U.S. Fish & Wildlife Service

Great Swamp National Wildlife Refuge

Fifth Five-Year Review

Operable Unit 3 of the Asbestos Dump Superfund Site

July 2020

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Acronyms and Abbreviations

ACM	asbestos containing material
AOC	Administrative Order of Consent
BLL	blood lead level
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHF	Central Hazardous Materials Fund
COC	contaminant of concern
DOI	United States Department of the Interior
EPA	United States Environmental Protection Agency
FWS	United States Fish and Wildlife Service
GSNWR	Great Swamp National Wildlife Refuge
IRIS	Integrated Risk Information System
LEL	lowest effect level
MCL	maximum contaminant level
µg/dL	micrograms per deciliter
mg/kg	milligrams per kilogram
MFL	million fibers per liter
NCP	National Contingency Plan
NGC	National Gypsum Company
NJ	New Jersey
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priority List
OLEM	Office of Land and Emergency Management
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response (Office has been updated to Office of Land and Emergency Management [OLEM])
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
PRP	potentially responsible party
%	percent
Refuge	Great Swamp National Wildlife Refuge
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
SVOC	semi-volatile organic compound
TAL	target analyte list

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Asbestos Dump Superfund Site, Operable Unit 3		
EPA ID: NJD980654149		
Region: 2	**State:** NJ	**City/County:** Harding Township, Morris County

SITE STATUS	
NPL Status: Deleted	
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: EPA **If "Other Federal Agency" was selected above, enter Agency name:** Click here to enter text.
Author name (Federal or State Project Manager): George Molnar
Author affiliation: United States Fish and Wildlife Service
Review period: July 2015 – March 2020
Date of site inspection: March 11, 2020
Type of review: Statutory
Review number: 5
Triggering action date: September 15, 2015
Due date *(five years after triggering action date)*: September 15, 2020

The table below is for the purpose of the summary form and associated data entry and does not replace the two tables required in Section VIII and IX by the FYR guidance. Instead, data entry in this section should match information in Section VII and IX of the FYR report.

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
Not applicable

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 3	**Issue Category: Operations and Maintenance**			
	Issue: None			
	Recommendation: None			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	No	Other	EPA	June 2025

To add additional issues/recommendations here, copy and paste the above table as many times as necessary to document all issues/recommendations identified in the FYR report.

Protectiveness Statement(s)

Include each individual OU protectiveness determination and statement. If you need to add more protectiveness determinations and statements for additional OUs, copy and paste the table below as many times as necessary to complete for each OU evaluated in the FYR report.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
3	Protective	Click here to enter date.

Protectiveness Statement:

Parts of the remediated area (i.e. north of the old Great Brook channel) are open to the public for passive recreation (e.g. bird watching, hiking, etc.) but this is extremely limited due to difficulties in accessing the site via the Refuge's hiking trail complex. The area south of the old Great Brook channel (landfill area) is accessible from Long Hill Road, but the Refuge has eliminated parking off of Long Hill Road, thereby closing the area to the public for all practical purposes. Refuge staff infrequently accesses the site area for various wildlife management and administrative purposes in neighboring parts of the Wilderness Area. Operation and Maintenance actions on the landfill are the predominant activities carried out in the area. During the last five years of implementation of the O&M Plan, there has been ample documentation that the landfill is successfully meeting its intended protectiveness. The remedy is functioning as intended. The remedial actions have interrupted potential exposure pathways at the site. As such, the remedy remains protective since the cap and other actions

have interrupted exposures to both human and ecological receptors. The remedy at OU3 is protective of human health and the environment.

Sitewide Protectiveness Statement (if applicable)	
For sites that have achieved construction completion, enter a sitewide protectiveness determination and statement.	
Protectiveness Determination: **Not applicable**	*Addendum Due Date (if applicable):* Click here to enter date.
Protectiveness Statement: **Not applicable**	

I. Introduction

The five-year review for the Operable Unit 3 (OU3) of the Asbestos Dump Superfund Site, located in the Great Swamp National Wildlife Refuge (GSNWR or Refuge) in Harding Township, New Jersey (NJ) was conducted by the United States Fish and Wildlife Service (FWS). This review was conducted pursuant to Section 121 (c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, 42 U.S.C. Sections 9601 *et seq.* and 40 CFR 300.430(f) (4) (ii), and in accordance with Comprehensive Five-Year Review Guidance, Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7-03B-P (June 2001). The purpose of the five-year review is to assure that the remedy implemented protects public health and the environment, and functions as intended by decision documents. This report will become part of the administrative record for the site.

The United States Environmental Protection Agency (EPA) conducted a site-wide five-year review for all three OUs of the site in 2000, and because hazardous contaminants remain landfilled at the site, second, third, and fourth reviews were completed in 2005, 2010, and 2015, respectively. This is the fifth five-year review, and as with the previous three, was conducted by the FWS who administers OU3 as part of the Refuge. The EPA prepares five-year reviews for OU1 and OU2.

II. Site Chronology

Pertinent site events and relevant dates in the site chronology are as follows:

- **1950's through 1960's:** Disposal of asbestos containing material (ACM) and other hazardous wastes at the OU3 site.

- **1967-1968:** The FWS acquires property containing the contaminated waste which is included in a tract of land declared a National Wilderness Area in 1968.

- **September 1983:** The Asbestos Dump Site (consisting of OU1, OU2, and OU3) is included on the National Priorities List (NPL). Approximately 7 acres of the National Wilderness Area of the GSNWR were designated OU3 of the Asbestos Dump Superfund site.

- **April 1984:** The EPA issues a notice letter to the National Gypsum Company (NGC) notifying the company of its liability as a potentially responsible party (PRP).

- **April 1985:** The EPA and the NGC enter into an Administrative Order on Consent (AOC) to complete a Remedial Investigation/Feasibility Study (RI/FS) at the site.

- **1985-1986:** The NGC conducts RI work on site, which is later determined by EPA to have inadequately characterized the nature and extent of contamination at the site.

- **October 1990- February 1993:** The NGC files for Chapter 11 bankruptcy. Through a legal process, the United States Department of the Interior (DOI) receives securities which were later sold to provide funding for natural resource restoration at the site.

- **April-September 1996**: The FWS continues with and completes the RI.

- **September-October 1996**: The FWS prepares an *Action Memorandum for Asbestos Containing Material Removal at four Limited Action Areas* and carries out the removal.

- **June 1997:** The FWS completes the FS and Value Engineering Study.

- **July-September 1997:** Clean up at OU3 begins with construction of water diversion and long term drainage improvements. Removal and off-site disposal of buried drums was also completed.

- **March-November 1998:** The project is completed with removal and off- site disposal of lead-impacted soils, refuse, and debris. Consolidation and capping of ACM was also completed.

- **September 1998:** Record of Decision (ROD) signed on September 8, 1998.

- **1999-present:** Landfill is administered following actions identified in the *Operation and Maintenance Plan for Operable Unit 3 of the Asbestos Dump Superfund Site*.

- **September 2000:** First five-year review completed.

- **January – September 2005:** Second five-year review process initiated and completed.

- **October 2005 – July 2010:** Third five-year review process initiated and completed.

- **July 10, 2010:** The site is deleted from the NPL.

- **July 2010 – June 2015:** Fourth five-year review process initiated and completed.

- **July 2015 – March 2020:** Fifth five-year review process initiated and completed.

III. Background

Operable Unit 3 was formerly a privately-owned wooded and wetland tract where open dumping, landfilling, and burning of household, industrial waste, and ACM was conducted for more than 15 years prior to the FWS taking possession of the land in 1968. In addition to ACM, numerous drums of chlorinated solvents and other organic wastes and sludges were found. The ACM was poorly contained and because of its ubiquitous extent, potential for weathering and deterioration, and future uses of the site, it presented a potential risk for future exposure. Metals found in the area were at concentrations high enough for potential human health and ecological risks. Drums of chlorinated solvents and other organic wastes posed a threat to ground and surface water resources.

IIIa. Physical Characteristics

The OU3 site is approximately 7 acres in size. It is part of the National Wilderness Area located within the GSNWR, Harding Township, Morris County, NJ (Figure 1). The site is owned by the DOI, administered by the FWS as part of the Refuge, and is zoned as Public Land by Harding Township.

The OU1 and OU2 components of the site are located in Millington and Meyersville, NJ, respectively. Operable Unit 1 consists of a single property located approximately 4 miles southwest of OU3. Operable Unit 2 consists of two parcels, the White Bridge Road and New Vernon Road properties which are located approximately 1.5 and 2 miles southeast of OU3, respectively. These other components of the site are located on private land, outside the boundaries of the GSNWR and are not contiguous; therefore, OU1 and OU2 are being addressed separately by EPA.

In the selection of the remedial design, the technical team working on the site was challenged with restoring ecological integrity and retaining the wilderness character of the area after the action. The landfill that resulted from the remediation was contoured to fit into the surrounding topography and seeded with native warm season grasses to provide wildlife habitat. A large “borrow area” had to be dug

to provide cap construction soils, creating a large open water pond on the refuge, a habitat that was absent from much of the Great Swamp watershed. The landfill cap was developed into warm season grassland and newly established wetlands that are now thriving. Previously, the cap was covered with ACM.

IIIb. Geology/Hydrogeology
Topography at OU3 is flat, ranging from just over 228 feet to 235 feet in elevation. The GSNWR is located within the north-central Piedmont Physiographic Province and is underlain by sandstones and shales with minor conglomerates and basalt. The northeast-trending syncline underlying GSNWR is bounded by the tectonically active Ramapo Fault on the west and by ridges of resistant basalt forming the Watchung Mountains to the northeast, east, and south.

Unconsolidated deposits, consisting of glacial drift and glacial lake sediments, overlie bedrock at GSNWR. The glacial lake deposits underlying OU3 consist of low permeability, varved silts and clays, and are 55-80 feet thick. The upper 5-15 feet of these sediments are swamp deposits with a locally high organic content.

The GSNWR lies within the Great Swamp Watershed and the hydrologic setting of OU3 is complex. Groundwater is at or near the surface most of the year. Great Brook and large wetlands around the landfill control local hydrology, where the shallow groundwater and surface water show a strong interaction. A second, lower aquifer exists in sand and gravel beneath the thick varved clay layer. The deeper aquifer serves as a potable water source in the region. The shallow aquifer is not used as a potable source near OU3, but is classified as Class II-A (Groundwater for Potable Water Supply) under the NJ Groundwater Quality Standards (NJAC 7:9-6). The channel of Great Brook splits just above the landfill. The landfill lies in the upper reaches of the impounded waters of Waterfowl Management Pool #1 when higher water levels are retained.

The low permeability glacial lake deposits serve as a low permeability layer above the underlying sand and gravel deposits, which constitute the deep aquifer beneath the GSNWR. Shallow groundwater flow in the shallow aquifer across OU3 appears to discharge to Great Brook. The horizontal flow gradient across much of the site is low and the water table nearly flat.

IIIc. Land and Resource Use
Operable Unit 3 is located entirely within the Wilderness Area of the GSNWR. Parts of the remediated area (i.e., north of the old Great Brook channel) are open to the public for passive recreation (e.g., bird watching, hiking, etc.) but this is extremely limited due to difficulties in accessing the site via the Refuge's hiking trail complex. The area south of the old Great Brook channel (landfill area) is accessible from Long Hill Road, but the Refuge has eliminated parking off of Long Hill Road, thereby closing the area to the public for all practical purposes.

As part of a National Wilderness Area, and more generally as part of the GSNWR, the remediated OU3 area is protected from development or future land uses that might potentially conflict with the remedial design. Any changes to this designation would be subject to Congressional approval. As such, the land will be managed in perpetuity as wildlife habitat with very limited public use and access insofar as these activities are consistent and compatible with Operation and Maintenance (O&M) actions that have been established for the site. The land will be administered following prescribed O&M procedures as they exist and as they are amended during this and subsequent five-year review periods.

IIId. History of Contamination
The site was formerly a privately-owned wooded and wetland tract where open dumping, landfilling, and burning of household, industrial, and ACM was conducted during the 1950's and 1960's prior to the FWS taking possession of the land in 1968. Along with refuse, ACM and other industrial wastes from the

former NGC Plant in Millington, NJ and possibly other sources were trucked to the site and landfilled. In addition to ACM, metal contaminated soils, and numerous drums of chlorinated solvents and other organic wastes and sludges were discovered.

IIIe. Initial Response

The initial response of the FWS was to close access to the area while the NGC, the lead PRP, conducted the RI/FS. In 1991 the NGC, filed for Chapter 11 bankruptcy and reorganization. This absolved the company of any current and future remediation and restoration costs and claims. The FWS found itself going from the role of involved third party observer (as the landowner of the site) to the role of being the lead PRP with responsibility for obtaining the funding and implementation of the cleanup and restoration of the site. After it had secured the appropriate levels of funding from the DOI's Central Hazardous Materials Fund (CHF), the FWS continued on with the remedial process. The area remained closed throughout the completion of the remedy.

IIIf. Basis for Taking Action

Results of the human health risk assessment indicated risks were primarily due to direct exposure to lead with concentrations slightly exceeding the EPA residential soil cleanup level of 400 milligrams per kilogram (mg/kg). In addition, the ACM present was poorly contained and because of its ubiquitous extent, potential for weathering and deterioration, and future uses of the site, it presented a potential for future human exposure.

Results of the ecological risk assessment indicated risks from exposure to a limited set of contaminants of concern (COCs) based on a comparison with ecological screening levels. Primary risk drivers identified were lead at Site B and mercury at Site A via direct exposure and ingestion of soils. Several metals and Aroclor 1248 contributed less to estimated risks based on food chain modeling using site-specific tissue concentrations. Models based on soil ingestion alone, indicated that some species would continue to experience risk from metals, particularly at higher levels in the food web. Results of the risk assessment indicated that wildlife communities were impacted. However, exposure to COCs did not contribute to any acute impairment or widespread regional problems.

IV. Remedial Actions

The Refuge initially advocated total removal of the contaminated material; however, due to cost and safety concerns, that option was eventually rejected. In anticipation of the selection of a remedy for OU3, the FWS Division of Engineering, supported by funds from the DOI's CHF, elected to implement the major components of the expected remedy in early 1998 (Section IVa).

IVa. Remedy Selection

Contaminants of concern at the site were determined to be lead in soils and sediments based on human health concerns, and several metals in soils and sediments based on ecological risk concerns. Although asbestos was not identified as a COC based on site conditions, all remedial alternatives addressed the presence of asbestos in surface soils due to its ubiquitous extent, potential for weathering and deterioration, and future uses of the site.

Remedial Action Objectives (RAOs) were developed as a result of data collected during the RI to aid in the development and screening of remedial alternatives to be considered for the ROD. After reviewing the alternatives and public comments, DOI, FWS, and EPA determined the appropriate remedy for the site. This remedy was selected because it best satisfied the requirements of CERCLA §12l, 42 U.S.C. §962l, and the National Contingency Plan's (NCP) nine evaluation criteria for remedial alternatives, 40 CFR §300.430(e)(9). The ROD for the remedy was signed in September 1998.

The following medium-specific and source-specific RAOs were established:

Groundwater

- Prevent ingestion of impacted groundwater;
- Restore the shallow overburden groundwater at the points of compliance (drum removal at Site A eliminated many potential sources of organic contaminants);
- Prevent the spread of contamination to unimpacted portions of the shallow overburden aquifer (drum source removal activities addressed this objective);
- Minimize the impact to site wetlands; and
- Demonstrate shallow groundwater quality through surface water and shallow aquifer groundwater monitoring, and maintenance of related remedial actions.

Surface Water

- Protect unimpacted surface water by preventing the occurrence of disposal area seeps (drum removal addressed the source of volatile organic compounds at the western side of Site A);
- Demonstrate that no related impacts occur in the future through monitoring of the surface water along Great Brook and in the wetlands adjacent to disposal area Site A; and
- Minimize, as practicable, the impact to site wetlands.

Sediment

- Protect unimpacted sediment by preventing the migration of contaminants through surface water;
- Prevent unacceptable risks associated with impacted sediment (i.e., mercury and asbestos in sediment around Site A).
- Demonstrate that no related impacts occur in the future through monitoring of the sediment along Great Brook and in the wetlands adjacent to disposal areas Site A and Site B; and
- Minimize, to the extent practicable, the impact to the site wetlands, in accordance with applicable requirements for the protection of wetlands, floodplains, riverways, and wildlife species.

Air

- Protect unimpacted air by preventing the migration of airborne contaminants; and
- Provide monitoring of air quality during remediation activities to assure that no related impacts occur in the future.

Soils

- Prevent unacceptable risks associated with impacted soils by eliminating direct exposure to humans and wildlife (e.g. excavation and removal, containment by covering or capping, perimeter fencing, etc. are a few possible alternatives among the many that eliminated or reduced direct exposure). (Note: the removal of lead impacted soils completed in late Spring 1998 at Site B and refuse areas has partially addressed this objective);
- Prevent the spread of contamination to unimpacted media during and following remediation;
- Minimize, as practicable, the impact to site wetlands; and
- Provide monitoring and maintenance of the related remedial actions.

In addition, the source specific objectives included the following:

- Reduce the potential for precipitation to percolate through the debris mass;
- Reduce the potential for groundwater and/or surface water to contact or infiltrate through the debris mass (the surface water lowering from drainage and diversion actions partially addressed this objective);
- Prevent the generation of disposal area seepage (the drum removal action at Site A addressed this objective);
- Prevent direct contact with and ingestion of soils and debris within the disposal areas;
- Control gas emissions so that explosive gases (e.g. methane) do not represent a hazard; prevent the inhalation of gas-containing hazardous substances, pollutants, or contaminants;
- Minimize the potential for slope failure of the disposal areas or any future action;
- Minimize the potential for excessive settlement of the disposal areas due to any future action or seismic occurrence;
- Minimize the impact to site wetlands; and
- Provide long-term monitoring and maintenance of the disposal area remedial actions to assure that gases and water are being properly controlled and that the remedy is functioning properly.

The major components of the selected remedy were as follows:

1. Access improvements;
2. Long-term drainage improvements, and short-term erosion control measures;
3. Drum removal activities (which were completed in September 1997 as a time-critical, non-emergency removal prior to implementation of the preferred alternative), including post-excavation and waste classification sampling;
4. Removal and off-site disposal of lead contaminated soils (completed Spring 1998);
5. Consolidation of ACM elsewhere on the site to the landfill (completed Spring 1998);
6. Placement of a biotic cover over the landfill. (This “biotic cap” was intended to encapsulate the ACM and metal-contaminated soils, provide a viable substrate for growth of a vigorous plant community, and protect against rodent damage and re-exposure of the contaminated materials. The biotic cap included a layer of composite synthetic barrier over a prepared sub-grade in order to prevent rodent burrowing into the waste. Overlying the synthetic barrier is 18 inches of common fill taken from the borrow area. On top of the common fill is a 6 inch “vegetative layer” of higher quality soil, also taken from the borrow area, to facilitate plant growth);
7. Implementation of institutional controls to ensure the continued integrity of the drainage and cover activities (e.g. limiting visitor access to daylight hours, prohibiting other than passive uses such as hiking, bird watching and photography); and,
8. Assessment of wetland impacts and wetlands restoration which included the placement of a final soil cover in impacted areas consisting of six inches of organic sediment taken from onsite disturbed wetlands. No planting activities were done, and instead the remedy relied on the natural seed bank contained within this material to reestablish and recolonize these areas. As part of restoration activities, a large "borrow area" had to be dug to provide cap construction soils. Approximately 23,000 cubic yards of material was excavated from the area for use on the cap. Prior to the excavation of capping material, the overlying organic material was removed and stockpiled and then redispersed. As a result of excavation activities a 0.66 acre pond, a habitat that was absent from much of the watershed was created.

IVb. Remedy Implementation

In all, 69 drums of hazardous materials were excavated and removed from the site. Another 30 cubic yards of drum carcasses (138 drums), their contents leaked into the environment years earlier, were also removed. Approximately 4,000 tons of non-hazardous lead contaminated soils, nearly 540 tons of hazardous lead contaminated soils, and almost 710 tons of soil containing co-mingled non-hazardous lead

and asbestos waste were disposed of off-site. An unspecified amount of large debris was removed to prevent potential future landfill subsidence or penetration of the landfill cover. Over 1,220 tons of non-hazardous lead contaminated soils, along with tons of ACM were landfilled on-site. Nearly 23,000 cubic yards of borrow material were used to cap the landfill which was completed in November 1998 (Section II).

IVc. Operation and Maintenance

The remediated OU3 site is now operated and maintained by FWS through annual monitoring of groundwater, surface water, and sediment, as well as quarterly site inspections, and control of woody and invasive vegetative species on the landfill cap via hand cutting and mowing. Any mowing to control invasive vegetative species is done after ground nesting birds have fledged. Annual reports are submitted to the EPA to detail the results of the analytical evaluations and inspections. These activities follow prescribed actions found in the O&M Plan. The FWS works cooperatively with the EPA to evaluate the overall efficacy of the remediation.

Following guidance set forth from the Centers for Disease Control and Prevention (CDC) and NJ Executive Orders due to the coronavirus (COVID 19) pandemic, FWS was unable to meet EPA's request to conduct annual monitoring of the landfill early to allow inclusion of 2020 data in the draft five-year review. Two revisions of the five-year review have been submitted and reviewed with all comments addressed, and restrictions are still in place. Therefore, 2020 data will not be included in this document, but will be reported in the next Annual Inspection Report and during the next five-year review.

As per recent EPA guidance, site project teams should determine potential site vulnerabilities due to climate change. During this five-year review, 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.

V. Progress Since Last Five-Year Review

The previous five-year review concluded there was ample documentation the landfill was successfully meeting its anticipated protectiveness, and the remedy was functioning as intended. The remedial actions interrupted potential exposure pathways at the site. As such, the remedy remained protective since the cap and other actions have interrupted exposures to both human and ecological receptors.

During this five-year review period, FWS petitioned EPA to eliminate the analysis of semi-volatile organic compounds (SVOCs) in sediment from the sampling program. This class of chemicals were never identified as site-related and over the previous 10 years most detections were comprised of a limited number of polycyclic aromatic hydrocarbons (PAHs). Most of these detections were found at sample location SD-3, which was situated close to Long Hill Road, suggesting that any detections were most likely associated with runoff and road maintenance activities, not the landfill. The EPA concurred with FWS's request, and SVOCs were eliminated from the sampling program beginning with samples collected in 2016.

An additional recommendation was to eliminate location SD/SW-3 entirely from the sampling program for the same reasons as noted above for SVOCs due to potential influences from road runoff. The EPA declined the request, and instead tasked FWS to propose an alternate location. The FWS complied and after an onsite meeting with EPA an alternative location, designated as SW/SD-3A, was approved for inclusion into the monitoring program and SD-3 was eliminated beginning with samples collected in 2016 (Figure 2).

As noted in the previous five-year review, large stands of invasive common reed (*Phragmites australis*) had colonized areas adjacent to the landfill. Since reported, and documented in annual inspection reports, considerable progress has been made to control the spread; however, success has varied over the years ranging from what appeared to be complete eradication, to sporadic individuals, to very small monotypic stands. The Refuge is currently managing this plant through its invasive species management program.

A small sunken area, approximately 40' X 9' in size with an approximate depth of 2-3" (page D-12 and Figure 1-3 in Appendix B) located on the landfill cap, as reported to EPA in previous five-year reviews and annual inspection reports continues to be monitored for further settling. The size of the area has remained unchanged since the last five-year review, and no cover penetrations were present.

During this five-year review period, EPA requested two additional monitoring wells be installed down gradient of the landfill along its southern boundary. The FWS initially disputed the request based primarily on the feasibility of installing the wells in the proposed locations due to the potential for ice scour and periodic inundation which would affect well integrity and potentially lead to cross-contamination with surface water. Other factors FWS noted were related to the nature of the substrate for which the wells would be installed, more specifically the documented presence of swamp muck followed by a thick clay layer (Section IIIb).

At EPA's request, FWS field-truthed the proposed locations. Both locations were situated within the adjacent wetland. Test borings revealed a surficial layer of swamp muck followed by approximately 4 feet of saturated silty clay intermixed with muck which abruptly transitioned to dense, heavy grey clay. Crews were unable to advance an auger through this layer. The FWS reported their findings to EPA in a March 25, 2019 letter.

EPA responded in a March 20, 2020 letter and requested that for the 2020 annual sampling event, FWS attempt to sample sediment porewater in the general area of the proposed sample locations using temporary well points or similar methods. The FWS agreed to EPA's request in a March 30, 2020 letter and will attempt to sample once COVID 19-related restrictions have been lifted.

No other follow up recommendations or issues were identified.

VI. Five-Year Review Process

Several activities were performed over the course of this five-year review period and in support of this document. A summary of these activities are provided in the subsections that follow.

VIa. Community Notification and Involvement

In addition to blending a landfill within the wilderness character of the surrounding area, the FWS's remedial activities were watched closely by neighbors and environmental groups, such as the Great Swamp Watershed Association. The FWS held numerous public meetings during the planning and implementation stages of the remediation. The FWS further supported the application of the Great Swamp Watershed Association for an EPA-sponsored Technical Assistance Grant, in order to further raise the visibility, transparency, and communication that would be required for a successful project.

The FWS continues with its desire to have the public fully apprised of landfill O&M, and of the five-year review process. The FWS worked with EPA to post a public notice on EPA's website, notifying the public of the current five-year review process. The notice was posted at the following: https://www.epa.gov/superfund/R2-fiveyearreviews. Harding Township was also contacted by FWS to post the announcement on the township's website. The announcement was posted May 21, 2020 at the following: http://www.hardingnj.org/filestorage/1068/176/FIVE_YEAR_REVIEW_NOTICE_OU3.pdf.

No comments were received from the public. The results of this five-year review will be placed in the public repository, located at GSNWR headquarters and Long Hill Township Public Library located at 917 Valley Road, Gillette, NJ 07933, following completion of the review.

VIb. Document Review
Several documents were reviewed or consulted during the completion of this five-year review which included the annual O&M/Site Inspection Reports and monitoring data for this review period. In addition, the following other documents were also consulted in the preparation of this five-year review.

- *Preliminary Review of Applicable or Relevant and Appropriate Requirements for OU-3 and Areas of Concern of the Asbestos Dump Superfund Site Remedial Action Work Plan for the Asbestos Dump Superfund Site Operable Unit 3, March 1996*
- *Phase II Remedial Investigation Work Plan and Attachments for Operable Unit 3 of the Asbestos Dump Superfund Site, July 1996*
- *Final Remedial Investigation Report for the Asbestos Dump Superfund Site Operable Unit 3, May 1997*
- *Value Engineering Report for Operable Unit 3 of the Asbestos Dump Superfund Site, June 1997*
- *Record of Decision for Operable Unit 3 of the Asbestos Dump Superfund Site, September 1998*
- *Operation and Maintenance Plan for Operable Unit 3 of the Asbestos Dump Superfund Site, May 1999*

VIc. Monitoring and Data Review
Annual monitoring of the landfill was conducted over the course of this five-year review period through the collection and analysis of site media. Delays in procuring an analytical laboratory in 2015 resulted in samples being collected late in the year and not included in the last five-year review. This five-year review includes the 2015 data set along with data collected in years 2016 through 2019. Due to COVID 19, 2020 samples have yet to be collected and are not included in this five-year review (Section IVc). A complete summary of analytical results is presented in Appendix A. A summary of the results is discussed below.

Monitoring
All sampling was conducted in accordance with the O&M Plan, as modified in previous years and approved by EPA. Groundwater samples were not collected during 2016 sampling due to the regional drought that affected the area. Due to their shallow placement (approximately 15 feet), wells were not recharging at a sufficient rate to allow the collection of adequate sample volume for analysis. No issues with well productivity were noted during subsequent sampling events.

Figure 2 illustrates the locations at which sediment (SD-1, SD-2, SD-3A, and SD-4), surface water (SW-1, SW-2, SW-3A, and SW-4), and groundwater samples (GS-6R, GS-11) were collected. Included is former sample location SD-3. Sampling was conducted at SD-3 in 2015 and data from that event are included in this five-year review as noted above. Samples representing background were collected at locations SD-1, SW-1 and GS-6R. All sampling locations remained consistent throughout the monitoring period and were sampled on an annual basis.

Data
A complete summary of analytical results from annual monitoring are presented in Tables A-1 through A-3 in Appendix A. Tables 1 through 3 present a comparison of the data to their media-specific criteria.

Metals
Sediment, surface water, and groundwater were analyzed for Target Analyte List (TAL) metals (Appendix A). Several metals were detected in all site media, most of which included common earth elements such as calcium, magnesium, potassium, sodium, aluminum, iron, and manganese.

Over the course of the monitoring period, lead, the primary human health risk driver was detected in all media including the upstream background sampling location; however, with the exception of sediment it was not detected during every sampling event. In general, concentrations of lead were relatively low and remained consistent throughout the years of sampling.

Concentrations of lead detected in sediment were below human health criteria of 200 mg/kg and 800 mg/kg for soil on residential and industrial properties, respectively. To put into perspective, the average of the highest lead concentrations from each year over the course of this review period was only 34.6 mg/kg.

Concentrations in surface water analyzed as the total fraction were also below levels associated with human health risks. The highest concentrations detected were at locations SW-1 and SW-4 at estimated concentrations of 9.8J µg/L and 7.4J µg/L, respectively during the 2018 sampling event.

Lead analyzed as the total fraction in groundwater was only detected during 2015 sampling at concentrations of 1.3 µg/L and 0.42 µg/L at background location MW-GS-6R and downgradient location MS-GS-11, respectively. Both concentrations are well below screening levels for residential tap water and the Action Level for lead in groundwater (Table 3).

Concentrations of several metals identified as COCs (barium, cadmium, chromium, lead, mercury, thallium, vanadium, and zinc) in the ecological risk assessment were detected in sediment; only a fraction of these were detected above screening levels. However, the majority of those in exceedance of NJDEP's most conservative screening criteria were extremely low, in most instances by only a few tenths up to about 20 mg/kg (Table 1). For example, NJDEP's screening level for lead is 31 mg/kg. Concentrations of lead in exceedance of the screening level occurred in years 2016, 2018, and 2019 at concentrations of 46.1 mg/kg, 57.4 mg/kg, and 33 mg/kg, respectively.

Lead analyzed as the total fraction in surface water samples collected in 2018 slightly exceeded the ecological screening level of 5.4 µg/L at locations SW-1 and SW-4 at estimated concentrations of 9.8J µg/L and 7.4J µg/L, respectively. No other exceedances were noted during any other sampling event. (Table 2).

Collectively speaking over the course of the review period, results indicated no upward or downward trends and no clear pattern of distribution across sampling points or media. In general, downgradient and upgradient background sample concentrations were similar. (Tables 1 through 3).

Asbestos
Asbestos was analyzed in sediment, surface water, and groundwater (Appendix A). Asbestos was not detected in any site media.

Semi-volatile Organic Compounds
The analysis of SVOCs in sediment was eliminated from the sampling program beginning in year 2016 (Section V); however, SVOC analysis was performed on samples collected in 2015 which are included in this five-year review. Dimethylphthalate was detected at an estimated concentration of 141J micrograms per kilogram at location SD-1. No other SVOCs were detected at any location (Appendix A).

VId. Site Inspection
Due to the COVID 19 pandemic, a site inspection with representatives from EPA and the NJDEP was not conducted. The FWS does conduct inspections of the landfill on a quarterly basis, and reports their findings in annual inspection reports. Results of the last FWS site inspection conducted on March 11, 2020 can be found on the Five-Year Review Site Inspection Checklist provided in Appendix B.

Operation and Maintenance documents and reports are readily available for inspection. As of the last FWS inspection, controls to site access and usage were found to be adequate. No vandalism was present. No land use changes have occurred on site since the last five-year review. Access roads are in good condition. A small sunken area, approximately 40' X 9' in size with an approximate depth of 2-3" (page D-12 and Figure 1-3 in Appendix B) located on the landfill cap, as reported to EPA in previous five-year reviews and annual inspection reports continues to be monitored for further settling. The size of the area has remained unchanged since the last five-year review. Repairs to the area have not been completed because it does not impact the intended protectiveness of the landfill. In addition, the placement of fill could increase the loading on the area and may lead to further subsidence, which is to be avoided. No cover penetrations were present.

Monitoring data and reports are submitted annually. All monitoring wells are in a state of good repair. The landfill is behind a locked gate, and although the area is accessible by foot, only a very limited number of people can enter the site due to difficulties of access. Overall, the O&M for the site is adequate and the landfill is functioning as intended.

VII. Technical Assessment
As per EPA guidance, the following questions are to be addressed during the five-year review process. The questions in this technical assessment along with their respective responses are provided below.

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

The remedy is functioning as intended. During the last five years of implementation of the O&M Plan, there has been sufficient documentation that the landfill is successfully meeting its intended protective purpose of interrupting exposures through direct contact. No substantive issues with the structure or function of the landfill have been identified. No significant detections of environmental contaminants have been noted in sediment, surface water, or groundwater (Section VIc). The remedy has also remained successful in its habitat restoration and use for wildlife. Several species are now found or are expected to use the restored habitat on and around the landfill (Appendix C).

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

The remedial actions at the site included conducting drum, large debris, and metal-impacted soil removal, consolidation and cover of ACM with clean soil excavated from an adjacent area, and use of institutional controls to limit access to the area.

There have been no changes in site conditions from the past five-year review that would impact the protectiveness of the remedy. Environmental data was collected over the past five years for site media. The following sections provide an evaluation of the data for human health and ecological receptors.

Human Health
Remedial actions of importance to human health included: implementation of institutional controls to ensure the continued integrity of the drainage improvements and capping activities (e.g. limiting visitor access to daylight hours, prohibiting other than passive uses such as bird watching, hiking and photography); and, appropriate environmental monitoring to confirm the effectiveness of the remedy. The remedial actions at the site have interrupted direct contact exposure pathways at the site. The remedy remains protective for potential human receptors.

Sediment

The maximum concentrations of metals in sediment are below concentrations associated with residential exposures. This comparison may be an overestimate since potential exposures are anticipated to be less for on-site workers who may be exposed during inspections and limited potential recreational uses. The current cap prevents potential exposures to metals and asbestos and the remedy remains protective.

Surface Water

Surface water is not used for potable purposes. Based on the anticipated recreational land-use, exposures to surface water are expected to be incidental (e.g., possible limited dermal contact or ingestion of surface water) rather than daily consumption associated with residential use. Asbestos was not detected in any sample. Concentrations of metals were primarily below groundwater residential values with the exception of naturally occurring analytes such as aluminum, iron, and manganese. Concentrations of lead in 2018 samples were slightly above NJDEP groundwater quality criteria, but below its respective EPA Office of Water Action Level for lead.. Based on the frequency of exposures associated with recreational use, the remedy remains protective.

Groundwater

Drinking water wells in the area are screened at levels of 100 feet or greater. There is a thick layer of clay between the shallow and deeper aquifers that likely prevents the migration of contaminants from the upper to lower aquifers thus preventing exposure. In addition, the protections offered by being located within a National Wildlife Refuge and designated Wilderness Area, the Wilderness Act prohibits the construction of any permanent structures. This would include wells for use as a potable water source. The designation and Act protect public health.

The maximum concentrations of metals detected exceeded screening levels for residential tap water consumption primarily for aluminum, iron and manganese, but were consistent with background concentrations. Concentrations of sodium and arsenic were in exceedance of NJDEP criteria in 2015. Asbestos was not detected. Exposures to the upper aquifer has been interrupted since it is not used as a drinking water supply, and there is a confining layer between the upper and lower aquifers, that limits potential exposure. Based on the anticipated recreational land-use of this property and the unlikely use of the upper aquifer as a drinking water supply, the remedy remains protective.

Vapor Intrusion

Due to the nature of the contaminants at the site which include asbestos and metals in groundwater, and the unlikely development of the property, further evaluation of the vapor intrusion pathway is not warranted.

Changes in Toxicity Values and Exposure Assumptions

The 1998 ROD identified lead as the COC for OU3 although all remedial alternatives addressed the presence of asbestos. Since the last Five-Year Review the list of chemicals being assessed through EPA's Integrated Risk Information System (IRIS) process has been updated. Chemicals under review through the IRIS program are arsenic and chromium VI. In addition, the model used to assess lead toxicity is being re-evaluated by the Lead Technical Review Workgroup. During the next five-year review period, these chemicals need to be re-evaluated to determine if any changes in toxicity values, exposure assumptions, or the model may impact the protectiveness of the remedy.

Since the last FYR, EPA issued a lead memorandum in December 2016 (OLEM Directive 9200.2-167) indicating the Blood Lead Level (BLL) of 10 micrograms/deciliter (µg/dL) previously used in decisions is no longer considered health-protective. The memo identifies BLLs between 2 and 8 µg/dL are appropriate. A target BLL of 5 µg/dL, proposed by EPA Region 2, for residential properties reflects current scientific literature on lead toxicology and epidemiology that the adverse health effects of lead exposure do not have a threshold. The concentration of lead in soil of 200 mg/kg for residential soils is associated with a BLL of 5 µg/L and the sediment levels were below this residential screening level. At the time of the 1998 ROD, a cleanup goal of 400 mg/kg for lead in soil was selected. Lead monitoring over the years found lead in all media, at every sample location, including the upstream background were generally relatively low and remained consistent throughout the years.

Even though the approach for addressing lead has changed since the remedy was selected, the installation of a biotic cover over the landfill to encapsulate ACM and metal-contaminated soils; implementation of institutional controls to ensure the continued integrity of the cover; and operation and maintenance of the cover including long term monitoring of groundwater, surface water, and sediment to ensure the effectiveness of the remedy continues to be protective of public health and the environment .

Although asbestos was not identified as a COC, asbestos was sampled in sediment, surface water, and groundwater (see Tables 1 to 3) over the past five years. The MCL for asbestos in groundwater, used as a comparison value for surface water and groundwater, has not changed over the past five years. Previously, the IRIS program provided an IRIS toxicity value for non-cancer for the Libby Amphibole Asbestos at a Region 8 Site. The updated non-cancer IRIS toxicity value for asbestos for the Libby Amphibole Asbestos has not resulted in a change in the MCL for asbestos used in the original ROD. The capping remedy for the ACM continues to interrupt exposures to ACM at the site.

There have been no changes in the toxicity values and exposure assumptions used in the risk assessment since the last five-year review. The remedy remains protective.

Conclusions

The toxicity values and exposure assumptions remain consistent with those developed during the original ROD The model and exposure assumptions for lead, the main COC for human health, are being updated but changes in the lead model and remedial action level remain protective since the cap is being appropriately maintained, preventing potential exposures. Future changes in toxicity and exposure assumptions will be evaluated in the next Five-Year review.

Ecological

Remedial actions of importance to ecological receptors included the placement of the biotic barrier (prevents animals from burrowing into material as well as direct contact), implementation of institutional controls to ensure the continued integrity of the drainage improvements and capping, wetland restoration

and appropriate environmental monitoring to confirm the effectiveness of the remedy. The remedy remains protective for potential ecological receptors.

Sediment

The exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the time of the remedy are still valid. Ecological criteria for asbestos in sediment and surface water were not available; however, it was not detected in any sample. The remedial actions addressed unacceptable risks associated with direct contact and ingestion of metals in media and biota. Sediment data collected during this review period was reviewed and screened against the most conservative NJDEP sediment quality criteria, more specifically, lowest effects levels (LELs) to determine if any risk exists from current contaminant concentrations.

Although exceedances of NJDEP values for several metals were noted, concentrations in general, were relatively low, just above screening levels, and remained consistent throughout the review period with no clear trends or patterns of distribution across the upstream background and other sample locations. The remedy remains protective for potential ecological receptors.

Surface Water

The exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the time of the remedy are still valid. Surface water collected during this review period was reviewed and screened against the most conservative NJDEP chronic surface water criteria to determine if any risk exists from current contaminant concentrations.

Concentrations of lead, analyzed as the total fraction, were detected slightly above its respective screening criteria collected at locations SW-1 and SW-4 during 2018 field activities. No other exceedances were noted. Results of the evaluation indicate no concerns, and the remedy remains protective for potential ecological receptors.

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

No. The concentrations of lead, the main COC for human health, are below their respective residential values for soil. No exceedances of the MCL were noted. Although some exceedances of conservative ecological screening values were noted for metals in sediment, concentrations in general, were relatively low and just above screening levels. The cap is being appropriately maintained, numerous species are using or are expected to utilize onsite habitats, and although there are no clear trends regarding sediment and surface water data, values overall appear to be similar to upstream background concentrations, and have remained relatively stable over the course of this review period.

VIII. Issues

No substantive issues with the structure or function of the landfill have been identified. In general, low concentrations of metals have been noted in site media.

IX. Recommendations and Follow-up Actions

The small area of differential settling will continue to be monitored. The FWS will fill this area back to grade if there is ever any perceived threat to the landfill's structure or function.

Wetlands that surround the OU3 landfill continue to be monitored for the presence of a diverse and native wetland plant community. All non-native and/or invasive plants will continue to be controlled by the Refuge through its invasive species management program.

Quarterly inspections of the landfill will be conducted during the next five-year review period, and will continue to be summarized and included in annual monitoring reports, following current practices.

X. Protectiveness Statement(s)

Parts of the remediated area (i.e. north of the old Great Brook channel) are open to the public for passive recreation (e.g. bird watching, hiking, etc.) but this is extremely limited due to difficulties in accessing the site via the Refuge's hiking trail complex. The area south of the old Great Brook channel (landfill area) is accessible from Long Hill Road, but the Refuge has eliminated parking off of Long Hill Road, thereby closing the area to the public for all practical purposes.

Refuge staff infrequently accesses the site area for various wildlife management and administrative purposes in neighboring parts of the Wilderness Area. Operation and Maintenance actions on the landfill are the predominant activities carried out in the area. Baseline O&M activities require approximately 120 hours per year of total staff time, usually conducted by one staff member, for adequate administration of the site.

During the last five years of implementation of the O&M Plan, there has been ample documentation that the landfill is successfully meeting its intended protectiveness. The remedy is functioning as intended. The remedial actions have interrupted potential exposure pathways at the site. As such, the remedy remains protective since the cap and other actions have interrupted exposures to both human and ecological receptors. The remedy at OU3 is protective of human health and the environment.

Table 1
Comparison of Metals and Asbestos Detected in Sediment to Screening Levels

Metals (mg/kg)	NJDEP SQC[1]	2015				2016				2017				2018				2019			
		SD-1	SD-2	SD-3	SD-4	SD-1	SD-2	SD-3A	SD-4	SD-1	SD-2	SD-3A	SD-4	SD-1	SD-2	SD-3A	SD-4	SD-1	SD-2	SD-3A	SD-4
Aluminum	25500	10,400	5,870	12,700	**26,500**	13,800	6,030	**45,100**	14,700	11,800	5,540	**50,200**	16,200	12,900	7,620	**35,600**	**44,500**	9,100	4,300	**29,000**	16,000
Antimony*	3	ND	ND	ND	ND	1.43 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	6	2.14	2.11 B	2.88	**7.62**	ND	2.28 J	**8.66 J**	4.06 J	2.65J	ND	**7.83**	4.07	ND	1.4 J	4.76 J	**6.17 J**	ND	ND	5.9	3.9
Barium	NC	64.5	39.8	96.3	222	75.7	28.5	274	85.4	59.5B	21.5	231	87.1	64.3	35.9	178	250	52	18	180	97
Beryllium	NC	0.476	0.256 B	0.432	1.45	0.628 J	0.188 J	2.30 J	0.675 J	0.575J	0.289J	2.14	0.711J	0.665 J	0.754 J	1.48 J	2.23	0.69	ND	1.7	0.93
Cadmium	0.6	ND	ND	ND	**0.876 B**	**0.679 J**	0.267 J	**0.975 J**	0.513 J	0.25J	0.0884J	0.490J	0.259J	0.269 J	0.225 J	0.583 J	**0.677 J**	ND	ND	ND	ND
Calcium	NC	1,570	1040	1,560	3,120	2,450	1,140	4,900	2,450	1730B	1270B	3230B	2190B	2,100	1,650	3,020	4,080	1,800	960	3,300	2,500
Chromium	26	18	8.65	20.9	**38.7**	23.8	8.12	**46.6**	21.5	18.9	8.25	**50.8**	22.5	21.8	11	**34.4**	**50.6**	20	7.7	**36**	**28**
Cobalt	50	8.69	3.42	6.34	9.03	10.1	3.08	6.82	7.25	7.35	2.48	7.68	7.21	8.91	4.29	6.52	7.73	9.6	3.1	6.4	11
Copper	16	10.2	5.64	9.19	**36.4**	13.4	4.44	**57.6**	**21.6**	10.8	3.78	**44.8**	14.4	18.9	9.37	**41.5**	**39.9**	13	3.9	**33**	**21**
Iron	NC	16,400	5,340	10,600	15,100	24,000	5,900	16,600	14,500	20,000	6,380	17,900	14,600	22,600	7,700	13,900	18,600	19,000	6,400	12,000	20,000
Lead	31	6.74	12.1	11.6	17.1	7.38	9.56	**46.1**	14.6	19.3	5.31	18.5	17.6	8.78	11.1	**57.4**	15.7	6.7	4.0	**33**	16
Magnesium	NC	2,650	970	2,210	2,740	3,660	1,110	3,170	2,760	2,720	1,420	3,600	3,160	3,350	1,660	2,990	3,420	2,800	1,200	2,400	3,800
Manganese	630	118	67.3	88.7	191	230	59	130	154	125B	56.5B	88.1B	146B	189	108	87.3	211	150	53	78	240
Mercury	0.2	ND	0.0538 B	0.19	**0.305**	0.0178 J	ND	**0.404**	0.127 J	ND	ND	0.109	0.122	ND	ND	**0.230 J**	0.145 J	ND	ND	**0.22**	0.081
Nickel	16	12.9	6.51	11.9	**18.5**	15.7	5.59	**23.6**	12.4	11.5	5.31	**28.5**	14	14.4	8.83	**21.7**	**23.9**	14	6.2	**21**	**20**
Potassium	NC	813	311	538	765	1,830	591	1,540	1,150	957	622	1,750	1,290	1,670	683	1,310	2,010	970	430	850	1,300
Selenium**	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**2.14J**	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver**	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**1.41**	0.562 J	ND	ND	**1.6**	ND	ND	**1.9**
Sodium	NC	184	129 B	255	290	315 J	134 J	473 J	259 J	187J	126J	370	228	271 J	172 J	500	571	190	ND	350	280
Thallium	NC	ND	ND	ND	ND	3.24 J	ND	2.43 J	1.69 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	NC	31.9	20.7	35.8	73.3	43.6	17.4	105	39.9	32.1	14.5	67.3	40.7	42.1	23.6	58.2	83.8	32	13	54	44
Zinc	120	39.5	27.4	36.1	95.7	47.4	19.7	74.7	41.7	48.4B	16.8B	46.4B	45.0B	46	31.8	91.2	73.1	41	21	96	55
Asbestos (%)	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

1 - New Jersey Department of Environmental Protection Sediment Quality Criteria. 2009. http://www.nj.gov/dep/srp/guidance/ecoscreening/

mg/kg - milligrams per kilogram

% - percent

* - no lowest effect level available; severe effects level used as alternate

** - no freshwater sediment value available; value is for marine sediment

B - result greater than method detection limit, but less than lab quantitation limit

J - estimated value

NC - no criteria available from source listed

ND - not detected

Shaded cells indicate exceedance of screening values.

Table 2
Comparison of Metals and Asbestos Detected in Surface Water to Screening Levels

Metals (µg/L)	NJDEP SWQC[1]	2015				2016				2017				2018				2019			
		SW-1	SW-2	SW-3	SW-4	SW-1	SW-2	SW-3A	SW-4	SW-1	SW-2	SW-3A	SW-4	SW-1	SW-2	SW-3A	SW-4	SW-1	SW-2	SW-3A	SW-4
Aluminum	NC	92.8	943	155	1,510	ND	ND	102 J	286 J	432	292J	265J	197J	ND	ND	213 J	1,000	2200	410	630	880
Antimony	80	0.365 B	0.343 B	0.712 B	0.509 B	ND	ND	ND	ND	ND	ND	ND	ND	11.1 J	ND	ND	ND	ND	ND	ND	ND
Arsenic	150	0.707 B	0.783 B	0.526 B	1.4 B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Barium	220	62.5	65.6	47.4	75.6 B	60	41.1	60.2	65.2	39.9	37.8	41.8	41.4	56.4	60.9	55	67.3	ND	ND	ND	ND
Beryllium	3.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium*	0.18	0.062 B	ND	ND	0.13 B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	NC	51,000	46,000	51,100	51,600	57,100	29,000	62,500	58,700	28,300	25,100	29,400	28,700	44,600	38,800	44,900	45,700	23,000	19,000	23,000	21,000
Chromium	42	0.54 B	1.4 B	0.984 B	4.8	2.3 J	2.0 J	2.0 J	2.5 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cobalt	24	0.524 B	0.659 B	0.256 B	1.6 B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper*	8.5	1.9 B	1.6 B	2.1	5.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron	NC	1,470	1,830	590	2,830	746	1,590	597	676	1770	1,840	1,450	1,560	1,490	3,570	789	2,290	2,600	2,300	1,800	1,600
Lead	5.4	0.617 B	1.1 B	0.469 B	3	ND	ND	ND	ND	ND	ND	ND	ND	**9.8 J**	ND	ND	**7.4 J**	ND	ND	ND	ND
Magnesium	NC	18,900	17,300	18,600	18,600	21,900	11,100	24,000	22,500	10,800	9,480	11,300	10,800	17,400	15,100	17,700	17,700	8,800	7,000	8,600	8,000
Manganese	NC	516	463	79.4	764	183	312	114	148	193	206	210	223	406	411	82.1	475	220	270	160	120
Mercury	0.77	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel*	44	1.4 B	1.8 B	1.4 B	4.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potassium	NC	5,810	6,950	5,700	7,350	8,080	2,560	8,630	8,750	2,880	2,600	2,760	2,810	3,880	2,110	3,790	4,190	2,500	2,500	2,400	2,100
Selenium	5	0.531 B	0.366 B	0.554 B	0.667 B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	0.12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium	NC	104,000	97,500	104,000	100,000	125,000	55,900	136,000	126,000	56,900	49,300	57,600	55,800	82,300	70,100	84,700	84,200	38,000	28,000	37,000	37,000
Thallium		ND	ND	0.338 B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	12	1.1 B	2.4 B	1.2 B	5.2	ND	ND	1.6 J	1.8 J	3.7J	3.5J	2.7J	2.7J	ND	ND	4.1 J	5.5 J	ND	ND	ND	ND
Zinc*	114	12.8	7.8	12.4	28.2	14.1 J	ND	11.1 J	9.7 J	ND	ND	ND	ND	ND	ND	3.3 J	9.0 J	21	ND	ND	ND
Asbestos (MFL)**	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

1 - New Jersey Department of Environmental Protection Surface Water Quality Criteria. 2009. http://www.nj.gov/dep/srp/guidance/ecoscreening/

µg/L - micrograms per liter

* - value calculated as per source using a default hardness of 100 ug/L

** - no ecological screening value available; value is based on human health

B - result greater than method detection limit, but less than lab quantitation limit

MFL - million fibers per liter

NC - no criteria available from source listed

ND - not detected

NJDEP SQC - New Jersey Department of Environmental Protection Surface Water Quality Criteria

Shaded cells indicate exceedance of screening values.

Table 3
Comparison of Metals and Asbestos Detected in Groundwater Water to Screening Levels

Metals (µg/L)	NJDEP GWQC[1]	EPA MCL[2]	2015		2016	2017		2018		2019	
			MW-GS-6R	MW-GS-11		MW-GS-6R	MW-GS-11	MW-GS-6R	MW-GS-11	MW-GS-6R	MW-GS-11
Aluminum	200	NC	**2,520**	**501**		**437**	136J	**803**	**1,430**	**2,000**	**560**
Antimony	6	6	0.371 B	0.558 B		ND	ND	ND	ND	ND	ND
Arsenic	0.02	10	**0.514 B**	**4.5**		ND	ND	ND	ND	ND	ND
Barium	6,000	2,000	18	55.8		10	30.5	10.7	38.1	ND	ND
Beryllium	1	4	0.142 B	0.386 B		ND	ND	ND	ND	ND	ND
Cadmium	4	5	ND	0.229 B		ND	ND	ND	ND	ND	ND
Calcium	NC	NC	7,140	24,900		2,980	11,700	3,250	11,200	3,800	6,500
Chromium	70	100	2.2	5.7		ND	ND	ND	5.4 J	ND	ND
Cobalt	100	NC	1.9 B	23.8		ND	21.7	ND	13.4	ND	ND
Copper	1,300	1,300	2.3	2.1		ND	ND	ND	ND	ND	ND
Iron	300	NC	**2,320**	**18,500**	**No samples collected because of poor well production due to regional drought**	**771**	**13,300**	**1,290**	**14,700**	**5,600**	**8,300**
Lead	5	15	1.3 B	0.42		ND	ND	ND	ND	ND	ND
Magnesium	NC	NC	3,260	14,300		1,190	7,760	1,280	6,580	1,400	3,400
Manganese	50	NC	39.9	**999**		26.4	**730**	22.5 J	**839**	**66**	**470**
Mercury	2	2	ND	ND		ND	ND	ND	ND	ND	ND
Nickel	100	NC	2.3	5.6		ND	6J	ND	3.2 J	ND	ND
Potassium	NC	NC	562	855		ND	208J	264 J	558 J	ND	ND
Selenium	40	50	0.506 B	1.8 B		ND	ND	ND	ND	ND	ND
Silver	40	NC	ND	ND		ND	ND	ND	ND	ND	ND
Sodium	50,000	NC	4,760	**77,000**		5,640	22,000	5,110	25,200	4,300	12,000
Thallium	0.5	2	ND	0.344		ND	ND	ND	ND	ND	ND
Vanadium	NC	NC	3.2 B	2.0		ND	ND	ND	5.7 J	ND	ND
Zinc	2000	NC	8.1	26.8		ND	26.9J	5.6 J	25.9 J	ND	ND
Asbestos (MFL)	7	7	ND	ND		ND	ND	ND	ND	ND	ND

Notes:

1 - NJDEP. 2014. Groundwater Quality Standards (GWQS). www.nj.gov/dep/rules/rules/njac7_9c.pdf

2 - EPA. 2009. List of Contaminants and their Maxium Contaminant Levels (MCLs).https://water.epa.gov/drink/contaminants/upload/mcl-2.pdf

µg/L - micrograms per liter

B - result greater than method detection limit, but less than lab quantitation limit

J - estimated value

MFL - million fibers per liter

NC - no criteria available from source listed

ND - not detected

Shaded cells indicate exceedance of screening values. Note no exceedances of EPA MCLs.

Figure 1 Site Location Map

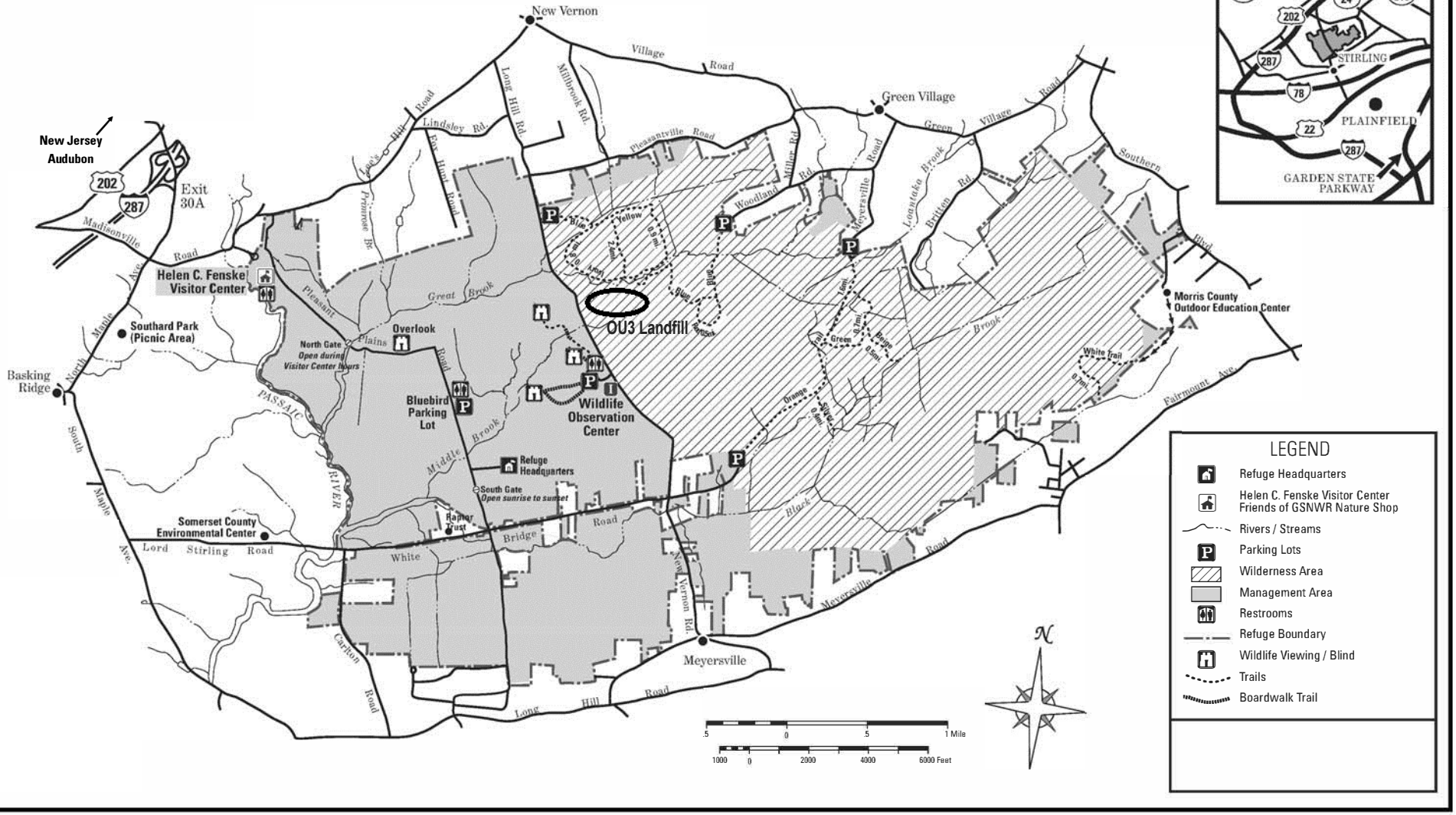

Figure 2: Operable Unit 3 Sample Location Map

Appendix A
Data Summary Tables

- **Table A-1 TAL Metals and Asbestos Sediment Data Summary**
- **Table A-2 TAL Metals and Asbestos Surface Water Data Summary**
- **Table A-3 TAL Metals and Asbestos Groundwater Data Summary**
- **Table A-4 Semi-Volatile Organic Compound Data Summary**

Table A-1 TAL Metals and Asbestos Sediment Data Summary

Metals (mg/kg)	2015								2016								2017								2018								2019							
	SD-1		SD-2		SD-3		SD-4		SD-1		SD-2		SD-3A		SD-4		SD-1		SD-2		SD-3A		SD-4		SD-1		SD-2		SD-3A		SD-4		SD-1		SD-2		SD-3A		SD-4	
	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL
Aluminum	10400	8.24	5870	8.35	12700	10.6	26500	15.8	6,030	10.5	6,030	10.5	45,100	24.5	14,700	11.8	11,800	10.7	5,540	8.32	50,200	14.3	16,200	8.81	12900B	16.1	7620B	13.1	35,600 B	27.3	44,500 B	21.6	9100D	130	4300D	67	D	480	D	260
Antimony	ND	1.88	ND	1.91	ND	2.26	ND	3.37	ND	0.85	ND	0.85	ND	1.98	ND	0.955	ND	1.04	ND	0.810	ND	1.39	ND	0.858	ND	2.32	ND	1.88	ND	3.93	ND	3.11	ND	2.5	ND	2.7	ND	4.8	ND	2.6
Arsenic	2.14	0.574	2.11B	1.16	2.88	0.46	7.62	0.679	2.28J	1.18	2.28J	1.18	8.66J	2.74	4.06J	1.32	2.65J	1.15	ND	0.894	7.8	1.53	4.07	0.946	ND	1.64	1.4J	1.33	4.76J	2.77	6.17J	2.20	ND	2.5	ND	2.7	5.9	4.8	3.9	2.6
Barium	64.5	0.192	39.8	0.195	96.3	0.294	222	0.439	28.5	0.04	28.5	0.04	274	0.093	85.4	0.045	59.5B	0.0528	21.5	0.0410	231	0.0703	87.1	0.0434	64.3	0.205	35.9	0.166	178	0.347	250	0.275	52	13	18	13	180	24	97	13
Beryllium	0.476	0.0294	0.256B	0.0298	0.432	0.00576	1.45	0.00860	0.188J	0.081	0.188J	0.081	2.30J	0.189	0.675J	0.091	0.575J	0.0949	0.289J	0.0735	2.1	0.126	0.711J	0.078	0.665J	0.137	0.754J	0.111	1.48J	0.231	2.2	0.183	0.69	0.51	ND	0.54	1.7	0.96	0.93	0.53
Cadmium	ND	0.100	ND	0.102	ND	0.121	0.876B	0.181	0.267J	0.06	0.267J	0.06	0.975J	0.138	0.513J	0.067	0.25J	0.0648	0.0884J	0.0503	0.490J	0.086	0.259J	0.053	0.269J	0.137	0.225J	0.111	0.583J	0.231	0.677J	0.183	ND	0.51	ND	0.54	ND	0.96	ND	0.53
Calcium	1,570	4.03	1,040	4.09	1,560	4.34	3,120	6.47	1,140	6.87	1,140	6.87	4,900	16	2,450	7.72	1730B	4.00	1270B	3.10	3230B	5.32	2190B	3.28	2,100	28.6	1,650	25.6	3,020	45.0	4,080	39.4	1,800	130	960	130	3,300	240	2,500	130
Chromium	18.0	0.333	8.65	0.338	20.9	0.575	38.7	0.857	8.12	0.17	8.12	0.17	46.6	0.396	21.5	0.191	18.9	0.204	8.25	0.158	50.8	0.271	22.5	0.168	21.8	0.287	11.0	0.233	34.4	0.485	50.6	0.384	20	1.3	7.7	1.3	36	2.4	28	1.3
Cobalt	8.69	0.216	3.42	0.219	6.34	0.296	9.03	0.441	3.08	0.146	3.08	0.146	6.82	0.339	7.25	0.164	7.35	0.132	2.48	0.102	7.7	0.176	7.21	0.108	8.91	1.03	4.29	0.166	6.5	0.347	7.7	0.275	9.6	1.3	3.1	1.3	6.4	2.4	11	1.3
Copper	10.2	0.402	5.64	0.407	9.19	0.0673	36.4	0.100	4.44	0.279	4.44	0.279	57.6	0.65	21.6	0.314	10.8	0.288	3.78	0.223	44.8	0.383	14.4	0.237	18.9J	3.42	9.37	0.554	41.5	1.16	39.9	0.92	13	2.5	3.9	2.7	33	4.8	21	2.6
Iron	16,400	2.58	5,340	2.62	10,600	1.45	15,100	2.16	5,900	5.0	5,900	5.0	16,600	11.6	14,500	5.62	20,000	9.67	6,380	7.49	17,900	12.9	14,600	7.93	B	6.84	7,700B	5.54	13,900B	11.6	18,600B	9.2	19000D	630	6,400	130	12,000	240	ND	660
Lead	6.74	0.925	12.1	0.937	11.6	1.06	17.1	1.57	9.56	0.668	9.56	0.668	46.1	1.55	14.6	0.75	19.3	0.720	5.31	0.558	18.5	0.958	17.6	0.591	8.78	0.821	11.1	0.665	57.4	1.39	15.70	1.10	6.7	1.3	4.0	1.3	33	2.4	16	1.3
Magnesium	2,650	3.85	970	3.90	2,210	4.99	2,740	7.44	1,110	2.31	1,110	2.31	3,170	5.37	2,760	2.59	2,720	2.92	1,420	2.26	3,600	3.88	3,160	2.4	3,350B	2.28	1660B	1.85	2,990B	3.86	3,420B	3.06	2,800	130	1,200	130	2,400	240	3,800	130
Manganese	118	0.177	67.3	0.180	88.7	0.296	191	0.441	59	0.101	59	0.101	130	0.235	154	0.113	125B	0.0997	56.5B	0.0773	88.1B	1.33	146B	0.082	189	1.23	108	0.998	87.3	2.08	211	1.65	150	1.9	53	2	78	3.6	240	2
Mercury	ND	0.047	0.0538B	0.048	0.19	0.053	0.305	0.079	ND	0.013	ND	0.013	0.404	0.030	0.127J	0.016	ND	0.013	ND	0.012	0.109	0.202	0.122	0.013	ND	0.048	ND	0.04	0.230J	0.072	0.145J	0.062	ND	0.067	ND	0.068	0.22	0.12	0.081	0.067
Nickel	12.9	0.231	6.51	0.234	11.9	0.343	18.5	0.511	5.59	0.364	5.59	0.364	23.6	0.848	12.4	0.409	11.5	0.180	5.31	0.140	28.5	0.24	14	0.148	14.4	0.287	8.83	0.233	21.7	0.485	23.9	0.384	14	2.5	6.2	2.7	21	4.8	20	2.6
Potassium	813	19.8	311	20.0	538	24.3	765	36.2	591	29	591	29	1540	67.5	1150	32.6	957	20.1	622	15.5	1750	26.7	1,290	16.5	1,670	27.1	683B	22.0	1,310B	45.8	2,010B	36.200	970	130	430	130	850	240	1300	130
Selenium	ND	1.76	ND	1.78	ND	2.59	ND	3.87	ND	1.09	ND	1.09	ND	2.54	ND	1.23	ND	1.12	ND	0.866	2.14J	0.383	ND	0.917	ND	2.05	ND	1.66	ND	3.47	ND	2.8	ND	2.5	ND	2.7	ND	4.8	ND	2.6
Silver	ND	0.107	ND	0.108	ND	0.0488	ND	0.0729	ND	0.182	ND	0.182	ND	0.424	ND	0.205	ND	0.288	ND	0.223	ND	26.7	ND	0.237	1.41J	0.547	0.562J	0.443	ND	0.925	ND	0.73	1.6	1.3	ND	1.3	ND	2.4	1.9	1.3
Sodium	184	16.1	129B	16.3	255	27.3	290	40.7	134J	29	134J	29	473J	67.5	259J	32.6	187J	20.1	126J	15.5	370	2.19	228	16.5	271J	63.2	172J	51.2	500	107	571	84.600	190	130	ND	130	350	240	280	130
Thallium	ND	0.76	ND	0.79	ND	0.879	ND	1.31	ND	0.996	ND	0.996	2.43J	2.32	1.69J	1.12	ND	1.65	ND	1.28	ND	2.19	ND	1.35	ND	1.23	ND	0.998	ND	2.08	ND	2	ND	13	ND	2.7	ND	9.6	ND	13
Vanadium	31.9	0.218	20.7	0.221	35.8	0.337	73.3	0.502	17.4	0.17	17.4	0.17	105	0.396	39.9	0.191	32.1	0.180	14.5	0.140	67.3	0.240	40.7	0.148	42.1	1.37	23.6	0.222	58.2	0.462	83.8	0.37	32	1.3	13	1.3	54	2.4	44	1.3
Zinc	39.5	1.20	27.4	1.22	36.1	0.964	95.7	1.44	19.7	0.826	19.7	0.826	74.7	1.92	41.7	0.927	48.4B	0.288	16.8B	0.223	46.4B	0.38	45.0B	0.237	46.0	0.547	31.8	0.443	91.2	0.925	73.1	0.732	41	2.5	21	2.7	96	4.8	55	2.6
Asbestos (%)	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA

Notes:
Analysis performed following EPA SW846 6010C/D and 7471B
mg/kg - milligrams per kilogram
% - percent
B - result greater than method detection limit, but less than lab quantitation limit
D - dilution
J - estimated; result below reporting limit, but at or above the MDL
MDL - method detection limit
NA - not applicable
ND - not detected

Table A-2 TAL Metals and Asbestos Surface Water Data Summary

Metals (µg/l)	2015								2016								2017								2018								2019							
	SW-1		SW-2		SW-3		SW-4		SW-1		SW-2		SW-3A		SW-4		SW-1		SW-2		SW-3A		SW-4		SW-1		SW-2		SW-3A		SW-4		SW-1		SW-2		SW-3A		SW-4	
	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL
Aluminum	92.8	2.10	943	2.10	155	2.10	1510	2.10	ND	86.8	ND	86.8	102 J	86.8	286 J	86.8	2,540	89	292	89	265	89	197	89	ND	153	ND	153	ND	153	1,000	153	2,200	100	410	100	630	100	880	100
Antimony	365 B	0.32	343 B	0.32	712 B	0.32	509 B	0.32	ND	7.7	ND	7.7	ND	7.7	ND	7.7	512	8.7	ND	8.7	ND	8.7	ND	8.7	ND	10	ND	10	ND	10	ND	10	ND	20	ND	20	ND	20	ND	20
Arsenic	707 B	0.19	783 B	0.19	526 B	0.19	1.40 B	0.19	ND	9.7	ND	9.7	ND	9.7	ND	9.7	153	10	ND	10	ND	10	ND	10	ND	16	ND	16	ND	16	ND	16	ND	20	ND	20	ND	20	ND	20
Barium	62.5	0.21	65.6	0.21	47.4	0.21	75.6	0.21	60	1.1	41.1	1.1	60.2	1.1	65.2	1.1	2,030	0.9	38	0.9	42	0.9	41	0.9	56.4	1.0	60.9	1.0	55.0	1.0	67.3	1.0	ND	100	ND	100	ND	100	ND	100
Beryllium	ND	0.06	ND	0.06	ND	0.06	ND	0.06	ND	0.67	ND	0.67	ND	0.67	ND	0.67	51	2.0	ND	2.0	ND	2.0	ND	2.0	ND	1.0	ND	1.0	ND	1.0	ND	1.0	ND	4	ND	4	ND	4	ND	4
Cadmium	620 B	0.06	ND	0.06	ND	0.06	130 B	0.06	ND	0.49	ND	0.49	ND	0.49	ND	0.49	51	1.8	ND	1.8	ND	1.8	ND	1.8	ND	1.0	ND	1.0	ND	1.0	ND	1.0	ND	4	ND	4	ND	4	ND	4
Calcium	51.0	9.70	46,000	9.70	51.1	9.70	51,600	9.70	57,100	38.2	29,000	38.2	62,500	38.2	58,700	38.2	32,700	60	25,100	60	29,400	60	28,700	60	44,600	33	38,800	33	44,900	33	45,700	33	23,000	1,000	19,000	1,000	23,000	1,000	21,000	1,000
Chromium	540 B	0.27	1.40 B	0.27	984 B	0.27	4.8	0.27	2.3 J	1.8	2.0 J	1.8	2.0 J	1.8	2.5 J	1.8	201	3.3	ND	3.3	ND	3.3	ND	3.3	ND	5.3	ND	5.3	ND	5.3	ND	5.3	ND	10	ND	10	ND	10	ND	10
Cobalt	524 B	0.04	659 B	0.04	256 B	0.04	1.60 B	0.04	ND	1.9	ND	1.9	ND	1.9	ND	1.9	508	1.7	ND	1.7	ND	1.7	ND	1.7	ND	1.5	ND	1.5	ND	1.5	ND	1.5	ND	10	ND	10	ND	10	ND	10
Copper	1.90 B	0.60	1.60 B	0.60	2.1	0.60	5.3	0.60	ND	4.1	ND	4.1	ND	4.1	ND	4.1	263	4.0	ND	4.0	ND	4.0	ND	4.0	ND	6.2	ND	6.2	ND	6.2	ND	6.2	ND	20	ND	20	ND	20	ND	20
Iron	1470	13.40	1830	13.40	590	13.40	2,830	13.40	746	74.7	1,590	74.7	597	74.7	676	74.7	2,590	81	1,840	81	1,450	81	1,560	81	1,490	40	3,570	40	789	40	2,290	40	2,600	100	2,300	100	1,800	100	1,600	100
Lead	617 B	0.18	1.10 B	0.18	469 B	0.18	3.0	0.18	ND	6.2	ND	6.2	ND	6.2	ND	6.2	156	6.0	ND	6.0	ND	6.0	ND	6.0	ND	7.1	ND	7.1	ND	7.1	ND	7.1	ND	10	ND	10	ND	10	ND	10
Magnesium	18,900	1.90	17,300	1.90	18,600	1.90	18,600	1.90	21,900	19	11,100	19	24,000	19	22,500	19	12,900	37	9,480	37	11,300	37	10,800	37	17,400	19	15,100	19	17,700	19	17,700	19	8,800	1,000	7,000	1,000	8,600	1,000	8,000	1,000
Manganese	516	0.14	463	0.14	79.4	0.14	764	0.14	183	1.8	312	1.8	114	1.8	148	1.8	700	1.6	206	1.6	210	1.6	223	1.6	406	1.1	411	1.1	82.1	1.1	475	1.1	220	15	270	15	160	15	120	15
Mercury	ND	0.03	ND	0.03	ND	0.03	ND	0.03	ND	0.04	ND	0.04	ND	0.04	ND	0.04	1	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.2	ND	0.2	ND	0.2	ND	0.2
Nickel	1.40 B	0.19	1.80 B	0.19	1.40 B	0.19	4.1	0.19	ND	2.8	ND	2.8	ND	2.8	ND	2.8	20	4.0	ND	4.0	ND	4.0	ND	4.0	ND	3.1	ND	3.1	ND	3.1	ND	3.1	ND	20	ND	20	ND	20	ND	20
Potassium	5810	5.50	6,950	5.50	5,700	5.50	7,350	5.50	8,080	160	2,560	160	8,630	160	8750	160	1,000	179	2,600	179	2,760	179	2,810	179	3,880	203	2,110	203	3,790	203	4,190	203	2,500	1,000	2,500	1,000	2,400	1,000	2,100	1,000
Selenium	531 B	0.36	366 B	0.36	554 B	0.36	667 B	0.36	ND	9.7	ND	9.7	ND	9.7	ND	9.7	40	9.3	ND	9.3	ND	9.3	ND	9.3	ND	21	ND	21	ND	21	ND	21	ND	20	ND	20	ND	20	ND	20
Silver	ND	0.15	ND	0.15	ND	0.15	ND	0.15	ND	1.9	ND	1.9	ND	1.9	ND	1.9	10	2.4	ND	2.4	ND	2.4	ND	2.4	ND	5.0	ND	5.0	ND	5.0	ND	5.0	ND	10	ND	10	ND	10	ND	10
Sodium	104000	4.90	97,500	4.90	104,000	4.90	100,000	4.90	######	173	55,900	173	######	173	######	173	2,000	321	49,300	321	57,600	321	55,800	321	ND	326	ND	326	ND	326	ND	326	38,000	1,000	28,000	1,000	37,000	1,000	37,000	1,000
Thallium	ND	0.06	ND	0.06	338 B	0.06	ND	0.06	ND	9.4	ND	9.4	ND	9.4	ND	9.4	60	14	ND	14	ND	14	ND	14	ND	14	ND	14	ND	14	ND	14	ND	20	ND	20	ND	20	ND	20
Vanadium	1.10 B	0.13	2.40 B	0.13	1.20 B	0.13	5.2	0.13	ND	1.6	ND	1.6	1.6 J	1.6	1.8 J	1.6	10	1.6	3.5	1.6	2.7	1.6	2.7	1.6	ND	3.0	ND	3.0	ND	3.0	ND	3.0	ND	10	ND	10	ND	10	ND	10
Zinc	12.8	2.10	7.8	2.10	12.4	2.10	28.2	2.10	14.1 J	5.4	ND	5.4	11.1 J	5.4	9.7 J	5.4	40	6.5	ND	6.5	ND	6.5	ND	6.5	ND	3.0	ND	3.0	ND	3.0	ND	3.0	21	20	ND	20	ND	20	ND	20
Asbestos (MFL)	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20

Notes:

Analysis performed following EPA SW846 6010C and 7470A

µg/L - micrograms per liter

B - result greater than method detection limit, but less than lab quantitation limit

MDL - method detection limit

MFL - milion fibers per liter

ND - not detected

J - estimated

Table A-3 TAL Metals and Asbestos Groundwater Data Summary

Metals (µg/l)	2015				2016	2017				2018				2019			
	MWGS11		MWGS6R			MWGS11		MWGS6R		MWGS11		MWGS6R		MWGS11		MWGS6R	
	Result	MDL	Result	MDL		Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL
Aluminum	2,520	2.1	501	2.1	No samples collected because of poor well production due to regional drought	136J	89.4	437	89.4	1,430	153	803	153	560	100	2000	100
Antimony	B	0.315	B	0.315		ND	8.7	ND	8.7	ND	10	ND	10	ND	20	ND	20
Arsenic	B	0.189	4.5	0.189		ND	9.6	ND	9.6	ND	16	ND	16	ND	20	ND	20
Barium	18.0	0.211	55.8	0.211		30.5	0.85	10	0.85	38.1	1.0	11	1.0	ND	100	ND	100
Beryllium	B	0.064	B	0.064		ND	2.0	ND	2.0	ND	1.0	ND	1.0	ND	4	ND	4
Cadmium	ND	0.061	B	0.061		ND	1.8	ND	1.8	ND	1.0	ND	1.0	ND	4	ND	4
Calcium	7,140	9.7	24,900	9.7		11,700	60	2,980	60	11,200	33	3,250	33	6,500	1,000	3,800	1,000
Chromium	2.2	0.269	5.7	0.269		ND	3.3	ND	3.3	5.4 J	5.3	ND	5.3	ND	10	ND	10
Cobalt	1.9 B	0.037	23.8	0.037		21.7	1.7	ND	1.7	13.4	1.5	ND	1.5	ND	10	ND	10
Copper	2.3	0.601	2.1	0.601		ND	4.0	ND	4.0	ND	6.2	ND	6.2	ND	20	ND	20
Iron	2,320	13.4	18,500	13.4		13,300	80.5	771	80.5	14,700	40	1,290	40	8,300	100	5,600	100
Lead	1.3 B	0.182	0.42	0.182		ND	6.0	ND	6.0	ND	7.1	ND	7.1	ND	10	ND	10
Magnesium	3,260	1.9	14,300	1.9		7,760	37.4	1,190	37.4	6,580	19	1,280	19	3,400	1,000	1,400	1,000
Manganese	39.9	0.144	999	0.144		730	1.6	26.4	1.6	839	1.1	22.5 J	1.1	470	15	66	15
Mercury	ND	0.025	ND	0.025		ND	0.05	ND	0.05	ND	0.05	ND	0.05	ND	0.2	ND	0.2
Nickel	2.3	0.194	5.6	0.194		6.0J	4.0	ND	4.0	3.2 J	3.1	ND	3.1	ND	20	ND	20
Potassium	562	5.5	855	5.5		208J	179	ND	179	558 J	203	264 J	203	ND	1,000	ND	1,000
Selenium	0.506B	0.358	1.8 B	0.358		ND	9.3	ND	9.3	ND	21	ND	21	ND	20	ND	20
Silver	ND	0.148	ND	0.148		ND	2.4	ND	2.4	ND	5.0	ND	5.0	ND	10	ND	10
Sodium	4,760	4.9	77,000	4.9		22,000	321	5,640	321	25,200B	326	5,110 B	326	12,000	1,000	4,300	1,000
Thallium	ND	0.059	0.344	0.059		ND	13.7	ND	13.7	ND	14	ND	14	ND	20	ND	20
Vanadium	3.2 B	0.127	2.0	0.127		ND	1.6	ND	1.6	5.7 J	3.0	ND	3.0	ND	10	ND	10
Zinc	8.1	2.1	26.8	2.1		26.9J	6.5	ND	6.5	25.9 J	3.0	5.6 J	3.0	ND	20	ND	20
Asbestos (MFL)	ND	0.20	ND	0.20		ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20	ND	0.20

Notes:

Analysis performed following EPA SW846 6010C and 7470A

µg/L - micrograms per liter

B - result greater than method detection limit, but less than lab quantitation limit

MDL - method detection limit

MFL - milion fibers per liter

ND - not detected

J - estimated

Table A-4 Semi-Volatile Organic Compound Sediment Data Summary

Semi-volatile Organic Compound (µg/kg)	SD-1		SD-2		SD-3		SD-4	
	Result	MDL	Result	MDL	Result	MDL	Result	MDL
1,2,4-Trichlorobenzene	ND	65.6	ND	66.5	ND	74.0	ND	110
1,2-Dichlorobenzene	ND	69.8	ND	70.7	ND	78.7	ND	117
1,2-Diphenylhydrazine	ND	41	ND	41.6	ND	46.2	ND	69.0
1,3-Dichlorobenzene	ND	69.6	ND	70.6	ND	78.5	ND	117
1,4-Dichlorobenzene	ND	65.3	ND	66.2	ND	73.7	ND	110
2,4,5-Trichlorophenol	ND	36	ND	36.5	ND	40.6	ND	60.6
2,4,6-Trichlorophenol	ND	37.8	ND	38.3	ND	42.6	ND	63.6
2,4-Dichlorophenol	ND	81.2	ND	82.3	ND	91.6	ND	137
2,4-Dimethylphenol	ND	38.3	ND	38.8	ND	43.2	ND	64.5
2,4-Dinitrophenol	ND	184	ND	187	ND	208	ND	310
2,4-Dinitrotoluene	ND	43.2	ND	43.7	ND	48.7	ND	72.6
2,6-Dinitrotoluene	ND	37.6	ND	38.1	ND	42.5	ND	63.3
2-Chloronaphthalene	ND	38	ND	38.6	ND	42.9	ND	64.0
2-Chlorophenol	ND	46.9	ND	47.5	ND	52.9	ND	79.0
2-Methylnaphthalene	ND	51.4	ND	52.0	ND	57.9	ND	86.4
2-Methylphenol	ND	46.9	ND	47.5	ND	52.9	ND	79.0
2-Nitroaniline	ND	46.9	ND	47.5	ND	52.9	ND	79.0
2-Nitrophenol	ND	46.8	ND	47.4	ND	52.8	ND	78.7
3&4-Methylphenol	ND	71.3	ND	72.2	ND	80.4	ND	120
3,3'-Dichlorobenzidine	ND	51.2	ND	51.9	ND	57.8	ND	86.2
3-Nitroaniline	ND	52.7	ND	53.4	ND	59.4	ND	88.7
4,6-Dinitro-2-methylphenol	ND	37.4	ND	37.9	ND	42.2	ND	62.9
4-Bromophenyl phenyl ether	ND	40.6	ND	41.1	ND	45.8	ND	68.3
4-Chloro-3-methylphenol	ND	38.6	ND	39.1	ND	43.5	ND	64.9
4-Chloroaniline	ND	35	ND	35.4	ND	39.4	ND	58.8
4-Chlorophenyl phenyl ether	ND	35	ND	35.4	ND	39.4	ND	58.8
4-Nitroaniline	ND	39.9	ND	40.5	ND	45.0	ND	67.2
4-Nitrophenol	ND	44.9	ND	45.5	ND	50.6	ND	75.6
Acenaphthene	ND	38.2	ND	38.7	ND	43.1	ND	64.3
Acenaphthylene	ND	37.5	ND	38.0	ND	42.3	ND	63.1
Aniline	ND	49.1	ND	49.7	ND	55.3	ND	82.6
Anthracene	ND	42.1	ND	42.6	ND	47.5	ND	70.8
Benzidine	ND	503	ND	510	ND	567	ND	846
Benzo(a)anthracene	ND	37.8	ND	38.3	ND	42.6	ND	63.6
Benzo(a)pyrene	ND	38.3	ND	38.8	ND	43.2	ND	64.5
Benzo(b)fluoranthene	ND	36	ND	36.5	ND	40.6	ND	60.6
Benzo(g,h,i)perylene	ND	39.3	ND	39.8	ND	44.3	ND	66.1
Benzo(k)fluoranthene	ND	38.6	ND	39.1	ND	43.5	ND	64.9
Benzoic acid	ND	881	ND	892	ND	993	ND	1480
Benzyl alcohol	ND	44	ND	44.6	ND	49.6	ND	74.0
bis(2-Chloroethoxy)methane	ND	47.7	ND	48.4	ND	53.8	ND	80.3
bis(2-Chloroethyl) ether	ND	66.3	ND	67.2	ND	74.8	ND	112
bis(2-Chloroisopropyl) ether	ND	69.4	ND	70.3	ND	78.2	ND	117
bis(2-Ethylhexyl) phthalate	ND	36.8	ND	37.3	ND	41.5	ND	62.0
Butyl benzyl phthalate	ND	43.7	ND	44.3	ND	49.3	ND	73.5
Carbazole	ND	41.7	ND	42.2	ND	47.0	ND	70.1
Chrysene	ND	36	ND	36.5	ND	40.6	ND	60.6
Di-n-Butylphthalate	ND	37.9	ND	38.4	ND	42.8	ND	63.8
Di-n-Octylphthalate	ND	33.3	ND	33.8	ND	37.6	ND	56.1
Dibenz(a,h)anthracene	ND	32.3	ND	32.7	ND	36.4	ND	54.3
Dibenzofuran	ND	36	ND	36.5	ND	40.6	ND	60.6
Diethylphthalate	ND	40.3	ND	40.9	ND	45.5	ND	67.9
Dimethylphthalate	141 J	102	ND	103	ND	114	ND	171
Fluoranthene	ND	37	ND	37.5	ND	41.7	ND	62.2
Fluorene	ND	35.8	ND	36.2	ND	40.3	ND	60.2
Hexachlorobenzene	ND	49.7	ND	50.4	ND	56.1	ND	83.7
Hexachlorobutadiene	ND	68.3	ND	69.2	ND	77.0	ND	115
Hexachlorocyclopentadiene	ND	38	ND	38.6	ND	42.9	ND	64.0
Hexachloroethane	ND	51.5	ND	52.2	ND	58.1	ND	86.7
Indeno(1,2,3-cd)pyrene	ND	41.7	ND	42.2	ND	47.0	ND	70.1
Isophorone	ND	36.8	ND	37.3	ND	41.5	ND	62.0
N-Nitroso-di-n-propylamine	ND	37.5	ND	38.0	ND	42.3	ND	63.1
N-Nitrosodimethylamine	ND	66	ND	66.9	ND	74.5	ND	111
N-Nitrosodiphenylamine	ND	50.1	ND	50.8	ND	56.6	ND	84.4
Naphthalene	ND	63.1	ND	63.9	ND	71.1	ND	106
Nitrobenzene	ND	67.4	ND	68.3	ND	76.0	ND	113
Pentachlorophenol	ND	60.1	ND	60.9	ND	67.8	ND	101
Phenanthrene	ND	42.8	ND	43.3	ND	48.2	ND	71.9
Phenol	ND	43.2	ND	43.7	ND	48.7	ND	72.6
Pyrene	ND	45.4	ND	46.0	ND	51.3	ND	76.5

Notes:

Analysis performed following EPA SW846 8270C

µg/kg - micrograms per kilogram

J - estimated; result below reporting limit, but at or above the MDL

MDL - method detection limit

ND - not detected

Data is for 2015 only; SVOCs were eliminated from the monitoring program beginning in 2016

Appendix B
Five Year Review Site Inspection Checklist

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Asbestos Dump Site, Operable Unit 3	**Date of inspection:** March 11, 2020
Location and Region: Great Swamp NWR NJ, EPA R2	**EPA ID:** NJD980654149
Agency, office, or company leading the five-year review: DOI - U.S. Fish and Wildlife Service	**Weather/temperature:** Sunny/mid-40s

Remedy Includes: (Check all that apply)

- ☑ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☑ Inspection team roster attached ☑ Site map attached See report

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** George Molnar (Name) Landfill Project Manager (Title) March 11, 2020 (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

2. **O&M staff** N/A (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☑ O&M manual — ☑ Readily available — ☑ Up to date — ☐ N/A
   - ☑ As-built drawings — ☑ Readily available — ☑ Up to date — ☐ N/A
   - ☑ Maintenance logs — ☑ Readily available — ☑ Up to date — ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** — ☑ Readily available — ☑ Up to date — ☐ N/A
   - ☐ Contingency plan/emergency response plan — ☐ Readily available — ☐ Up to date — ☑ N/A

   Remarks_____

3. **O&M and OSHA Training Records** — ☑ Readily available — ☑ Up to date — ☐ N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☑ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☑ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☑ N/A
   - ☐ Other permits_____ — ☐ Readily available — ☐ Up to date — ☑ N/A

   Remarks_____

5. **Gas Generation Records** — ☐ Readily available — ☐ Up to date — ☑ N/A

   Remarks_____

6. **Settlement Monument Records** — ☐ Readily available — ☐ Up to date — ☑ N/A

   Remarks_____

7. **Groundwater Monitoring Records** — ☑ Readily available — ☑ Up to date — ☐ N/A

   Remarks_____

8. **Leachate Extraction Records** — ☐ Readily available — ☐ Up to date — ☑ N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☑ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☑ N/A

   Remarks_____

10. **Daily Access/Security Logs** — ☐ Readily available — ☐ Up to date — ☑ N/A

    Remarks The landfill is behind a locked gate. Area is accessible by foot, but very limited. Few people access the site.

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☑ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____

2. **O&M Cost Records**

☑ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate $85,000/year ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ X Not available ☐ Breakdown attached N/A
Date Date Total cost
From_____ To_____ X Not aavailable ☐ Breakdown attached N/A
Date Date Total cost
From_____ To_____ X Not available ☐ Breakdown attached N/A
Date Date Total cost
From_____ To_____ X Not available ☐ Breakdown attached N/A
Date Date Total cost
From_____ To_____ X Not available ☐ Breakdown attached N/A
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS ☑ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☑ Gates secured ☐ N/A

Remarks The landfill is behind a locked gate. Access is limited. Only a limited number of people access the area by foot.

B. Other Access Restrictions

1. ☑ **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks Site is located within refuge boundaries identified by signs informing people to stay out.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☑ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☑ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Site inspection
Frequency Four times per year
Responsible party/agency U.S. Fish and Wildlife Service refuge personnel
Contact George Molnar (Name) Landfill Project Manager (Title) N/A (Date) (973) 294-1997 (Phone no.)

Reporting is up-to-date ☑ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☑ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☑ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ☑ N/A
Other problems or suggestions: ☐ Report attached
N/A

2. **Adequacy** ☑ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☑ No vandalism evident
Remarks

2. **Land use changes on site** ☑ N/A
Remarks

3. **Land use changes off site** ☑ N/A
Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ☑ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☑ Roads adequate ☐ N/A
Remarks

B. Other Site Conditions

Remarks N/A

VII. LANDFILL COVERS ☑ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent approx 40' x 9' Depth 2 - 3 inches
Remarks See approximate area depicted on Figure 1-3 of O&M Plan attached. The area is stable and is not considered an issue.

2. **Cracks** ☐ Location shown on site map ☑ Cracking not evident
Lengths_____ Widths_____ Depths_____
Remarks N/A

3. **Erosion** ☐ Location shown on site map ☑ Erosion not evident
Areal extent_____ Depth_____
Remarks N/A

4. **Holes** ☐ Location shown on site map ☑ Holes not evident
Areal extent_____ Depth_____
Remarks_____

5. **Vegetative Cover** ☑ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☑ N/A
Remarks_____

7. **Bulges** ☐ Location shown on site map ☑ Bulges not evident
Areal extent_____ Height_____
Remarks_____

8. **Wet Areas/Water Damage** ☑ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent_____
☐ Ponding ☐ Location shown on site map Areal extent_____
☐ Seeps ☐ Location shown on site map Areal extent_____
☐ Soft subgrade ☐ Location shown on site map Areal extent_____
Remarks Area of settlement not holding any water at time of inspection. Previous inspections noted ponding of area approximately 2 - 3 inches in depth. The area is stable; no damage is evident.

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☑ No evidence of slope instability
Areal extent_____
Remarks_____

B. Benches ☐ Applicable ☑ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☑ N/A or okay
Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☑ N/A or okay
Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☑ N/A or okay
Remarks_____

C. Letdown Channels ☐ Applicable ☑ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____
_____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____
_____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____
_____

D. Cover Penetrations ☐ Applicable ☑ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks_____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks Due to dense vegetation on landfill cover, monuments were not able to be located.
_____

E. Gas Collection and Treatment ☐ Applicable ☑ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

F. Cover Drainage Layer ☐ Applicable ☑ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

G. Detention/Sedimentation Ponds ☐ Applicable ☑ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A
   ☐ Siltation not evident
   Remarks_____
   _____

2. **Erosion** Areal extent_____ Depth_____
   ☐ Erosion not evident
   Remarks_____
   _____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks_____
   _____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks_____
   _____

H. Retaining Walls ☐ Applicable ☑ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____
   _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
   Remarks_____
   _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☑ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Discharge Structure** ☐ Functioning ☐ N/A
   Remarks_____
   _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☑ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____ ☐ Evidence of breaching
   Head differential_____
   Remarks_____
   _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☑ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   ☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☑ N/A

1. **Collection Structures, Pumps, and Electrical**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
   Remarks_____

C. Treatment System ☐ Applicable ☑ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks_____
   _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____
   _____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

5. **Treatment Building(s)**
   ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____
   _____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

D. Monitoring Data

1. Monitoring Data
   ☑ Is routinely submitted on time ☑ Is of acceptable quality

2. Monitoring data suggests: landfill is functioning as intended.
   ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☑ Properly secured/locked ☑ Functioning ☑ Routinely sampled ☑ Good condition
☑ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. N/A

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy is functioning as intended. During O&M over the course of this fiver year review period there has been ample documentation the landfill is successfully meeting its protective purpose. There have been no issues with the structure or function of the landfill. There have been no considerable detections of contaminants noted in sediment, surface water, or groundwater.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The last five years of landfill O&M have been more than adequate.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

N/A

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

X-REF: ---
OFFICE: PGH
DRAW NUMBER: 74397-E19

MAINTENANCE LIMITS

REVISED LANDFILL LIMITS

NW-GS-11 (EL 234.69')

ROCK SUBBASE

ACCESS ROAD

Settlement Area

REFERENCE GRID FOR GEOPHYSICAL REPORT

TABLE 1 – STONE MONUMENT LOCATION		
MONUMENT ID	COORDINATES	
	NORTHING	EASTING
1	N:687688.27	E:495542.19
2	N:687686.81	E:495700.40
3	N:687717.90	E:495763.82
4	N:687740.79	E:495851.10
5	N:687716.43	E:495922.04
6	N:687708.35	E:495945.57
7	N:687700.23	E:495969.22
8	N:687556.90	E:496078.72
9	N:687516.35	E:496196.84
10	N:687476.42	E:496236.11
11	N:687381.92	E:496203.42
12	N:687351.54	E:496060.95
13	N:687367.74	E:496013.77
14	N:687416.50	E:495871.79
15	N:687432.70	E:495824.61
16	N:687481.45	E:495682.63
17	N:687513.93	E:495588.05
18	N:687570.05	E:495501.59

LEGEND:

- –230– FINAL GRADE CONTOUR
- REVISED LANDFILL LIMITS
- MAINTENANCE LIMITS
- MW–11 MONITORING WELL LOCATION
- ROCK SUBGRADE
- POTENTIALLY WET AREA
- 15 STONE MONUMENT FOR LOCATING MAINTENANCE LIMITS (~24"x24" SIZE)

NOTES:

1. GEOD CORPORATION PERFORMED ALL FIELD SURVEY WORK. ALL CALCULATIONS OF FIELD SURVEY WERE PERFORMED BY IT CORPORATION.
2. THE AREA OF THE LANDFILL WITHIN THE MAINTENANCE LIMITS AND BELOW ELEVATION 230' MAY BE WET AND SHALL BE MOWED ONLY WITH THE PERMISSION OF THE REFUGE MANAGER.

SCALE
30 0 30 60 FEET

FIGURE 1–3

U.S. FISH AND WILDLIFE SERVICE	USACE OMAHA DISTRICT RAPID RESPONSE

SITE 'A' LANDFILL
MAINTENANCE LIMITS
GREAT SWAMP NATIONAL WILDLIFE REFUGE
MORRIS COUNTY, NEW JERSEY

INTERNATIONAL TECHNOLOGY CORPORATION
... Creating a Safer Tomorrow

DESIGNED BY G. Johnstone | CHECKED BY G. Johnstone | 7/11/00 | SHEET

10" DATE: 7/7/99
10" SCALE: 1" = 30'

Appendix C
Operable Unit 3 Species Use List

Operable Unit 3 Species Use List

Birds	
American Kestrel (*Falco sparverius*)**	Hairy Woodpecker (*Picoides villosus*)
Northern Harrier (*Circus cyaneus*)*	Pileated Woodpecker (*Dryocopus pileatus*)
Red-tailed Hawk (*Buteo jamaicensis*)	Northern Flicker (*Colaptes auratus*)
Red-shouldered Hawk (*Buteo lineatus*)*	Red-winged Blackbird (*Agelaius phoeniceus*)
Broad-winged Hawk (*Buteo platypterus*)***	Tree Swallow (*Tachycineta bicolor*)
Cooper's Hawk (*Accipiter cooperii*)***	Swamp Sparrow (*Melospiza georgiana*)
Sharp-shinned Hawk (*Accipiter striatus*)***	American Tree Sparrow (*Spizella arborea*)
Osprey (*Pandion haliaetus*)**	Chipping Sparrow (*Spizella passerina*)
Great Horned Owl (*Bubo virginianus*)	Field Sparrow (*Spizella pusilla*)
Barred Owl (*Strix varia*)**	White-throated Sparrow (*Zonotrichia albicollis*)
Eastern Screech Owl (*Otus asio*)	Eastern Towhee (*Pipilo erythrophthalmus*)
Turkey Vulture (*Cathartes aura*)	Common Yellowthroat (*Geothlypis trichas*)
Black Vulture (*Coragyps atratus*)	Yellow Warbler (*Dendroica petechia*)
Great Blue Heron (*Ardea herodias*)***	Yellow-rumped Warbler (*Dendroica coronata*)
Little Blue Heron (*Egretta caerulea*)***	Palm Warbler (*Dendroica palmarum*)
Green Heron (*Butorides virescens*)	Ovenbird (*Seiurus aurocapillus*)
Black-crowned Night Heron (*Nycticorax nycticorax*)**	Marsh Wren (*Cistothorus palustris*)
Great Egret (*Ardea alba*)	Carolina Wren (*Thryothorus ludovicianus*)
American Bittern (*Botaurus lentiginosus*)*	House Wren (*Troglodytes aedon*)
Least Bittern (*Ixobrychus exilis*)***	Eastern Phoebe (*Sayornis phoebe*)
Belted Kingfisher (*Ceryle alcyon*)	Eastern Kingbird (*Tyrannus tyrannus*)
Virginia Rail (*Rallus limicola*)	Great Crested Flycatcher (*Myiarchus crinitus*)
Common Moorhen (*Gallinula chloropus*)	Eastern Wood-Pewee (*Contopus virens*)
Killdeer (*Charadrius vociferus*)	Willow Flycatcher (*Empidonax traillii*)
Solitary Sandpiper (*Tringa solitaria*)	Blue-gray Gnatcatcher (*Polioptila caerulea*)
Spotted Sandpiper (*Actitis macularia*)***	Golden-crowned Kinglet (*Regulus satrapa*)
Least Sandpiper (*Calidris minutilla*)	Ruby-crowned Kinglet (*Regulus calendula*)
Common Snipe (*Gallinago gallinago*)	White-breasted Nuthatch (*Sitta carolinensis*)
American Woodcock (*Scolopax minor*)	American Goldfinch (*Carduelis tristis*)
Mallard (*Anas platyrhynchos*)	Dark-eyed Junco (*Junco hyemalis*)
American Black Duck (*Anas rubripes*)	Black-capped Chickadee (*Poecile atricapilla*)
Northern Pintail (*Anas acuta*)	Tufted Titmouse (*Baeolophus bicolor*)
Green-winged Teal (*Anas crecca*)	Northern Cardinal (*Cardinalis cardinalis*)
Wood Duck (*Aix sponsa*)	Baltimore Oriole (*Icterus galbula*)
Ring-necked Duck (*Aythya collaris*)	American Robin (*Turdus migratorius*)
Hooded Merganser (*Lophodytes cucullatus*)	Wood Thrush (*Hylocichla mustelina*)***
Canada Goose (*Branta canadensis*)	Hermit Thrush (*Catharus guttatus*)
Mute Swan (*Cygnus olor*)	Veery (*Catharus fuscescens*)***
Ring-billed Gull (*Larus delawarensis*)	Gray Catbird (*Dumetella carolinensis*)
Wild Turkey (*Meleagris gallopavo*)	Brown Thrasher (*Toxostoma rufum*)***
Downy Woodpecker (*Picoides pubescens*)	Blue Jay (*Cyanocitta cristata*)
Red-headed Woodpecker (*Melanerpes erythrocephalus*)**	American Crow (*Corvus brachyrhynchos*)
Red-bellied Woodpecker (*Melanerpes carolinus*)	Mourning Dove (*Zenaida macroura*)

Notes:

* - State-listed endangered species

** - State-listed threatened species

*** - State-listed special concern species

No Federal-listed speceis occur on the above list

Operable Unit 3 Species Use List

Mammals	
White-tailed Deer (*Odocoileus virginianus*)	Southern Flying Squirrel (*Glaucomys volans*)
Eastern Coyote (*Canis latrans*)	Eastern Chipmunk (*Tamias striatus*)
Red Fox (*Vulpes vulpes*)	Star-nosed Mole (*Condylura cristata*)
Raccoon (*Procyon lotor*)	Meadow Vole (*Microtus pennsylvanicus*)
Opossum (*Didelphis virginiana*)	Woodland Vole (*Microtus pinetorum*)
Striped skunk (*Mephitis mephitis*)	Short-tailed Shrew (*Blarina brevicauda*)
River otter (*Lutra canadensis*)	Smoky Shrew (*Sorex fumeus*)
Mink (*Mustela vison*)	White-footed Mouse (*Peromyscus leucopus*)
Long-tail Weasel (*Mustela frenata*)	Little Brown Bat (*Myotis lucifugus*)*
Muskrat (*Ondatra zibethicus*)	Red Bat (*Lasiurus borealis*)
Gray Squirrel (*Sciurus carolinensis*)	
Reptiles	**Amphibians**
Snapping Turtle (*Chelydra serpentina*)	Bullfrog (*Rana catesbeiana*)
Eastern Painted Turtle (*Chrysemys picta*)	Green Frog (*Rana clamitans melanota*)
Stinkpot (*Sternotherus odoratus*)	Southern Leopard Frog (*Rana sphenocephala*)
Spotted Turtle (*Clemmys guttata*)***	Pickerel Frog (*Rana palustris*)
Eastern Box Turtle (*Terrapene carolina*)***	Northern Cricket Frog (*Acris crepitans*)
Wood Turtle (*Clemmys insculpta*)**	Gray Treefrog (*Hyla versicolor*)
Northern Water Snake (*Nerodia sipedon*)	Spring Peeper (*Hyla crucifer*)
Eastern Ribbon Snake (*Thamnophis sauritus*)	Wood Frog (*Rana sylvatica*)
Eastern Garter Snake (*Thamnophis sirtalis*)	American Toad (*Bufo americanus*)
Northern Brown Snake (*Storeria dekayi*)	Fowler's Toad (*Bufo woodhousii fowleri*)***
	Red-backed Salamander (*Plethodon cinereus*)
	Red-spotted Newt (*Notophthalmus viridescens*)
Fish	
Largemouth Bass (*Micropterus salmoides*)	Pumpkinseed (*Lepomis gibbosus*)
Black Crappie (*Pomoxis nigromaculatus*)	Green Sunfish (*Lepomis cyanellus*)
Chain Pickerel (*Esox niger*)	Mud Sunfish (*Acantharchus pomotis*)
Redfin Pickerel (*Esox americanus americanus*)	Bluespotted Sunfish (*Enneacanthus gloriosus*)
Carp (*Cyprinus carpio*)	Banded Sunfish (*Enneacanthus obesus*)
Brown Bullhead (*Ictalurus nebulosus*)	Golden Shiner (*Notemigonus crysoleucas*)
Yellow Bullhead (*Ictalurus natalis*)	Eastern Mudminnow (*Umbra pygmaea*)
Bluegill (*Lepomis macrochirus*)	Tessalated Darter (*Etheostoma olmstedi*)

Notes:

* - State-listed endangered species

** - State-listed threatened species

*** - State-listed special concern species

No Federal-listed speceis occur on the above list

Appendix D
Comments Received from Support Agencies and/or Public

July 7, 2020

George Molnar
OU3 Landfill Project Manager
Great Swamp National Wildlife Refuge
241 Pleasant Plains Road
Basking Ridge, NJ 07920

Re: CERCLA Five-Year Review 2020
Operable Unit 3, Asbestos Dump Superfund Site

Dear Mr. Molnar:

This is regarding the *Draft Five-Year Review Report for Operable Unit 3 of the Asbestos Dump Superfund Site April 2020* prepared by the U.S. Fish and Wildlife Service (FWS) for the U.S. Department of the Interior. The report was provided electronically to EPA on April 28, 2020. EPA comments are as follows:

Comments from the Superfund and Emergency Management Division

1. **Page 2, Issues/Recommendations:** This table should only be used for issues that affect protectiveness. Small concerns related to long-term maintenance of the site (e.g., landfill settling) would be considered suggestions and do not belong in this table.

2. **Page 3 and Page 18, Protectiveness Statement:** The following sentence should be added as a final sentence in these sections:
   "The remedy at OU3 is protective of human health and the environment."

3. **Page 1, Review Status:** The triggering action for this FYR should be the date EPA sent FWS the letter approving the last FYR report: September 15, 2015. Therefore, the "due date" is September 15, 2020. Please revise the triggering action date and the due date.

4. **Page 4, Introduction:** The last paragraph regarding COVID-19 would be better suited for the "O&M" or "Progress Since the Last FYR" sections. We suggest moving it.

5. **Pages 11 and 12, VIa. Community Notification and Involvement:** EPA also placed a notice on its website that could be mentioned in the community outreach activities: https://www.epa.gov/superfund/R2-fiveyearreviews.

6. **Page 16, Conclusions:** In the middle of the paragraph, there is an extra "s" on the end of the word "protective".

Comments from the Program Support Branch

Title Page: The Title Page should be revised to indicate this is the Fifth Five Year Review for the Site.

Acronyms and Abbreviations: The current list identifies the Office of Solid Waste and Emergency Response. It is recommended that the definition include a parenthesis indicating that the name of this Office has been updated to Office of Land and Emergency Response (OLEM). Also, OLEM should be added to the list of Abbreviations.

Site Chronology, Sentence 1: The letter "s" should be added to the word "follow", so the sentence reads, "Pertinent site events and relevant dates in the site chronology are as follows:"

Physical Characteristics, Page 6, Paragraph 2, Last Sentence: We suggest revising the sentence to read, "The landfill cap was developed into warm season grassland and newly reestablished wetlands that are now thriving. Previously, the cap was covered with ACM."

Surface Water, Page 15, Paragraph 1:

Second to Last Sentence: The sentence should be revised to read, "Concentrations of lead in 2018 samples were slightly above NJDEP groundwater quality criteria but below its respective EPA Office of Water Action Level for lead.

Can we make any statements regarding any Institutional Controls on the use of the aquifer as a drinking water supply? If not, it may be helpful to further discuss the reasons why this aquifer would not be used as a drinking water supply e.g., yield, no existing wells, land use, etc.

Changes in Toxicity Values and Exposure Assumptions, Page 15, Last Paragraph: The paragraph should be revised to add the underlined language as follows:

Since the last FYR, EPA issued a lead memorandum in December 2016 (OLEM Directive 9200.2-167) indicating the Blood Lead Level (BLL) of 10 ug/dL previously used in decisions is no longer considered health-protective. The memo identifies BLLs between 2 and 8 micrograms/deciliter (ug/dL) are appropriate. A target BLL of 5 ug/dL, proposed by Region 2 <u>for residential properties</u>, reflects current scientific literature on lead toxicology and epidemiology that the adverse health effects of lead exposure do not have a threshold. <u>The concentration of lead in soil of 200 mg/kg for residential soils is associated with a BLL of 5 ug/l and the sediment levels were below this residential screening level.</u> At the time of the 1998 ROD, a cleanup goal of 400 mg/kg for lead in soil was selected. Lead monitoring over the years found lead in all media, at every

sample location, including the upstream background were generally relatively low and remained consistent throughout the years.

Metals, Page13, Paragraph 2: This paragraph describing lead in all media would benefit from the use of actual numbers. Are the concentrations total or dissolved? How high were the background concentrations? Are the downgradient concentrations consistent with background? 400 mg/kg should be changed to 200 mg/kg, as discussed in the comment above, regarding changes in toxicity values and exposure assumptions. In addition, it would be helpful to separate this section by media.

Comments from the Federal Facilities Section

Review Status, Page 1: The review period should be changed to July 2015 – March 2020.

Site Chronology, Page 5: The last bullet should be revised to read, "**July 2015 – March 2020**: Fifth five-year review process initiated and completed."

Progress Since Last Five-Year Review, Pages 10-11: This section should have a discussion or reference, to a section discussing the "sunken area", such as size, depth, cracking, location, pictures etc.

Community Notification and Involvement, Page 12, Paragraph 1: Posting the public notice has already been achieved. Some details could be included within the summary, such as the Harding Township website, the date the public announcement was posted on the Harding Township website. The paragraph should be revised.

Data, Page 12: This section should also reference Tables A-1, A-2, A-3 and A-4.

Document Review, Page 12: Dates should be provided for the documents listed in this section.

If you have any questions, please feel free to call me at 212-637-4322.

Sincerely yours,

Carla M. Struble, P.E.
Project Manager

cc: M. Horne, U.S. FWS
J. Abels, NJDEP

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Great Swamp National Wildlife Refuge
32 Pleasant Plains Road
Basking Ridge, NJ 07920

VIA Electronic Mail July 14, 2020

Carla Struble
Remedial Project Manager
United States Environmental Protection Agency, Region 2
Struble.Carla@epa.gov

Re: Response to Comments – Draft Five-Year Review, Asbestos Dump Superfund Site, Operable Unit 3
Great Swamp National Wildlife Refuge, Morris County, New Jersey

Dear Ms. Struble:

Attached are responses to the United States Environmental Protection Agency's (EPA) comments, dated July 7, 2020 on the Draft Five-Year Review for Operable Unit 3 (OU3) of the Asbestos Dump Superfund Site, prepared by the United States Fish and Wildlife Service (FWS) and dated April 28, 2020.

Should you have any questions or concerns, please do not hesitate to contact me at (973) 294-1997, or george_molnar@fws.gov.

Sincerely,

George Molnar
OU3 Landfill Project Manager

Response to EPA Comments
Draft Five-Year Review
Asbestos Dump Superfund Site, Operable Unit 3

Comments from the Superfund and Emergency Management Division

Comment 1: Page 2, Issues/Recommendations: This table should only be used for issues that affect protectiveness. Small concerns related to long-term maintenance of the site (e.g., landfill settling) would be considered suggestions and do not belong in this table.

Response: Comment acknowledged. The table will be revised accordingly.

Comment 2: Page 3 and Page 18, Protectiveness Statement: The following sentence should be added as a final sentence in these sections: "The remedy at OU3 is protective of human health and the environment."

Response: The above sentence will be added as per the comment.

Comment 3: Page 1, Review Status: The triggering action for this FYR should be the date EPA sent FWS the letter approving the last FYR report: September 15, 2015. Therefore, the "due date" is September 15, 2020. Please revise the triggering action date and the due date.

Response: The text will be revised accordingly.

Comment 4: Page 4, Introduction: The last paragraph regarding COVID-19 would be better suited for the "O&M" or "Progress Since the Last FYR" sections. We suggest moving it.

Response: The above mentioned paragraph will be moved to Section IVc, Operation and Maintenance.

Comment 5: Pages 11 and 12, VIa. Community Notification and Involvement: EPA also placed a notice on its website that could be mentioned in the community outreach activities: https://www.epa.gov/superfund/R2-fiveyearreviews.

Response: The text will be revised accordingly.

Comment 6: Page 16, Conclusions: In the middle of the paragraph, there is an extra "s" on the end of the word "protective".

Response: The typographical error will be deleted from the word "protective".

Comments from the Program Support Branch

Comment 1: Title Page: The Title Page should be revised to indicate this is the Fifth Five Year Review for the Site.

Response: The Title Page will be revised accordingly.

Comment 2: Acronyms and Abbreviations: The current list identifies the Office of Solid Waste and Emergency Response. It is recommended that the definition include a parenthesis indicating that the name of this Office has been updated to Office of Land and Emergency Response (OLEM). Also, OLEM should be added to the list of Abbreviations.

Response: The list of Acronyms and Abbreviations will be revised accordingly.

Comment 3: Site Chronology, Sentence 1: The letter "s" should be added to the word "follow", so the sentence reads, "Pertinent site events and relevant dates in the site chronology are as follows:"

Response: The above sentence will be revised accordingly.

Comment 4: Physical Characteristics, Page 6, Paragraph 2, Last Sentence: We suggest revising the sentence to read, "The landfill cap was developed into warm season grassland and newly reestablished wetlands that are now thriving. Previously, the cap was covered with ACM."

Response: The above sentence will be revised accordingly.

Comment 5: Surface Water, Page 15, Paragraph 1: Second to Last Sentence: The sentence should be revised to read, "Concentrations of lead in 2018 samples were slightly above NJDEP groundwater quality criteria but below its respective EPA Office of Water Action Level for lead.

Response: The above sentence will be revised accordingly.

Can we make any statements regarding any Institutional Controls on the use of the aquifer as a drinking water supply? If not, it may be helpful to further discuss the reasons why this aquifer would not be used as a drinking water supply e.g., yield, no existing wells, land use, etc.

Response: Review of the ROD indicates no institutional controls were established to prevent the consumption of shallow groundwater. No impacts to the deeper aquifer, separated by a confining unit from the shallow one were seen, and as noted in the ROD, any domestic wells in the immediate area draw water from the deeper aquifer. Finally, since the site is located in a National Wildlife Refuge and designated Wilderness Area, the Wilderness Act prohibits the construction of any permanent structures. This would include wells for use as a potable water source. The FWS believes the section following the one cited in the comment, titled "Groundwater" addresses EPA's comment.

Comment 6: Changes in Toxicity Values and Exposure Assumptions, Page 15, Last Paragraph: The paragraph should be revised to add the underlined language as follows:

Since the last FYR, EPA issued a lead memorandum in December 2016 (OLEM Directive 9200.2-167) indicating the Blood Lead Level (BLL) of 10 ug/dL previously used in decisions is no longer considered health-protective. The memo identifies BLLs between 2 and 8 micrograms/deciliter (ug/dL) are appropriate. A target BLL of 5 ug/dL, proposed by Region 2 for residential properties, reflects current scientific literature on lead toxicology and epidemiology that the adverse health effects of lead exposure do not have a threshold. The concentration of lead in soil of 200 mg/kg for residential soils is associated with a BLL of 5 ug/l and the sediment levels were below this residential screening level. At the time of the 1998 ROD, a cleanup goal of 400 mg/kg for lead in soil was selected. Lead monitoring over the years found lead in all media, at every sample location, including the upstream background were generally relatively low and remained consistent throughout the years.

Response: The above paragraph will be revised accordingly.

Comment 7: Metals, Page13, Paragraph 2: This paragraph describing lead in all media would benefit from the use of actual numbers. Are the concentrations total or dissolved? How high were the background concentrations? Are the downgradient concentrations consistent with background? 400 mg/kg should be changed to 200 mg/kg, as discussed in the comment above, regarding changes in toxicity values and exposure assumptions. In addition, it would be helpful to separate this section by media.

Response: The text will be revised accordingly.

Comments from the Federal Facilities Section

Comment 1: Review Status, Page 1: The review period should be changed to July 2015 – March 2020.

Response: The text will be revised accordingly.

Comment 2: Site Chronology, Page 5: The last bullet should be revised to read, "**July 2015 – March 2020**: Fifth five-year review process initiated and completed."

Response: The text will be revised accordingly.

Comment 3: Progress Since Last Five-Year Review, Pages 10-11: This section should have a discussion or reference, to a section discussing the "sunken area", such as size, depth, cracking, location, pictures etc.

Response: The text will be revised accordingly.

Comment 4: Community Notification and Involvement, Page 12, Paragraph 1: Posting the public notice has already been achieved. Some details could be included within the summary, such as the Harding Township website, the date the public announcement was posted on the Harding Township website. The paragraph should be revised.

Response: The text will be revised accordingly.

Comment 5: Data, Page 12: This section should also reference Tables A-1, A-2, A-3 and A-4.

Response: The section will be revised accordingly.

Comment 6: Document Review, Page 12: Dates should be provided for the documents listed in this section.

Response: The text will be revised accordingly.

July 20, 2020

George Molnar
OU3 Landfill Project Manager
Great Swamp National Wildlife Refuge
241 Pleasant Plains Road
Basking Ridge, NJ 07920

Re: CERCLA Five-Year Review 2020
Operable Unit 3, Asbestos Dump Superfund Site

Dear Mr. Molnar:

This is regarding the *Revised Draft Five-Year Review Report for Operable Unit 3 of the Asbestos Dump Superfund Site July 2020* prepared by the U.S. Fish and Wildlife Service (FWS) for the U.S. Department of the Interior. The red-line strike-out report and FWS responses to EPA July 7, 2020 comments were provided electronically to EPA on July 14, 2020. EPA comments have been addressed except for the following:

Comments from the Program Support Branch

Comment 2: Acronyms and Abbreviations: The current list identifies the Office of Solid Waste and Emergency Response. It is recommended that the definition include a parenthesis indicating that the name of this Office has been updated to Office of Land and Emergency Response (OLEM). Also, OLEM should be added to the list of Abbreviations.

FWS Response: *The list of Acronyms and Abbreviations will be revised accordingly.*

EPA Evaluation: The comment was addressed, but a minor change is needed to the list of Abbreviations and Acronyms. OLEM is the Office of Land and Emergency **Management**. The document lists the Office of Land and Emergency Response which was a typo in EPA's original comment.

Comment 5: Page 15:
Can we make any statements regarding any Institutional Controls on the use of the aquifer as a drinking water supply? If not, it may be helpful to further discuss the reasons why this aquifer would not be used as a drinking water supply e.g., yield, no existing wells, land use, etc.

FWS Response: *Review of the ROD indicates no institutional controls were established to prevent the consumption of shallow groundwater. No impacts to the deeper aquifer, separated by a confining unit*

from the shallow one, were seen and as noted in the ROD, any domestic wells in the immediate area draw water from the deeper aquifer. Finally, since the site is located in a National Wildlife Refuge and designated Wilderness Area, the Wilderness Act prohibits the construction of any permanent structures. This would include wells for use as a potable water source. The FWS believes the section following the one cited in the comment, titled "Groundwater" addresses EPA's comment.

EPA Evaluation: The comment was partially addressed. Based on the response, please revise Question B, Human Health, Groundwater, Paragraph 1 to read as follows:

> Drinking water wells in the area are screened at levels of 100 feet or greater. There is a thick layer of clay between the shallow and deeper aquifers that likely prevents the migration of contaminants from the upper to lower aquifers thus preventing exposure. In addition, the protections offered by being located within a National Wildlife Refuge and designated Wilderness Area, the Wilderness Act prohibits the construction of any permanent structures. This would include wells for use as a potable water source. The designation and Act protect public health.

Comment 7: Metals, Page13, Paragraph 2: This paragraph describing lead in all media would benefit from the use of actual numbers. Are the concentrations total or dissolved? How high were the background concentrations? Are the downgradient concentrations consistent with background? 400 mg/kg should be changed to 200 mg/kg, as discussed in the comment above, regarding changes in toxicity values and exposure assumptions. In addition, it would be helpful to separate this section by media.

FWS Response: *The text will be revised accordingly.*

EPA Evaluation: The comments were addressed for surface water and sediment, but not for groundwater. A separate paragraph describing lead in groundwater should be added and would benefit from the use of actual numbers. Are the concentrations total or dissolved? How high were the background concentrations? Are the downgradient concentrations consistent with background?

Comments from the Federal Facilities Section

Comment 3: Progress Since Last Five-Year Review, Pages 10-11: This section should have a discussion or reference, to a section discussing the "sunken area", such as size, depth, cracking, location, pictures etc.

FWS Response: *The text will be revised accordingly.*

EPA Evaluation: The comment has been partially addressed. Please discuss in this section and in Section VId. Site Inspection, if the dimensions of the sunken area have changed in the last 5 years and the figure in Appendix B which shows the location of the sunken area.

Comment 6: Document Review, Page 12: Dates should be provided for the documents listed in this section.

FWS Response: *The text will be revised accordingly.*

EPA Evaluation: The comment has been addressed. However, we suggest listing the documents chronologically.

If you have any questions, please feel free to call me at 212-637-4322.

Sincerely yours,

Carla M. Struble, P.E.
Project Manager

cc: M. Horne, U.S. FWS
J. Abels, NJDEP

No comments have been received from the public on this Five Year Review.