

**FIFTH FIVE-YEAR REVIEW REPORT  
MONROE TOWNSHIP LANDFILL SUPERFUND SITE  
MIDDLESEX COUNTY, NEW JERSEY**



**Prepared by**

**U.S. Environmental Protection Agency  
Region 2  
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**Date**

*For*

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## LIST OF ABBREVIATIONS & ACRONYMS

|          |   |
|----------|---|
| ACO      | Administrative Consent Order  |
| ARAR     | Applicable or Relevant and Appropriate Requirement                    |
| BFISJ    | Browning Ferris Industries of South Jersey                            |
| BRA      | Baseline Risk Assessment  |
| CEA      | Classification Exception Area   |
| CERCLA   | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR      | Code of Federal Regulations   |
| DSW      | Discharge to Surface Water  |
| EPA      | United States Environmental Protection Agency                         |
| FYR      | Five-Year Review  |
| GMP      | Gas Monitoring Probe  |
| ICs      | Institutional Controls  |
| NRCP     | Natural Remediation Compliance Program                                |
| NCP      | National Oil and Hazardous Substances Pollution Contingency Plan      |
| NJDEP    | The New Jersey Department of Environmental Protection                 |
| NJGWQS   | New Jersey Ground Water Quality Standards                             |
| NPL      | National Priorities List  |
| NRCP     | Natural Remediation Compliance Program                                |
| O&M      | Operation and Maintenance   |
| OU       | Operable Unit   |
| POTW     | Publicly Owned Treatment Works  |
| PRP      | Potentially Responsible Party   |
| RAO      | Remedial Action Objectives  |
| Republic | Republic Services   |
| RI/FS    | Remedial Investigation and Feasibility Study                          |
| ROD      | Record of Decision  |
| RPM      | Remedial Project Manager  |
| TBC      | To be considereds   |
| UU/UE    | Unlimited Use and Unrestricted Exposure                               |
| µg/L     | Micrograms/liter  |

# **I. INTRODUCTION**

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

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

This is the Fifth FYR for the Monroe Township Landfill Superfund Site. The triggering action for this statutory review is the completion date of the previous five-year review. The FYR has been prepared due to the fact that hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of one Operable Unit (OU) which will be addressed in this FYR. OU1 addresses the groundwater remedy.

The Monroe Township Landfill Superfund Site FYR was led by John Osolin the Remedial Project Manager for EPA. Participants included Rachel Griffiths, EPA's Hydrologist; Urszula Kenahan, EPA's Human Health Risk Assessor; Michael Clemetson, EPA's Ecological Risk Assessor; Pat Seppi, EPA's Community Involvement Coordinator; and Gwen Zervas, state agency representative. The New Jersey Department of Environmental Protection (NJDEP), Monroe Township, and Republic Services were notified of the initiation of the five-year review. The review began on April 30, 2019.

## **Site Background**

The Monroe Township Landfill Site is located on an 86 acre property in Middlesex County, New Jersey. The landfill mound covers the majority of the property, with the leachate collection facilities in the northeast corner covering most of the remaining area. Although at the time of the Record of Decision (ROD) the landfill was only bordered on two sides by residential housing, with wooded areas adjacent to the other sides, it is now completely surrounded by low to mid-density residential development. There are no current uses for the closed landfill, or any planned uses over the next five years. While the landfill is considered ready for restricted use by EPA guidance, the operation and maintenance activities limit the reuse opportunities available at the site.

Monroe Township was the original owner and operator of the landfill, and continues to own the property. The township operated the landfill from the mid-1950s to 1968, when it was leased to Princeton Disposal Service for operation under a service contract with Monroe Township. Browning Ferris Industries of South Jersey (BFISJ) acquired Princeton Disposal Service in 1972 and operated the landfill until 1978. NJDEP ordered the site operations to cease in 1978 when leachate seeped onto Lani Street adjacent to the northeast corner of the property. Based on NJDEP documentation, only municipal and household waste was placed in the landfill. BFISJ was acquired by Republic Services (Republic) in 2008.

## **FIVE-YEAR REVIEW SUMMARY FORM**

| <b>SITE IDENTIFICATION</b>   |  |   |
|--|--|---|
| <b>Site Name:</b> Monroe Township Landfill Superfund Site                    |  |   |
| <b>EPA ID:</b> NJD980505671  |  |   |
| <b>Region:</b> 2   | <b>State:</b> NJ   | <b>City/County:</b> Monroe Township, Middlesex County |
| <b>SITE STATUS</b>   |  |   |
| <b>NPL Status:</b> Deleted   |  |   |
| <b>Multiple OUs?</b> No  | <b>Has the site achieved construction completion?</b><br>Yes |   |
| <b>REVIEW STATUS</b>   |  |   |
| <b>Lead agency:</b> NJDEP  |  |   |
| <b>Author name (Federal or State Project Manager):</b> John Osolin           |  |   |
| <b>Author affiliation:</b> USEPA   |  |   |
| <b>Review period:</b> 10/23/2015 - 10/1/2019                                 |  |   |
| <b>Date of site inspection:</b> 6/12/2019                                    |  |   |
| <b>Type of review:</b> Statutory   |  |   |
| <b>Review number:</b> 5  |  |   |
| <b>Triggering action date:</b> 10/23/2014                                    |  |   |
| <b>Due date (<i>five years after triggering action date</i>):</b> 10/23/2019 |  |   |

## **II. RESPONSE ACTION SUMMARY**

### **Basis for Taking Action**

When the site was placed on the NPL in September 1983, NJDEP was designated the lead agency, and EPA was designated the support agency. Pursuant to a 1986 order with NJDEP, BFISJ was required to perform a remedial investigation and feasibility study (RI/FS) to determine the effectiveness of the remedial measures already in place, and determine if any additional measures were required to address site contamination (A list of Site Contaminants can be found in table 4). During the RI/FS, a site-specific risk assessment considered several potentially exposed populations including; off-site residents, site trespassers, site workers, and future recreational site users. Each of these populations was evaluated for potential exposure to contaminated groundwater, soil, sediments and air. The risk assessment determined that the remedial measures already in place were effective, and none of the exposure pathways posed an unacceptable risk.

The RI/FS also evaluated ecological risks. Based on the off-site chemical data, information on the source of contaminants, and remedial measures taken pursuant to the ACO, it was concluded that it was unlikely that there would be adverse impacts on the flora and fauna of the area, on the wetland communities as a whole, or on potential threatened and endangered species in the vicinity of the site. The RI/FS was completed in 1993 and formed the basis for the selection of a remedy for the site, discussed below.

### **Response Actions**

Following cessation of operations, an Administrative Consent Order (ACO) was signed by BFISJ and NJDEP on October 19, 1979. The ACO established methods and schedules for designing and implementing a landfill closure plan. The remedial measures required under the closure plan were completed in 1984. In accordance with the 1979 ACO the following remedial measures were implemented:

- Installation of a 7,000 foot long compacted clay cutoff wall circumscribing most of the site.
- Construction and operation of a leachate collection and storage system that discharges to a Publicly Owned Treatment Works (POTW) under a New Jersey Pollutant Discharge Elimination System (NJPDES) permit.
- Construction of a protective clay cap covering the northern portion of the landfill and a soil cap covering the remainder of the landfill.

The clay cutoff wall could not be installed on the northern portion of the landfill due to the absence of an underlying clay layer to key the wall into. On this portion of the landfill, a low-permeability clay cap was installed (maximum permeability of  $10^{-7}$  centimeters per second) to minimize infiltration of precipitation. The clay cap was installed in accordance with the New Jersey State Solid Waste Management Act and meets current state and federal standards for solid waste.

The soil cap covering the remainder of the landfill was also installed in accordance with the New Jersey State Solid Waste Management Act and meets current state and federal standards (two feet of clean topsoil and vegetation). The soil cap prevents erosion from occurring and allows the percolation of rain water through the landfill. Leachate generated from this percolation is collected in the leachate collection system and treated. Figure 1 identifies areas of the landfill with the clay cap, cutoff wall, leachate collection system and the soil cap.

BFISJ and the NJDEP entered into a second ACO effective December 29, 1986, to determine the effectiveness of the closure and remedial measures implemented, and to address upgrades required by NJDEP.

The following additional remedial measures were completed between 1987 and 1991 in accordance with the 1986 ACO:

- Upgrading the soil erosion and sediment control systems by replacing the former channels with rip-rap lined channels, and upgrading the sediment basin.
- Installation of a seven foot high chain-link fence surrounding the landfill to limit unauthorized access.

- Closure of the previous leachate storage lagoon and construction of an underground leachate storage tank.
- Installation of an emergency power generator as a contingency for the leachate collection system in case of power failure.
- Installation of 13 landfill gas vents for gas ventilation under a New Jersey Air Pollution Control Permit.

These remedial systems have proven to be effective as source control measures.

### **Status of Implementation**

The ROD for the Monroe Township Landfill was issued by NJDEP on April 23, 1993. The ROD called for No Further Action with Maintenance and Monitoring. A summarized description of the selected remedy as contained in the ROD is presented below.

- The source control measures which are currently in place at the site, including the landfill cover systems, site security fencing, leachate collection and management system, emergency power supply, landfill gas vent system, and surface water, sediment and erosion control are maintained under the post-closure operation and maintenance plan.
- A groundwater monitoring program is to be instituted to assess the continued effectiveness of the existing source control measures in accordance with a Natural Remediation Compliance Program (NRCP) developed by BFISJ and approved by NJDEP, which includes a sentinel well system. The sentinel well system is to be sampled on a quarterly basis to monitor groundwater quality. The groundwater at the site is determined to be in compliance with the NRCP if: 1) contaminant concentrations have not been increasing in site monitor wells; 2) contaminant concentrations have been steadily decreasing in source control monitor wells; and 3) no contamination above the applicable groundwater quality standard is detected in the sentinel well system, which indicates no significant migration of contaminants has occurred. If contaminants are confirmed to be present in the sentinel well system at concentrations above promulgated state and federal drinking water standards or the New Jersey Ground Water Quality Standards (NJGWQS), the need for additional remedial action(s) will be reevaluated.
- Landfill gas emissions are to be monitored in accordance with the existing air pollution control permit.
- Surface water discharge from the sedimentation pond is to be monitored in accordance with the NJPDES/Discharge to Surface Water (DSW) permit for the first five years.
- The leachate collection and discharge to the POTW is to be monitored in accordance with the current NJPDES permit.

The requirements for the NRCP, and the Operation and Maintenance Plan for the source control measures are specified in the Post-Closure Monitoring and Maintenance Plan. The Post-Closure

Monitoring and Maintenance Plan also included monitoring of selected perimeter monitor wells using target compound list/target analyte list parameters.

### **IC Summary Table**

**Table 1:** Summary of Planned and/or Implemented ICs

| <b>Media, engineered controls, and areas that do not support UU/UE based on current conditions</b> | <b>ICs Needed</b> | <b>ICs Called for in the Decision Documents</b> | <b>Impacted Parcel(s)</b> | <b>IC Objective</b>   | <b>Title of IC Instrument Implemented and Date (or planned)</b> |
|--|-------------------|---|---------------------------|---|---|
| Groundwater  | Yes               | No  | Landfill Property         | Restrict installation of ground water wells and ground water use. | Classification Exception Area October 2000                      |

### **Systems Operations/Operation & Maintenance**

Since the last FYR, Republic has done regular maintenance of the cap including filling of subsidence areas and mowing of the grass. They have maintained the gas collection system, the gas monitoring system and the site fence. The site wells are also sampled twice a year.

Since 1991, BFISJ (now Republic) has been operating the leachate collection system under State oversight and have conducted long-term monitoring and maintenance activities according to the State approved Post-Closure Monitoring and Maintenance Plan (O&M) plan. The primary activities associated with O&M, which are currently ongoing, include the following:

- Operate, monitor, and maintain the leachate collection system.
- Collect and analyze groundwater samples to ensure effectiveness of the containment System.
- Monitor the landfill gas emissions.
- Monitor and maintain integrity of the perimeter fence, cap and slurry wall.

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

## **III. PROGRESS SINCE THE LAST REVIEW**

This section includes the protectiveness determinations and statements from the last FYR. There were no issues or recommendations from the last FYR.

**Table 2:** Protectiveness Determinations/Statements from the Fifth FYR

| <b>OU #</b> | <b>Protectiveness Determination</b> | <b>Protectiveness Statement</b>   |
|-------------|-------------------------------------|---|
| 1           | Protective                          | The remedy at the Monroe Township Landfill site is protective of human health and the environment |



## **IV. FIVE-YEAR REVIEW PROCESS**

### **Community Notification, Involvement & Site Interviews**

On October 1, 2019, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 43 Superfund sites in New York, New Jersey, and Puerto Rico including the Monroe Township Landfill site. The announcement can be found at the following web address: <https://www.epa.gov/aboutepa/fiscal-year-2020-five-year-reviews>. In addition to this notification, a public notice was made available by EPA on the Monroe Township webpage on 10/3/2019, stating that there was a FYR and inviting the public to submit any comments to the U.S. EPA. The results of the review and the report will be made available at <http://www.epa.gov/superfund/monroe-township> and in the Site information repository at:

#### **EPA Region 2, Superfund Records Center**

290 Broadway, 18th Floor  
New York, NY 10007-1866  
Phone: (212) 637-4308

#### **Site Interviews**

During the five-year review process, an interview was conducted with Shanon Cenci of Feist Engineering. Feist Engineering is Monroe Township's engineering firm which oversees site activities performed by Republic. The purpose of the interview was to document any perceived problems or changes with the remedy that has been implemented. The interview was conducted by phone on June 12, 2019.

Ms. Cenci told EPA that there were no major concerns raised by homeowners in the area. There was some surface-water runoff from the eastern side of the landfill a few years back, which was quickly addressed by Republic. Ms. Cenci also indicated that the township was satisfied that the landfill has been regularly maintained and they had no issues or concerns.

### **Data Review**

#### *Sentinel Well Monitoring*

In accordance with the 1993 ROD, a system of sentinel monitoring wells was installed between impacted groundwater beneath the landfill and the off-property area to serve as early warning should groundwater impacts extend beyond the landfill. Sentinel wells consist of B-52R, located on the southern landfill boundary (screened in the Merchantville Formation), well B-48, located on the northern boundary (in the Magothy Formation), and wells B-1RSS and B-46P, also on the north side and screened in the perched zone within the Magothy. Sentinel wells are sampled semi-annually, and analyzed for VOCs and metals. Metals are not filtered and are reported as totals. During the 2014-2018 reporting period, B-46P was dry from 2015 through 2018 and could only be sampled once.

VOCs were sporadically detected above the NJGWQS in sentinel wells three times during this monitoring period. Benzene was detected above its NJGWQS of 1.0 microgram per liter (µg/L)

at 1.7 µg/L in well B-48 (April 2015). Cis-1,2-dichloroethylene and methylene chloride were detected above their NJGWQSs of 0.4 µg/L and 3 µg/L at well B-1RSS at 1.1 µg/L (in 2017) and 7.4 µg/L (in 2018), respectively. Based on sample analysis, the metals aluminum, iron, and manganese were consistently detected at concentrations in excess of NJGWQS in all sentinel wells. Arsenic was detected at concentrations above the 3 µg/L standard for several sampling events in wells B-1RSS and B-48. Well B-1RSS showed the highest arsenic concentration of the sentinel wells for the period with a maximum concentration of 20 ug/L reported in October 2015. Beryllium was detected at concentrations above the 1 µg/L standard for many sampling events throughout the period in wells B-1RSS, B-46P and B-48. Other metals were detected sporadically at concentrations above NJGWQS and include nickel, detected at concentrations above the 100 µg/L standard in wells B-1RSS and B-48; lead, detected at concentrations above the 5 µg/L standard in wells B-1RSS, and B-46P (maximum concentration of 20 µg/L in Oct 2015), and sodium, detected at concentrations above the 50,000 µg/L standard in well B-52R.

Generally, metal concentrations in sentinel wells have fluctuated, but showed no discernable trend over this review period, and have remained consistent with concentrations reported for the wells in the past. Iron, manganese, and aluminum occur naturally in the formations and were found at concentrations in excess of standards in the background monitoring perimeter well B-51-SS. Nickel, beryllium, and to a lesser degree, arsenic were also found in the background monitoring well at concentrations exceeding standards. Thus, the data show that contaminant concentrations are consistent with previous years and groundwater impacts are not extending beyond the landfill.

#### *Perimeter Well Monitoring*

In accordance with the 1993 ROD, a system of perimeter monitoring wells was also installed around the landfill. The objective of these wells is to evaluate performance of the remedial system and to track groundwater quality adjacent to the site. The perimeter wells include B-41R, B43R, and B-44, screened in the Merchantville Formation, and B-7R, B21R, B-46SS, B-53R, B-56R, and B-51SS (background well), screened in the Magothy Formation. Perimeter wells are sampled annually, and analyzed for VOCs and metals.

For the period 2014-2018, VOCs were either not detected or did not exceed NJGWQS in perimeter wells, except for well B-21R, where vinyl chloride and 1,2 dichloroethane were detected each year at an average of 1.2 µg/L and 3.2 µg/L respectively, in excess of the NJGWQS of 1 µg/L and 2 µg/L, respectively. Results from metals analysis indicate that iron, aluminum, and manganese were consistently detected in all perimeter wells at concentrations in excess of NJGWQS. Arsenic was detected at concentrations above the 3 µg/L standard in wells B-41R, B-7R in all sampling events with the average arsenic concentrations of 5.05 µg/L and 15.7 µg/L respectively, and once in background well B-51SS at 5.8 µg/L. Beryllium was detected above the 1 µg/L standard in well B-7R, and the background well B-51SS in all sampling events with the average beryllium concentrations of 2.4 µg/L and 14.5 µg/L respectively, and only once in well B-46S at 1.3 µg/L. Lead was detected in well B-7R at concentrations as high as 39 µg/L (In 2017) and averaged 28.7 µg/L over the 2015-2018 period. Sporadic exceedances of other metals, such as cobalt and sodium were also detected in perimeter wells.

Metal concentrations in perimeter wells also showed no discernable trend over this review period, and have remained consistent with concentrations reported for the wells in the past. Iron, manganese, and aluminum were consistently found at concentrations in excess of standards in the background well B-51-SS, an indication that these constituents occur naturally in the formations. Other more sporadically occurring metals, such as beryllium and arsenic, were also found in background wells. The concentration patterns for these metals have not changed much relative to the water-quality data in years past. Analysis of groundwater from the Merchantville Formation show no increasing trends in contamination over time, an indication that migration of contaminants from the site is not occurring. This is attributed to both the low permeability characteristics of the formation as well as the successful operation of the containment system. The average lead concentration (28.7 µg/L) for well B-7R appears to be slightly higher than seen in the last review (27.3 µg/L). The detections of lead in B-7R warrant continued monitoring at this well.

#### *Water level data*

Hydraulic gradients in the Merchantville Formation along the clay cut-off wall on the southern perimeter of the site are monitored quarterly to insure that inward gradients are maintained. Based on water-level data from piezometer transects since 2015, there was a minimal outward gradient at transect 2, in three of the four monitoring periods in 2018. This is likely due to the increased rainfall during that period. Transect 2 has experienced periods of outward gradient in the past, and the groundwater monitoring has not shown an increase in contamination. Overall, the inward gradients have been consistently achieved.

#### *Landfill gas data*

Passive gas vents were originally installed through the clay cap to dissipate potential gas pressure build-up. Over the years, the vents were modified to an active landfill gas extraction well and a gas monitoring probe (GMP) system. There are currently 29 extraction wells connected to a candlestick flare and 20 GMPs. GMPs are monitored quarterly to ensure that methane gas levels remain below 25% of the Lower Explosive Limit (LEL). Readings taken during the period 2014-2018 indicate that methane levels in GMP-7, GMP-8R, GMP-9, GMP-16, GMP-17, GMP-18, GMP-19, and GMP-20 were sporadically recorded at levels in excess of 25% of the LEL. Using a barhole punch, samples were taken on the adjacent property in each case of exceedance, and no methane was detected, indicating there was no off-site migration.

#### **Site Inspection**

The site inspection was conducted on June 12, 2019, by EPA, representatives of NJDEP, Republic, Taylor Geosciences and SCS Engineers. The purpose of the site inspection was to assess the protectiveness of the remedy, including the operation of the leachate collection system, the methane gas collection system, the integrity of the landfill cap, slurry wall and fencing. At the time of the inspection, the fence surrounding the site was in good condition, and the landfill cap was properly maintained. In addition, the leachate collection and gas collection systems were operational. No significant issues were identified during the inspection. All the engineering controls appeared intact and in good condition.

## V. TECHNICAL ASSESSMENT

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

**Question A Summary:**

According to the ROD of April 1993, the remedy specified for Monroe Township Landfill is a No Further Action with Maintenance and Monitoring. The major components of the remedy include the maintenance of source control remedial measures already in place (completed in 1984), groundwater monitoring of off-site sentinel and site perimeter monitoring wells, monitoring of landfill gas, leachate, and surface water, and an upgrade to the passive landfill gas system. The source control remedial measures that have been in place include a protective clay cap covering the northern portion of the landfill and a protective soil cap covering the remainder of the landfill, a 7,000-foot long compacted clay cutoff wall circumscribing the area of the soil cap and keyed into a clay layer base, a leachate storage system installed parallel to the cut-off wall, passive landfill gas venting systems, and a security fence.

The combination of protective caps, the cutoff wall, and leachate collection system function to contain contaminated groundwater. Groundwater monitoring well systems (both sentinel and perimeter) are used to evaluate performance of the remedy and monitor potential migration of contaminants from the site. Water-quality data reported in Post-Closure Reviews for the last five years indicate that there were no discernable trends in metal concentrations over the period, and that concentrations have remained consistent with those reported for the wells in the past. While the concentrations of several metals (such as iron, manganese, and aluminum) were detected in excess of groundwater standards, the metals occur naturally in the formations beneath the landfill. With a few minor exceptions VOCs did not exceed NJGWQS. The concentrations of VOCs detected during the review period were low and sporadic. The detections do not appear to be indicative of any trends and will continue to be monitored. Water-level data from wells along the cut-off wall show that inward gradients have been consistently achieved over the period. Thus, contaminated groundwater appears to be contained and does not extend beyond the landfill.

An enhanced surface-water drainage control system was put in place at the Site. Surface drainage runs north and south away from height of the landfill. The system appears to be functioning as designed. No obstructions to drainage were noted. A 7-foot high chain-link security fence surrounds the site. The fence is in good repair. The caps appear to be in good repair, and are regularly maintained. Discharge is sent to a POTW under NJDES permit. Analytical results for leachate indicate that all parameters are within the permit limitation.

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

There have been no physical changes to the Site that would adversely affect the protectiveness of the remedy. Land use assumptions, exposure assumptions and pathways, and clean up levels considered in the decision document followed the Risk Assessment Guidance for Superfund used by the Agency and remain valid. Although specific parameters may have changed since the time

the risk assessment was completed, the process that was used remains valid. No remedial action objectives were identified in the ROD, therefore they cannot be evaluated in this review.

As indicated in the ROD, the 1992 Baseline Risk Assessment (BRA) evaluated populations potentially exposed to surface water, surface soil, sediment and air under current site conditions (these included off-site residents, trespassers and site workers). For future conditions, in addition to the exposure scenarios outlined above, hypothetical recreational use of the site as a play area or park and subsequent exposure to surface water, surface soil, sediment and air were evaluated. Additionally, direct human exposure to chemicals of concern in groundwater via ingestion and bathing was also assessed. The result of the BRA indicated that the current and potential future risks associated with the chemicals of concern at the site fell within or below acceptable limits (i.e., do not exceed the carcinogenic risk range of  $10^{-4}$  to  $10^{-6}$  or a non-carcinogenic hazard index greater than 1) and therefore, there is no unacceptable risk to public health.

As a result of the protective clay and soil covering system, the clay cutoff wall and the security fencing, direct contact to contaminated soils has been interrupted. Direct contact with contaminated groundwater beneath the site also continues to be an incomplete exposure pathway due to a township ordinance requiring all dwellings in the vicinity of the site be connected to the public water supply. In addition, a Classification Exception Area (CEA) was established for the Site in October 2000 and remains in place. These two restrictions preclude any future homes from using private wells in the area of the site. It should also be noted that the Merchantville formation has been identified by NJDEP as a Class III-A aquitard and is naturally unsuitable as a source of potable water.

As discussed in the data review section, although there have been several exceedances of constituents above the NJGWQS during the review period of this FYR, it appears the concentrations remain consistent with those reported in the past. Metal exceedances of iron, manganese and aluminum are likely attributable from background sources and/or geologic formations beneath the site. Acidic groundwater conditions may also be contributing to the detected metal concentrations in some site wells. Continued groundwater monitoring will ensure the remedy continues to remain protective of human health.

The potential for soil vapor intrusion (VI) is evaluated when site soils and/or groundwater are known or suspected to contain VOCs. Five VOCs were detected above their respective state standards in groundwater samples collected during the time of this five year review period (2014 to 2018). Benzene was detected at 1.7 µg/L in sentinel well B-48 (April 2015). Cis-1,2-dichloroethylene and methylene chloride were detected at 1.1 µg/L (in 2017) and 7.4 µg/L (in 2018) respectively in sentinel well B-1RSS. Vinyl chloride and 1,2 dichloroethane were detected each year at a maximum of 1.4 µg/L and 6.2 µg/L respectively in well B-21R. The Monroe Township Landfill is closely surrounded on all sides by residences; thus to ensure protectiveness, a screening evaluation to ensure the VI pathway remains incomplete was conducted as part of this FYR period. A comparison of maximum detections of the above mentioned VOCs to current risk-based groundwater vapor intrusion screening levels (VISL) indicate these detections continue to fall below or within an acceptable risk range. Based on this evaluation, the VI pathway remains incomplete and additional vapor intrusion investigations are not necessary at this time.

Although the ecological risk assessment screening and toxicity values used to support the 1993 ROD may not necessarily reflect the current values, the landfill cap eliminates any potential risk from surface soil contaminants to terrestrial receptors. The slurry wall helps prevent any groundwater contaminant migration to sediment and surface water. As noted in the ROD, sediment and surface water samples collected from an off-site intermittent stream did not exceed ecological screening/background values. Consequently, the exposure assumptions remain appropriate and thus the remedy remains protective of ecological resources.

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

No other information has come to light that could call into question the protectiveness of the remedy.

## VI. ISSUES/RECOMMENDATIONS

| Issues/Recommendations  |  |
|---|--|
| <b>OU(s) without Issues/Recommendations Identified in the Five-Year Review:</b> |  |
| <i>OUI- (Site-wide remedy)</i> No issues or recommendations                     |  |

## VII. PROTECTIVENESS STATEMENT

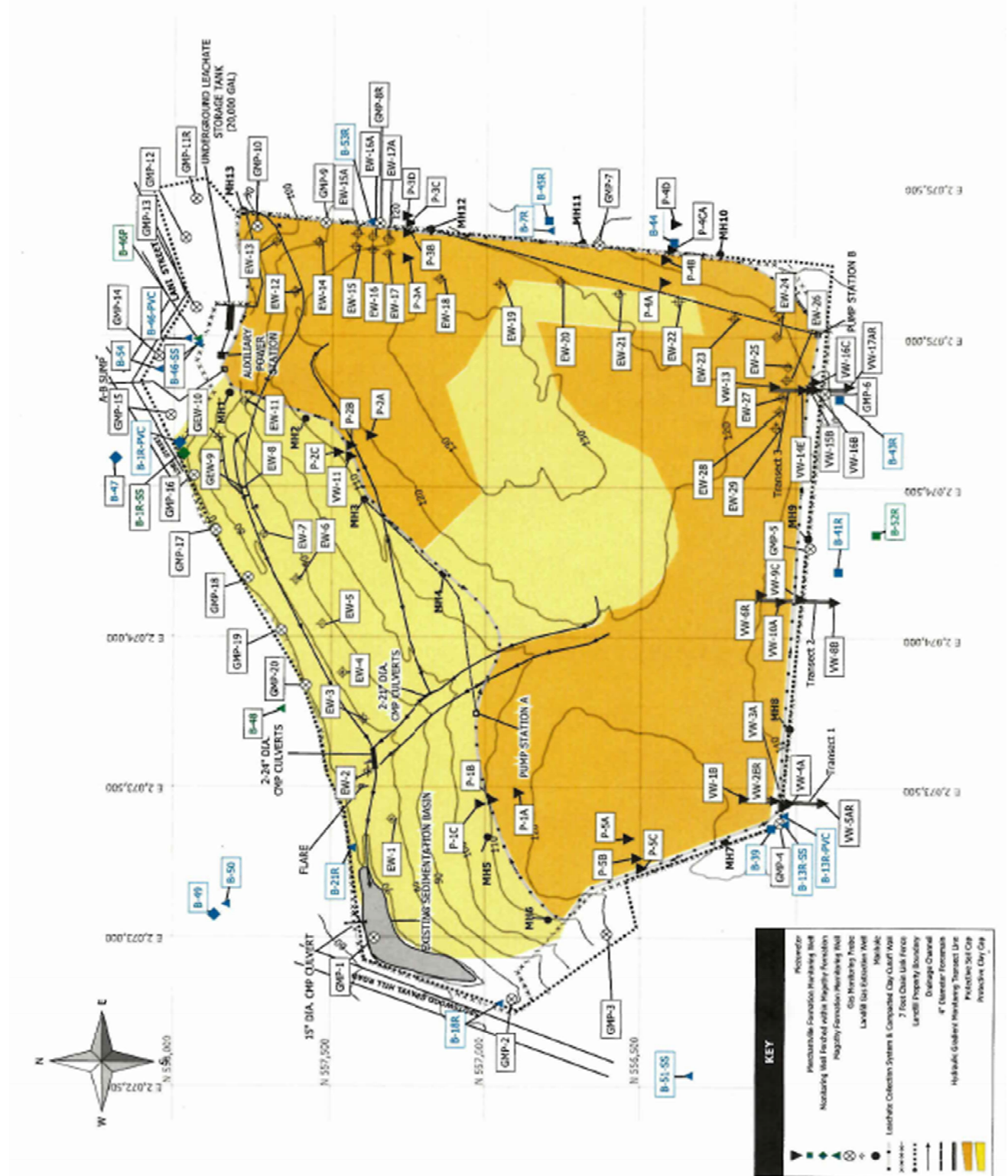
| Protectiveness Statement(s)  |  |  |
|--|--|--|
| <i>Operable Unit:</i><br>OU1   | <i>Protectiveness Determination:</i><br>Protective | <i>Planned Addendum Completion Date:</i><br>Not applicable |
| <i>Protectiveness Statement:</i><br>The remedy at the Monroe Township Landfill site is protective of human health and the environment. |  |  |

| Sitewide Protectiveness Statement  |  |
|--|--|
| <i>Protectiveness Determination:</i><br>Protective   | <i>Planned Addendum Completion Date:</i><br>Not applicable |
| <i>Protectiveness Statement:</i><br>The remedy at the Monroe Township Landfill site is protective of human health and the environment. |  |

## VIII. NEXT REVIEW

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

### Figure 1 - Site Map



| <b>Table 3: Chronology of Site Events</b>                            |                    |
|--|--------------------|
| <b>Event</b>   | <b>Date(s)</b>     |
| Landfill run by Monroe Township                                      | Mid -1950s to 1968 |
| Landfill leased and operated by Princeton Disposal                   | 1968 to 1972       |
| BFISJ operates Landfill after taking over Princeton Disposal         | 1972 to 1978       |
| Landfill ordered closed by NJDEP after leak of Leachate              | 1978               |
| Administrative Consent Order (ACO) signed by BFISJ and NJDEP         | 1979               |
| Site listed on the National Priorities List (NPL)                    | September 1983     |
| Work under 1979 ACO completed  | 1984               |
| Second ACO signed by BFISJ and NJDEP                                 | December 1986      |
| Work under 1986 ACO Completed  | 1991               |
| Record of Decision – No further action with maintenance & monitoring | April 23, 1993     |
| Site deleted from the NPL  | Feb. 3, 1994       |
| First Five-Year Review completed                                     | January 2000       |
| Second Five-Year Review completed                                    | April 2005         |
| Third Five-Year Review completed                                     | January 2009       |
| Forth Five-Year Review completed                                     | October 2014       |
| Site inspection for Fifth Five-Year Review                           | June 12, 2019      |



| <b>Table 4: Groundwater Standards for Contaminants of Concern</b> |  |  |
|---|--|--|
| <b>Contaminants of Concern</b>                                    | <b>National Primary Drinking Water Standards µg/L (Federal MCLs)</b> | <b>New Jersey Groundwater Quality Standards µg/L</b> |
| Arsenic   | 10   | 3  |
| Cadmium   | 5  | 4  |
| Lead  | 15   | 5  |
| Nickel  | -  | 100  |
| Benzene   | 5  | 1  |
| Chlorobenzene   | 100  | 50   |
| 1,2-Dichloroethane  | 5  | 2  |
| 1,1-Dichloroethene  | 7  | 1  |
| Vinyl chloride  | 2  | 1  |

| <b>Table 5: Documents, Data and Information Reviewed in Completing the Five-Year Review</b>   |                       |
|---|-----------------------|
| <b>Document Title, Author</b>   | <b>Submittal Date</b> |
| Monroe Township Municipal Code Chapter 126-1 1983<br>(originally adopted in 1972 as ordinance no.224)   | 1983                  |
| Administrative Consent Order, for the Monroe Township Landfill, NJDEP   | December 29, 1986     |
| Post-Closure Monitoring and Maintenance Plan, Monroe Township Landfill,<br>Monroe Township, New Jersey  | July 1993             |
| Amendment to Administrative Consent Order, NJDEP  | November 12, 1993     |
| Forth Five-Year Review Report, Monroe Township Landfill Superfund Site<br>Monroe Township, Middlesex County, New Jersey by USEPA                        | October 23, 2014      |
| Post-Closure Environmental Monitoring<br>Twenty-First Annual Report Monroe Township Landfill<br>Monroe Township, New Jersey by Golder Associates Inc.   | June 2015             |
| Remedial Action Protectiveness/ Biennial Certification Form<br>Monroe Township Landfill (G000004439) Republic Services.                                 | September 2015        |
| Post-Closure Environmental Monitoring<br>Twenty-Second Annual Report, Monroe Township Landfill<br>Monroe Township, New Jersey by Golder Associates Inc. | March 2016            |
| 23rd Annual Post-Closure Monitoring Report<br>Monroe Township Landfill 2015-2016<br>Monroe Township, New Jersey by Taylor Geoservices.                  | March 2017            |
| 24th Annual Post-Closure Monitoring Report<br>Monroe Township Landfill 2016-2017<br>Monroe Township, New Jersey by Taylor Geoservices.                  | March 2018            |
| 25th Annual Post-Closure Monitoring Report<br>Monroe Township Landfill 2017-2018<br>Monroe Township, New Jersey by Taylor Geoservices.                  | March 2019            |