THIRD FIVE-YEAR REVIEW REPORT FOR SHARKEY LANDFILL SUPERFUND SITE PARSIPPANY-TROY-HILLS, MORRIS COUNTY, NEW JERSEY

Prepared by

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Region 2
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Approved by:

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Date: 9/30/19

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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
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
ICs	Institutional Controls
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
ROD	Record of Decision
RPM	Remedial Project Manager
TBC	To be considered

I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order 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 (NCP) (40 CFR Section 300.430(f)(4)(ii)) and considering EPA policy.

This is the third FYR for the Sharkey Landfill Superfund Site (Site). The triggering action for this statutory review is the September 29, 2014 signature date of the previous FYR. The FYR has been prepared due to the fact that 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 1 operable unit (OU) and OU1 will be addressed in this FYR. OU1 addresses the landfill and groundwater remediation.

The Site FYR was led by Ms. Pamela J. Baxter, Ph.D., CHMM, Remedial Project Manager. Participants included Mr. Michael Scorca, Hydrogeologist; Ms. Abbey States, Risk Assessor, Mr. Michael Clemetson, Ecological Risk Assessor; and Ms. Pat Seppi, Community Involvement Coordinator. The review began on November 29, 2018.

Site Background

The Site is located in the Townships of Parsippany-Troy Hills and East Hanover, in Morris County, New Jersey. The Site is bounded by Route 46, New Road, the Rockaway River, and extends south beyond Interstate Route 280 between Troy Meadows and the Hatfield Swamp.

During the 1930s, the Site was used as a pig farm. In 1945, landfill operations began, and the Site accepted municipal waste material until September 1972. During that time, the landfill also accepted commercial, industrial, and hazardous waste materials. Records indicate that various organic compounds were disposed of at the Site, including toluene, benzene, chloroform, dichloroethylene, and methylene chloride, as well as other "liquid and/or chemical wastes" described as cesspool-type wastes. Although there have been allegations of waste disposal after 1972, the Site is believed to have been generally inactive after that date. Some excavation and on-site relocation of some fill material occurred during the expansion of the Parsippany-Troy Hills wastewater treatment plant.

The Site is approximately 90 acres in size, and is divided into five separate landfill areas (Fill Areas): the Large Fills (North Fill, South Fill) and the Small Fills (Northwest-North Fill (NW-N), Northwest-South Fill (NW-S), and Southwest Fill). The North Fill is an approximately 26-acre island in the Rockaway River and is located at the northern end of Sharkey Road in Parsippany-Troy Hills. The South Fill is an approximately 32-acre area adjacent to the Rockaway and Whippany Rivers and the Parsippany-Troy Hills wastewater treatment plant. The NW-N and NW-S Fills are about 11 and 15 acres in size, respectively, and were originally one fill area. The two fill areas were created as a result of the construction of Interstate 280. The Southwest Fill is an approximately 9-acre area located along the Whippany River southeast of Ridgedale Avenue in East Hanover, which received fill material excavated during the construction of Interstate 280. See attached Site map.

The Site is located in the Piedmont Physiological Province. It is characterized by a swampy low land with a few surrounding ridges and isolated hills rising above the plain. Most of the area lies between the elevations of 170 to 440 feet above mean sea level. Rocks underlying Pleistocene era and younger unconsolidated deposits in this area are predominately of the Brunswick Formation consisting of red shale and sandstone. Also present in this area, and forming the topographic relief of the Watchung Mountains, are Triassic-age basalt flows.

The general area in which the Fill Areas is located can be described as residential and light industrial to the north and west of the Whippany River, and considerable swamp land to the east and south. Approximately eight miles downstream, the Passaic River is used as a source of drinking water by the Passaic Valley Water Commission.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Sharkey Landfill		
EPA ID: NJD980505762		
Region: 2	**State:** NJ	**City/County:** Parsippany-Troy Hills, Morris County

SITE STATUS	
NPL Status: Final	
Multiple OUs? No	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: EPA **If "Other Federal Agency" was selected above, enter Agency name**
Author name (Federal or State Project Manager): Pamela J. Baxter, Ph.D., CHMM
Author affiliation: EPA
Review period: September 29, 2018 – August 31, 2019
Date of Site inspection: October 17, 2018
Type of review: Statutory
Review number: 3
Triggering action date: September 29, 2014
Due date *(five years after triggering action date)*: September 29, 2019

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

On September 8, 1983, the Site was included on the National Priorities List (NPL). The New Jersey Department of Environmental Protection (NJDEP) was the lead agency at the Site from December 1983 to April 1994.

A remedial investigation and feasibility study (RI/FS) was conducted by NJDEP from December 1983 to September 1986, to determine the nature and extent of contamination and to develop alternatives for remediation.

The results of the RI/FS indicated the presence of low concentrations of organic compounds, pesticides, and inorganic compounds in soils, and low levels of organic and inorganic compounds in the shallow groundwater beneath the Site. The primary contaminants of concern include: VOCs, trichloroethene, organics, inorganics, and heavy metals.

The analytical results of the samples of the shallow aquifer monitoring wells indicated low levels of organic contamination with only benzene and trichloroethene exceeding drinking water standards. Inorganic chemicals, primarily heavy metals, were also detected in the shallow aquifer. Some of these contaminants were also found in excess of drinking water standards in both rivers near the landfill. However, a short distance downstream, the contaminant levels are below drinking water standards. The overall adverse effects of the Fill Areas on the water quality of the Rockaway and Whippany Rivers appears to be minimal. Also, the closest surface water intake, for the purpose of public consumption, is approximately eight miles downstream of the Site.

The analytical results of the samples of the deeper aquifer revealed the presence of cadmium, lead, chromium, iron, manganese, mercury, and nickel at concentrations in excess of drinking water standards, indicating that the landfill impacted the aquifer. The analyses of the lower aquifer also found one organic compound, benzene, in one well at a concentration of 13 micrograms per liter (µg/L). However, this detection is believed to be an isolated occurrence which does not indicate significant organic contamination in the lower aquifer.

The RI concluded that several contaminants at levels below existing health risk guidelines, were present in Site media:

Soil: acetone, chromium, lead, benzo(a)pyrene, nickel,
pesticides (dieldrin, 4,4'-DDD, endrin, ketone), and PCB-Aroclor 1254
Sediments: cyanide
Leachate: VOCs (acetone, 2-butanone, naphthalene, phenanthrene, 2-methylnaphthalene, fluoranthene, and pyrene)
Groundwater (monitoring wells): benzene, trichloroethene, cadmium, lead, chromium, iron, manganese, mercury, nickel, cyanide, phenols, VOCs (acetone and 2-butanone)

***Surface Water**:* chromium, nickel.

No human health or ecological risk assessments were performed during the RI; however, because groundwater exceeded drinking water standards, there was a need to take an action to prevent further impacts.

Response Actions

Based on the results of the RI, EPA and NJDEP established cleanup goals and objectives for the Site. The goals and objectives were to minimize the potential for migration of the low levels of groundwater contamination and minimize the risks to the public from exposure to waste and contaminated soil on the Site. To accomplish these goals and objectives, EPA selected a remedy which was described in a Record of Decision (ROD) signed on September 29, 1986.

The ROD included the following elements:

- Capping of the landfill in accordance with relevant Resource Conservation and Recovery Act requirements, including the appropriate grading of fill areas
- A venting system for landfill gases
- Extraction and treatment of shallow groundwater and leachate
- Surface water controls to accommodate seasonal precipitation and storm runoff as well as erosion control for river banks
- Security fencing to restrict Site access
- An environmental monitoring program to ensure the effectiveness of the remedial action.

On October 4, 1993, EPA issued an Explanation of Significant Differences (ESD) to change the capping requirement to limited capping, and to modify the cap. EPA determined that only the portions of the North Fill and South Fill areas that exhibit slopes of less than or equal to three horizontal to one vertical (3:1) would be capped since the slopes greater than 3:1 would allow a significantly higher amount of precipitation to run off. Capping was considered less necessary on the steeply sloped areas than on the mildly sloped areas, since one of the primary reasons for installing a cap was to reduce the infiltration of rain water into the waste material.
The 1993 ESD also modified the liner material. Since the steep slopes were not to be capped under the modified remedy, the use of a synthetic liner was determined to be appropriate on the North Fill and South Fill areas.

The ESD also called for a groundwater monitoring program to be implemented for all Fill Areas in addition to a surface water monitoring program for the Rockaway and Whippany Rivers. Provision for a groundwater extraction system was made in each of the Fill Areas to provide hydraulic containment and prevent migration of contaminants out of each fill area when operating at design capacity.

Status of Implementation

EPA reached a settlement with a group of potentially responsible parties (PRPs) in which they agreed to perform the RD and the remedial action (RA). A Consent Decree (CD) was entered in federal district court on December 4, 1994. The PRP group (the Group) completed the RD on May 9, 2000. On June 5, 2000, the Group solicited bids for construction, and construction activities began on September 5, 2000. Remedial construction activities at the Site were substantially completed on December 29, 2003, and EPA issued a Preliminary Close Report on March 9, 2004.

A PRP independent of the Group, HMAT Services, is responsible for the NW-N Fill area. According to the 1994 CD, HMAT's responsibilities included Site management planning, as well as the installation of soil cover, drainage controls, erosion protection, and other related work at the NW-N Fill area. HMAT began remedial action activities at the NW-N Fill area in May 2002 and awarded a construction contract to American Environmental Assessment Corporation. A pre-construction meeting was held on August 28, 2002, and construction activities commenced on September 3, 2002. EPA inspected the Site and observed that remediation activities were substantially completed on October 4, 2002.

Institutional Controls

Institutional controls (ICs) were not included as part of the selected remedy. Fencing has been installed around the perimeter of the Site. Deed notices should be placed on the Fill Areas. Currently, the owners of the fills are in the process of pursuing deed notices.

IC Summary Table

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)
Deed Notice	Yes	No	Fill Areas	Deed Notice/ Restriction: A notification added to the title of a property when contamination will remain above NJDEP's residential/ unrestricted soil remediation standards, N.J.A.C. 7:26D. A Deed Notice requires a property owner's concurrence and specifies the location and concentration of all contaminants and how they must be controlled, maintained, or monitored.	Deed Notice 2024

System Operations/Operations and Maintenance

The Township of Parsippany-Troy Hills is responsible for the inspection of the landfill area; operation of the groundwater extraction system (while it was operating); and maintenance of the cap cover, access road, surface water management system, river bank erosion protection, passive gas vents, and groundwater extraction and monitoring system. The Group is responsible for monitoring the piezometer levels, groundwater monitoring and well sampling, surface water sampling, and analytical testing and reporting. At the request of the PRP, the groundwater extraction system was shut down on August 18, 2014 in order to determine whether it was still needed.

The North and South Landfills and methane vents are inspected quarterly, the grass is mowed in the spring and fall, access to the monitoring wells and pumping stations are checked, trees outside the landfill that were blocking access were recently trimmed, and the access roads and fencing were also recently repaired.

Groundwater and surface water monitoring are required under the CD during operation and maintenance (O&M). There are separate criteria for groundwater versus surface water, and North and South Fills versus the Small Fills. Only groundwater and surface water data from around the Large Fills (North and South) are currently collected. The CD also divides the O&M

into the different phases of work (First Baseline, 5-Year Pump and Treat, Second Baseline, and Long-Term) and these are described below for the North and South Fills and the Small Fills. The CD also lists the required analyses during the O&M phases and the Well and River Trigger Levels that are used to evaluate the effectiveness of the remedy.

Well Trigger Levels

The three specific trigger events, i.e., the Type A Trigger, the Type B Trigger, and the Type C Trigger, were designed to identify when contaminants are migrating out of one or more Fill Areas at levels which would necessitate activation of the groundwater extraction system at one or more of the Fill Areas (or portions thereof as approved in writing by EPA).

A Type A Trigger would occur when any analysis of any sample taken from any groundwater monitoring well at the Site indicates that the concentration of any Well Chemical, as defined in the December 2, 1994 Consent Decree, is greater than or equal to two times the Well Trigger Level set for that Well Chemical.

A Type B Trigger would occur whenever a) the concentration of a River Chemical at any station located within one-quarter mile downstream from any of the Fill Areas or portion thereof ("the downstream location") in either the Whippany River or the Rockaway River exceeds the River Trigger Level for that Chemical and either of the following exists: b.1) the concentration of the River Chemical at that upstream location is less than the River Trigger Level; or b.2) the concentration of a River Chemical at both the upstream and downstream locations are above the River Trigger Level, but the downstream concentration is statistically greater than the upstream concentration.

A Type C Trigger would occur, for the purposes of the SOW, whenever the concentration of any Well Chemical in groundwater, averaged over the groundwater monitoring wells in any groundwater extraction zone, is equal to or greater than its respective Well Trigger Level.

North and South Fills

- The first Baseline Phase for the North and South Fills was conducted in 2002.
- The Five-Year Pump and Treat Phase for the North and South Fills was conducted from 2003 to 2007.
- The groundwater extraction system (GWES) was shut off on August 18, 2014, as per EPA's approval.
- The Second Baseline Phase for the North and South Fills was conducted from October 2014 to August 2015.
- The Long-Term Phase for the North and South Fills began in November 2015 after the completion of the Second Baseline phase.
- On May 2, 2017, EPA approved a request to reduce the frequency of the North and South Fills groundwater and Whippany and Rockaway Rivers surface water sampling. The monitoring is currently conducted on an annual basis.

The 2019 annual groundwater and surface water monitoring for the North and South Fills were conducted on April 22, 2019 through April 24, 2019.

Small Fills (NW-N and NW-S)

- The first Baseline Phase for the Small Fills was conducted in 2003.
- The Long-Term Phase for the Small Fills began in 2004.
    - On July 20, 2005, EPA approved groundwater and surface water sampling events to be conducted annually.
    - On December 12, 2012, EPA approved an additional modification to biennially conduct (until 2016) groundwater and surface water monitoring for the Small Fills.
    - On May 2, 2017, EPA approved the Group's request to discontinue sampling of the monitoring wells associated with the Small Fills.

Climate Change

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

This section includes the protectiveness determinations and statements from the last FYR, as well as the recommendations from the last FYR, and the current status of those recommendations.

2014 FYR

Protectiveness Statement(s)		
Operable Unit: OU1	*Protectiveness Determination:* Short-term Protective	*Addendum Due Date (if applicable):*
Protectiveness Statement: The OU1 remedy currently protects human health and the environment because all exposure pathways have been addressed by the engineered remedy. However, in order to be protective in the long term, deed notices restricting future use of the property need to be put in place and the effects of turning off the treatment system need to be evaluated.		
Sitewide Protectiveness Statement (if applicable)		
Protectiveness Determination: Short-term Protective	*Addendum Due Date (if applicable):*	
Protectiveness Statement: The implemented remedy currently protects human health and the environment because all		

exposure pathways have been addressed by the engineered remedy. However, in order to be protective in the long term, deed notices restricting future use of the property need to be put in place and the effects of turning off the treatment system need to be evaluated.

The 2014 FYR also contained the following issues and recommendations. These are included in the table below along with a status update

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	The Northwest-North Fill area appears to have potential for commercial use.	Deed notices need to be established to limit potential development options. An advisement of existing soil cover and potential underlying waste material should be noted.	Ongoing	Currently, the owners of the fills are in the prcoesss of pursuing deed notices.The owner of the NW-N fill area has applied for a deed notice and CEA for the property. The submittals are currently under NJDEP's and EPA's review.	9/2024
1	The Southwest Fill and Northwest-South Fill areas are within or adjacent to property that is considered preserved open space.	This should be confirmed, and a similar deed restriction may be advisable.	Addressed in Next FYR	Currently, the owners of the fills are in the process of pursuing deed notices. CDMG Realty is owner of the NW-S Fill area and the Fish and Wildlife Preserve Group is the owner of the Southwest Fill area. The representatives of these fill areas were contacted in September 2019 to initiate the process of obtaining deed notices for the properties.	9/2024
1	Aquifer samples are not being collected in shallow aquifer immediately downgradient of large Fills area.	Collect data and evaluate the need to restart extraction system and verify that Well Trigger levels are not in exceedance.	Addressed in Next FYR	The Consent Decree's Scope of Work (SOW), did not require sampling of the groundwater monitoring wells of the North and South Fill areas during the pump and treat phase, composite samples were collected and analyzed. During the second base line phase, the pump and treat system was shut down and the wells were sampled quarterly. Currently, the Site is in the long-term phase and the wells are sampled annually. Now that the system has been off for five years, there have been increases in some constituents. In addition, 1,4-dioxane levels have been detected above the groundwater quality standard. Given the current well network, it is unclear whether the extraction system needs to be restarted. This FYR recommends collecting additional information to evaluate this recommendation.	9/2020

IV. FIVE-YEAR REVIEW PROCESS

Community Involvement

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, New Jersey,Puerto Rico and the U.S. Virgin Islands, including the Sharkey Landfill Site. The announcement can be found at the following web address: https://www.epa.gov/sites/production/files/2018-10/documents/five_year_reviews_fy2019_for_web_posting.pdf

In addition to this notification, on March 21, 2019, a notice was posted to the Regional EPA webpage to notify the community of Site activities and a copy of the notice was mailed to the Parsippany-Troy Hills Township clerk for posting to the community website. The purpose of the public notice was to inform the community that EPA is conducting an FYR to ensure that the remedy implemented at the Site remains protective of human health and the environment and is functioning as intended by the decision documents.

The notice indicated that upon completion of the FYR, the document would be available to the public at the Parsippany-Troy Hills Public Library located at 449 Halsey Road, Parsippany, New Jersey 07054. In addition, the notice included the RPM's name, address and telephone number for questions related to the FYR process of the Sharkey Landfill Site in general, https://www.epa.gov/superfund/sharkey-landfill.

Data Review

During the FYR period, nine groundwater monitoring wells were sampled at the South Fill and seven wells were sampled at the North Fill. Ten groundwater monitoring wells were sampled twice at the Small Fills. Analytical data is compared with the New Jersey Ground Water Quality Standards (NJGWQS) or Well Trigger Levels established in the CD and discussed above.

The analytical results indicated that arsenic levels exceeded the NJGWQS of 3 µg/L in most wells and ranged from 2.4 to 87.3 µg/L. Arsenic levels were showing a rising trend in several wells, especially in the area of the South Fill. The April 24, 2019 sampling event showed arsenic levels at 54 µg/L and 53.6 µg/L in monitioning wells M-11 and M-13, respectively. Confirmation samples were collected on June 3, 2019, and the concentration level detected were 52.4 µg/L and 52.3 µg/L, respectively.

Concentrations of 1,4 dioxane were common at elevated levels, ranging from 3.9 to 1,500 µg/L. Although no well trigger level was developed for 1,4 dioxane at the Site, the NJGWQS is 0.4 µg/L.

Measurements of specific conductance (which is an indicator of dissolved solids in water and likely impacts from the landfill), were highest in well M-4 (46 ft below ground surface). Other

wells that had notably elevated values during the last five years included M-1, M-6, M-10, M-11, M-20, M-21, M-22, M-26, and M-27.

The groundwater extraction system at the Site was shut down on August 18, 2014. The current network of monitoring wells is too close to the boundaries of the Large Fills. In order to evaluate potential migration of contamination in groundwater, the well network must be expanded outside the boundaries of Large Fills and sampled to compare concentrations to the groundwater beneath the landfills. Results of groundwater samples are evaluated with respect to federal and state groundwater standards/MCLs and Well Trigger Levels. Surface water data are compared with River Trigger Levels.

Large Fills:
The results of groundwater detections for samples collected from the North and South Fills during 2014 – 2018 were as follows:

- Five of the 13 samples collected from monitoring well M-4 during the Second Baseline Phase and the Long-Term Phase exceeded the Well Trigger Level for total VOCs (1,000 µg/L). The highest concentration of total VOCs was 1,559 µg/L on July 19, 2016.
- Arsenic was detected in exceedance of the Well Trigger Level (50 µg/L) in four of the 12 primary samples collected from monitoring well M-6 between 2014 and 2018. The highest concentration of arsenic was 87.3 µg/L on May 12, 2017.
- Arsenic was detected in exceedance of the Well Trigger Level (50 µg/L) in 11 of the 16 primary samples collected from monitoring well M-11 between 2014 and 2018. The highest concentration of arsenic was 62.1 µg/L on November 8, 2016. In April 2019, the concentration level of arsenic in M-11 was 54 µg/L and confirmation sampling on June 3, 2019 indicated a concentration level of 52.4 µg/L.
- Arsenic was detected in exceedance of the Well Trigger Level (50 µg/L) in the sample collected from monitoring well M-13 on November 8, 2016 (52.5 µg/L). In April 2019, the concentration level for M-13 was 53.6 µg/L. Confirmation samples were collected on June 3, 2019, and the concentration levels for M-13 was 52.3 µg/L.

The current monitoring requirements for the North and South Fills are summarized below. The next sampling event is tentatively scheduled for spring 2020.

Small Fills:
No VOC, SVOC, pesticide, PCB, or metal compounds were detected in exceedance of the Well Trigger Levels from the 2014 to 2018 sampling events.

Surface Water:
The results of the Whippany River and Rockaway River, the North and South Fill areas, surface water detections for samples collected between 2014 to 2018 are summarized as follows:

- The concentration of bromodichloromethane was slightly above the River Trigger Level at surface water location R1(U) on August 31, 2016. The concentration of bromodichloromethane at all other surface water locations was below the River Trigger Level.

- No other VOCs were detected in exceedance of River Trigger Levels.
- No SVOC, pesticide, PCB, or metal compounds were detected in exceedance of the River Trigger Levels.

Reduced Monitoring Program
In May 2017, the following reduced monitoring program was put in place:

1) Monitor North and South Fills groundwater annually for the following parameters:
- Target Compound List (TCL) VOCs.
- SVOCs – Well Chemicals (i.e., Bis(2-ethylhexyl)phthalate and N-Nitrosodiphenylamine) and 1,4-dioxane.
- Metals – Well Chemicals only (i.e., arsenic, barium, cadmium, chromium, lead, silver, selenium, and mercury).

2) Monitor Whippany River and Rockaway River surface water annually for the following parameters:
- TCL VOCs .
- SVOCs – Well Chemicals only (i.e., Bis(2-ethylhexyl)phthalate and N-Nitrosodiphenylamine).
- Metals – Well Chemicals only (i.e., arsenic, barium, cadmium, chromium, lead, silver, selenium, and mercury).

Site Inspection

A Site inspection was conducted on October 17, 2018. In attendance were Ms. Pamela J. Baxter, Ph.D., CHMM, EPA RPM; Mr. Michael Scorca, EPA's hydrogeologist; Mr. Steven Mizerek, Engineering and Environmental Services, Inc. (Township Engineer); and Mr. John Rolfe, de maximus, Inc (PRPs' representative). Various Site-related issues were discussed relating to operations and maintenance schedules and sampling activities. A second site inspection was conducted on September 12, 2019, in attendance were Ms. Pamela J. Baxter, Ph.D., CHMM, EPA RPM; Mr. Steven Mizerek, Engineering and Environmental Services, Inc. (Township Engineer); and Mr. John Rolfe, de maximus, Inc (PRPs' representative). It was observed during the site inspection that various trees and bushes have grown on the landfill cap. The Site is secured by fencing.

Interviews

No interviews were conducted for this FYR. EPA has ongoing discussions with the Group's representative and the Township's Engineer regarding Site activities.

V. TECHNICAL ASSESSMENT

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

Although the concentrations of most chemicals are below the well trigger levels in the decision documents (with at least arsenic as an exception), the extraction system is no longer operating, and potential migration from the landfill to surrounding areas or greater depth is not being evaluated with the current monitoring well network, because all the wells are located within or directly adjacent to the landfill. Additional wells are necessary to determine the extent of arsenic, VOC and 1,4 -dioxane contamination that appears to be emanating from the Large Fills.

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

The RAOs for the site were to minimize the potential for migration of the low levels of groundwater contamination and minimize the risks to the public from exposure to waste and contaminated soil on the Site. They 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. The cap is intact throughout the Fill Areas, preventing exposure to contaminated material remaining on-site and a fence surrounds the Fill Areas; a deed restriction on the Site is still needed to ensure long-term protectiveness.

A quantitative risk assessment was not performed during the original 1986 RI and risk-based remediation goals were not selected. The 1994 Consent Decree set specific contaminant triggers for groundwater extraction and diversion to Parsippany-Troy Hills Sewage Treatment Plant (PTH STP) for treatment and disposal. Trigger levels and state groundwater maximum contaminant levels (MCLs) are qualitatively compared in Table A; the trigger levels are above New Jersey (NJ) MCLs with the exception of chromium, silver, selenium, and barium.

Table A: Comparison of Well Trigger Levels and NJ MCLs

Contaminant of Concern	Well Trigger Level (µg/L)	NJ MCL (µg/L)
Total VOCs	1,000	-
Benzene	50	1
N-nitrosodiphenylamine	10	-
Bis(2-ethylhexyl)phthalate	100	6

Arsenic	50	5
Cadmium	10	5
Chromium	50	100
Lead	50	15
Mercury	2	2
Silver	50	100
Selenium	10	50
Barium	1,000	2,000

Trigger levels were exceeded for Total VOCs and arsenic during the FYR period and MCLs were exceeded for benzene, bis(2-ethylhexyl)phthalate, arsenic, and lead. Standards were also exceeded for chemicals that were not specifically included on the Site contaminants of concern list: 1,4-dioxane, manganese, chlorobenzene, and aroclors 1242 and 1254. 1,4-dioxane was present at concentrations exceeding both the NJGWQS of 0.4 µg/L as well as EPA's Removal Management Level of 46 µg/L for residential tap water (set at a cancer risk of 10^{-4} and a hazard quotient of 1) in multiple monitoring wells in each sampling round during the FYR period, driving the trigger level exceedances for total VOCs. Area residents are connected to the municipal water supply. Therefore, there is no direct exposure to groundwater contamination and the remedy remains protective despite continued exceedances of drinking water standards. Institutional controls are needed to restrict the installation of new drinking water wells to ensure long-term protectiveness.

Inspection of the cap and possibly groundwater sampling will be required to determine if there is exposure or contamination as a result of unauthorized materials being placed at the small Fills.

Vapor Intrusion - Groundwater VOC results from the FYR period were also compared to EPA's vapor intrusion screening levels (VISLs) to determine the potential for the intrusion of vapors into buildings should they be constructed above the most contaminated groundwater on the Site. Benzene concentrations were within EPA's residential acceptable risk range (10^{-6} to 10^{-4} and hazard quotient <1) and all other VOCs were below risk thresholds, indicating the potential for unacceptable risk to future Site residents due to vapor intrusion is unlikely if future homes were constructed at the Site. There are no residential structures located on or near the landfill. The Parsippany-Troy Hills Wastewater Treatment facility is located near the landfills.

Surface water samples did not exceed river trigger levels, but did exceed MCLs for bis(2-ethylhexyl)phthalate and arsenic.

Although the ecological risk assessment screening and toxicity values used to support the ROD may not necessarily reflect the current values, the landfill cap eliminates any potential risk from

surface soil contaminants to terrestrial receptors. Consequently, the exposure assumptions remain appropriate and thus the remedy remains protective of ecological resources. Surface water monitoring data from the Whippany River and Rockaway River were reviewed. In 2016, the concentration of bromodichloromethane (0.28 µg/L) slightly exceeded the river trigger level (0.27 µg/L). However, there were no further exceedances of the river trigger levels during the more recent sampling events. Since there was an exceedance of the river trigger levels, the surface monitoring should be continued.

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

During the October 17, 2018 and other previous Site visits, it was observed that crushed concrete debris and asphalt millings was placed on top of the NW-N Fill cap cover and the NW-N Fill area appears to have been used as a storage facility for large equipment and trucks. It is recommended that the materials be removed from the Fill and the cap inspected. If there is damage to the cap, groundwater sampling may be necessary to ensure that the groundwater has not been compromised by these unauthorized activities.

VI. ISSUES/RECOMMENDATIONS

<table>
<tr><th colspan="5">Issues/Recommendations</th></tr>
<tr><td colspan="5">OU(s) without Issues/Recommendations Identified in the Five-Year Review:</td></tr>
<tr><td colspan="5">N/A</td></tr>
<tr><td colspan="5">Issues and Recommendations Identified in the Five-Year Review:</td></tr>
<tr><td rowspan="3">OU(s): OU1</td><td colspan="4">Issue Category: Monitoring</td></tr>
<tr><td colspan="4">Issue: The PRP of the NW-N fill area has been placing unauthorized material (crushed concrete and asphalt milings) on top of the existing cap cover remedy.</td></tr>
<tr><td colspan="4">Recommendation: Remove the unauthorized materials from the NW-N fill area and inspect the cap for damage. If there is damage to the cap, repairs, along with groundwater sampling may be required.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Implementing Party</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>State</td><td>EPA</td><td>March 2020</td></tr>
<tr><td rowspan="2">OU(s): OU1</td><td colspan="4">Issue Category: Monitoring</td></tr>
<tr><td colspan="4">Issue: Due to the proximity of the monitoring well network to the</td></tr>
</table>

	boundaries of the Large Fills, it is difficult to interpret data that show arsenic, total VOCs and 1,4-dixoane at concentrations significantly above groundwater quality standards and MCLs. Specific conductance is also high in several wells, indicating impacts from the landfills.			
	Recommendation: Additional wells outside the landfill boundaries are necessary to determine the extent of landfill impacts to the aquifer.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	September 2024
OU(s): OU1	**Issue Category:** Institutional Controls			
	Issue: The landfills need deed notices to prevent future uses that are incompatible with the remedies.			
	Recommendation: Deed notices need to be established to limit potential development options.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	September 2024

During a September 12, 2019 site inspection, it was noted that trees and bushes had grown on the large Fill areas. Although this does not affect protectiveness, it should be addressed. It was discussed with the PRPs' representative and the Township Engineer that cutting and mowing of the landfills should be conducted on a regular basis.

VII. PROTECTIVENESS STATEMENT

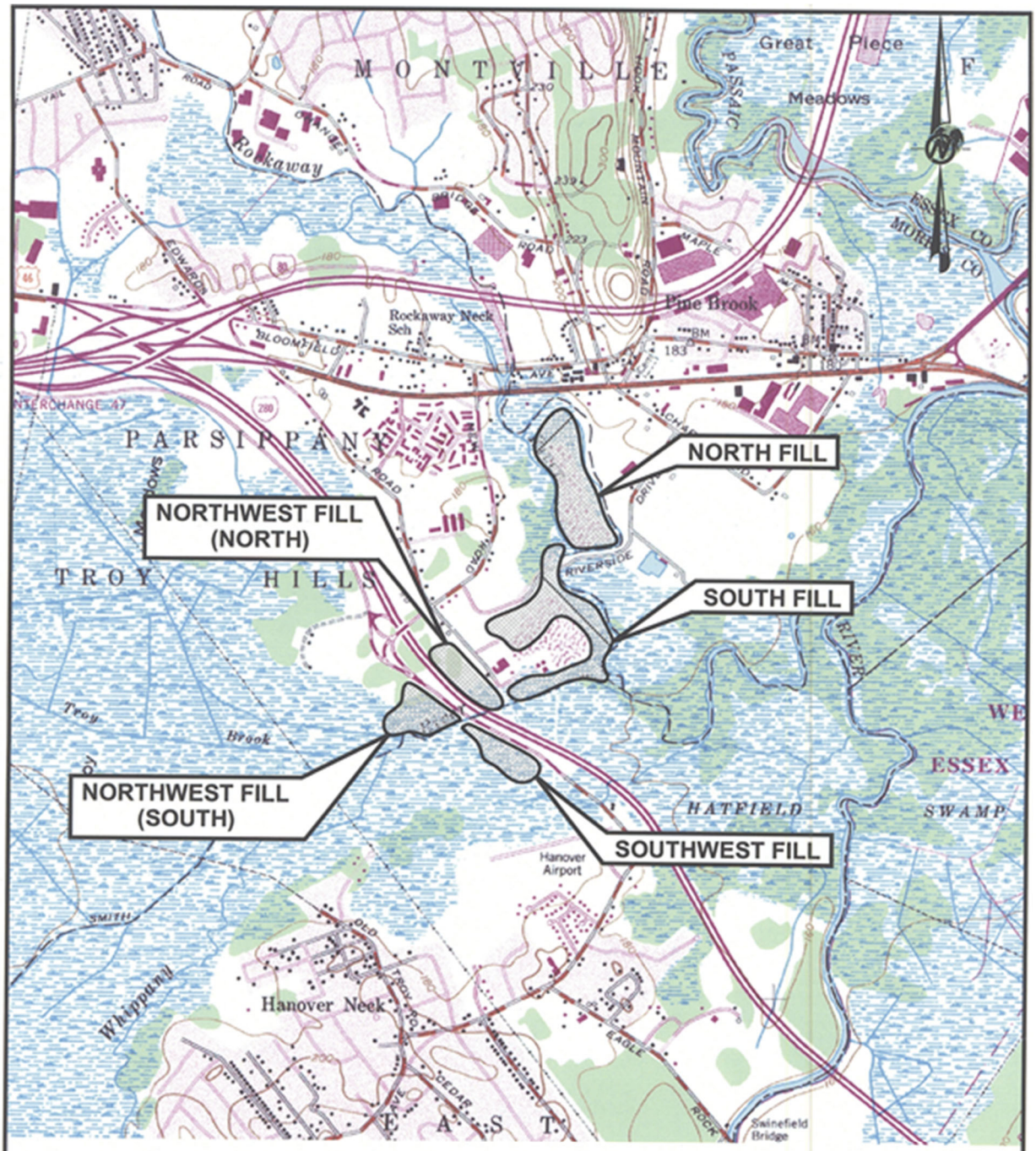
2019 FYR

Protectiveness Statement(s)		
Operable Unit: OU1	*Protectiveness Determination:* Short-term Protective	*Addendum Due Date (if applicable):*
Protectiveness Statement: The OU1 remedy currently protects human health and the environment in the short term because all exposure pathways have been addressed by the engineered remedy. However, in order to be protective in the long term, deed notices restricting future use of the property need to be put in place, groundwater data that evaluates migration of contaminants from the landfill needs to be evaluated and unauthorized material needs to be removed from the NW-N Fill.		
Sitewide Protectiveness Statement (if applicable)		
Protectiveness Determination: Short-term Protective		*Addendum Due Date (if applicable):*
Protectiveness Statement: The implemented remedy currently protects human health and the environment in the short term because all exposure pathways have been addressed by the engineered remedy. However, in order to be protective in the long term, deed notices restricting future use of the property need to be put in place, groundwater data that evaluates migration of contaminants from the landfill needs to be evaluated and unauthorized material needs to be removed from the NW-N Fill.		

VIII. NEXT REVIEW

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

SITE MAPS



REFERENCE

1.) BASE MAP SHOWN TAKEN FROM U.S.G.S. 7.5 MINUTE SERIES TOPOGRAPHIC MAP, CALDWELL, NJ QUADRANGLE, PHOTOREVISED 1981.

2000 0 2000
SCALE FEET

NJ Authorization #24GA28029100

Golder Associates
Philadelphia USA

FILE No.	94361980001
PROJECT No.	943-6198
REV.	0
SCALE	AS SHOWN
DATE	08/18/05
DESIGN	FTA
CADD	RG
CHECK	MCF
REVIEW	MEC

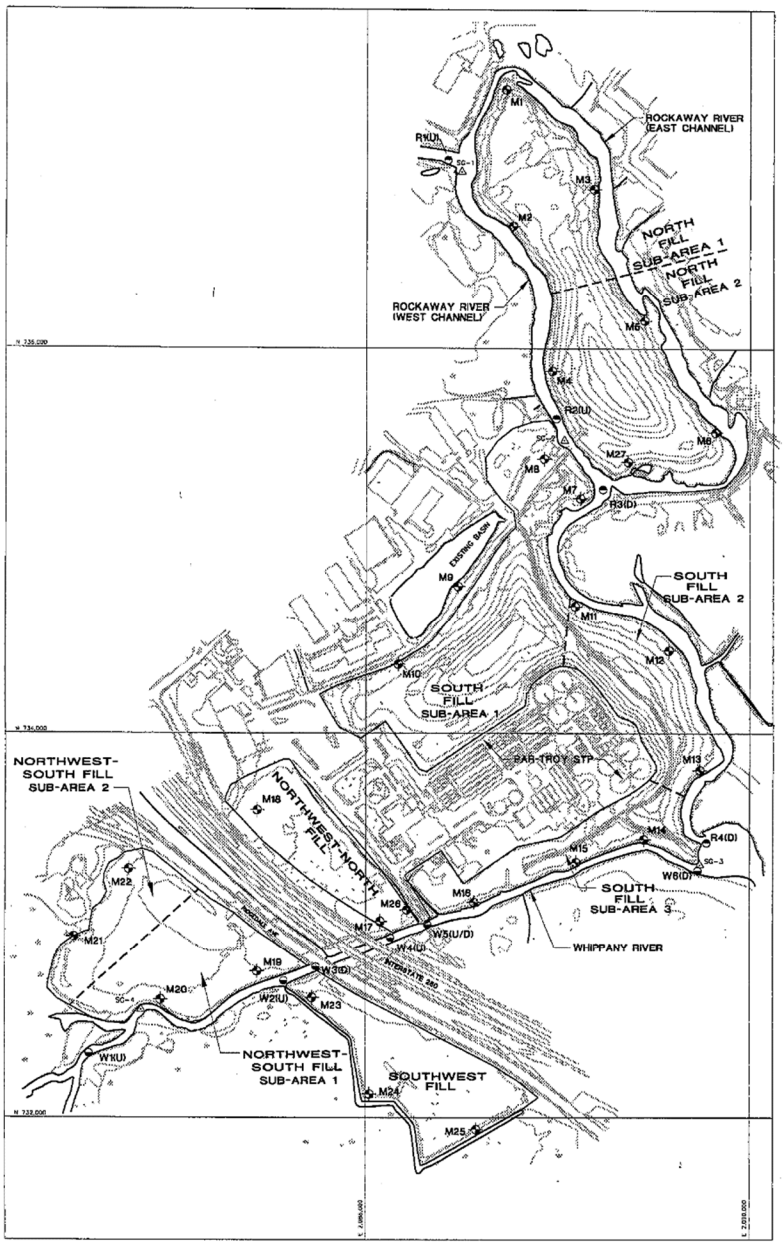
TITLE

SITE LOCATION MAP

SHARKEY LANDFILL

FIGURE 1

Drawing file: 94361980001.dwg Aug 19, 2005 - 10:51am



NOTE: FIGURE TAKEN FROM THE REVISED FINAL DESIGN REPORT. FIGURE 13-1, NOTES AND/OR CALLOUT REFERENCES APPLY TO THE RFDR FIGURES.

LEGEND

- SG-4 △ — STAFF GAUGE LOCATION
- SW-1 ⊕ — PROPOSED EXTRACTION WELL (SEE FIGURE 13-2)
- P38 ⊕ — PROPOSED PIEZOMETER (SEE FIGURE 13-2)
- M14 ⊕ — PROPOSED GROUNDWATER MONITORING WELL
- R1(U) ◓ — PROPOSED SURFACE WATER SAMPLING STATION IN THE ROCKAWAY RIVER
- W1(U) ◓ — PROPOSED SURFACE WATER SAMPLING STATION IN THE WHIPPANY RIVER
- ---- — LANDFILL SUB-AREA BOUNDARY

NOTES

1.) (U) - UPSTREAM SAMPLING STATION (WITH REGARD TO NEAREST FILL AREA)
(D) - DOWNSTREAM SAMPLING STATION (WITH REGARD TO NEAREST FILL AREA)

2.) ELEVATION CONTOURS SHOWN AT 10 FOOT INTERVALS.

3.) REFER TO FIGURE 13-2 FOR LOCATION OF GROUNDWATER EXTRACTION WELLS AND PIEZOMETERS.

4.) REFER TO FIGURE 13-3 FOR PRE-EXISTING WELLS AND PIEZOMETERS TO BE DECOMMISSIONED.

5.) REFER TO FIGURE 9-4 FOR GROUNDWATER MONITORING WELL SCHEDULE AND SCHEDULE OF PRE-EXISTING MONITORING WELLS/PIEZOMETERS TO BE REUSED.

6.) REFER TO FIGURE 4-11 FOR LOCATION OF ALL KNOWN EXISTING WELLS, PIEZOMETERS, STAFF GAUGES, AND EXPLORATORY BOREHOLES.

REFERENCES

1.) TOPOGRAPHIC DATA AT THE FIVE FILLS PROVIDED BY PROMAPS, MOORESTOWN, NEW JERSEY VIA CADD FILE TITLED 82598, DATED JANUARY 26, 1999, BASED ON AERIAL PHOTOGRAPHY DATED JANUARY 4, 1999. TOPOGRAPHIC DATA OUTSIDE OF THE FIVE FILLS PROVIDED BY ATLANTIS AERIAL SURVEY COMPANY, INC., BUDD LAKE, NEW JERSEY DATED OCTOBER 4, 1994, BASED ON AERIAL PHOTOGRAPHY DATED APRIL 1, 1994. TOPOGRAPHIC DATA TIE-IN PREPARED BY PROMAPS.

250 0 250 500
scale feet

REV	DATE	DESCRIPTION	DR BY	CHK BY	RVW BY
2	11/10/99	UPDATED/INCORPORATED INTO THE REVISED FINAL DESIGN REPORT	AH		
1	04/09/99	UPDATED/INCORPORATED INTO THE FINAL DESIGN REPORT	MRM	MEC	MEC

PROJECT:
SHARKEY LANDFILL SUPERFUND SITE
MORRIS COUNTY, NEW JERSEY

SHEET TITLE:
PROPOSED GROUNDWATER AND SURFACE WATER MONITORING LAYOUT

Golder Associates
Philadelphia USA

PROJECT No.	943-6198
FILE No.:	NJ06-070
CLIENT PROJ. No.	
DRAFTING SUBTITLE:	*5
DES BY	MFK 08/10/98
SCALE:	AS SHOWN
DR BY	MRM 09/25/98
CHK BY	MFK 09/25/98
RVW BY	MEC 09/25/98

FIGURE 3-11

Table 2 – Site Chronology

Event	Date(s)
The Sharkey Farm Landfill Site (Site) was used as a pig farm	1930s
Landfilling operations began	1945
The landfill began accepting hazardous waste from the Ciba-Geigy Company	1962 – 1969
Approximately 25,700 tons of non-chemical wastes and approximately 1,160 tons of liquid and/or chemical wastes were deposited at the Site.	April 13, 1972 – May 10, 1972
The Site ceased landfill operations	September 9, 1972
It was reported that about three million gallons of wastewater of unknown composition were taken to Sharkey Disposal-Pine Brook	1972 – 1974
The Site remained inactive until excavation began for the expansion of the Parsippany-Troy Hills Sewer Treatment Plant	1979
The expansion project was completed	1981
The Site was included on the National Priorities List	September 8, 1983
A remedial investigation and feasibility study was conducted by various contractors for the New Jersey Department of Environmental Protection (NJDEP)	December 1983 - September 1986
EPA selected a remedy which was described in a ROD	September 29, 1986
NJDEP initiated the Remedial Design in March 1987	March 1987 – April 1994
EPA issued an Explanation of Significant Differences to change the capping requirement to limited capping and to modify the cap material	October 4, 1993
EPA became the lead agency for the Site	April 1994
A consent decree was issued to the Potential Responsbile Parties (PRP aka the Group)	December 4, 1994
EPA approved the Revised Final 100% Design Report	May 9, 2000
The Group solicited bids to hire a construction company	June 5, 2000
The Haseley Construction Company, Inc. was awarded the contract	June 29, 2000
EPA approved the remedial action work plan	July 21, 2000
Site mobilization activities began	August 7, 2000
A pre-construction meeting was held	August 9, 2000

Event	Date(s)
Construction activities began	September 5, 2000
The Haseley's contract was terminated by the Group because of financial difficulties and poor work performance	August 27, 2001
HMAT Services, PRP responsible for the Northwest-North Fill (NWN) area, started remedial action activities	May 2002
Sevenson Environmental Services was hired as an interim contractor to complete construction activities at the Site	May 29, 2002
EPA approved the technical specifications and revised grading plans, referred to as the Remedial Design for the Northwest-North Fill Area	August 15, 2002
A pre-construction meeting was held and HMAT awarded a construction contract to American Environmental Assessment for the Northwest-North Fill Area	August 28, 2002
The Group performed baseline groundwater sampling	August and September 2002
Construction activities commenced at the NWN Fill area	September 3, 2002
EPA and the Group conducted a Site inspection	September 27, 2002
EPA inspected the NWN Fill area and observed that remediation activities were substantially completed	October 4, 2002
Substantial completion of remediation activities appeared to have been achieved	October 24, 2002
Proposal for Classification Exception Area Equivalency submittal for the Site	January 14, 2003
EPA requested a corrective action plan, since it was determined that substantial repair work would be required to restablize some of the slopes and drainage channels	January 29, 2003
EPA conducted a second pre-final Site inspection following a rainstorm event	September 19, 2003
A Site visit confirmed that the cap repairs appeared to be effective. Remedial construction activities at the Site were substantially completed	December 29, 2003
EPA issued the Preliminary Close Report	March 9, 2004
The Remedial Action Certification Report was approved	September 29, 2005
Commencement of Five-Year Review	October 2008
FYR Site visit	April 24, 2014
NW-S and NW-N Site visit	July 17, 2014
Third FYR Site visit	October 17, 2018
Third FYR Second Site visit	Septemer 12, 2019