FIFTH FIVE-YEAR REVIEW REPORT
MALTA ROCKET FUEL AREA SUPERFUND SITE
TOWNS OF MALTA AND STILLWATER, NEW YORK

Prepared by

U.S. Environmental Protection Agency
Region 2
New York, New York

Pat Evangelista, Acting Director
Superfund and Emergency Management Division

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Date

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LIST OF ABBREVIATIONS & ACRONYMS

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
AWQG	New York State Ambient Water Quality Guidance
CT	Carbon tetrachloride
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
CSWF	Cold Springs Well Field
DO	Dissolved Oxygen
EPA	United States Environmental Protection Agency
ERZ	Environmental Restriction Zone
ESD	Explanation of Significant Differences
FS	Feasibility Study
FYR	Five-Year Review
GE	General Electric Company
GWQS	New York State Groundwater Quality Standard
HI	Hazard Index
ICs	Institutional Controls
LFTC	Luther Forest Technology Campus
LFTCEDC	Luther Forest Technology Campus Economic Development Corporation
LFWF	Luther Forest Well Field
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSERDA	New York State Energy Research and Development Authority
PRP	Potentially Responsible Party
PCB	Polychlorinated Biphenyl
PTI	Power Technologies, Inc.
RAO	Remedial Action Objective
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
RWE	Remedial Work Element
SCWA	Saratoga County Water Authority
SCOs	6 New York Codes, Rules and Regulations Part 375, Soil Cleanup Objectives for Commercial Use
SDMP	Subsurface Drum Management Plan
TCE	Trichloroethylene
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 fifth FYR for the Malta Rocket Fuel Area Superfund site (Site). The triggering action for this statutory FYR is July 31, 2014, the signature date of the previous FYR report. The FYR has been conducted because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

The entire Site is being addressed under one Operable Unit (OU) under four Remedial Work Elements (RWEs): RWE I (Drinking Water); RWE II (Groundwater); RWE III (Soil); and RWE IV (Institutional Controls).

The FYR was led by Patricia Simmons Pierre, the EPA Remedial Project Manager (RPM). Other EPA participants included Joel Singerman (Central New York Remediation Section Chief), Abbey States (Human Health Risk Assessor), Michael Clemetson (Ecological Risk Assessor), Rachel Griffiths (Hydrogeologist), and Larisa Romanowski (Community Involvement Coordinator).

Site Background

The 445-acre Site property, currently known as the Luther Forest Technology Campus (LFTC), includes a square parcel of approximately 165 acres of developed land, known as the Malta Test Station (Test Station). The Test Station, at one time, included 33 buildings, numerous rocket test stands, concrete quench pits, leach fields/septic tanks, dry wells, storage areas, disposal areas, and a small artificial pond known as Muggett's Pond. The Test Station has been fully decommissioned and is currently owned by the Luther Forest Technology Campus Economic Development Corporation (LFTCEDC) and GlobalFoundries US, Incorporated (GlobalFoundries). The existing Test Station buildings are currently unoccupied and a fence surrounds much of the property. The Site also includes portions of predominantly undeveloped woodlands that surround the Test Station; the Saratoga Technology Energy Park, owned by New York State Energy Research and Development Authority (NYSERDA); and areas located adjacent to the Test Station that have been impacted by Site-related contaminants in the groundwater, owned by NYSERDA, the Town of Malta and Luther Forest Corporation (Luther Forest). A Site map is provided in Figure 1 of Appendix A.

Test Station operations involved the use of carbon tetrachloride (CT) and trichloroethylene (TCE) as solvents and degreasers. These activities resulted in the contamination of the soil and groundwater with volatile organic compounds (VOC) and metals.

Appendix B, attached, summarizes the documents utilized to prepare this FYR.

Appendix C, attached, summarizes the Site's history, geology/hydrogeology and land use. For more details related to background, physical characteristics, geology/hydrogeology, land/resource use, and history related to the site, please refer to EPA's webpage for the Site, www.epa.gov/superfund/malta-rocket.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Malta Rocket Fuel Area Site		
EPA ID: NYD980535124		
Region: 2	**State:** NY	**City/County:** Malta and Stillwater/Saratoga
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): Patricia Simmons Pierre		
Author affiliation: EPA		
Review period: 7/31/2014 - 4/29/2019		
Date of site inspection: 11/1/2018		
Type of review: Statutory		
Review number: 5		
Triggering action date: 7/31/2014		
Due date *(five years after triggering action date)*: 7/31/2019		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

In the mid-1980s, groundwater at the Site was sampled and found to contain CT, TCE, chloroform, and several metals.

In 1989, EPA issued a Unilateral Administrative Order to the potentially responsible parties (PRPs) to perform a remedial investigation and feasibility study (RI/FS). In March 1990, General Electric Company (GE), NYSERDA, and the Department of Defense entered into a participation agreement and undertook the RI/FS. Groundwater samples collected during the RI confirmed the presence of VOCs above federal Maximum Contaminant Levels (MCLs). Specifically, CT and TCE were detected near the center of the Test Station at maximum concentrations of 220 micrograms per liter (µg/L) and 280 µg/L, respectively.

The results of the RI were used to conduct human health and ecological risk assessments for the Site. Based on these risk assessments, the levels of PCBs in soil at the Building 23P area (where lead was also detected) and the levels of mercury at the Muggett's Pond Drainage Ditch Intersection were found to present unacceptable human health risks. The ecological risk assessment indicated that the soil contaminated with mercury at the Muggett's Pond Drainage Ditch Intersection may pose an ecological risk to terrestrial species. The potential risk posed to Muggett's Pond itself was determined to be minimal based on its small size (0.07 acre) and limited habitat for aquatic receptors.

Response Actions

In 1987, an air stripper was installed on the Test Station water supply wells by Wright-Malta under a New York State Department of Environmental Conservation (NYSDEC) permit to treat the contaminated groundwater prior to its use by employees at the Test Station. In addition, following the listing of the Site on the National Priorities List in July 1987, groundwater and surface water quality monitoring between the Site and the Luther Forest Well Field (LFWF) (located approximately one mile southwest of the Site in the Town of Malta) was initiated because of concerns regarding the potential for contaminated Test Station groundwater to affect the LFWF.

Several response actions were performed concurrent with the RI, including the decommissioning and removal of two compressed gas cylinders, excavating and recycling 560 empty, buried, crushed drums, cleaning out several septic tanks, catch basins and dry wells, and cleaning out a sump.

Based on the results of the RI/FS, EPA signed a ROD for the Site in July 1996. The following remedial action objectives (RAOs) were established in the ROD:

- Prevent ingestion of groundwater with concentrations of Site-related constituents (primarily the VOCs CT and TCE) above current federal drinking water standards or, if more stringent, New York State drinking water standards. Specifically, prevent the ingestion of groundwater containing concentrations of CT above 5 μg/L; TCE above 5 μg/L, tetrachloroethylene (PCE) above 5 μg/L; chloromethane above 5 μg/L; 1,1,1-trichloroethane above 5 μg/L, and total trihalomethanes (which includes chloroform) above 100 μg/L.
- Prevent ingestion of groundwater with concentrations of Site-related VOCs that pose an unacceptable risk to human health (total carcinogenic risk greater than 1 in 10,000 or a noncarcinogenic Hazard Index greater than 1).
- Prevent further migration of the groundwater plume containing Site-related VOCs above current federal drinking water standards or, if more stringent, New York State Groundwater Quality Standards (GWQSs), into areas with concentrations of contaminants in ground water below such standards. Specifically, prevent further migration of ground water containing more than 5 μg/L of CT, 5 μg/L of TCE, 5 μg/L of PCE, 5 μg/L of chloromethane, 5 μg/L of 1,1,1-trichloroethane, and 7 μg/L of chloroform.
- Restore groundwater so that concentrations of VOCs in the aquifer at the Site are reduced to current federal drinking water standards or, if more stringent, New York State groundwater standards. Specifically, restore the groundwater to concentrations that do not exceed 5 μg/L for CT, 5 μg/L for TCE, 5 μg/L for PCE, 5 μg/L for chloromethane, 5 μg/L for 1,1,1-trichloroethane, and 7 μg/L for chloroform.

- Prevent human exposure to soil at the Building 23P area containing concentrations of PCBs that pose an unacceptable risk to human health (i.e., an excess cancer risk greater than 1 in 10,000) and concentrations of lead in excess of generally accepted cleanup levels for lead in soil for commercial/industrial land use. Specifically, prevent human exposure to PCBs in soil at concentrations greater than 10 milligrams per kilogram (mg/kg) from the surface to a depth of 1 foot and in soil at concentrations greater than 25 mg/kg for soil below a depth of 1 foot, and prevent human exposure to lead in soil at the Building 23P area at concentrations greater than 1000 mg/kg.
- Prevent unacceptable ecological risk attributable to mercury in soil at the Muggett's Pond Drainage Ditch Intersection. Specifically, prevent ecological exposure to mercury in soil at concentrations greater than 2 mg/kg.

The major components of the selected remedy are as follows:

- Continued pumping of the Test Station water supply well(s) and treatment of the water by air stripping to provide an acceptable drinking water supply for the Test Station employees, which may be accomplished using the existing air stripper. Continued monitoring of the influent and effluent of the air stripper in accordance with New York State requirements to ensure that it effectively treats the on-Site water supply to federal MCLs, or if more stringent, New York State drinking water standards.
- Natural attenuation (*i.e.*, any combination of dilution, dispersion, adsorption and degradation) and natural discharge to nearby surface water springs and seeps into ravines (where concentrations of VOCs would be reduced to acceptable levels in surface water through volatilization) to address the VOCs that are not captured by the pumping well(s) until the groundwater attains federal MCLs, or if more stringent, New York State Groundwater Quality Standards (GQWS). It was estimated that the concentrations of VOCs in groundwater would be reduced to acceptable levels in 110 years.
- Monitoring of surface water and groundwater to ensure that off-Site groundwater users are not impacted by contamination from the Site, that contaminated groundwater does not migrate into uncontaminated areas (*i.e.*, that the groundwater plume is contained) and that natural attenuation is restoring the groundwater to the cleanup standards. The existing surface water and groundwater sample locations may be modified as necessary to meet the objectives of this monitoring program.
- Excavation of contaminated soil at the Building 23P area to a depth of 1 foot or less having a concentration of greater than 10 milligrams per kilogram (mg/kg) of PCBs, soil at a depth below 1 foot having a concentration of greater than 25 mg/kg of PCBs and soil at any depth with a concentration of lead of greater than 1,000 mg/kg.
- Excavation of contaminated soil at the Muggett's Pond Drainage Ditch Intersection at any depth with a concentration of greater than 2 mg/kg of mercury.
- Backfilling of excavations in the Building 23P area and at Muggett’s Pond Drainage Ditch Intersection with clean fill material, grading to blend with the surrounding areas and revegetation.
- Transportation of the excavated soil from the Building 23P area and Muggett’s Pond Drainage Ditch Intersection and disposal off-Site at an appropriate EPA-approved facility, consistent with Resource Conservation and Recovery Act and all other applicable or relevant and appropriate requirements.
- Implementation of institutional controls, which may include new deed restrictions, to prevent ingestion of contaminated groundwater, to restrict withdrawal of groundwater within the vicinity

of the plume that could adversely impact groundwater remediation and to restrict the Test Station to its current commercial/industrial land use.

- Evaluation of Site conditions at least once every five years to ensure that the remedy is protective of human health and the environment. If justified by the review, the EPA may require that additional remedial actions be implemented.

The GWQSs for the Site contaminants of concern (COCs) were selected in the ROD as the groundwater remediation goals and are listed in the table below.

Table 1: OU2 Remediation Goals

COC	Remediation Goal Micrograms/Liter (µg/L)
Carbon tetrachloride	5
Chloroform	7
Chloromethane	5
PCE	5
TCE	5
1,1,1- Trichloroethane	5

Status of Implementation

In September 1997, EPA and the PRPs signed a Consent Decree for the performance of the work called for in the ROD. GE was designated the party responsible for performing the selected remedy. The components of the remedy were addressed in four remedial work elements (RWEs): RWE I (Drinking Water),[1] RWE II (Groundwater), RWE III (Soil), and RWE IV (Institutional Controls).

No further remedial action was required for RWE I and RWE II after the issuance of the ROD because the air stripper was already in operation and no actions were required related to natural attenuation of the VOCs in the groundwater. The remedial design related to RWE III and RWE IV was approved by the EPA in September 1997. The remedial actions performed for RWEs III and IV are discussed below.

RWE III

Approximately four cubic yards of contaminated soil were excavated from the Building 23P area in July 1998. Six post-excavation soil samples were collected from the excavation and analyzed for PCBs and lead. All the samples contained less than 10 mg/kg of total PCBs and less than 1,000 mg/kg of lead. Thus, they met the cleanup criteria specified in the ROD. The excavated area was subsequently backfilled with clean fill and seeded. The excavated soil was transferred to a roll-off container and staged.

Approximately 62 cubic yards of contaminated soil, including visible elemental mercury in soil and debris, were excavated from the concrete trough at the Muggett's Pond drainage ditch intersection and from the surrounding areas in 1998. The excavated soil was transferred to 20-cubic yard roll-off containers and one-cubic yard soil boxes and staged. The elemental mercury and associated soil were placed in two one-

[1] Wright-Malta provided bottled water for consumption by its Test Station employees during the time that the buildings were being used as office space. The Test Station is currently unoccupied.

liter glass bottles, which were stored in a five-gallon pail for secondary containment. The excavated area (except the concrete trough) was subsequently backfilled with clean fill and seeded.

Based on the analysis of samples for hazardous waste characterization, the excavated soil was determined to be nonhazardous and was shipped by truck to Waste Management Inc.'s facility in Model City, New York. The two-liter bottles containing elemental mercury and associated soil were determined to be hazardous and were transported by truck to Advance Environmental Technical Services' transfer station in Flanders, New Jersey in 1998 and ultimately disposed of at AERC/MTI in Allentown, Pennsylvania in 1999.

In 2011, during excavation and grading of soils in an area of the GlobalFoundries property that would eventually become a parking lot, approximately 60 drums/containers were encountered. They were sampled and removed for proper off-Site disposal by CT Male Associates, a contractor for GlobalFoundries. NYSDEC provided oversight for the response activities in coordination with EPA.

In 2014, during preconstruction activities associated with another GlobalFoundries parking lot on the Test Station property, an area of buried drums and debris was discovered. Because of concerns about the potential for buried munitions and other military items, an electromagnetic survey was conducted in the planned construction area. The survey found some anomalies and an investigation of the area was performed in 2016. Subsequently, approximately 60 drums and containers and 34 stainless steel cylinders (of varying sizes up to 12 inches in length with U.S. Navy markings) were excavated. The drums and containers were sampled and properly disposed of off-Site by LFTCEDC and GE. Because their contents were unknown, the cylinders were destroyed by controlled detonation in a remote area of the Site. EPA provided oversight for this response action.

As part of the 2011 and 2016 drum removal activities, post-excavation samples were collected from the soil and nearby groundwater wells and the results were compared to 6 NYCRR Part 375 Soil Cleanup Objectives for Commercial Use (SCOs) and GWQSs, respectively. Based upon the results of these investigations, it was concluded that the responses adequately addressed the limited contamination in these two areas.

RWE IV

The ROD required the implementation of institutional controls to prevent ingestion of contaminated groundwater, restrict withdrawal of groundwater within the vicinity of the plume that could adversely impact groundwater remediation and restrict the Test Station to commercial/industrial use, which is its current land use. To implement the institutional controls, an environmental restriction zone (ERZ)[2] was designated to prevent the capture zone of hypothetical future pumping wells from intersecting the groundwater plume of VOCs and thereby ensure containment of the plume and ERZ. Declarations of Restrictive Covenants were recorded with the Saratoga County Clerk for the property located within the ERZ (owned by Luther Forest, NYSERDA and Wright-Malta) in 1999.

[2] The ERZ extends approximately 1,500 ft. from the upgradient and lateral edges of the VOC plume, and approximately 1,500 ft. from the downgradient edge of the VOC plume (see Figure 1 of Appendix A).

Post-Remediation

Based on the presence of elevated VOCs in the groundwater, the 2009 FYR report recommended that post-construction vapor intrusion sampling be performed at the GlobalFoundries building, designated as the Fab 8 Administration 1 Building, that was under construction at that time, and that a mitigation system be installed if vapors were detected above levels of concern. It was also recommended that future construction include vapor mitigation measures that entail either the installation of a vapor barrier and vapor mitigation system (followed by post-installation indoor air sampling to verify that the system is working as intended), or the performance of a vapor intrusion study once construction is completed. The existing GlobalFoundries microchip manufacturing building is constructed with a vapor barrier and 36-inch thick concrete foundation slab, which eliminates any potential for vapor intrusion.

In 2010, the Saratoga County Water Authority (SCWA) completed the construction of a 27-mile water supply line which uses the Upper Hudson River as its water source. This waterline supplies water to the LFTC (including the Test Station) and five surrounding municipalities, including the Towns of Malta, Moreau, Wilton, Ballston and Clifton Park and the Village of Stillwater. The on-Site air-stripper treatment system was decommissioned following the connection of the Test Station to the public water line.

The GlobalFoundries Fab 8 Administration 1 Building was completed in 2012 and another building, designated as the Fab 8 Administration 2 Building was completed in 2013. Vapor intrusion studies were conducted by GlobalFoundries at the Administration 1 and 2 Buildings in 2012 and 2013, respectively. The sampling results were compared to values developed using EPA's vapor intrusion screening level calculator and values provided in the New York State Department of Health (NYSDOH) *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, 2006. Based upon these results, EPA determined that no further vapor intrusion sampling was warranted in either building.

In March 2018, a post-construction vapor intrusion study was conducted in the GlobalFoundries M+W Project Building, located in the north corner of the Test Station property. All indoor air results were below the EPA commercial vapor intrusion screening levels and NYSDOH indoor air guidelines, indicating no additional mitigation measures are needed to ensure protectiveness for workers in the building at this time.

In April 2018, EPA issued an Explanation of Significant Differences (ESD) for the Site. The ESD serves to document EPA's decision to incorporate into the remedy ICs that limit occupancy of existing buildings or new construction, on or within 200 feet of the Test Station property, unless appropriate vapor intrusion investigations are conducted and/or mitigation measures (including periodic monitoring) are implemented, and EPA's determination that a Subsurface Drum Management Plan (SDMP) should be implemented whenever intrusive activities are planned on the Test Station property. The existing Environmental Protection Easements and Declarations of Restrictive Covenants will be amended to include these ICs and the requirement for the implementation of a SDMP. The ESD also documents EPA's determination to eliminate the air stripping of the Test Station groundwater for potable use.

Institutional Controls Summary

As part of RWE IV activities, Site inspections are conducted during the routine groundwater sampling events to determine if any changes or development (specifically, installation of groundwater wells and new construction) have occurred within the ERZ. In addition, representatives from NYSERDA, Luther Forest, GlobalFoundries and the Town of Malta (owners of the property located within the ERZ) are interviewed about current or proposed changes in land use, groundwater usage, and compliance with the ESD and notice requirements in the respective deed restrictions. EPA is notified in writing of any changes

observed during the sampling events or discovered during the interviews and the findings of these inspections and interviews are summarized in the Annual Operation and Maintenance (O&M) Reports.

New York State requires annual certification that institutional controls required by RODs are in place, and that remedy-related O&M is being performed. This certification is included as an attachment to the annual O&M reports.

Table 2: Summary of Planned and/or Implemented Institutional Controls

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Parcel(s) Impacted	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Yes	Sitewide	Prevent the utilization of the groundwater underlying the ERZ, prevent the development of the Site for residential use, and allow access for maintenance and monitoring activities.	Environmental Protection Easements and Declarations of Restrictive Covenants recorded by the Saratoga County Clerk on June 3, June 11, and June 28, 1999
Land Use	Yes	Yes	Test Station Property	Restrict the Test Station property to commercial/industrial land use.	Environmental Protection Easements and Declarations of Restrictive Covenants recorded by the Saratoga County Clerk June 11, 1999
Groundwater	Yes	Yes	Sitewide	Limit occupancy of existing buildings or new construction, on or within 200 feet of the Test Station property, unless appropriate vapor intrusion investigations are conducted and/or mitigation measures (including periodic monitoring) are implemented.	Planned amendments to the existing Environmental Protection Easements and Declarations of Restrictive Covenants recorded by the Saratoga County Clerk on June 3, June 11, and June 28, 1999; Anticipated completion: September 2019
Buried Drums	Yes	Yes	Test Station Property	Establish Site-specific protocol for the management of any buried drums encountered during intrusive construction activities	Planned development of a Subsurface Drum Management Plan; Anticipated completion: September 2019

System Operations, Monitoring and Maintenance

System Operations

System operation activities related to RWE I previously included the collection of influent and effluent water samples from the on-Site water supply system quarterly and analysis for the presence of VOCs to

ensure that the air stripper was functioning as designed and the Test Station potable water supply was being effectively treated and meeting MCLs. All activities related to RWE I ceased after February 2010, when the LFTC was connected to the newly-installed SCWA public water supply and the air stripper was decommissioned.

Monitoring

As part of the RWE II monitoring activities, groundwater and surface water samples are collected semi-annually and analyzed for VOCs, hexavalent chromium and total chromium. Hexavalent chromium and total chromium, though not listed in the 1996 ROD as COCs, were added to the list of analytes for selected wells (along the western side of the Site) in the early 1990s due to detections of these contaminants in downgradient monitoring wells.

GE analyzed selected samples for ammonium perchlorate (a chemical associated with rocket fuel), from 2003 through 2004, in response to a request from NYSDOH. These analyses were discontinued because ammonium perchlorate was either not detected or detected at levels below the method reporting limit in all the samples.

The 2009 FYR report recommended sampling for hydrazine, another chemical associated with rocket fuel that was reportedly used widely across the Site and burned in one area (with an NYSDEC permit), to ensure full contaminant characterization at the Site. Hydrazine sampling was conducted at the Site during 2012 and 2013. Hydrazine sampling was discontinued because the results did not indicate the presence of this compound at the Site.

Groundwater elevations are measured at well locations to evaluate potential changes in the size and shape of the contaminant plume to ensure that off-Site groundwater users are not impacted by Site contamination, and groundwater samples are analyzed for natural attenuation parameters based upon a recommendation in the 2009 FYR report.

Maintenance

Maintenance activities at the Site include conducting inspections during routine monitoring events to ensure that the monitoring wells remain secured and are accessible and fully operational. GE submits O&M reports to the EPA semiannually.

Potential impacts from climate change have been assessed at the Site. 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 3, below.

Table 3: Protectiveness Determinations/Statements from the 2014 FYR		
Operable Unit	**Protectiveness Determination**	**Protectiveness Statement**
01	Short-term Protective	The implemented remedy currently protects human health and the environment in the short term because soil contamination has been addressed through the removal of contaminated soil and institutional and access controls are properly operated, monitored and maintained to prevent use of groundwater and maintain industrial commercial use of the property. In order for the remedy to be protective in the long term, the downgradient edge of the plume should be further characterized, the newly discovered area of buried drums and pails should be investigated for soil and groundwater impacts and future construction should include either the installation of mitigation measures during construction or vapor intrusion sampling and the installation of post-construction mitigation measures, if necessary.
Sitewide	Short-term Protective	The implemented Site-wide remedial action currently protects human health and the environment in the short term because soil contamination has been addressed through the removal of contaminated soil and institutional and access controls are properly operated, monitored and maintained to prevent use of groundwater and maintain industrial commercial use of the property. In order for the remedy to be protective in the long term, the downgradient edge of the plume should be further characterized, the newly discovered area of buried drums and pails should be investigated for soil and groundwater impacts and future construction should include either the installation of mitigation measures during construction or vapor intrusion sampling and the installation of post-construction mitigation measures, if necessary.

Table 4: Status of Recommendations from the 2014 FYR		
Issue	**Recommendations and Follow-Up Actions**	**Status**
An increasing trend in TCE concentrations was observed in monitoring well M-29D and the 2013 sampling data showed a TCE exceedance in monitoring well M-28S.	TCE concentrations in monitoring wells M-29D and M-28S should be more closely monitored, along with the remaining shallow and deep aquifer monitoring wells situated along the north-northwest boundary of the Former Test Station property (monitoring wells M-25S, M-25D, M-28D, M-29S, 4D and 4S), to ensure that contaminant trends do not continue to increase or contaminants migrate beyond the monitoring well network. If continued monitoring suggests persistent contamination along this property boundary and an ongoing increasing trend in contaminant data, then appropriate actions should be considered.	Ongoing since October 2014

Table 4: Status of Recommendations from the 2014 FYR, Continued		
Issue	**Recommendations and Follow-Up Actions**	**Status**
Vapor intrusion concerns related to future construction of the Luther Forest Technology Campus.	In light of the presence of elevated VOCs in the groundwater, it is recommended that future construction within a 200-foot radius of monitoring wells M-25D, M-27D, 11D, M-26D, M-24DR, M-28D and M-29D include vapor mitigation measures. These measures should entail either the installation of a vapor barrier and vapor mitigation system (followed by post-installation indoor air sampling to verify that the system is working as intended), or the performance of a vapor intrusion study once construction is completed that involves sampling the air that collects underneath the slab at regular intervals until groundwater concentrations decrease to a level where there is no longer the potential for vapor intrusion. If during this sampling, vapors are detected above levels of concern, then an appropriate system should be installed to remove the vapors.	Ongoing
Buried drums and pails discovered in an area located along the northeast border of the Site.	The newly discovered area of buried drums and pails should be investigated for soil and groundwater impacts.	Completed on 9/15/16

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement and Site Interviews

On October 1, 2018, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 42 Superfund sites in New York and New Jersey, including the Malta Rocket Fuel Area site. The announcement can be found at the following web address: https://www.epa.gov/aboutepa/fiscal-year-2019-five-year-reviews.

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 towns of Malta and Stillwater by email on February 13, 2019, with a request that the notice be posted in municipal offices and on the town webpages. The purpose of the public notice was to inform the community that the EPA would be conducting a FYR to ensure that the remedy implemented at the site remains protective of public health 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 webpage for the Site, (www.epa.gov/superfund/malta-rocket) and at the Site repositories, which are Malta Town Hall, 2540 Route 9, Ballston Spa, NY 12020; Round Lake Library, 31 Wesley Ave, Round Lake, NY 12151; and the USEPA Region 2, Superfund Records Center, 290 Broadway, 18th Floor, New York, NY 10007.

Data Review

From May 2014 through October 2017, shallow and deep groundwater samples, as well as surface water samples, were collected semiannually. Groundwater elevation measurements were also collected during each sampling event.

Samples were collected from shallow aquifer monitoring wells DGC-3S, DGC-4S, MW-1, MW-4, M-10S, M-13S, M-26S, M-28S and deep aquifer monitoring wells M-11D, M-13D, M-24DR, M-25D, M-26D, M-27D, and M-29D. In accordance with the recommendations from the last FYR, during this review period, samples were also collected semiannually from shallow aquifer monitoring wells M-4S, M-25S, and M-29S and deep aquifer monitoring wells M-4D and M-28D. All samples were analyzed for the presence of VOCs and dissolved oxygen (DO) levels as an indicator of natural attenuation (*i.e.*, degradation). Samples collected from monitoring wells M-13D and M-27D were also analyzed for the presence of hexavalent and total chromium.

Surface water samples collected from locations SW-A, SW-B, SW-D, SW-E, SW-F and SW-G were analyzed for VOCs. Samples from location SW-B were also analyzed for the presence of hexavalent chromium and total chromium. All sampling locations are depicted in Figure 1 and the sampling results are discussed below.

Shallow Groundwater

Shallow groundwater at the Site generally refers to depths ranging from about 30 to 50 ft. below ground surface (bgs). While it primarily flows in the south-southwest direction, there is a potential radial component to the shallow groundwater, as well. Compounds detected in the shallow groundwater include acetone, chloromethane, CT, chloroform and TCE; however, only concentrations of TCE and CT regularly exceeded their respective GWQS of 5 μg/L and 7 μg/L during this review period.

Monitoring wells DGC-3S and DGC-4S are sentinel wells located downgradient of the LFWF and have consistently shown no indication of VOC contamination in the groundwater. Monitoring wells MW-1 and MW-4 are also located hydraulically downgradient along the south-southeast Test Station boundary and have shown no presence of COCs since being added to the monitoring program in 2012.

Monitoring wells M-10S and M-13S, situated along the south-southwest edge of the LFWF property boundary, showed VOC concentrations at levels below GWQSs. In October 2017, CT concentrations in monitoring wells M-10S and M-13S were 1.1 μg/L and 2.7 μg/L, respectively, and TCE was detected at 2.7 μg/L in M-13S.

Monitoring wells M-25S, M-28S, and M-29S are situated along the north-northwest Test Station boundary. During the review period, concentrations of TCE and CT exceeded their GWQS in M-25S with maximum detections of 57 μg/L and 29 μg/L, respectively. Detections of CT in well M-28S (maximum of 5.4 μg/L) remained below the GWQS of 7 μg/L, and TCE was detected at a maximum of 18 μg/L in May 2016, exceeding the GWQS of 5 μg/L (see trend graph in Appendix D). Concentrations of TCE and CT sporadically exceeded GWQS at well M-29S, with respective maximum concentrations of 14 μg/L and 11 μg/L.

Monitoring well M-26S, located along the north-northeast Test Station boundary, showed mostly non-detectable concentrations of COCs and some low-level estimated concentrations of acetone and chloromethane below their respective GWQS.

Monitoring well M-4S is downgradient from the Test Station boundary to the south-southwest and had no exceedances of COCs above the GWQS during the review period.

Overall, the data collected during the review period indicate that low level concentrations of COCs are present in the shallow aquifer (mostly at levels below their respective GWQS). The exception to this is along the north-northwest Test Station boundary where monitoring wells M-25S, M-28S, and M-29S showed TCE and CT concentrations exceeding their GWQS of 5 μg/L and 7 μg/L. Downgradient monitoring well M-4S, had no constituents detected above GWQS, which indicates that the area of impact along the north-northwest Test Station boundary is limited in extent.

Deep Groundwater

The deep groundwater at the Site flows to the north-northwest and southwest and, generally, refers to depths ranging from 70 to 90 ft. bgs. While compounds detected in the deep groundwater include acetone, CT, chloroform, TCE, cis-1,2-DCE, 1,1,1-trichloroethane, 1,1-DCE, chromium, the only compounds regularly exceeding their respective GWQS during this review period were CT and TCE. Isolated exceedances of acetone and total chromium above their respective GWQS (50 μg/L for both constituents) were noted during the review period, but the exceedances are not tied to any individual trends or sitewide patterns.

During this review period, TCE concentrations in the deep wells ranged from not detected to 62 μg/L (monitoring well M-25D), with maximum concentrations consistently being found in monitoring well M-25D. Carbon tetrachloride concentrations ranged from non-detect to 39.8μg/L. Trend graphs, provided in Appendix C, show declining or stable concentrations of CT and TCE over the FYR period with the exception of TCE in MW-24DR and CT in MW-27D. TCE and CT trend graphs for selected deep aquifer monitoring wells are also provided in Appendix D.

Monitoring well M-13D, which is located on the downgradient south-southwest side of the Test Station boundary, had one occurrence of chromium above its GWQS of 50 μg/L, but the filtered sample results were non-detect which indicates the absence of hexavalent chromium in the well. No other exceedances of GWQS were noted at this location during the review period.

Monitoring well M-27D, which is located on the south-southwest side downgradient of the Test Station boundary, has relatively stable concentrations of TCE slightly above its GWQS of 5 μg/L. CT concentrations in this well have a slightly increasing trend and were above the GWQS of 7 μg/L for both of the 2017 monitoring events, with a high of 8.6 μg/L in May.

The highest concentration of COCs in the deep aquifer are in monitoring well M-25D, which is located on the north-northwest boundary of the Test Station. While the concentrations of TCE and CT exceeded their respective GWQS, they showed decreasing trends during the review period. Monitoring wells M-24DR, M-28D, and M-29D are also situated on the north-northwest boundary. Concentrations of CT remained below GWQS in monitoring well M-24DR, but concentrations of TCE sporadically exceeded its GWQS of 5 μg/L during the review period. No exceedances of GWQS were reported in samples from monitoring well M-28D during the review period. Monitoring well M-29D exhibited stable/decreasing trends of TCE and CT during the review period, though concentrations remain above their respective GWQS. Low-level detections in monitoring well M-29D include chloroform, 1,1-DCE, and 1,1,1-TCA, which suggest the occurrence of incomplete reductive dechlorination.

In summary, groundwater data in both the shallow and deep aquifer indicate decreasing concentrations of VOCs in most wells, except for shallow and deep wells at the north-northwest property boundary. The last FYR noted increasing TCE concentrations in monitoring wells M-29D and M-28S and recommended continued monitoring. Although TCE concentrations remain above GWQS in monitoring wells M-29 and M-28S, concentrations at these locations were stable throughout the FYR period and will continue to be monitored. COC concentrations at downgradient monitoring well M-4D, located on the north-northwest side of the Test Station boundary, have not exceeded GWQS. This indicates that COC impacts on the north-northwest boundary are localized and have not migrated to downgradient locations.

Surface Water

In October 2017, acetone exceeded the New York State Ambient Water Quality Guidance (AWQG) value of 50 μg/L at surface water sampling locations SW-B (77.8 μg/L) and SW-D (70 μg/L). No other VOC concentrations exceeded AWQG values during the FYR period. Chromium was not detected in the surface water during this FYR period.

Natural Attenuation Processes

In 2017, DO concentrations ranged from 0.05 to 15.19 μg/L and from 0.07 to 12.59 μg/L in the shallow and deep aquifers, respectively. The majority of monitoring wells show DO concentrations in the higher end of the concentration ranges, which is indicative of an aerobic environment (EPA, 1998). Based upon estimated low-level concentrations of cis-1,2-DCE detected in monitoring wells M-25D and M-29D, there is some evidence that reductive dechlorination is occurring. However, because neither vinyl chloride nor ethane has been detected, and the DO concentrations indicate aerobic conditions, the data do not support complete dechlorination processes. Instead, the main processes driving decreases in contaminant concentrations are natural dispersion processes.

Drum Removal Activities

During the review period, limited soil excavation was conducted during the drum removal activities in 2016 and post-excavation samples were collected from the surrounding soils and nearby groundwater wells to determine the extent of any impacts to the areas. Soil sampling results were compared to the SCOs and groundwater sampling results were compared to the GWQSs. Post-excavation sampling results indicated no exceedances of SCOs or GWQSs.

Site Inspection

The Site inspection was conducted on November 1, 2018. In attendance were EPA RPM, Patricia Simmons Pierre, NYSDEC Project Manager, Steven Scharf, Matthew Calacone of GE, Michael Relyea of LFTCEDC, and Joel Roulliard and Stephanie Kaczynski of GlobalFoundries. The purpose of the inspection was to assess the protectiveness of the remedy.

Messrs. Calacone, Relyea and Roulliard were interviewed in relation to this FYR. Mr. Calacone indicated that the remedy is functioning as anticipated in the ROD and Messrs. Relyea and Roulliard confirmed that there are no redevelopment plans for the Site property that would conflict with the ICs established in the ROD and ESD. No issues impacting the current or future protectiveness of the remedy were identified during the Site visit.

V. TECHNICAL ASSESSMENT

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

The ROD called for the excavation and off-Site disposal of contaminated soils. The soil contamination has been addressed through the removal of contaminated soil and backfilling with clean soil. The remedy eliminated any potential for on-Site exposures through dermal contact with and ingestion of contaminated soil by human and ecological receptors, as well as any potential impacts of the contaminated soil on groundwater through removal of the contaminated source.

The ROD called for continued pumping of the Test Station water supply well(s) to provide a potable water source for Test Station employees and natural attenuation (*i.e.*, dilution, dispersion, adsorption, and possibly degradation) and natural discharge to nearby surface water springs and seeps into ravines (where concentrations of VOCs would be reduced to acceptable levels in surface water through volatilization) to address the VOCs that are not captured by the pumping well(s) until the groundwater attains federal MCLs, or if more stringent, GWQS. It was estimated in the ROD that the concentrations of VOCs in the groundwater would be reduced to acceptable levels in 110 years.

Following the installation of a public water line in February 2010, the pumping of the Test Station water supply wells was discontinued.

Overall, the two persistent and widespread contaminants that remain at the Site above the GWQSs in both the shallow and deep aquifers are CT and TCE. Deep aquifer trend data (provided in Appendix D) shows declining trends for both constituents, with one exception (TCE in monitoring well M-24DR and CT in monitoring well M-27D). Deep aquifer monitoring well M-25D has the highest concentrations of CT and TCE; both contaminants exhibited decreasing trends in this well during the review period. The overall declining concentrations in the groundwater, coupled with stability of the plume, support the conclusion that the remedy is functioning as intended.

In response to a recommendation made by EPA in the previous FYR, shallow monitoring wells M-4S, M-25S, and M-29S and deep monitoring wells M-4D and M-28D were added to the monitoring network to collect information from the full radial extent of groundwater flow and contaminant distribution in each aquifer zone. The addition of these locations to the monitoring program have aided in monitoring contaminant trends and overall extent on the north-northwest property boundary and will continue to be utilized in monitoring the concentrations of CT and TCE in both aquifers.

The groundwater remedy is functioning as intended by the decision documents.

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?

The exposure assumptions and toxicity values that were used to estimate the potential cancer risks and noncancer hazards in the risk assessment followed the general risk assessment practice at the time. Although specific parameters and toxicity values may have changed, the risk assessment process that was used is still consistent with current practice and the need to implement a remedial action remains valid. The RAOs of preventing groundwater ingestion, groundwater restoration, preventing migration of groundwater contamination, and preventing direct exposure to soils from human and ecological receptors are still valid. There are no changes in the physical conditions of the Site or Site uses that would affect the protectiveness of the selected remedy.

Soils contaminated with PCBs, lead, and mercury were excavated and disposed off-Site in 1998. ICs to restrict the land use within the ERZ to commercial/industrial have been in place since 1999. There is currently no residential or recreational development expected in the next review period, either on-Site or within one mile of the Test Station. The recommended commercial/industrial cleanup value for lead is currently 800 mg/kg. The 2009 FYR confirmed that the post-excavation data met this goal despite the 1,000 mg/kg remedial goal established in the ROD. Buried drums discovered during redevelopment activities were removed from the Site in 2011 and 2016; post-excavation soil sampling confirmed that the response efforts addressed the contamination and met current SCOs for commercial use and GWQSs.

The selected remedy previously allowed for groundwater treated on-Site to be used as a potable supply for the Test Station. However, the Site groundwater has not been used for this purpose since 2010, when the Test Station was connected to a public water supply line that sources from the Hudson River. As observed in monitoring well data collected during the FYR period, concentrations of CT and TCE in the northwestern portion of the Site (within the boundaries of the Test Station) continue to exceed their respective remediation goals, however, the plume does not appear to be migrating and concentrations are gradually decreasing. No private potable supply wells are in use in the vicinity of the Site and all neighboring residential communities obtain their potable water from either the LFWF or the CSWF, which are not impacted by Site-related contaminants. ICs are in place to prevent the installation of new wells in the ERZ and groundwater use is not expected to change during the next FYR period. Therefore, the ingestion of groundwater pathway is incomplete and the groundwater remedy remains protective.

Vapor intrusion investigations were conducted during the previous FYR period at the Fab 8 Administration 1 and 2 buildings (constructed with 12-inch concrete slabs and vapor barriers), which indicated that no additional mitigation measures were necessary. In March 2018, a vapor intrusion investigation was conducted at the Global Foundries M&W Projects Building, which is built with a 12-inch concrete vapor barrier. All indoor air sampling results were below the EPA commercial vapor intrusion screening levels (set at a cancer risk of 10^{-6} and a hazard of 1) and the NYSDOH indoor air guidelines, indicating no additional mitigation measures are required to ensure protectiveness for workers in the building at this time. Further evaluation of the vapor intrusion pathway may be necessary in the future if nearby monitoring wells indicate increasing VOC concentrations or if there are any changes made to the vapor barriers currently in place.

Additional ICs were incorporated into the remedy by the 2018 ESD to limit occupancy for all existing buildings and new construction within 200 feet (ft) of the Test Station property boundaries without conducting appropriate vapor intrusion investigations and/or implementing mitigation measures (including periodic monitoring).

Shallow groundwater data collected during the review period was screened against EPA's commercial vapor intrusion screening levels to assess the potential for vapor intrusion from the groundwater plume if additional new buildings were constructed on-Site. Concentrations of TCE at monitoring well M-25S exceeded these screening levels, indicating the potential for unacceptable risk from vapor intrusion if a building was constructed in the vicinity of this well with no vapor controls in place. However, there are currently no buildings within 200 ft of this well and the ICs would ensure protectiveness for any future construction within the ERZ. The vapor intrusion pathway was also considered in the vicinity of monitoring well 27D, near the Luther Forest Athletic Fields. Groundwater data collected during this FYR period for monitoring well M-27D (screened at approximately 80 ft. bgs) showed detections of TCE and CT that exceeded their respective remediation goals. Because the concentrations were below the EPA target groundwater concentrations that would warrant further investigation and the structures are well-ventilated and open to the atmosphere, the incorporation of vapor intrusion mitigation measures into the

building design was deemed unnecessary by EPA during the previous review period. Vapor intrusion data across the Site currently indicates that there is no completed vapor intrusion pathway. Vapor intrusion sampling and mitigation measures, if determined to be necessary, should continue for any future construction within the ERZ.

Although the ecological risk assessment screening and toxicity values used to support the ROD may not necessarily reflect the current values, the excavation of the contaminated soil following backfilling eliminated any potential risk from surface soil contaminants to terrestrial receptors. If in the unlikely event that the current Site use changes from commercial/industrial, then the soil remedy for PCBs may need to be reevaluated. Surface water monitoring data collected during the review period indicate that the AWQG value for acetone was exceeded at surface water sampling locations SW-B and SW-D during the most recent sampling event, the monitoring program should be continued to ensure the protectiveness of ecological receptors.

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 selected remedies.

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): 01	**Issue Category:** Institutional Controls			
	Issue: The 2018 ESD incorporates into the remedy ICs that limit occupancy of existing buildings or new construction on or within 200 feet of the Test Station property, unless appropriate vapor intrusion investigations are conducted and/or mitigation measures (including periodic monitoring) are implemented.			
	Recommendation: The existing Environmental Protection Easements and Declarations of Restrictive Covenants for the Site should be amended to include the IC required in the 2018 ESD.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	9/30/2019
OU(s): 01	**Issue Category:** Other			
	Issue: The 2018 ESD requires that an SDMP be implemented whenever intrusive activities are planned on the Test Station property.			
	Recommendation: The existing Environmental Protection Easements and Declarations of Restrictive Covenants for the Site need to be amended to include the implementation of the SDMP required in the 2018 ESD.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	9/30/2019

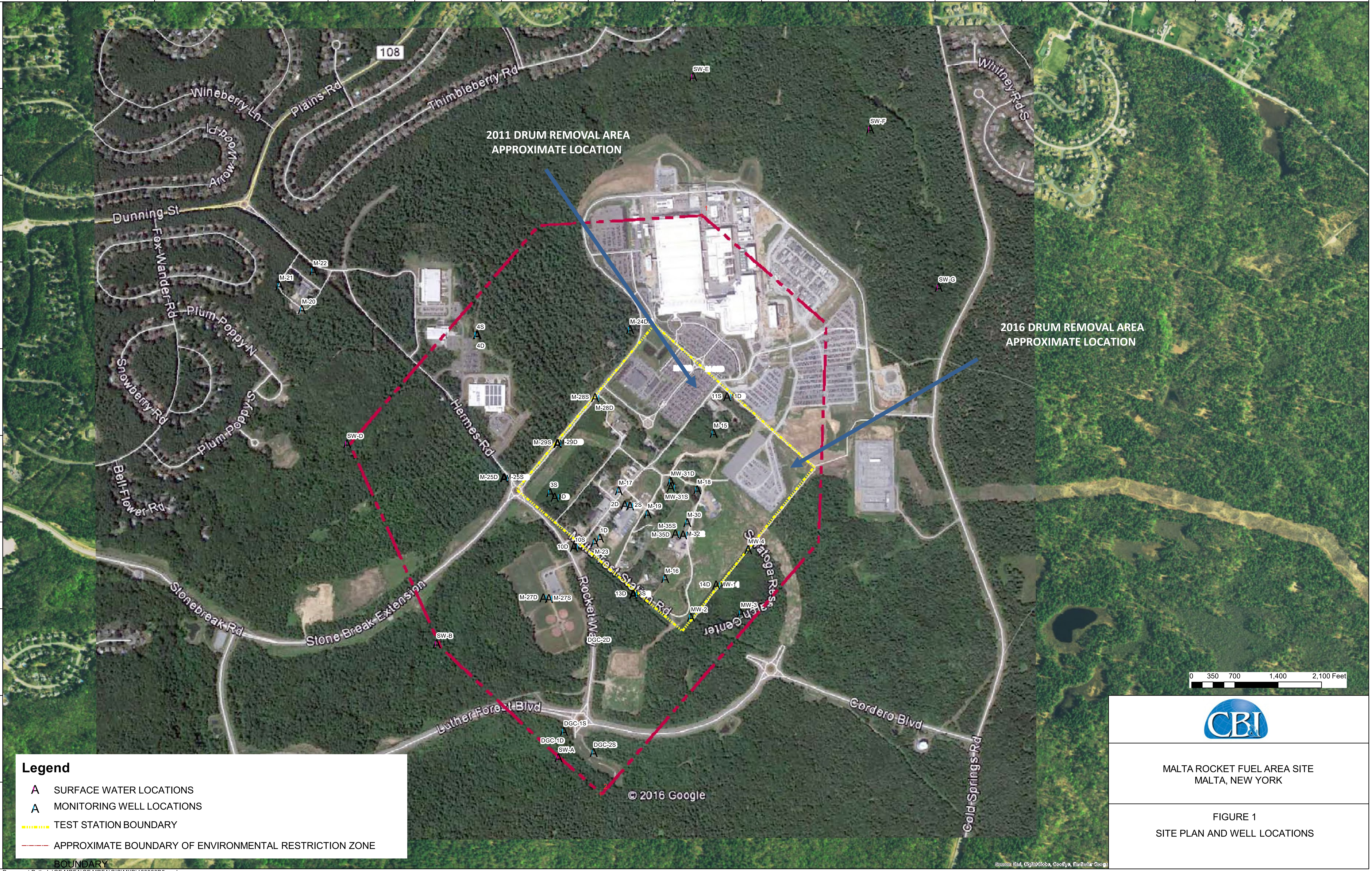
VII. PROTECTIVENESS STATEMENTS

Protectiveness Statements	
Operable Unit: 01	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The implemented remedy protects human health and the environment in the short term. In order to be protective in the long term, the ICs and SDMP required in the 2018 ESD need to be implemented.	
Sitewide Protectiveness Statement	
Protectiveness Determination: Short-term Protective	
Protectiveness Statement: The implemented Sitewide remedy protects human health and the environment in the short term. In order to be protective in the long term, the ICs and SDMP required in the 2018 ESD need to be implemented.	

VIII. NEXT REVIEW

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

APPENDIX A – Figure


2011 DRUM REMOVAL AREA
APPROXIMATE LOCATION
2016 DRUM REMOVAL AREA
APPROXIMATE LOCATION
108
Wineberry Ln
Plains Rd
Thimbleberry Rd
Arrow-Wood-Pl
Dunning St
Fox-Wander-Rd
Plum-Poppy-N
Snowberry Rd
Plum Poppy S
Bell-Flower Rd
Hermes Rd
Stonebreak Rd
Stone Break Extension
Rocket-Way
Luther Forest Blvd
Cordero Blvd
Cold Springs Rd
Whitney Rd S
SW-E
SW-F
SW-G
SW-D
SW-B
SW-A
M-22
M-21
M-20
4S
4D
M-24D
M-28S
M-28D
M-29S
M-25D
11S
M-15
MW-31D
MW-31S
M-17
M-18
M-19
M-30
M-35S
M-35D
M-32
M-23
10S
10D
MW-4
M-16
14D
M-27D
M-27S
13D
MW-2
MW-3
DGC-2D
DGC-1S
DGC-1D
DGC-2S
© 2016 Google
0 350 700 1,400 2,100 Feet
Legend
SURFACE WATER LOCATIONS
MONITORING WELL LOCATIONS
TEST STATION BOUNDARY
APPROXIMATE BOUNDARY OF ENVIRONMENTAL RESTRICTION ZONE
BOUNDARY
CB&I
MALTA ROCKET FUEL AREA SITE
MALTA, NEW YORK
FIGURE 1
SITE PLAN AND WELL LOCATIONS

APPENDIX B – Reference List

Remedial Investigation Report, Volumes I - VIII, Malta Rocket Fuel Area Site, ERM-Northeast, Inc., February 1995

Record of Decision, Malta Rocket Fuel Area Site, EPA, July 1996

Remedial Design Reports, Remedial Work Elements I, III, and IV, Malta Rocket Fuel Area Site, ERM-Northeast, August 1997

Operation and Maintenance Manual, Remedial Work Element II, Groundwater, Malta Rocket Fuel Area Site, ERM-Northeast, Inc., January 1998

Consent Decree, United States v. Curtiss-Wright Corporation, et al., Civil Action No. 98-CV-0014, entered in the United States District Court for the Northern District of New York, March 1998

Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water, EPA/600/R-98/128, EPA, September 1998

Operation and Maintenance Manual, Remedial Work Element IV, Institutional Controls, Malta Rocket Fuel Area Site, IT Corporation, September 1999

Operation and Maintenance Manual, Remedial Work Element I, Drinking Water, Malta Rocket Fuel Area Site, IT Group, January 2002

Five-Year Review Reports, Malta Rocket Fuel Area Site, EPA, September 2004, August 2009 and July 2014

EPA Guidance for Conducting Five-Year Reviews, USEPA, 2016

Annual O&M Reports, Remedial Work Elements I, II, and IV, Malta Rocket Fuel Area Site, Tetra Tech, Inc., 2014 – 2018

Explanation of Significant Differences, Malta Rocket Fuel Area Site, April 2018

APPENDIX C – Site History, Geology/Hydrogeology and Land Use

Site History

The U.S. government established the Test Station in 1945 for rocket engine and fuel testing. A perpetual restrictive safety easement was established around the Test Station to limit facility access to only those personnel who worked at the facility. This safety easement encompassed approximately 1,800 acres of pine forest in a one-mile radius from the center of the Test Station. The Test Station was first leased by various agencies, including several departments of the military, and then purchased in 1955 by a predecessor of the Department of Defense. General Electric Company (GE) operated the Test Station as a government contractor from 1945 to 1964. In 1964, the Test Station and the easement property were acquired by a predecessor of New York State Energy Research and Development Authority (NYSERDA). The safety easement was eliminated at that time. GE continued as an operating contractor while NYSERDA and its predecessor conducted atomic and space research and development at the Test Station. Research and development activities at the Test Station continued until 1984, when NYSERDA sold approximately 81 acres of the Test Station, including most of the original buildings, test areas, rocket gantries and other facilities, to the Wright-Malta Corporation (Wright-Malta).

The land outside the former safety easement is zoned for residential use; approximately 12,000 people live within a two-mile radius of the Site. The Luther Forest Well Field (LFWF) is located approximately one mile southwest of the Site in the Town of Malta. This well field consists of five production wells connected to the Luther Forest water distribution system, which are operated by the Saratoga Water Company. Regional groundwater flow in the vicinity of the LFWF is in a southwest direction toward Round Lake. The Cold Springs Well Field (CSWF) is located approximately one mile northeast of the Site in the Town of Stillwater. This well field consists of one well that was installed in 1990 but was not connected to the Luther Forest water distribution system until 1993. There are two additional production wells in the vicinity of the Site--the Saratoga Hollow and Saratoga Ridge Wells. These wells provide water to the Saratoga Glen Hollow housing development and the Saratoga Ridge Townhouse development, respectively. Regional groundwater in the vicinity of the CSWF is believed to flow northeast toward Saratoga Lake. Potable water for Luther Forest is obtained from LFWF and CSWF.

In 1979, approximately eight grams of uranium hexafluoride gas were released in a portion of the former GE/Exxon Nuclear building, depositing a thin film on the floor of the room. The area was decontaminated and the contaminated material was sent to licensed disposal facilities. A subsequent radiation survey of the building indicated that all beta and gamma readings taken were within the limits of unrestricted use.

In 1980, the combustible contents of drums containing hydrazine and CAVEA-B, experimental liquid rocket propellants, were burned on-site by NYSERDA in accordance with a New York State Department of Environmental Conservation (NYSDEC) restricted burning permit. The non-combustible drum contents were transferred to new poly-lined drums and staged until they were disposed of off-site in 1981.

In June 1985, transformers located on a portion of the Test Station leased to Power Technologies, Inc. (PTI) were tested and found to contain polychlorinated biphenyls (PCBs). NYSERDA and PTI decontaminated the transformers in 1987.

In 1985 and 1986, groundwater at the site was sampled and found to contain carbon tet, TCE, chloroform and several metals. In 1987, an air stripper was installed on the Test Station water supply wells by Wright-Malta (under an NYSDEC permit) to treat the groundwater prior to its use by employees at the Test Station.

In 1987, NYSERDA sampled liquid and sludge from several septic tanks. Based on detections of VOCs in these samples, NYSERDA subsequently pumped out and rinsed the septic tanks.

In July 1987, the site was placed on the National Priorities List (NPL). Following the listing of the site on the NPL, because of concerns regarding the potential for the contaminated groundwater from the Test Station to affect the LFWF (the CSWF and the Saratoga Hollow and Saratoga Ridge wells did not exist at that time), groundwater and surface water quality monitoring between the Test Station and the LFWF was initiated. This monitoring system serves as an "early warning" to ensure that contaminated groundwater from the Test Station is not migrating toward the Luther Forest Residential Development.

In 1989, a drum containing 4,270 milligrams per liter (mg/L) of lead, 235 mg/L of zinc and 93 mg/L of copper was disposed of off-site by NYSERDA in a Resource Conservation and Recovery Act-compliant facility.

In September 1989, the EPA issued a Unilateral Administrative Order to eight potentially responsible parties (PRPs)[3] to perform a remedial investigation and feasibility study (RI/FS). In March 1990, GE, NYSERDA and DOD entered into a participation agreement and undertook performance of the RI/FS.

From 1991 to 1994, a comprehensive RI was performed to define the nature and extent of the contamination at the site. A total of 48 distinct areas of concern and site-wide groundwater and surface water were investigated. Components of the RI field work include a groundwater investigation, including the installation of 30 wells to supplement the existing network of 18 monitoring wells; surface water and sediment investigations at six surface water bodies at the site; a radiation survey in the former GE/Exxon Nuclear building; geophysical surveys at 19 areas to identify locations of possible buried metal; soil gas surveys at 46 areas to provide a semi-quantitative evaluation of the extent of VOCs in shallow soil; a surface soil investigation of 67 samples collected from 60 locations, a subsurface soil investigation consisting of 254 shallow subsurface soil samples and three deep subsurface soil samples; a dry well investigation of 31 soil and sediment samples from 23 dry well features (dry wells, catch basins, floor drains, a swale and an open sump); and a septic tank investigation.

Several response actions were performed concurrent with the RI, including: the decommissioning and removal of two compressed gas cylinders; excavating and recycling 560 empty, buried, crushed drums; cleaning out several septic tanks, catch basins and dry wells and cleaning out a sump.

Site Geology/Hydrogeology

The Site is underlain by several layers of unconsolidated sediment with a total thickness reaching up to 250 feet (ft.) in some areas. There is a surficial layer of aeolian (wind-blown) sand and silt deposits varying in thickness from 0 to 14 ft. Underlying the aeolian deposits is a thick (up to 220 ft.) sequence of glaciolacustrine (originating from glacial lakes) deposits. Below the glaciolacustrine deposits is approximately 10 to 15 ft. of a dense glacial till consisting of shale fragments, silt and clay. Directly above the bedrock and immediately below the glacial till lies a thin layer (less than 2 ft.) of fine to coarse sand with minor amounts of silt and clay.

[3] The Respondents were Advanced Nuclear Fuels, Inc., Curtiss-Wright Corporation, GE, MTI, NYSERDA, Olin Corporation, PTI, and Wright-Malta.

Based upon the hydraulic gradients observed at the Site, for both the shallow and deep aquifers, radial flow is to the north, west and southwest from the center of the Test Station. In addition, as groundwater flows laterally away from the source areas, it also flows downward.

Much of the groundwater in the vicinity of the site eventually breaks out as surface water springs and seeps into ravines surrounding the site. The Test Station is situated on a drainage divide with surface water in the northern portion of the Test Station flowing toward Saratoga Lake, and surface water in the southern portion of the Test Station flowing toward Round Lake and Little Round Lake. The depth to groundwater at the site ranges from approximately 15 to 55 ft. below the land surface.

The Luther Forest Well Field (LFWF) is located approximately one mile southwest of the Test Station and north of Knapp Road, in the Town of Malta. This well field consists of five production wells connected to the Luther Forest water distribution system, which are operated by the Saratoga Water Company. Regional groundwater flow in the vicinity of the LFWF is in a southwest direction toward Round Lake. The Cold Springs Well Field (CSWF) is located approximately one mile northeast of the site, along Cold Springs Road in the Town of Stillwater. This well field consists of one well that was installed in 1990 but was not connected to the Luther Forest water distribution system until 1993. There are two additional production wells in the vicinity of the site, the Saratoga Hollow and Saratoga Ridge Wells. These wells are located along Lake Road north of the CSWF, and they provide water to the Saratoga Glen Hollow housing development and the Saratoga Ridge Townhouse development, respectively. Regional groundwater in the vicinity of the CSWF is believed to flow northeast toward Saratoga Lake.

In February 2010, the Saratoga County Water Authority completed the construction of a 27-mile water supply line which uses the Upper Hudson River as its water source. This waterline supplies the Luther Forest Technology Campus (including the Test Station) and five surrounding municipalities including the Towns of Malta, Moreau, Wilton, Ballston and Clifton Park and the Village of Stillwater. Previously, the potable water at the Test Station was supplied by two on-site production wells.

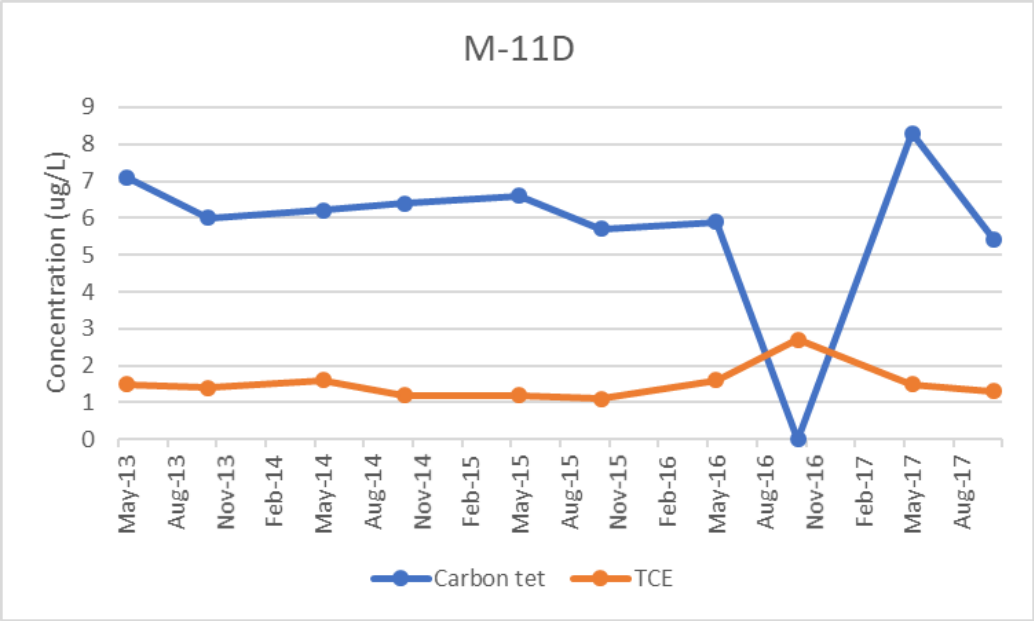
Land and Resource Use

Established by the U.S. Government Department of War (which later became the Department of Defense) in 1945, the Test Station was used as a research and development facility for rocket and weapons testing for more than 50 years.

In 1955, the U.S. Government established a perpetual restrictive safety easement around the Test Station to limit facility access to only those personnel who worked at the facility. This safety easement encompassed approximately 1,800 acres of pine forest in a circular area of a one-mile radius from the center of the Test Station. The safety easement was eliminated in 1964. The land outside the former safety easement is zoned for residential use; approximately 12,000 people live within a two-mile radius of the site. The Luther Forest Residential Development, located to the west of the site, is owned by The Luther Forest Corporation. Potable water for the Luther Forest Residential Development is obtained from the LFWF and the CSWF.

The Site property is zoned for industrial use. Active redevelopment of the property is underway. In 2004, LFTCEDC purchased more than 1,400 acres of property, including the Test Station property and surrounding areas, and in 2009, began the first phase of construction for the LFTC. GlobalFoundries, the first company to occupy the LFTC, has redeveloped a portion of the Site property. It is anticipated that the entire Site property will eventually be encompassed by the technology campus.

APPENDIX D – Monitoring Well Concentration Trend Graphs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3
4
5
6
7
8
9
May-13
Aug-13
Nov-13
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May-14
Aug-14
Nov-14
Feb-15
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Feb-17
May-17
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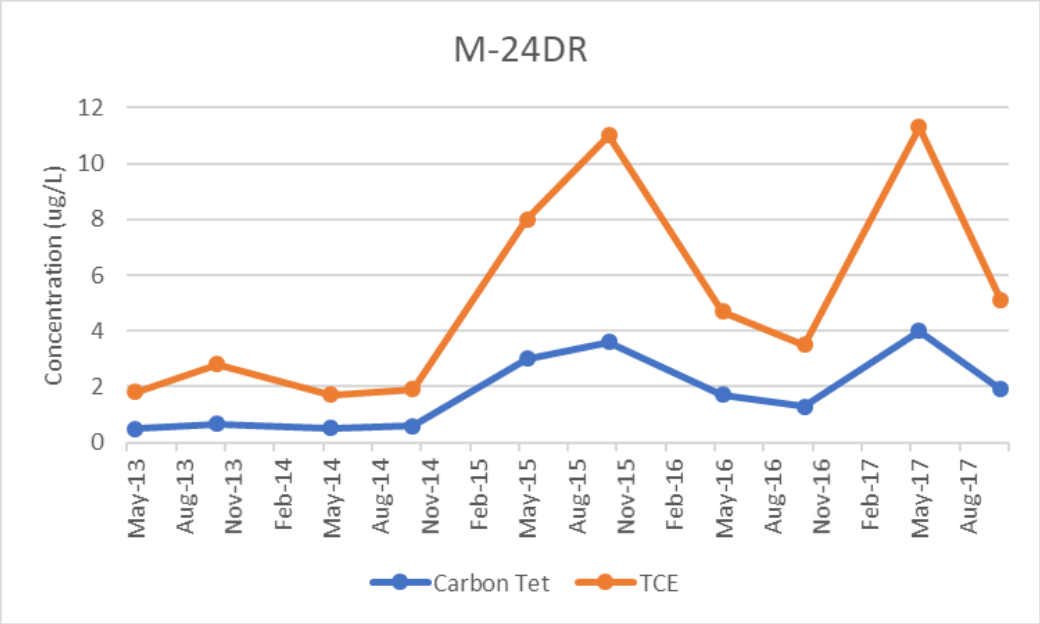
Carbon tet
TCE


M-24DR
Concentration (ug/L)
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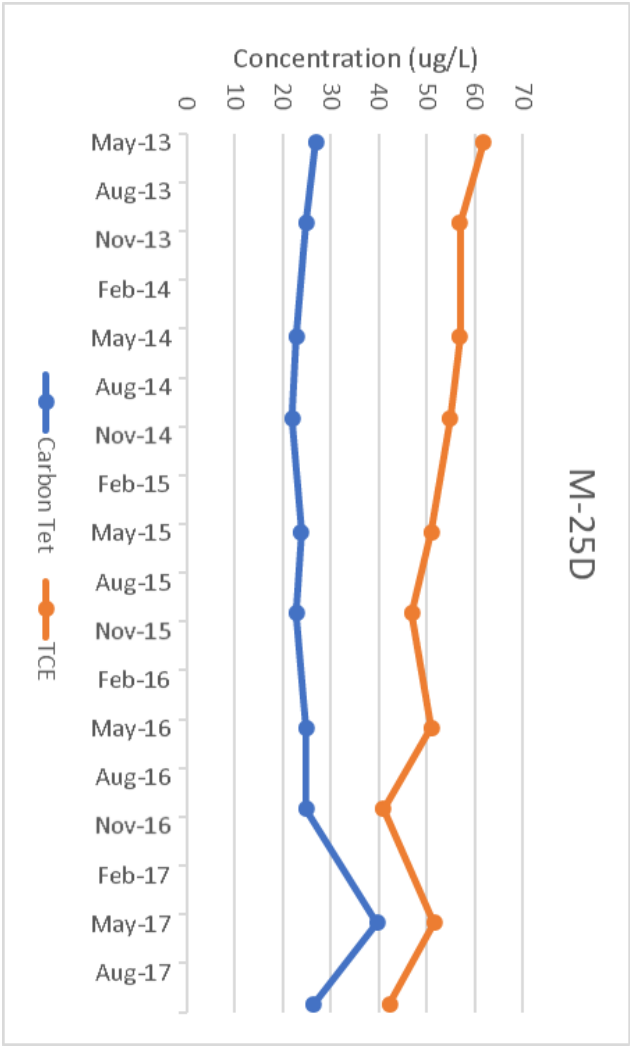
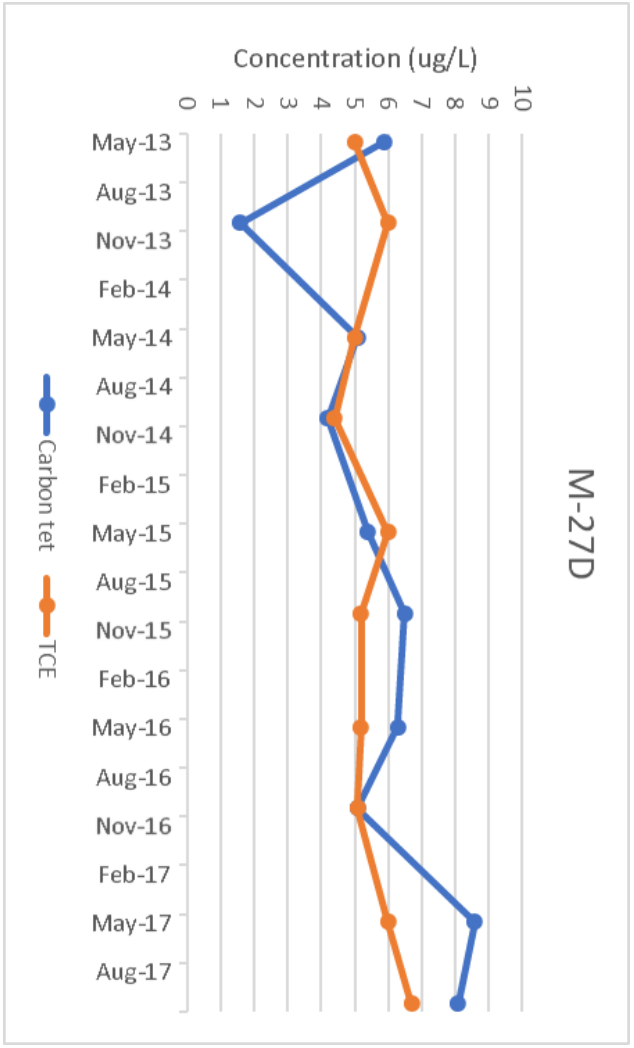
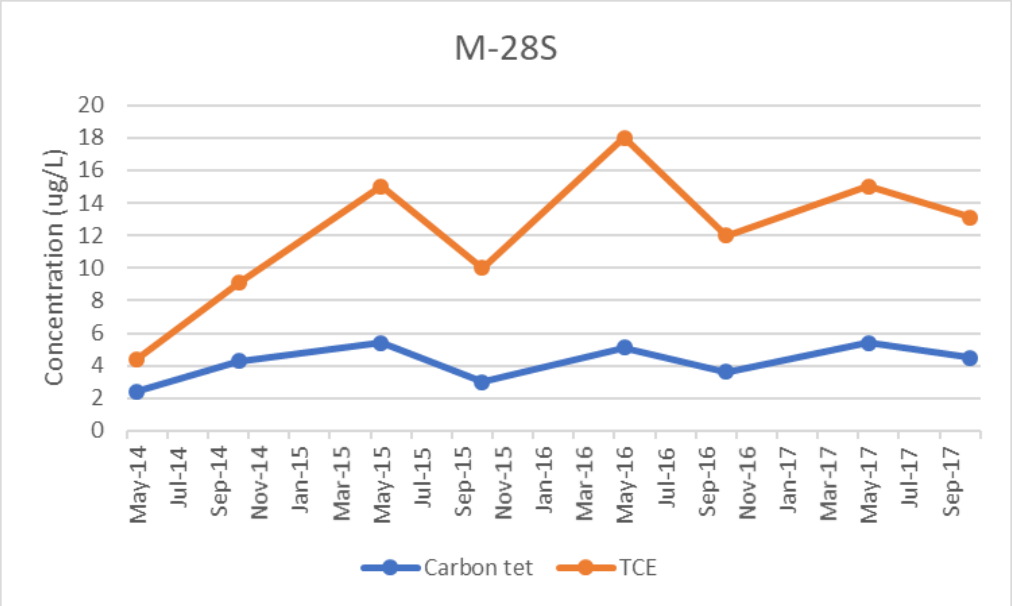
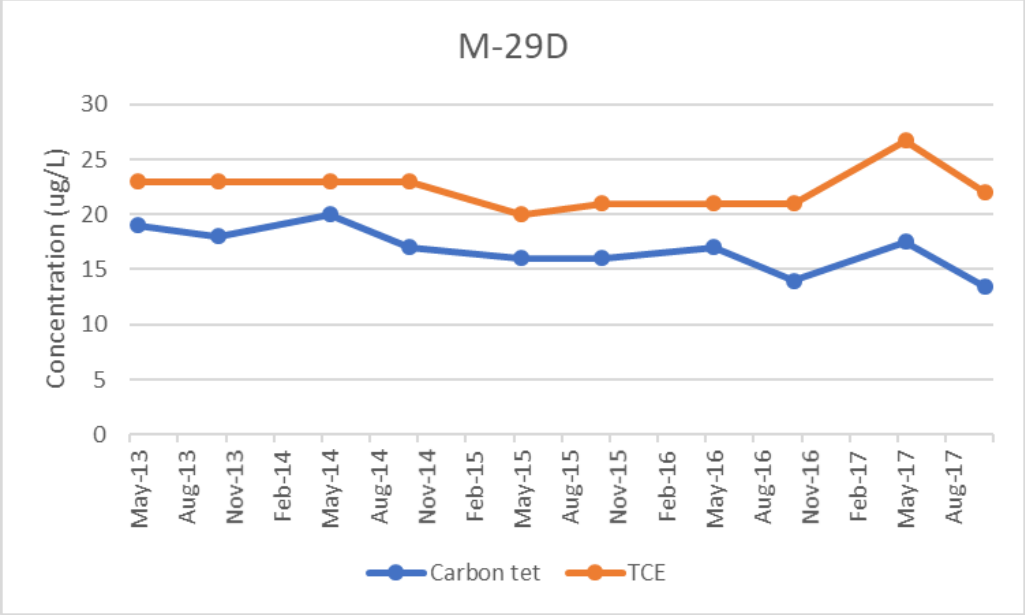
10
12
May-13
Aug-13
Nov-13
Feb-14
May-14
Aug-14
Nov-14
Feb-15
May-15
Aug-15
Nov-15
Feb-16
May-16
Aug-16
Nov-16
Feb-17
May-17
Aug-17
Carbon Tet
TCE


Concentration (ug/L)
0
10
20
30
40
50
60
70
May-13
Aug-13
Nov-13
Feb-14
May-14
Aug-14
Nov-14
Feb-15
May-15
Aug-15
Nov-15
Feb-16
May-16
Aug-16
Nov-16
Feb-17
May-17
Aug-17
Carbon Tet
TCE
M-25D


Concentration (ug/L)
0
1
2
3
4
5
6
7
8
9
10
May-13
Aug-13
Nov-13
Feb-14
May-14
Aug-14
Nov-14
Feb-15
May-15
Aug-15
Nov-15
Feb-16
May-16
Aug-16
Nov-16
Feb-17
May-17
Aug-17
Carbon tet
TCE
M-27D


M-28S
Concentration (ug/L)
20
18
16
14
12
10
8
6
4
2
0
May-14
Jul-14
Sep-14
Nov-14
Jan-15
Mar-15
May-15
Jul-15
Sep-15
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
Mar-17
May-17
Jul-17
Sep-17
Carbon tet
TCE


M-29D
Concentration (ug/L)
30
25
20
15
10
5
0
May-13
Aug-13
Nov-13
Feb-14
May-14
Aug-14
Nov-14
Feb-15
May-15
Aug-15
Nov-15
Feb-16
May-16
Aug-16
Nov-16
Feb-17
May-17
Aug-17
Carbon tet
TCE