approximately six months) with no known explanation. Additional data will be collected as part of the regular groundwater monitoring program to further understand these fluctuations. Recent sampling from temporary well points near the toe of the contaminated groundwater plume have allowed the plume to be fully delineated. Similar sampling will need to be performed in the future to ensure that the plume boundaries continue to be accurate and up-to-date. Residential bedrock well sampling conducted in 2017 indicates no currently known exposure from the bedrock aquifer. However, additional sampling of the bedrock aquifer in the vicinity of the contaminated groundwater plume in the Moreau aquifer is needed to confirm there are no impacts to the groundwater which may flow in a different direction than the upper aquifer.

No VOCs have been detected in the Village of Fort Edward reservoirs. The containment system appears to continue to be functioning as intended. However, based on recent hydraulic performance data, it appears that a fifth dewatering event will be needed in the near future (*i.e.,* evaluation once the system's inward hydraulic gradient performance criterion of a half foot is not met for two consecutive months).

The excavation and capping of the PCB-contaminated soil was intended to eliminate the exposure to future residential users. Soil was delineated and excavated to a cleanup goal of 1 mg/kg for PCBs.

The selected remedy for the Site did not include an investigation of the bedrock aquifer due to the presence of a clay confining layer beneath the Moreau aquifer and concerns associated with inadvertently introducing contamination to the bedrock aquifer during well installation. Analytical results indicate that the highest concentrations of COCs exist in the intermediate and deep wells and new knowledge of the hydrogeologic behavior of clay layers and advances in well technology would make such an investigation possible at this time. As was previously noted, recent bedrock aquifer sampling from private wells indicates that there is currently no known human exposure from potentially contaminated bedrock groundwater.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

There are no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. Inaccessibility and intermittent flow conditions limit potential recreational use of surface water bodies located between the erosional escarpment and the air stripper.

PCBs, the main Site soil contaminant, were excavated and consolidated with other contaminated soils under the clay cap, thus, interrupting exposures (*e.g.,* pathways, including direct contact.)

The toxicity values for PCBs have not changed since the last FYR, however, this chemical is currently being evaluated through the Integrated Risk Information System, EPA's consensus database system, for noncancer toxicity. Any changes in toxicity values will be evaluated in future FYRs.

Since the last FYR, the exposure assumptions used in the human health risk assessment were updated (OSWER Directive 9200.1-120). The updates in exposure factors, however, do not change the protectiveness of the remedy.

As is noted in the response to Question A, above, exposures to contaminated groundwater were interrupted by providing residences with public water. ICs also restrict the withdrawal and use of contaminated groundwater and interrupt potential exposures. The Town adopted a local requirement that any new construction overlying or near the groundwater plume must install a vapor mitigation system to interrupt potential exposures. There are currently no buildings overlying the plume.

The ROD and ESDs include the following RAOs: provide a safe drinking water supply for residents whose drinking water wells have been adversely impacted by groundwater contamination emanating from the site; assure that the existing groundwater plume does not adversely affect other areas; remediate the water quality of Reardon Brook feeding the public water supply reservoir of the village of Fort Edward, and reduce the potential for exposure to PCB-contaminated soils. The RAOs remain valid.

The combination of the risk-based concentrations and the institutional controls meet the goal of protection since exposures to contaminated groundwater at the site have been interrupted.

Although a screening level ecological risk assessment was not performed, the remedy is protective of ecological resources, as the exposure to ecological receptors has been controlled by soil excavation and capping and the extraction and treatment system has addressed surface water contaminant concentrations. Concentrations of TCE and 1,2-DCE in surface water have decreased since 2013, the last FYR period. Concentrations had exhibited an increasing trend in the early 2000s, and current values are similar to those detected in the mid-1990s. It should be noted that NYSDEC does not have values specific to ecological receptors (*e.g.*, wildlife protection values, fish survival or fish propagation values) for these contaminants of concern.

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

No other information which would call into question the protectiveness of the remedy has been discovered.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
None

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 1	**Issue Category: Monitoring**			
	Issue: The current dimensions of the contaminated groundwater plume need to be confirmed.			
	Recommendation: Additional sampling should be conducted near the toe of the plume to delineate the downgradient edge.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	9/30/2019
OU(s): 1	**Issue Category: Monitoring**			
	Issue: Confirmation is needed that there are no impacts to surface water beyond the Unnamed Pond.			
	Recommendation: Collect additional samples from any surface water bodies east of the Unnamed Pond or document that no such water bodies exist.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	9/30/2019
OU(s): 1	**Issue Category: Remedy Performance**			
	Issue: Characterization of the bedrock aquifer below the Site is needed.			
	Recommendation: Conduct an investigation of the bedrock aquifer, including at least one monitoring well located within the area of the contaminated groundwater plume.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	9/30/2019
OU(s): 1	**Issue Category: Monitoring**			
	Issue: Monitoring well cluster DGC-18 has not been sampled in several years due to access restrictions.			
	Recommendation: GE should coordinate with the owner of the property to resume semi-annual sampling of the DGC-18 well cluster which is needed to define the northeast portion of the plume.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	9/30/2019

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
1	Short-term Protective
Protectiveness Statement: The remedy at OU1 currently protects human health and the environment in the short-term because PCB contaminated soils have been excavated and consolidated within the containment area, residents who could potentially be affected by the contaminated groundwater plume have been provided with public water, the Reardon Brook air stripper continues to operate and treat all known impacted surface water, and institutional controls are in place to prevent the extraction of contaminated groundwater for drinking water purposes. For the remedy to be protective in the long-term, the dimensions of the contaminated groundwater plume need to be updated and confirmed, potential impacts to the bedrock aquifer need to be investigated, and additional surface water sampling may be needed to confirm the current conceptual Site model.	
Sitewide Protectiveness Statement	
Protectiveness Determination: Short-term Protective	
Protectiveness Statement: The remedy at OU1 currently protects human health and the environment in the short-term because PCB contaminated soils have been excavated and consolidated within the containment area, residents who could potentially be affected by the contaminated groundwater plume have been provided with public water, the Reardon Brook air stripper continues to operate and treat all known impacted surface water, and institutional controls are in place to prevent the extraction of contaminated groundwater for drinking water purposes. For the remedy to be protective in the long-term, the dimensions of the contaminated groundwater plume need to be updated and confirmed, potential impacts to the bedrock aquifer need to be investigated, and additional surface water sampling may be needed to confirm the current conceptual Site model.	

VIII. NEXT REVIEW

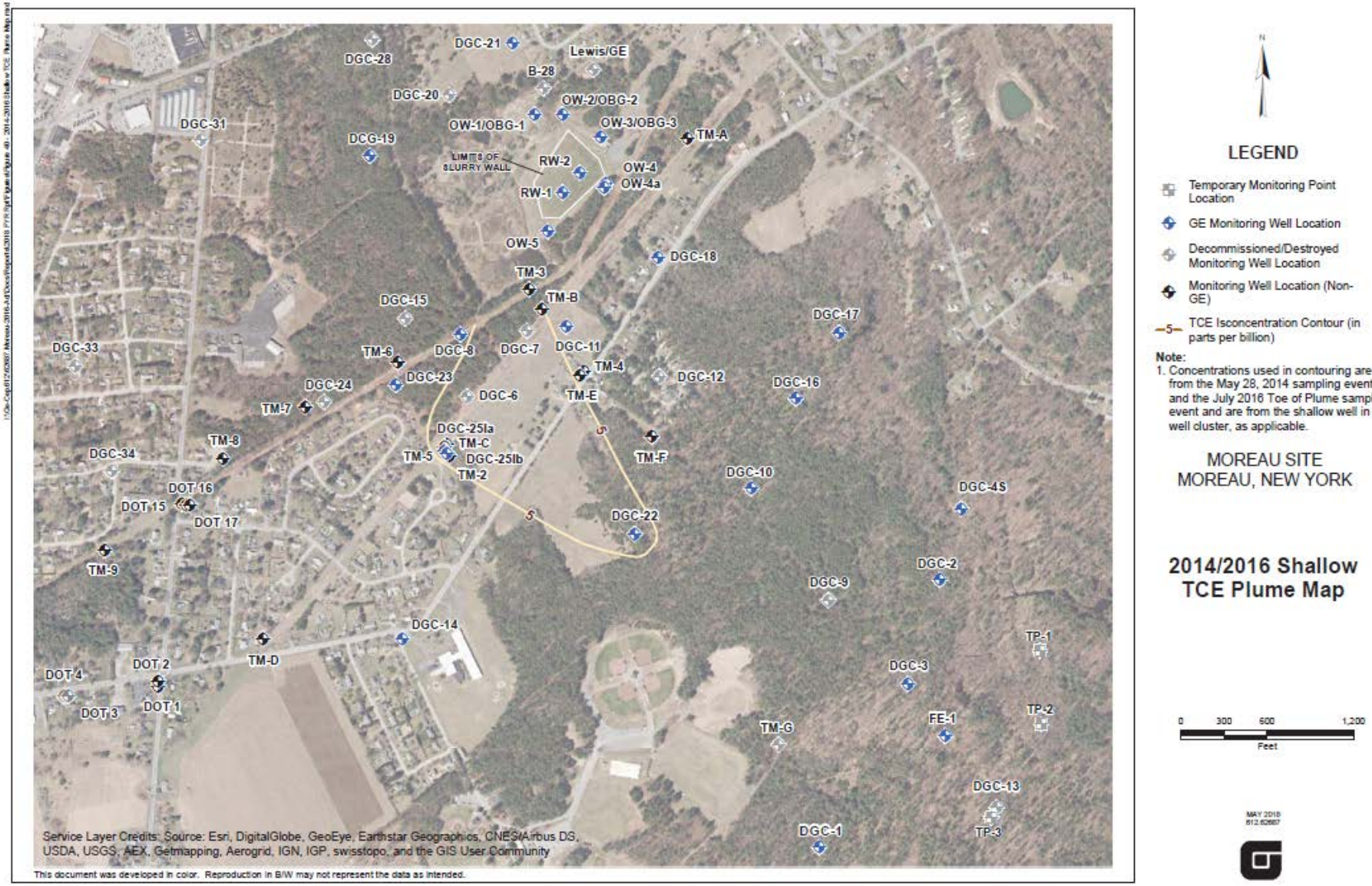
The next FYR report for the GE Moreau Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

- Record of Decision, GE Moreau Site, EPA, July 13, 1987
- Explanation of Significant Differences, Enhancement to Containment System, GE Moreau Site, EPA, February 22, 1994
- Explanation of Significant Differences, Technical Impracticability Waiver of Groundwater Cleanup Standards, GE Moreau Site, EPA, October 6, 1994
- Fifth Five-Year Review Report, GE Moreau Site, EPA, September 30, 2013
- Groundwater Analytical Data, O'Brien & Gere/Tetra Tech, 2013-2017
- Surface Water Analytical Data, O'Brien & Gere/Tetra Tech, 2013-2017
- Maintenance & Monitoring Program Quarterly Reports, O'Brien & Gere/Tetra Tech, 2013-2017
- Containment System Performance Quarterly Reports, O'Brien & Gere/Tetra Tech, 2013-2017

APPENDIX B – FIGURES

Figure 1 – Shallow Groundwater Plume Map



N

LEGEND

- Temporary Monitoring Point Location
- GE Monitoring Well Location
- Decommissioned/Destroyed Monitoring Well Location
- Monitoring Well Location (Non-GE)
- –5– TCE Isoconcentration Contour (in parts per billion)

Note:
1. Concentrations used in contouring are from the May 28, 2014 sampling event and the July 2016 Toe of Plume sampling event and are from the shallow well in a well cluster, as applicable.

MOREAU SITE
MOREAU, NEW YORK

2014/2016 Shallow TCE Plume Map

0 300 600 1,200
Feet

MAY 2018
612.62687

Figure 2 – Intermediate Groundwater Plume Map

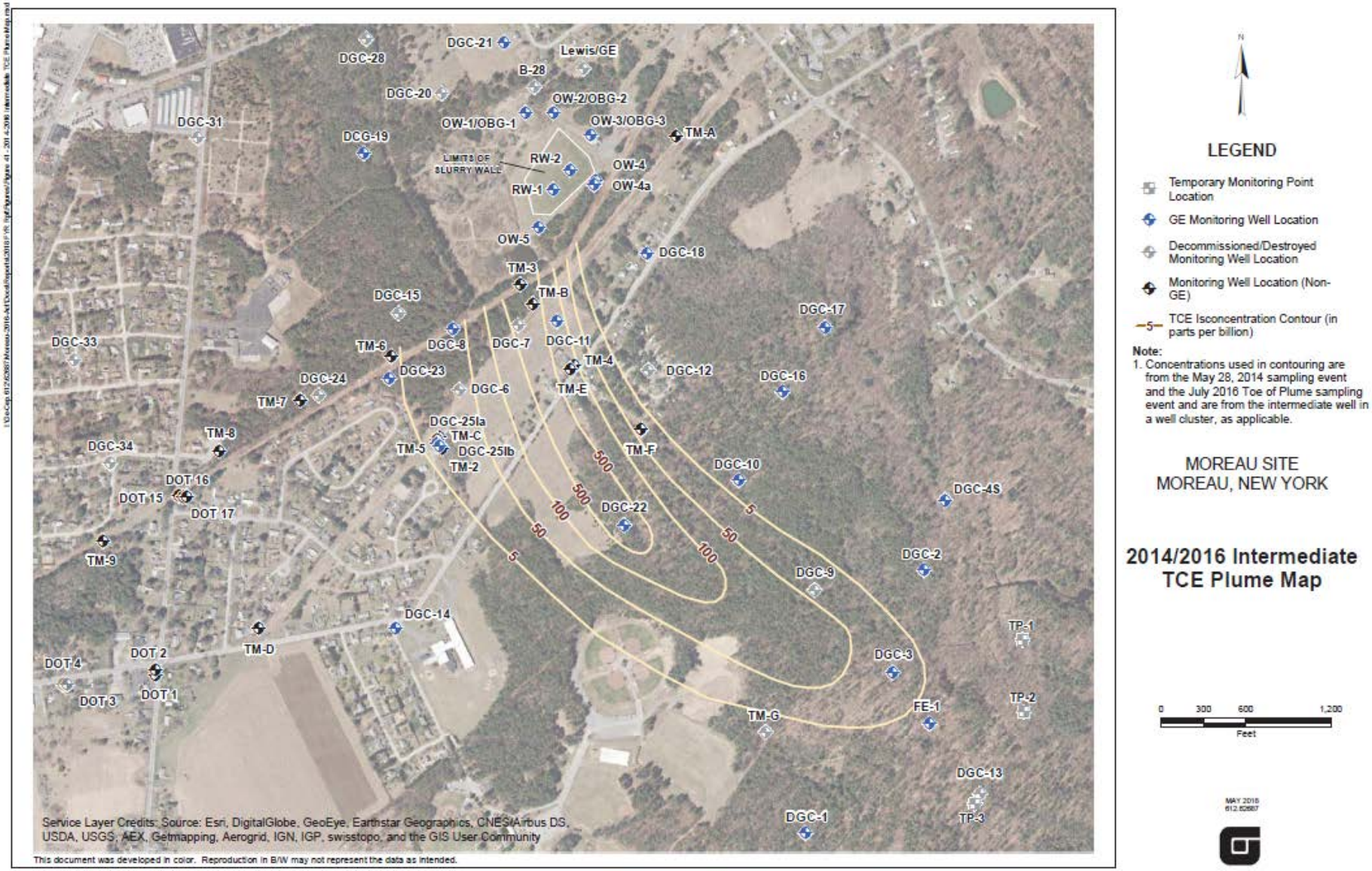
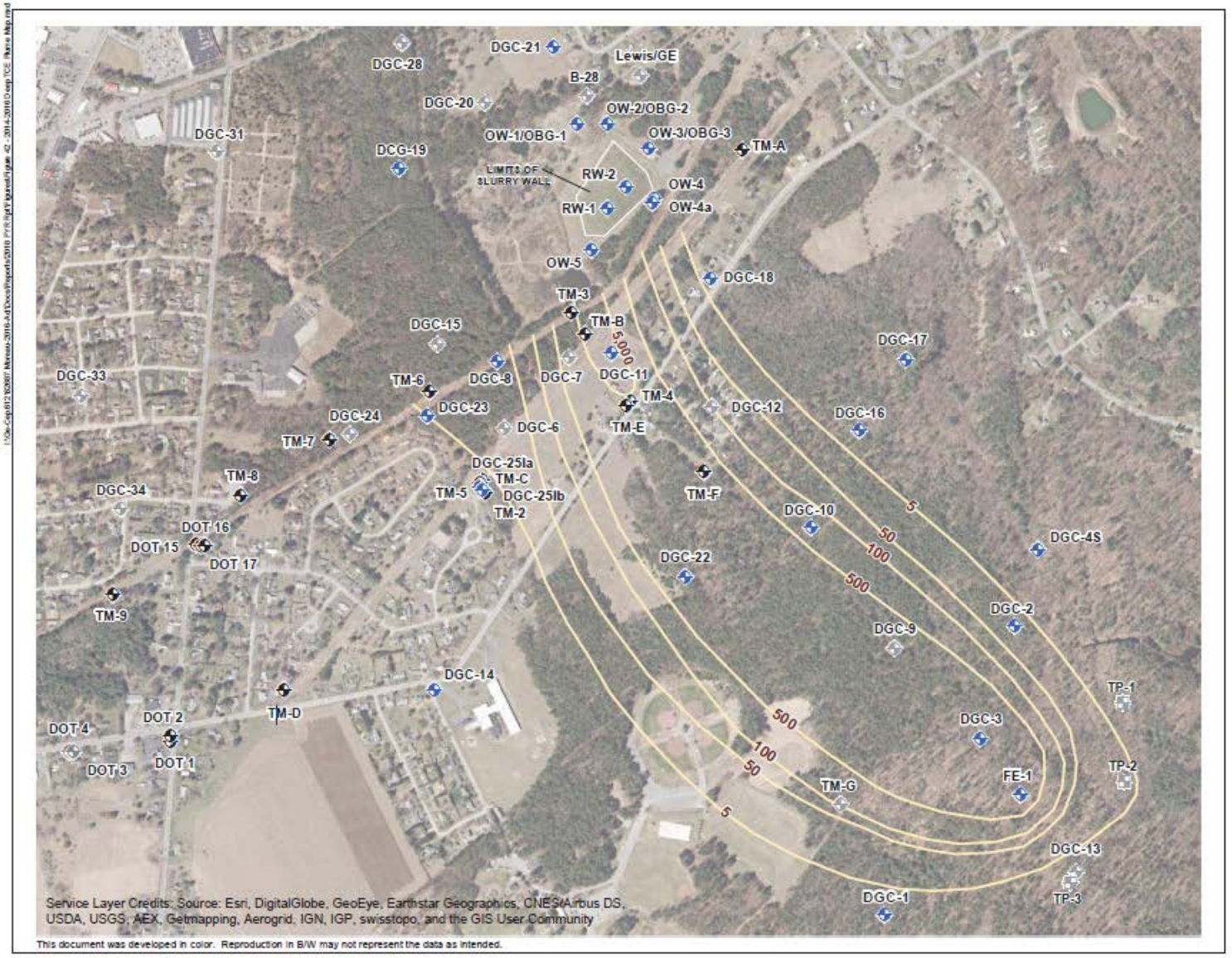


Figure 3 – Deep Groundwater Plume Map



N

LEGEND

- Temporary Monitoring Point Location
- GE Monitoring Well Location
- Decommissioned/Destroyed Monitoring Well Location
- Monitoring Well Location (Non-GE)
- —5— TCE Isoconcentration Contour (in parts per billion)

Note:

1. Concentrations used in contouring are from the May 28, 2014 sampling event and the July 2016 Toe of Plume sampling event and are from the deep well in a well cluster, as applicable.

MOREAU SITE
MOREAU, NEW YORK

2014/2016 Deep TCE Plume Map

0 300 600 1,200
Feet

MAY 2018
612.62667

Figure 4 – Surface Water Sampling Locations