

**SIXTH FIVE-YEAR REVIEW REPORT FOR
OLD BETHPAGE LANDFILL SUPERFUND SITE
OLD BETHPAGE, NASSAU COUNTY, NEW YORK**



Prepared by

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

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LIST OF ABBREVIATIONS & ACRONYMS

CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIC	Community Involvement Coordinator
COCs	Contaminants of Concern
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
GCCS	Gas Collection and Control System
HHRA	Human Health Risk Assessment
ICs	Institutional Controls
MCLs	Maximum Contaminant Levels
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ng/L	Nanograms per Liter
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OBL	Old Bethpage Landfill
OBSWDC	Old Bethpage Solid Waste Disposal Complex
OM&M	Operation, Maintenance, and Monitoring
PFAS	Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
TVOC	Total VOCs
µg/L	Micrograms per Liter
UU/UE	Unlimited Use/Unrestricted Exposure
VOC	Volatile Organic Compound

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy 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 FYRs such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

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

This is the sixth FYR for the Old Bethpage Landfill (OBL) Superfund site (Site) located in the Town of Old Bethpage, Nassau County, New York. The triggering action for this statutory FYR is the completion date of the previous FYR, dated August 15, 2017. 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 and addresses the identification and abatement of the source of Site contamination at the landfill property and the groundwater contamination at the Site. The remedy for the OBL Site has been completed and is in an Operation, Maintenance and Monitoring (OM&M) Program and is the subject of this FYR.

The OBL Superfund Site FYR was led by Maria Jon, EPA Remedial Project Manager (RPM). Participants include:

- Damian Duda, EPA Chief, Eastern New York Remediation Section
- Shereen Kandil, EPA Community Involvement Coordinator (CIC)
- Stephanie Kim, EPA Human Health and Ecological Risk Assessor
- Paul Zarella, EPA Hydrogeologist
- Jared Donaldson, Project Manager, New York State Department of Environmental Conservation (NYSDEC).

Site Background

The Site is located in Old Bethpage, Town of Oyster Bay, Nassau County, New York. The 68-acre landfill is an inactive municipal landfill that is part of a larger sanitary landfill complex, namely, the Old Bethpage Solid Waste Disposal Complex (OBSWDC). The OBSWDC is owned and operated by the Town of Oyster Bay (Town). The property on which the landfill is located is bounded primarily on the north by Bethpage Sweet Hollow Road, on the east by Winding Road and on the west by Claremont Road and Round Swamp Road. See **Figure 1**.

The OBSWDC consists of a total of 134 acres which contain the closed and capped landfill, a gas collection and control system (GCCS), inactive incinerators, an inactive compactor-baler facility, a municipal solid waste transfer facility, a groundwater treatment facility, a leachate

collection and treatment facility, landfill gas control and recovery systems, a periodically operated NYSDEC-approved clean fill area, a recycling facility, scale house, recharge basins, stockpile areas, vehicle maintenance facilities and offices.

The Town began landfilling operations in 1958, which consisted of processing and disposing municipal waste at the OBSWDC. The municipal wastes were burned in two on-site incinerators, and excess materials were compacted and baled for disposal in the adjacent landfill. The landfill also accepted incinerator ash and residue, as well as raw municipal solid waste which bypassed the incinerators during periods of maintenance downtime. In 1986, all landfilling and incineration activities ceased, and the Town began to ship off-site all waste collected and not recycled.

In 1979, local, state and federal investigations were initiated to evaluate the groundwater quality beneath and adjacent to the OBSWDC and the Site's potential impact to the public health and safety of area residents. The data obtained during these investigations indicated the presence of inorganic compounds and volatile organic compounds (VOCs) in the groundwater and methane gas was detected in the subsurface soil, both on- and off-Site. The Site was listed on the National Priorities List (NPL) on September 8, 1983.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Old Bethpage Landfill		
EPA ID: NYD980531727		
Region: 2	State: NY	City/County: Old Bethpage/Nassau
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	Has the site achieved construction completion? Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Maria Jon		
Author affiliation: EPA		

Review period 8/15/2017 thru 5/15/2022
Date of site inspection: 5/11/2022
Type of review: Statutory
Review number: 6
Triggering action date: 8/15/2017
Due date (five years after triggering action date): 8/15/2022

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

A Remedial Investigation and Feasibility Study (RI/FS) was completed for the Site in 1987. The RI included drilling and installing groundwater monitoring wells, collecting groundwater and soil samples for laboratory analyses, and a subsurface gas study. Based on the results of the RI, EPA performed a risk assessment for the Site.

The assessment concluded that the main health risk associated with the Site is drinking contaminated groundwater, and since the Village of Farmingdale uses the public drinking water wells directly downstream of the landfill, these wells could be threatened by site related contaminants. The primary contaminants associated with the landfill and detected in the groundwater included benzene, toluene, ethylbenzene, xylenes, and chlorobenzene. There were no completed pathways identified for ecological receptors.

Response Actions

From 1982 to 1984, prior to the NPL listing, the Town had already initiated various remediation activities. These remediation activities included the following:

- Installation of a gas control system to control subsurface gas migration.
- Installation of a landfill leachate collection and treatment system to control the accumulation and migration of landfill leachate off-Site.
- Placement of an impermeable clay cap on the eastern and northern slopes of the landfill (approximately 29 acres).
- Installation of additional monitoring wells.

EPA issued a Record of Decision (ROD) on March 17, 1988. The remedial action objectives (RAOs) identified in the ROD were:

- To prevent, to the extent feasible, future contaminant migration from the landfill;
- To control the source of the contamination, i.e., the landfill;
- To prevent further expansion of the offsite groundwater plume of contamination; and
- To remediate the plume to ARARs, New York State Groundwater Standards and Drinking Water Guidelines.

The major components of the ROD include:

- Design, construct and operate a groundwater collection and treatment facility to recover and remediate the contaminated groundwater plume associated with the landfill;
- Design and construct a cap for the remaining uncapped areas of the landfill, approximately 29 acres of the 68-acre landfill had been capped;
- Continue to operate the leachate treatment facility;
- Continue to operate the landfill gas migration control system; and
- Perform various monitoring to determine the effectiveness and performance of each of the remedial systems components described above.

Status of Implementation

In June 1988, the Town entered into a consent decree with NYSDEC for the implementation of the remedy. Lockwood, Kessler & Bartlett, Inc., (LKB) was selected by the Town to prepare remedial design (RD) plans and specifications for all remedial components. These RDs were approved by the NYSDEC and EPA on various dates from 1989 through 1992. The following describes the remedial action (RA) efforts that were undertaken to implement each remedial component called for in the ROD and the Consent Decree:

Groundwater Collection and Treatment

The groundwater treatment system consists of five recovery wells, with an average depth of 280 feet, delivering a combined maximum design flow of 1.5 million gallons per day (MGD); a treatment plant building, which houses the control room, laboratory, wet wells, pumps, acid rinse system and chemical holding tanks; an air stripper; a recharge basin with diffusion wells; and transmission piping.

In order to verify hydraulic capture and containment of the groundwater plume and to assess the progress of the remediation, a monitoring program was designed and implemented when the groundwater treatment system began continuous operation on April 1, 1992.

On October 1, 2016, following remediation of the VOC plume from the landfill (the landfill-related contaminants of concern (COCs) were no longer detected in the influent), the NYSDEC approved the Town's request to terminate the operation of RW-1 and RW-2 and to continue monitoring Site groundwater, as per the Consent Decree Remedial Action Plan (RAP). In

addition, the Town transferred ownership of the groundwater extraction and treatment system to the NYSDEC for the continued remediation of the Claremont Polychemical Superfund Site's VOC plume, as a portion of the Claremont Polychemical plume was being captured by three other recovery wells.

Landfill Capping

As discussed previously, prior to the development of the final Consent Decree and the issuance of the ROD, 29 acres of the total 68 acres of the landfill had already been capped. The remaining portion, 39 acres, was capped under the provisions of the final Consent Decree and the ROD.

Landfill Leachate Collection and Treatment

A leachate collection and treatment system has been operating at the landfill since September 1983. The system is designed to collect, store, treat and dispose of leachate generated by the landfill. Collection wells and an under drain system have been installed over the 12-acre, lined portion of the landfill. The treated effluent is discharged into the Nassau County sewage treatment system, in accordance with the requirements of the State Pollution Discharge Elimination System (SPDES) and Nassau County ordinances.

Landfill Gas Collection and Treatment

Since 1982, the Town has implemented programs to prevent off-site migration of landfill gas at the Site. A perimeter landfill gas-collection system is installed and consists of 33 gas-recovery wells, 6,500 feet of collection header, and three condensate collection wells. Under the terms of the ROD and the Consent Decree, the Town is required to operate and maintain the gas control system in compliance with the requirements of 6 NYCRR Part 360 at the OBSWDC property boundary.

Institutional Controls Implementation

Table 1: Summary of Planned and/or Implemented Institutional Controls

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Document	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Landfill	Yes	No	OBL	Establishing institutional controls in the form of deed restrictions on future uses of the landfill.	Environmental Easement/Restrictive Covenants were placed on the real property on June 30, 2017.
Groundwater	Yes	No		Restrict future groundwater use at the Site.	ICs in the form of existing state and local regulations restrict future groundwater use at the Site. Specifically, the NYSDOH State Sanitary Code regulates and prevents the installation of wells at a hazardous waste site in the state.

Note: The ROD did not require ICs, however, ICs are required under 6NYCRR Part 360 and were filed at the Office of the County Clerk on June 30, 2017.

Systems Operations/Operation & Maintenance

The groundwater remediation system began operating on April 1, 1992. A system of five recovery wells, designated RW-1 through RW-5, was installed at the leading edge of the VOC plume associated with the landfill. On October 1, 2016, following remediation of the VOC plume from the landfill (the landfill-related COCs were no longer detected in the influent), the NYSDEC approved the Town request to terminate the operation of RW-1 and RW-2 and to continue monitoring the Site groundwater as per the Consent Decree RAP. In addition, the Town transferred ownership of the groundwater extraction and treatment system to the NYSDEC for the continued remediation of the Claremont Polychemical Superfund Site's downgradient VOC plume.

Based on the decision to shut down the OBL groundwater recovery wells RW-1 and RW-2, the OM&M plan was revised to begin attainment monitoring. The revised monitoring program consists of groundwater monitoring at the following wells: LF1, LF2, MW-5B, MW-6A, MW-6B, MW-6C, MW-6E, MW-6F, MW-8A, MW-8B, MW-9B, MW-9C, OBS-1. This revised sampling program is in effect and will be used to confirm attainment of groundwater restoration, RAOs and associated cleanup levels.

Soil gas quality and ambient air-quality monitoring are being conducted in the vicinity of the landfill on a quarterly basis to measure compliance with established ambient air-quality guidelines. Additionally, the Town submits an annual engineering report prepared by its contractor for the purpose of summarizing the status of all landfill gas monitoring programs. The reports document the effectiveness of the methane gas-collection system for controlling gas migration beyond the boundary of the landfill. The frequency of monitoring perimeter gas wells, and on-site buildings and structures for methane was reduced from quarterly to annually, effective the second quarter of 2016. In addition, landfill leachate is monitored semiannually for metals, sulfites, and total suspended solids.

Climate Change

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

III. PROGRESS SINCE THE LAST REVIEW

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

Table 2: Protectiveness Determinations/Statements from the 2017 FYR

OU #	Protectiveness Determination	Protectiveness Statement
OU1	Protective	The implemented remedy for the Old Bethpage Landfill Superfund Site protects human health and the environment.

There were no issues or recommendations identified in the 2017 FYR.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On Friday, August 6, 2021, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at Superfund sites in New York and New Jersey, Puerto Rico and the U.S. Virgin Islands, including the OBL Site. The announcement can be found at the following web address: <https://www.epa.gov/superfund/R2-fiveyearreviews>.

In addition to this notification, the EPA CIC for the site, Shereen Kandil, posted a public notice on the EPA site webpage <https://www.epa.gov/superfund/old-bethpage-landfill> and provided the notice to the town by email on Thursday, February 10, 2022 with a request that the notice be posted in municipal offices and on the town webpage. This notice indicated that a FYR would be

conducted at the OBL Site to ensure that the cleanup at the Site continues to be protective of human health and the environment. Once the FYR is completed, the results will be made available on the following website: <https://www.epa.gov/superfund/old-bethpage-landfill>. Efforts will be made to reach out to local public officials to inform them of the results.

Data Review

The OBL Site is located in a partly commercial/industrial area and at least three other known sources of groundwater contamination are located nearby to the south and east of the landfill (See Figure 2). The Nassau County Firemen's Training Center (FTC), a New York State Inactive Hazardous Waste Site, is located approximately 500 feet south of the OBL Site. The Claremont Polychemical Superfund Site, which has a documented history of VOC contamination, is located immediately east of the landfill across Winding Road. Another NYSDEC Superfund site with similar VOC contamination is the Former Aluminum Louvre located approximately 750 feet north (upgradient) of the Claremont Polychemical Site.

Review of sampling data through 2015 confirmed that recovery wells RW-1 and RW-2 were no longer necessary as inlet sampling consistently detected no OBL-related COCs. On October 1, 2016, these recovery wells were shut off, and the remaining recovery wells continued operating to address groundwater contamination from a neighboring site (**Figure 2**). The Town has developed a revised monitoring program after the shutdown of RW-1 and RW-2. This monitoring includes sampling 13 monitoring wells semiannually for the RAP parameters and reporting.

During the most recent groundwater sampling event in May 2021, detectable concentrations of VOCs were identified in 5 of the 13 groundwater monitoring wells, down from 9 of the 13 monitoring wells sampled in October 2020. VOCs were detected at concentrations above Class GA groundwater standards and guidance values at wells LF-2, MW-6B and MW-8A as follows:

- 1,4-dichlorobenzene was detected at LF-2 and MW-6B at concentrations of 3.1 µg/l and 4.9 µg/l, respectively, above the Class GA standard of 3 µg/l.
- Benzene was detected at LF-2 and MW-6B at concentrations of 4.5 µg/l and 5.7 µg/l, respectively, above the Class GA standard of 1 µg/l.
- Chlorobenzene was detected at MW-6B at 13.4 µg/l, above the Class GA standard of 5 µg/l.
- Cis-1,2-dichloroethylene (1,2-DCE) was detected at MW-8A at 21.9 µg/l, above the Class GA standard of 5 µg/l.
- Isopropylbenzene was detected at LF-2 at 9 µg/l, above the Class GA standard of 5 µg/l.
- Tetrachloroethylene (PCE) was detected at MW-8A at a concentration of 7.5 µg/l, slightly above the Class GA standard of 5 µg/l.

In general, during the monitoring period (2017 - present), nine monitoring wells (MW-5B, MW-6A (since May 2019), MW-6C, MW-6F, MW-8B, MW-9B, MW-9C, OBS-1 and LF-1)

exhibited a fairly stable trend in total VOCs (TVOCs). Monitoring well MW-6E (since June 2018) has exhibited a decreasing trend. Although monitoring wells MW-6B, MW-8A and LF-2 have shown a more apparent increasing trend in TVOCs, concentrations of individual VOCs remain relatively low (**Figure 3**). Continued monitoring will indicate if there is a sustained upward trend.

Inorganic parameters including iron, manganese and sodium were detected above groundwater standards in both total and dissolved samples, as described below:

- Total iron was detected above the Class GA groundwater standard of 300 µg/l in 5 of the 13 groundwater monitoring wells, with concentrations ranging from 5,250 µg/l at MW-6E to a maximum of 19,900 µg/l at LF-1. For samples collected from LF-1, LF-2, MW-6B, MW-6C and MW-6E, dissolved iron concentrations were similar to their respective total concentrations.
- Total manganese was detected above the Class GA groundwater standard of 300 µg/l in 7 of the 13 groundwater monitoring wells, with concentrations ranging from 328 µg/l at MW-6E to a maximum of 3,110 µg/l at MW-8B. Dissolved manganese concentrations were similar to their respective total concentrations.
- Total sodium was detected above the Class GA groundwater standard of 20,000 µg/l in 12 of the 13 groundwater monitoring wells, with concentrations ranging from 41,500 µg/l at MW-9B to a maximum of 466,000 µg/l at LF-2. In general, dissolved sodium concentrations were similar to their respective total concentrations.

In general, iron, manganese and sodium exhibited either a decreasing or flat trend in all or nearly all of the wells (**Figure 4**). Leachate indicator parameters including chloride, ammonia and total phenols were detected above groundwater standards in the collected samples, as follows:

- Chloride was detected above the Class GA groundwater standard of 250 mg/l in 5 of the 13 groundwater monitoring wells, with concentrations ranging from 256 mg/l at MW-6B to a maximum of 533 mg/l at LF-2.
- Ammonia was detected above the Class GA groundwater standard of 2 mg/l in 7 of the 13 groundwater monitoring wells, with concentrations ranging from 2.1 mg/l at MW-9C to a maximum of 190 mg/l at MW-6B.
- Total phenols were detected above the Class GA groundwater standard of 0.001 mg/l in 1 of the 13 groundwater monitoring wells, with a concentration of 0.006 mg/l at LF-2.

In general, these leachate indicators exhibited either a decreasing or relatively flat trend in the majority of the wells (**Figure 5**).

Although recovery wells RW-1 and RW-2 were shutdown due to a lack of landfill-related COCs detected in the influent, RWs 3-5 continue to operate. Groundwater flow is generally towards the southeast, east from the landfill towards the recovery wells RW-3, RW-4 and RW-5. Therefore, COCs that may travel from the landfill are likely captured by the combined capture

zone of recovery wells RW-3, RW-4 and RW-5. This is confirmed in a 2019 Remedial System Optimization Evaluation for the adjacent Claremont Superfund site that includes a regional groundwater contour map of the Upper Magothy showing groundwater flow from the landfill towards the recovery wells.

Emerging contaminant screening for 1,4-dioxane, perfluorooctanoic acid (PFOA), and perfluorooctanesulfonic acid (PFOS) was conducted in 2017. A regional groundwater emerging contaminant screening was performed by NYSDEC and its contractor as part of the nearby Claremont Polychemical sampling program. This effort provided the data with respect to detecting emerging contaminants in OBL monitoring wells, as well as the other sites identified above.

In 2020, New York State adopted new drinking water standards which set MCLs of 10 parts per trillion or $\eta\text{g/L}$ for PFOA, 10 $\eta\text{g/L}$ for PFOS, and 1 $\mu\text{g/L}$ for 1,4-dioxane.

The groundwater sampling results collected at Old Bethpage Landfill's monitoring wells (LF-1, LF-2, LF-3) indicated that 1,4-dioxane measurements were above (LF-1: 20 $\mu\text{g/L}$, LF-2: 390 $\mu\text{g/L}$, and LF-3: 3.3 $\mu\text{g/L}$) the NYS drinking water standard of 1 $\mu\text{g/L}$. PFOA and PFOS were detected above the NYS drinking water standard of 10 $\eta\text{g/L}$ at LF-1, LF-2, and LF-3: maximum detected PFOA concentrations were 56.6 $\eta\text{g/L}$ (LF-1), 320 $\eta\text{g/L}$ (LF-2), and 38.6 $\eta\text{g/L}$ (LF-3); and maximum detected PFOS concentrations were 22.6 $\eta\text{g/L}$ (LF-1), 143 $\eta\text{g/L}$ (LF-2), and 41.5 $\eta\text{g/L}$ (LF-3). The Town is conducting additional sampling to determine the source of emerging contaminants and verifying if the impacted wells are located within the landfill leachate collection system. The results and evaluation of this sampling will be discussed in the next FYR.

The Town operates the perimeter landfill gas (LFG) collection system and maintains a zero percent LFG migration line at the OBL site boundary, as documented by the February 2019 zero-percent LFG migration survey. The Town monitors the perimeter LFG collection system exhaust weekly for methane, and the results continue to indicate that minor emissions are not a concern.

Site Inspection

A Site inspection was conducted on May 11, 2022. The following parties were in attendance:

Maria Jon, EPA RPM
Stephanie Kim, EPA Risk Assessor
Paul Zarella, EPA Hydrologist
Jared Donaldson, NYSDEC
Francesca King, NYSDEC Region 1
Renata Ockerby, NYSDOH
Richard Lenz, Town of Oyster Bay, Commissioner DPW
Matthew Russo, Town of Oyster Bay

Daniel Pearl, Town of Oyster Bay
Gary Terrell, Town of Oyster Bay
Terry Heneveld, LKB, Inc.
John Gerlach, LKB, Inc.

Since the completion of the remedial action, the Site conditions have remained relatively stable. The landfill cap is well-maintained and fully operating as designed. The volume of leachate has steadily declined as the waste materials under the cap drained. The OBL is surrounded by a fence with a gated entrance to control access. There has been no evidence of trespassing. The entrance is manned by Town personnel during operating hours, and visitors must sign in. Besides daily on Site activity, fencing and the posting of signs have effectively controlled access to the Site. The monitoring wells installed are functional.

V. TECHNICAL ASSESSMENT

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

The remedy identified in the 1988 ROD consisted of the design, construction and operation of a groundwater collection and treatment facility to recover and remediate the contaminated groundwater plume associated with the OBL site; the design and construction of a cap for the remaining uncapped areas of the OBL; the continuation of operation of the leachate treatment facility and the OBL gas migration control system operation; and various monitoring activities to determine the effectiveness and performance of each of the remedial systems components described above.

The OBL landfill cap is well-maintained and fully operating as designed. Due to improved leachate quality, the Town received permission in 2016 to discharge the untreated leachate directly to the Nassau County sewer system. Monitoring is conducted by the Township twice per year. No issues have arisen that would impact the current discharge agreement.

Effective October 1, 2016, NYSDEC assumed operational control of the groundwater treatment system and recovery wells. Review of the sampling data through 2015 confirmed that Recovery Wells RW-1 and RW-2 were no longer necessary as inlet sampling consistently detected no OBL-related COCs. These recovery wells were shutoff and the remaining wells operated to address groundwater contamination from a neighboring site. The Town has entered a revised monitoring program, which includes sampling 13 monitoring wells semiannually for RAP parameters, and reporting.

Groundwater monitoring data related to landfill impacts (*e.g.*, low concentrations benzene, 1,4-dichlorobenzene, chlorobenzene, select VOCs, metals and leachate parameters) continue to be detected in wells LF-1 and LF-2, located at the downgradient boundary of the landfill, as well as wells MW-6B, MW-6C and MW-6E, located in a cluster further downgradient of the landfill boundary. Groundwater from these wells, however, flows towards the existing recovery well

system. The remaining wells that were sampled continue to exhibit no or only minor landfill-related impacts. With respect to landfill-related VOCs, detections were limited to low concentrations of five aromatic hydrocarbons which included benzene, 1,4-dichlorobenzene, chlorobenzene, isopropylbenzene and total xylenes. One or more of these VOCs were detected in wells LF-2 and MW-6B. Four of these (benzene, 1,4-dichlorobenzene, chlorobenzene, isopropylbenzene), with exception of total xylenes, exceeded their individual Class GA groundwater standard in one or more of these wells. PCE and cis-1,2-DCE were detected in well MW-8A slightly above their respective groundwater standards but are most likely attributed to residual contamination from upgradient sources of groundwater contamination. Monitoring will continue to evaluate these chemicals.

Although some samples exceeded the Class GA Groundwater Standard for iron, manganese, sodium, and select leachate indicators, there was a decreasing or flat trend in all or nearly all of the wells. Sampling of the 13 post-termination monitoring wells will continue in order to determine if there is an upward trend in COCs.

Emerging contaminant screening of the regional groundwater area indicates that emerging contaminants (e.g., 1,4-dioxane, PFOA, and PFOS) have been detected in the groundwater in the vicinity of the landfill. The Data Review section above presents all the current data for 1,4-dioxane and PFAS and PFOA contaminants. The Town is conducting additional sampling to determine the source of emerging contaminants, and the results and evaluation of this sampling will be discussed in the next FYR.

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?

Human Health Risk Assessment

The exposure assumptions, pathways, and receptors that were used to estimate the potential risks and hazards to human health followed the standard risk assessment paradigm in use at the time. As identified in previous FYRs, two complete exposure pathways were identified in the ROD: ambient air exposure and groundwater exposure. The remedial actions that have taken place at the Site have prevented the surrounding populations from potential exposure to contaminants found in the landfill. The exposure assumptions, pathways, and receptors evaluated at the time of the ROD are still valid.

The cleanup levels that were identified in the ROD were based upon the existing standards in place at the time and are still valid. However, some of the standards have been revised to be more stringent. The remediation goals that differ between the 1988 ROD and current NYS Groundwater Water Quality Standards (GWQS) for prevalent groundwater COCs identified at the Site are listed in **Table 3**.

Some of the toxicity values used to calculate the risks and hazards in the 1988 ROD have changed; however, the changes would not impact the remedial decision that was made for the Site.

Vapor intrusion

Although vapor intrusion was not evaluated in the original ROD, vapor intrusion was evaluated as part of the 2002 FYR. The conclusions from that evaluation indicated that, since there were no residences within 100 feet of the groundwater plume, the vapor intrusion pathway was not complete. Currently, there are still no residences within 100 feet of the plume. Thus, the previous and current evaluations indicate that vapor intrusion is not an issue as the vapor intrusion pathway remains incomplete.

Ecological Risks

There were no completed pathways identified for ecological receptors. Based upon a review of the past and current data, the previous conclusion that there are no completed exposure pathways for ecological receptors remains valid.

In summary, the previous FYR indicated that the exposure assumptions, toxicity data, and cleanup levels used at the time of remedy were valid, and they remain valid at this time. The remedial actions objectives used at the time of the remedy selection are still valid and protective of the human health and the environment.

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	
Issues and Recommendations Identified in the Five-Year Review	
OU(s): OU1	Issue Category: Monitoring
	Issue: Wells in the vicinity of the landfill are showing emerging contaminant impacts and it is unclear whether these impacts are from OBL.
	Recommendation: Collect data needed to determine the source of emerging contaminants.

Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	EPA	9/29/2025

OTHER FINDINGS

As stated under Data Review, groundwater sampling during this FYR identified the presence of 1,4-dioxane and PFAS compounds above state criteria at monitoring wells LF-1, LF-2 and LF-3. In addition to further sampling, the Town is also verifying if these wells are located within the landfill leachate collection system, which would indicate that the transport of these chemicals would be impeded through capture by the system. This information, along with additional data collected, will be evaluated in the next FYR period.

VII. PROTECTIVNESS STATEMENT

Protectiveness Statement	
<i>Operable Unit:</i> OU1	<i>Protectiveness Determination:</i> Short-term Protective
<p>The implemented remedy for the Old Bethpage Landfill is protective of human health and the environment in the short term since there are currently no exposures. In order to be protective in the long-term, additional data needs to be collected and evaluated to determine the source of emerging contaminants (e.g., 1,4 dioxane, PFOA, and PFOS). The Town is conducting additional sampling to further evaluate the source of these chemicals, and the results of this sampling will be discussed in the next FYR.</p>	
Sitewide Protectiveness Statement	
<i>Protectiveness Determination:</i> Short-term Protective	Click here to enter a date
<p>The implemented remedy for the Old Bethpage Landfill is protective of human health and the environment in the short term since there are currently no exposures. In order to be protective in the long-term, additional data needs to be collected and evaluated to determine the source of emerging contaminants (e.g., 1,4 dioxane, PFOA, and PFOS). The Town is conducting additional sampling to further evaluate the source of these chemicals, and the results of this sampling will be discussed in the next FYR.</p>	

VIII. NEXT REVIEW

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

TABLES

Table 3. Old Bethpage Landfill Contaminants of Concern

Volatile Organic Compounds (VOCs)	1988 ROD	Current NYS Groundwater Water Quality Standards (GWQS)
	Units (ug/l)	Units (ug/l)
Methylene Chloride	50	5
1, 1-Dichloroethane	50	5
1, 2-Dichloroethane	0.8	0.6
1, 1-Dichloroethene	0.07	5
1, 2-Dichloroethene (trans)	50	5
1,1,1-Trichloroethane	50	5
Chloroform	100	7
1, 2-Dichloropropane	50	1
Tetrachloroethene	0.7	5
Chloroethane	50	5
Benzene	Non-detect	1
Toluene	50	5
Xylene (all isomers)	50	5
Ethylbenzene	50	5
Chlorobenzene	20	5
Dichlorobenzene (ortho and para)	4.7	3
Dichlorobenzene (all isomers)	50	3
<i>Metals</i>	Units (mg/l)	Units (mg/l)
Cadmium	0.01	0.005
Copper	1	0.2
Mercury	0.002	0.0007
Zinc	5	2

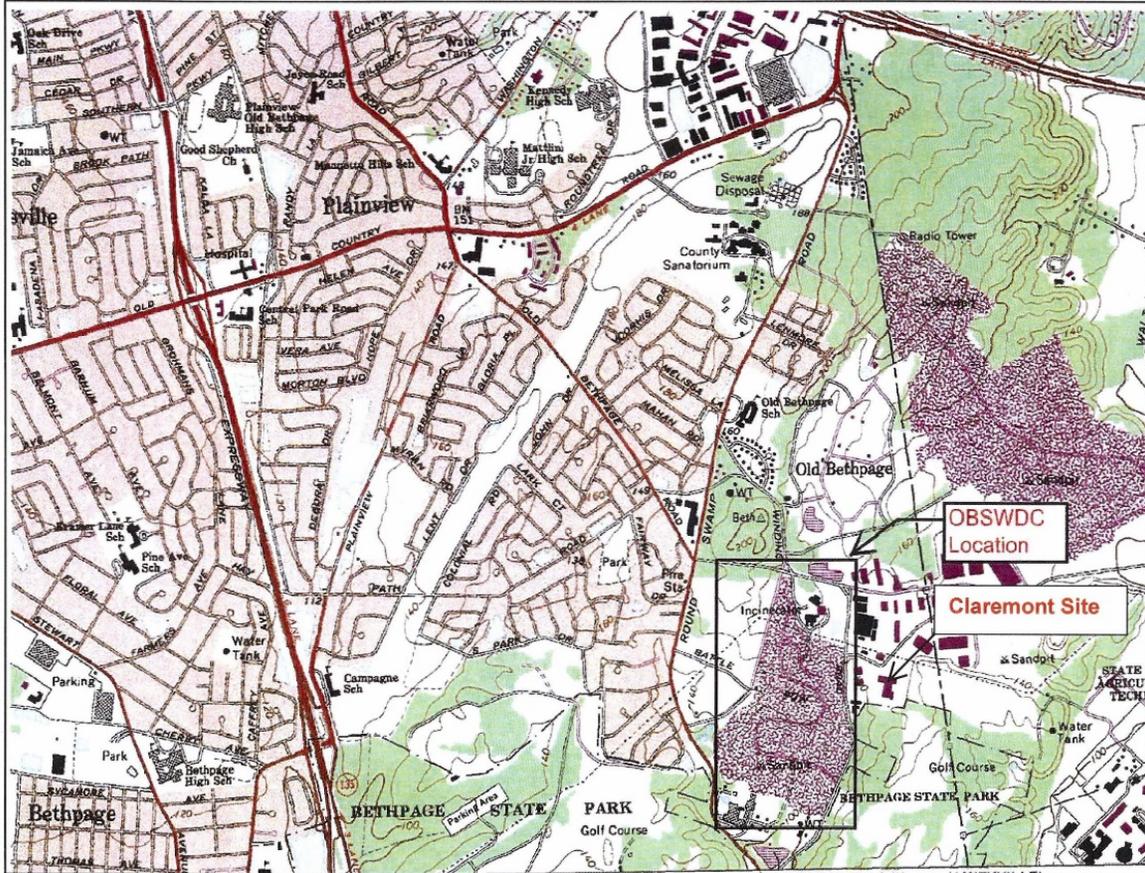
Table 4

Documents, Data, and Information Reviewed

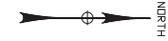
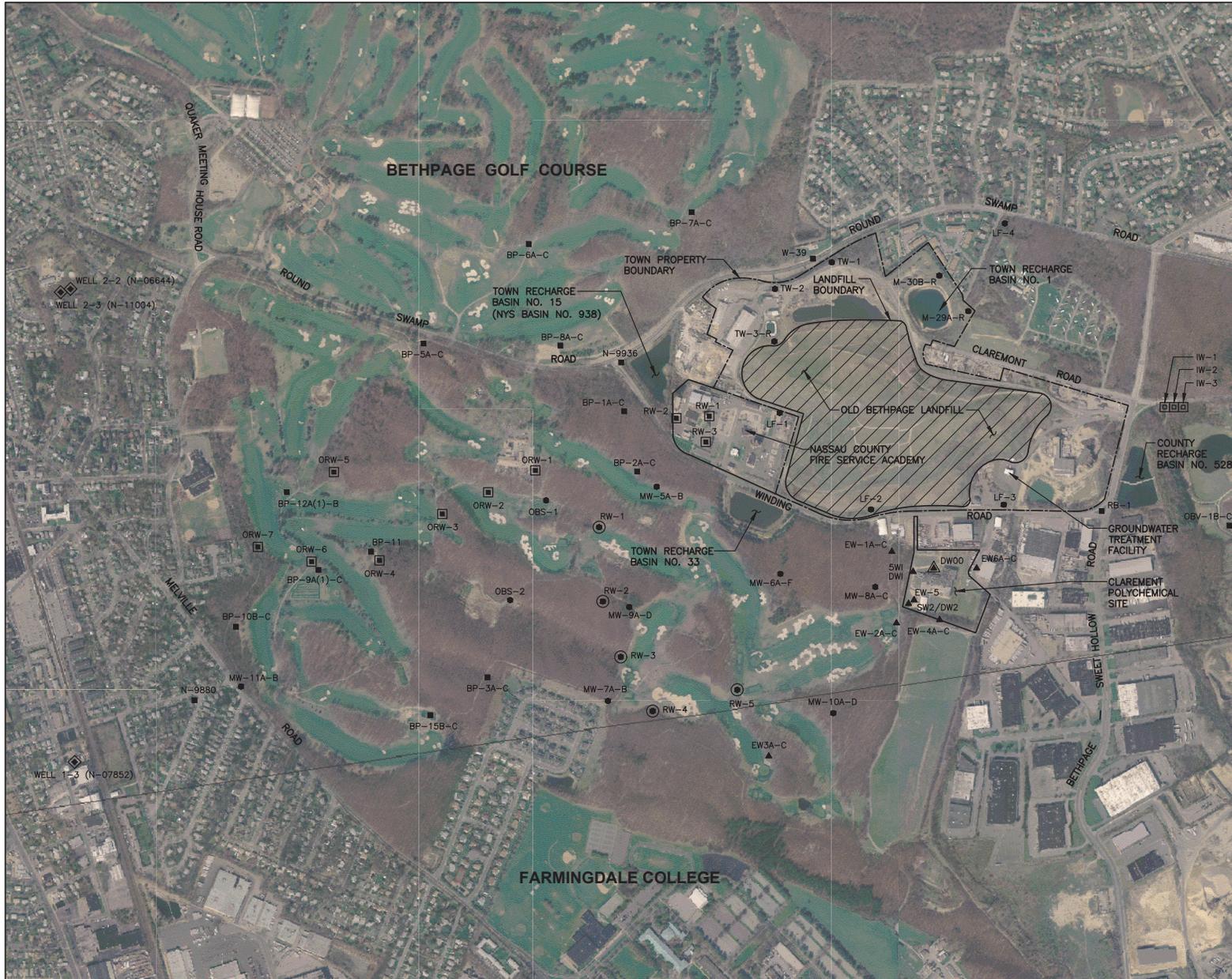
Record of Decision, Old Bethpage Landfill, March 1988
New York State Department of Law Consent Decree, July 1988
EPA Guidance for conducting Five-Year Reviews, June 2001
Old Bethpage Landfill, Fifth Periodic Review Report June 1, 2016 through May 31, 2017, Lockwood, Kessler and Bartlett, June 30, 2017
Old Bethpage Landfill, Second Semiannual Report of 2017, Post-Termination Groundwater Monitoring Program, D&B Engineers and Architects, P.C., Woodbury, New York, November 2017
Old Bethpage Landfill, Sixth Periodic Review Report June 2017 through May 2018, Lockwood, Kessler and Bartlett, June 20, 2018
Old Bethpage Solid Waste Disposal Complex, Summary of Monitoring and Testing Programs 2019 Annual Master Report, RTP Environmental Associates, Inc. 400 Post Avenue, Westbury, New York, September 2019
Old Bethpage Landfill, Post-Termination Groundwater Monitoring Program, First Semiannual Report of 2019, D&B Engineers and Architects, P.C., Woodbury, New York, October 2019
Old Bethpage Landfill Recovery Wells RW-1 and RW-21, Post-Termination Groundwater Monitoring Program, Lockwood, Kessler and Bartlett Inc., 1 Aerial Way Syosset, NY 11791, March 2, 2020
Old Bethpage Landfill, Post-Termination Groundwater Monitoring Program, Second Semiannual Report of 2020, D&B Engineers and Architects, P.C., Woodbury, New York, December 2020
Old Bethpage Landfill, Post-Termination Groundwater Monitoring Program, First Semiannual Report of 2021, D&B Engineers and Architects, P.C., Woodbury, New York, August 2021

FIGURES

Figure 1: Site Location on USGS Quad MAP



Source: Huntington, NY 7.5-Minute Quad



LEGEND:

- TOWN OF OYSTER BAY RECOVERY WELL (RW-1 THROUGH RW-5).
- TOWN OF OYSTER BAY MONITORING WELL OR WELL CLUSTER (AS INDICATED).
- NASSAU COUNTY RECOVERY WELL (RW-1 THROUGH RW-3, OR ORW-1 THROUGH ORW-7).
- NASSAU COUNTY INJECTION WELL (IW-1 THROUGH IW-3).
- NASSAU COUNTY MONITORING WELL OR WELL CLUSTER (AS INDICATED).
- ▲ CLAREMONT POLYCHEMICAL SITE MONITORING WELL (DW 00).
- ▲ CLAREMONT POLYCHEMICAL SITE WELL CLUSTER (AS INDICATED).
- ◇ VILLAGE OF FARMINGDALE SUPPLY WELL (WELLS 1-3, 2-2 AND 3-3).

NOTES:

1. TOWN WELLS LOCATED BY LKB.
2. COUNTY WELLS LOCATED BY NCDPW (ON-SITE FTC MONITORING WELLS NOT SHOWN).
3. CLAREMONT WELLS LOCATED BY USEPA AS PROVIDED ON PLATE 1, CONTAMINANTS DETECTED IN GROUNDWATER AND PROPOSED MONITORING WELL LOCATIONS, EBASCO SERVICES, INC. 1/6/93.
4. AERIAL PHOTOGRAPH DATE: 2004

REV.	DATE	REMARKS	BY

CLIENT
**DEPARTMENT OF PUBLIC WORKS
 TOWN OF OYSTER BAY
 NASSAU COUNTY, N.Y.**



PROJECT TITLE	OLD BETHPAGE SOLID WASTE DISPOSAL COMPLEX OLD BETHPAGE LANDFILL GROUNDWATER REMEDIATION		DESIGN BY	J.G.	PROJECT NO.	2018-1030
DRAWING TITLE	WELL LOCATION MAP		DRAWN BY	E.J.Z.	DRAWING NO.	101
			CHECKED BY	J.G.	DATE	DECEMBER 2019
			SCALE	APPROX. 1"=400'	SHEET NO.	1 OF ...

Figure 3: Total VOCs trends in MW-6 cluster and MWs-5, 8, 9.

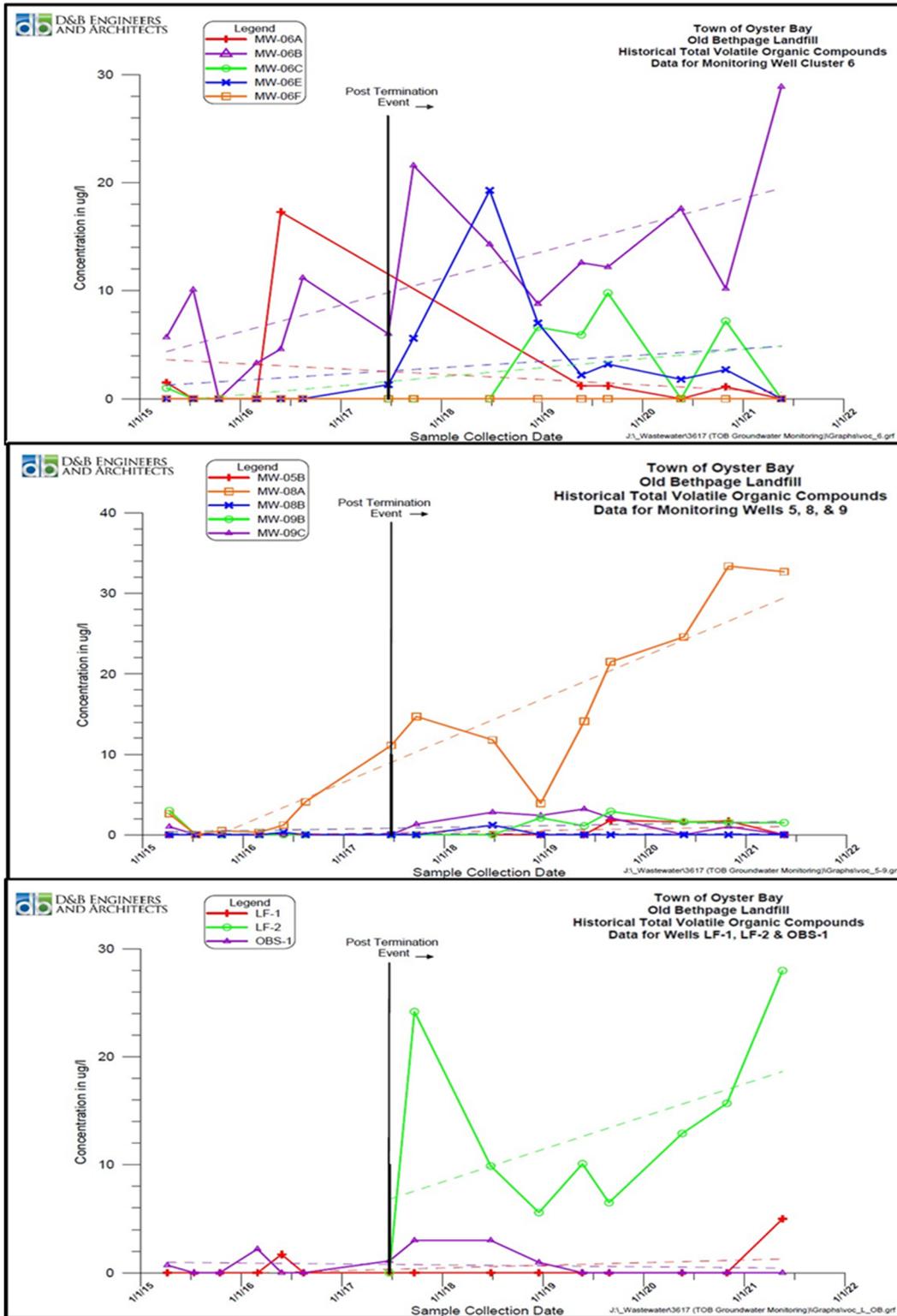


Figure 4: Historic iron trends for site wells.

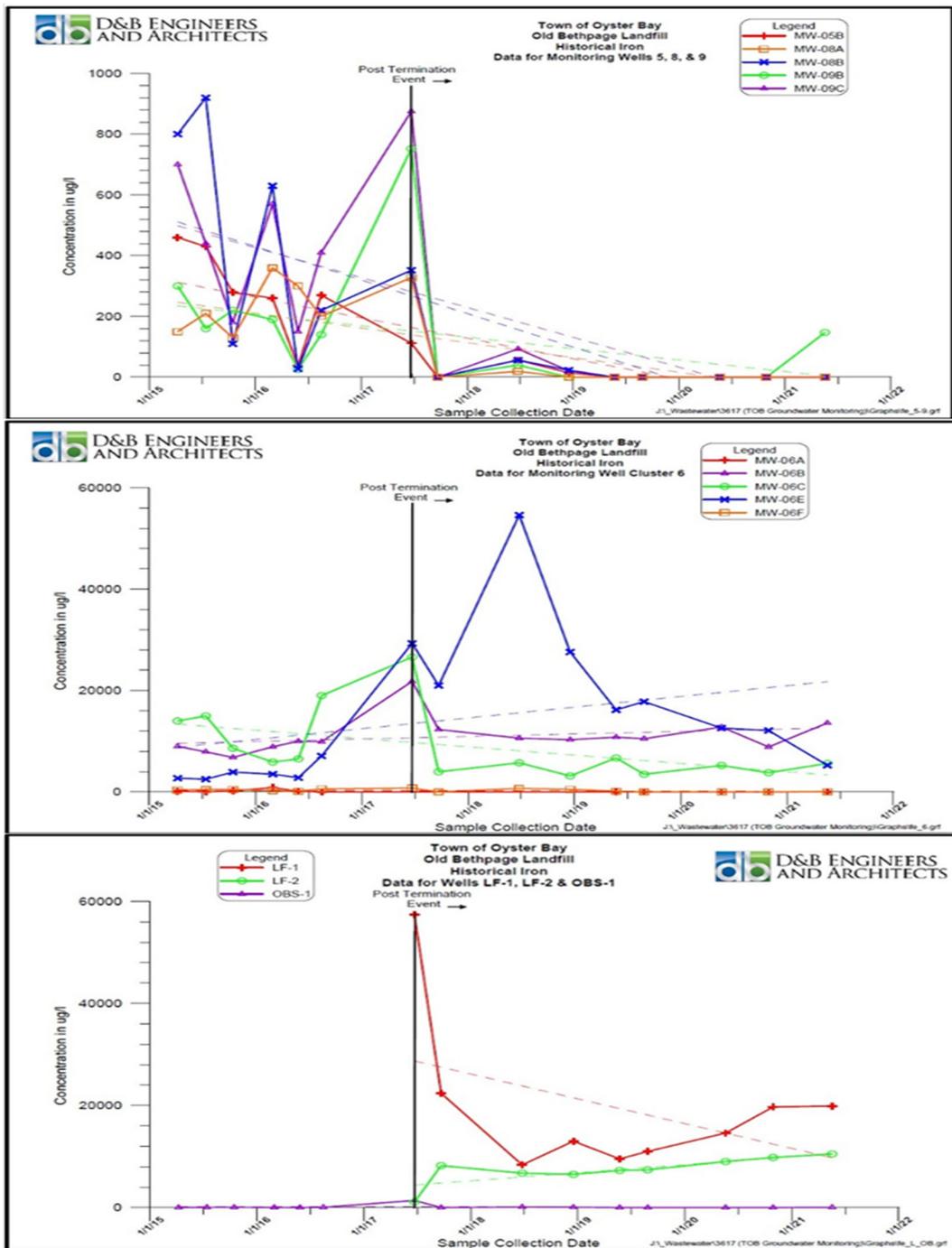


Figure 5: Historic ammonia trends for site wells.

