SIXTH FIVE-YEAR REVIEW REPORT FOR BOG CREEK FARM SUPERFUND SITE MONMOUTH COUNTY, NEW JERSEY

Prepared by

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

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
ICs	Institutional Controls
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
ROD	Record of Decision
RPM	Remedial Project Manager
TBC	To be considered

I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review 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 five-year 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 sixth FYR for the Bog Creek Farm Superfund Site (Site). The triggering action for this policy review is the completion date of the previous FYR. The remedy will not result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unrestricted use and unrestricted exposure (UU/UE); however it is EPA policy to conduct five-year reviews when remedial activities will take longer than five years to meet UU/UE.

The Site is being addressed in two remedial phases or operable units (OUs). Operable Unit One (OU1), based on a Record of Decision (ROD) issued on September 30, 1985 and modified by an Explanation of Significant Differences (ESD) on January 3, 2005, addressed securing the site with fencing, excavation of contaminated soils and sediments followed by incineration and/or off-site disposal. The OU has been completed and does not require long term operation and maintenance. Operable Unit Two (OU2), based on the June 28, 1989 ROD, and a September 29, 2005 ROD Amendment, addresses contaminated groundwater and included construction of a groundwater pump and treat/air sparging system and reinjection trenches for the reinjection of treated groundwater. This FYR will address OU2.

The Site Five-Year Review was led by Tamara Rossi, EPA Region 2 Remedial Project Manager (RPM). Participants included: John Mason (EPA Hydrogeologist), Julie McPherson (EPA Risk Assessor), Charles Nace (EPA Ecological Risk Assessor) and Pat Seppi (EPA Community Involvement Coordinator).

Site Background

The Site is located at 579 Lakewood/Farmingdale Road in Howell Township, New Jersey. The Site consists of a 4-acre disposal area situated on the eastern end of a former 12-acre farm (Block 46: Lot 29), which originally contained a contaminated pond, bog, and trench, plus two-acres of adjoining farmland (Block 46: Lot 28), which is a small piece of a 181-acre tract. Bog Creek Farm was purchased in June 1973 by Western Ranch Corporation, an entity owned by Fred and Margaret Barry. It is believed that the Barry's dumped organic solvents, paint residues, disinfectants, and trash generated from a paint manufacturing operation they owned, in and around trenches excavated on the Site sometime between 1973 and 1974. The waste was deposited on Lot 29, but the contamination migrated to a portion of the adjoining property via the groundwater. The northern portion of Lot 28, which was not found to be contaminated, has been redeveloped by Howell Township into a series of athletic fields. The Site is bounded on the west by County Road 547, on the north by the North Branch of Squankum Brook, a tributary of the Manasquan River, and to the east and south by public athletic fields. Because of this

public use of Lot 28, EPA has installed a fence to prevent trespassers from accidentally entering the Site. (Figure 1 Site Location Map).

The Site lies in a rural agricultural and recreational area and is approximately three miles south of Farmingdale, five miles north of Lakewood and 12 miles west of the Atlantic coast. Farms which raise horses, nursery stock, vegetables, grain, sod, and flowers are situated here. Allaire State Park is 1/2- mile east of the Site and is used by golfers, fishermen, hunters, and equestrians. The Site is bounded by a chain-link fence on three sides that ties into the North Branch of Squankum Brook which is the physical boundary to the north.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Bog Creek Farm		
EPA ID: NJDO63157150		
Region: 2	**State:** NJ	**City/County:** Howell Township/Monmouth County
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA ***[If "Other Federal Agency", enter Agency name]*:**		
Author name (Federal or State Project Manager): Tamara Rossi		
Author affiliation: EPA		
Review period: 4/1/2021 – 12/1/2021		
Date of site inspection: 8/4/2021		
Type of review: Policy		
Review number: 6		
Triggering action date: 3/27/2017		
Due date *(five years after triggering action date)*: 3/27/2022		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

Bog Creek Farm was proposed for addition to the National Priorities List (NPL) of Superfund sites in December 1982. After a public comment period, the status of the Site on the NPL was changed to final in September 1983. EPA began a Remedial Investigation and Feasibility Study (RI/FS) in 1984 to determine the nature and extent of contamination at Bog Creek Farm. This study determined that the greatest hazard at the Site was the soil near the waste trench, which was highly contaminated with volatile organic compounds (VOCs). In addition, unacceptable levels of contamination and potential exposure were identified in the bog and an on-site pond.

Based on 2003 groundwater sampling results, Site groundwater was found to be significantly contaminated with a variety of VOCs, including chlorinated VOCs and petroleum hydrocarbon contaminants. In particular, the following compounds and maximum concentrations were detected: 1,2-dichloroethane 30,000 micrograms per liter (µg/L), vinyl chloride 590 µg/L, benzene 8,800 µg/L, trichloroethene (TCE) 520 µg/L, cis-1,2-dichloroethane (DCE) 8,300 µg/L, l,2,4 trimethylbenzene 1,600 µg/L, toluene 5,800 µg/L, tetrachloroethene (PCE) 590 µg/L, l, l,2-trichloroethane 640 µg/l, l, l, l-trichloroethane 260 µg/L, 2,4-methylphenol 3,900 µg/L, phenol 1900 µg/L, and lead 25 µg/L. The 2005 screening level ecological risk assessment determined that contaminated sediments and surface water may have an impact on aquatic biota in the North Branch of Squankum Brook due to the presence of 1,2-dichlorobenzene in the sediment and barium in the surface water.

Response Actions

Initial Response

Prior to 1974, no removal or enforcement actions were undertaken at the Site. Neighbors' complaints of odors emitting from the Site drew the attention of the Howell Township Health Department and, later, the New Jersey Department of Environmental Protection (NJDEP). Late in 1974, the property owner removed some waste from the disposal trenches, transported the waste to KinBuc landfill in Edison, New Jersey and backfilled the pits with soil under the direction of the Howell Township Health Department. Over the next several years, the Howell Township Health Department and the NJDEP monitored the Site.

Selected Remedy

OU1 Remedy Selection

Based on the results of the RI/FS, EPA issued the OU1 ROD on September 30, 1985. The OU1 remedial action objectives are to:

- Control the release of contaminants from the waste disposal area; and,
- Reduce the adverse public health and environmental impacts associated with the high levels of contamination at the Site.

The OU1 ROD selected a cleanup level of 10,000 milligrams/kilogram (mg/kg) for total VOCs in the soils. However, the final action level for the excavation was deferred to the remedial design and was established to be 200 mg/kg for total VOCs.

The major components of the remedy selected in the OU1 ROD include the following:

- Remove the waste water and sediments from the pond and the bog;
- Regrade and cover the pond and the bog to prevent re-ponding;
- Treat the waste water on-site and discharge to the stream;
- Excavate the waste deposits and contaminated soil greater than 10,000 mg/kg of total volatile organics;
- Dispose of the excavated materials by incineration at a temporary facility on-site or at an off-site facility in accordance with the Resource Conservation and Recovery Act (RCRA);
- Perform a further analysis of the impact of the residual contaminated soil to determine the appropriate extent of additional soil cleanup;
- Cover the excavated area with a compact soil cap;
- Construct a security fence surrounding the Site and work areas;
- Implement a monitoring program to assess the effectiveness and reliability of the remedial action; and,
- Evaluate soil washing, soil segregation and other innovative technologies for the residual contaminated soil.

The OU1 ROD was modified on January 3, 2005 with an ESD. The OU1 ESD called for the excavation and disposal of contaminated soils that exceeded the New Jersey Impact to Groundwater Soil Cleanup Criteria (NJIGSCC). This ESD resulted in the removal of all contaminated soils with contamination levels above NJIGSCC, and as a result, removed the statutory requirement for FYRs at this OU.

OU2 Remedy Selection

The OU2 ROD for Bog Creek Farm, signed on June 28, 1989 called for two actions:

- Groundwater extraction, treatment, and reinjection to restore the Upper Kirkwood aquifer to cleanup goals identified in the Decision Summary.
- Excavation and incineration of contaminated sediments from the North Branch of Squankum Brook.

In September 2005, EPA issued the OU2 ROD Amendment which called for the optimization of the groundwater treatment plant, additional groundwater recovery wells, and if needed, in-situ treatment of contaminated soils/groundwater, such as soil vapor extraction/air sparging (SVE/AS). The OU2 ROD Amendment remedial action objectives (RAOs) are:

- Prevent exposure to contaminated groundwater;
- Prevent/minimize contaminated groundwater discharge to the North Branch of Squankum Brook;
- Reduce Site cleanup time and life cycle costs; and,
- Restore contaminated groundwater to drinking water standards within a reasonable time-frame.

Status of Implementation

Remedy Implementation OU1

The OU1 remedy was implemented between 1989-1990 with the on-site incineration of 15,000 cubic yards of contaminated material and restoration of the Site with clean fill. The remediated areas were regraded, capped with clean topsoil and reseeded. These actions were intended to remediate the primary source of the groundwater contamination.

While the on-site incinerator was still in operation for OU1, it also treated the contaminated sediments removed from the stream bed of the North Branch of Squankum Brook as required under OU2. The OU1 ROD remedy included limited excavation of contaminated soils and established that if post-remediation monitoring and modeling demonstrate that the remedy is not meeting established goals, then additional excavation would be required.

In May 2003, EPA conducted soil sampling that determined that an estimated additional 21,000 cubic yards of soil may be present with elevated VOC concentrations exceeding the NJIGSCC that could potentially impact the groundwater. The soil contamination remaining at the Site included VOCs at concentrations up to 16,800 mg/kg. Without removal of the remaining soils, the groundwater pump and treatment remedy would be unable to reach cleanup objectives for the groundwater for many decades. A second remedial action resulting in the removal of 14,500 tons of soils was completed in two phases during 2005 and 2006 (Figure 2 Historical Excavation Limits).

Remedy Implementation OU2

The OU2 remedial design (OU2 RD) began on December 5, 1989 and was completed on August 10, 1990. A slurry wall was constructed adjacent to the North Branch of Squankum Brook. The slurry wall was constructed primarily to reduce clean water from the North Branch of Squankum Brook from entering the pump and treatment system and at the same time it would also contain the plume, thus preventing any contaminated groundwater from reaching the North Branch of Squankum Brook until it attains the groundwater cleanup levels established in the OU2 ROD. A groundwater extraction system consisting of 33 well points and a vacuum system was installed inside the slurry wall alignment. The existing aqueous waste treatment system used in OU1 was upgraded and used for the treatment component of the remedy. Finally, two infiltration trenches were constructed up-gradient of the contaminant plume to receive the treated groundwater and thus provide a continuous, closed-loop flushing cycle. The upgraded treatment plant began trial runs in May 1994, and was determined to be fully operational and functional by August 1, 1995. In accordance with the OU2 ROD, the plant was designed to remove certain contaminants known to have migrated into the groundwater, namely four VOCs (benzene, toluene, 1,l,l-trichloroethane, trans-1,2-dichloroethene) and three heavy metals (copper, lead, zinc). While the on-site incinerator was still in operation for OU1, it also treated the contaminated sediments removed from the stream bed of the North Branch of Squankum Brook as required under the OU2 ROD. The plant operated during the long-term response action (LTRA) period and was utilized to treat contaminated groundwater during the contaminated soils remediation.

The 2005 OU2 ROD amendment selected a modified groundwater extraction and ex-situ treatment strategy with wells located across the contaminated portions of the Site, as opposed to only along the slurry wall, in order to both maintain hydraulic control and facilitate contaminant removal via focused

pumping within the directly contaminated areas. In addition, the selected remedy included provisions for the groundwater extraction and treatment to be coupled with additional in-situ treatment enhancements for the groundwater, as necessary based on the monitoring of Site groundwater conditions following the OU1 ESD contaminated soil and source area removal.

Based on pilot testing work completed in February 2008, and the amended OU2 RD completed in July 2008, a new groundwater treatment plant (GWTP) facility was constructed during a 12-month period from July 2009 to July 2010. The extracted groundwater is currently treated on a continuous cycle after which the clean effluent is discharged to the two reinjection trenches which remain intact from the original facility. The GWTP consists of an in-situ treatment using a soil vapor extraction/air sparging (SVE/AS) system with 20 two-phase extraction (TPE) wells and 34 air sparge wells feeding into the system. Compressed air is injected into AS wells to promote in-ground stripping of VOCs for capture by the SVE system and in-situ biological degradation of contaminants. Contaminants in vapor stream are captured in vapor phase granular activated carbon vessels and treated. It is important to note that air sparge wells have been positioned outside the slurry wall in order further diminish any contaminants that still might be impacting the North Branch of Squankum Brook. The startup year ran from July 2010 to July 2011 when the base year of LTRA began.

Institutional Controls (ICs) Summary Table

Table 1: Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Yes	New Jersey Department of Environmental Protection (NJDEP) ID #G000003346	Use restriction provided by Classification Exception Area (CEA). Restricts installation of ground water drinking wells and ground water use.	NJDEP CEA implemented August 6, 2014

Systems Operations/Operation & Maintenance

The operation and maintenance requirements and activities are specified in the Bog Creek Farm August 8, 2011, Contractor's Operation and Maintenance Manual. The manual provides that throughout the groundwater treatment plant's operational duration, there is regular inspection, preventive maintenance, and unscheduled maintenance of all components of the groundwater, extraction, treatment, and discharge systems. A minimum of one Site facility inspection is performed per week, with additional inspections as necessary. During the system operations, the largest problem has been fouling caused by iron that naturally occurs in groundwater in the area. The contractor has taken actions such as variation in treatment processes to optimize performance and pump restoration to enhance efficiency. There have been no reported compliance issues with the NJDEP permit equivalencies at the Site. Transfer of the Site from LTRA to operation and maintenance (O&M) was completed on September 30, 2021, such that the State will be responsible for funding O&M activities, and ensuring performance of the O&M.

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** five-year review as well as the recommendations from the **last** five-year review and the current status of those recommendations.

Table 2: Protectiveness Determinations/Statements from the 2017 FYR

OU #	Protectiveness Determination	Protectiveness Statement
2	Protective	The OU2 remedy is protective of human health and the environment.
Sitewide	Protective	The Site remedy is protective of human health and the environment.

There were no issues or recommendation identified in the last FYR. However, due to COVID related laboratory staffing issues, the laboratory for the December 2020 sampling event was unable to accommodate the modified analysis requirement for a lower reporting limit. The reporting limit for 1,4-dioxane of 2 µg/L was above the NJDEP groundwater quality standard of 0.4 µg/L. For the May 2021 sampling event, the reporting limit for 1,4-dioxane of 0.2 µg/L was below the NJDEP groundwater quality standard of 0.4 µg/L.

IV. FIVE-YEAR REVIEW PROCESS

Community Involvement

On 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, including the Bog Creek Farm Superfund Site. The announcement can be found at the following web address: https://www.epa.gov/superfund/R2-fiveyearreviews. In addition to this notification, efforts were made to reach out to local public officials to inform them of the results. The EPA Community Involvement Coordinator (CIC) for the site, Pat Seppi, arranged for a notice to be posted on the township website, as well as the EPA website, https://www.epa.gov/superfund/bog-creek-farm. This notice indicated that a FYR would be conducted at the Bog Creek Farm Superfund Site to ensure that the site is protective of human health and the environment. Once the FYR is completed, the results will be made available at the following repository: Howell Library at 318 Old Tavern Road, Howell Township, New Jersey 07731. In addition, the final report will be posted on the following website: https://www.epa.gov/superfund/bog-creek-farm.

Document Review

The documents, data, and information which were reviewed in completing this sixth five-year review are summarized in the reference list (Appendix A).

Data Review

Groundwater samples and water levels are monitored in addition to the collection of limited surface water and sediment samples. Soil vapor samples are no longer collected. The frequency of the sampling is varied to address the data objectives of the sampling.

Groundwater Sampling

While most groundwater sampling is conducted on an annual basis, in the event that new monitoring wells are installed, they are initially sampled quarterly. In summary, groundwater data collected during the FYR period indicated that the remedy is progressing towards restoration of groundwater. Historical contaminants of concern (benzene, PCE, TCE, and vinyl chloride) have decreased substantially since 2011. Table 3 presents a historical data comparison of monitoring well groundwater analytical results for benzene, TCE, PCE, and vinyl chloride.

During the most recent monitoring well sampling event in December 2020, benzene, TCE, and vinyl chloride concentrations were found in groundwater exceeding the associated cleanup goals. PCE concentrations were below the cleanup goal in all sampled locations. Some key monitoring well locations include, MW-G, MW-03, MW-23, MW-26 and MW-39.

- MW-G had TCE slightly above the 1 µg/L cleanup goal at a concentrations of 1.4 µg/L and benzene above the 1 µg/L cleanup goal at a concentration of 33 µg/L.
- MW-03 had TCE above the 1 µg/L cleanup goal at a concentrations of 2.4 µg/L.
- MW-23 had benzene above the 1 µg/L cleanup goal at a concentration of 110 µg/L.
- MW-26 had benzene at a concentration of 4.5 µg/L and a total xylenes concentration of 1260 µg/L, above the cleanup goal of 1000 µg/L.

On the downgradient side of the slurry wall adjacent to the North Branch of Squankum Brook, one new monitoring well (MW-42) was installed in March 2019. This well was added to the sampling network and was sampled as part of the scheduled sampling events. It was sampled during the 2019 and 2020 annual events. Notable contaminants of concern (COC) exceedances in this well include 140 µg/L benzene and 18 µg/L vinyl chloride in 2019. In 2020, this well was found to contain benzene and vinyl chloride concentrations of 85 µg/L and 14 µg/L, respectively. Contamination associated with this well is currently being addressed by the newly-installed air sparging wells located along the perimeter of the downgradient side of the slurry wall adjacent to the brook (refer to *Surface Water and Soil Sampling Outside Slurry Wall* below).

Eight of the TPE wells were sampled during the review period. In the most recent sampling event, PCE concentrations were below the 1 µg/L cleanup goal in each of these wells, and TCE was just above the cleanup goal in three of these wells. Benzene exceeded its 1 µg/L cleanup goal in six of the eight sampled TPE wells ranging from 2.1 µg/L to 19 µg/L . Throughout the review period, the maximum observed benzene concentration within these wells was 40 µg/L (TPE-5, 2019).

Within monitoring wells, the concentrations of benzene, PCE, and TCE in groundwater have decreased when compared to historical analytical results. For example, MW-1 had none of these COCs above cleanup goals in 2020, whereas historically these COCs were all present above cleanup goals, including 53 µg/L benzene in 2006. It is expected that the remedial goal of reducing groundwater contaminant concentrations to below the cleanup goals using the GWTP will be achieved over time. Trend graphs for

benzene in the TPE wells are provided in Figure 3. Trend graphs for TCE, PCE, and vinyl chloride in the TPE wells are provided in Figure 4.

Throughout the review period, five metals exceeded their respective cleanup goals. Iron and manganese were the most frequently detected and often had the highest concentrations. Elevated concentrations of iron and manganese in Site groundwater are thought to be naturally occurring, and contribute to well and pump fouling at the Site. Arsenic, chromium, and cobalt were the other metals detected above cleanup goals, with maximum respective concentrations of 35 µg/L (MW-39; 12/2017), 3000 µg/L (MW-E; 11/2016), and 285 µg/L (MW-G; 11/2016). During the 2020 sampling event, concentrations of these COCs were generally lower, with detections of iron, manganese, and cobalt above cleanup goals. The maximum cobalt concentration observed during this event was 32 µg/L, above the cleanup goal but below the New Jersey Groundwater Quality Standard (NJ GWQS) of 100 µg/L.

Pesticides were not detected in groundwater above their respective cleanup goals at any time during this review period.

Emerging Contaminants

As part of the annual long term monitoring, the influent and effluent from the GWTP along with select monitoring wells were sampled for per and polyfluoroalkyl substances (PFAS), 1,4-dioxane and 1,2,3-trichloropropane (TCP) analyses, in addition to the standard tests. Samples were collected in December 2020 and May 2021.

- Across the two sampling events, PFAS were detected at concentrations slightly above NJ GWQS in five of six sampled wells, as wells as GWTP influent and effluent.
  - Perfluorooctanoic acid (PFOA), which has a NJ GWQS of 14 ng/L, was the most prevalent PFAS constituent detected, and was most elevated at MW-38 at a concentration of 71 ng/L. PFOA was detected in effluent at a maximum concentration of 58 ng/L (12/2020).
  - Perfluorooctanesulfonic acid (PFOS) was present above its 13 ng/L NJ GWQS in two wells and GWTP effluent, with a maximum observed concentration of 56.3 ng/L in MW-E (upgradient well).
  - PFOA and PFOS were detected in both upgradient wells (MW-E and MP-4).
  - Perfluorononanoic acid (PFNA) was not present above its 13 ng/L NJ GWQS in any monitoring wells, influent, or effluent.

- Concentrations for 1,4-dioxane were detected at levels slightly above the NJ GWQS in two wells, MW-39 and MW-42, during the current review period. New Jersey has adopted a NJ GWQS of 0.4 µg/L. Results ranged from not detected to 0.81 µg/L (MW-42; 05/2021).

- 1,2,3-TCP was not detected in any of the samples.

Water Level Elevations

Water level elevations were measured on annual, monthly and weekly basis throughout the review period. The annual groundwater sampling event in December 2019 provided the data used to create the potentiometric surface contour map. Monthly measurement of TPE wells monitor groundwater flow direction and gradient. The water level elevations in MW-18, MW-23, and MW-26 are measured weekly and compared to the elevation of the top of the slurry wall. Results are indicative of likely seasonal

effects on groundwater elevations, with typically higher elevations during the winter and spring. Throughout the review period, groundwater elevations at these wells occasionally exceeded the elevation of the top of the slurry wall during this time.

Surface Water and Soil Sampling Outside Slurry Wall

Surface water samples were collected semiannually at two locations in the North Branch of Squankum Brook outside of the slurry wall throughout the review period and analyzed for VOCs. In 2020, no VOC detections were observed at these locations and no VOCs were observed above cleanup levels in surface water during this review period or the previous review period. However, during the previous review period, a small area of VOC impacted soils was detected immediately outside the slurry wall. Further sampling took place in order to characterize impacted soils as well as potential impacts on groundwater and the North Branch of Squankum Brook. Surface water data does not show impacts from the residual source material.

In 2017 and 2018, a direct-push technology (DPT) soil and groundwater investigation delineated the areas outside of the slurry wall where contaminants of concern were present above cleanup goals. Benzene was above the cleanup goal in the majority of DPT groundwater sampling locations. VOCs were detected in the DPT subsurface soil samples above NJIGSCC. Based on this investigation as well as long-term monitoring groundwater data, the original air sparge system consisting of 34 air sparge wells was expanded with 23 air sparge wells on the downgradient side of the slurry wall (Figure 5 - Air Sparge Well Locations). The new air sparge system was fully online in February 2021.

Soil Vapor Samples

The soil vapor extraction (SVE) system was taken off line on June 17, 2015. It was determined that the TPE well screens were submerged by groundwater. The submergence of the well screens prevents the SVE system from being effective. Before the SVE screens were submerged, the total mass of VOCs removed by the SVE system was negligible due to the low levels of contaminants remaining during 2011-2014 period of operations.

Site Inspection

The five-year review Site inspection was held with the five-year review team on 8/4/2021. In attendance were Tamara Rossi and John Mason from EPA Region 2; and Thomas Roche and Neal Kolb from the United States Army Corps of Engineers (USACE). The purpose of the inspection was to assess the protectiveness of the remedy. No issues were found. The plant operators are present on-site five days a week to make sure everything is functioning smoothly and all required testing and sampling is conducted on schedule. Similarly, the USACE is on the Site on a daily or weekly basis, as needed, to arrange the changeout of carbon, dispose of waste sludge, handle all visitors, as well as conduct field activities such as sampling and investigations.

Interviews / Meetings

There have been Site visits, discussions and limited interviews with the town engineers since the Township of Howell has taken over the adjacent properties since some of their activities require joint planning with EPA. No issues were identified resulting from the Site visits, discussions and limited interviews with the township.

V. TECHNICAL ASSESSMENT

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

The OU2 ROD and OU2 ROD Amendment called for extracting, treating, and reinjecting groundwater to restore the Upper Kirkwood Aquifer to cleanup goals and excavating and treating contaminated sediment from the North Branch of Squankum Brook. Data collected over the last five years indicate that the remaining groundwater plume continues to be effectively addressed at the Site: the plume is confined to the shallow aquifer and the slurry wall aligned along the North Branch of Squankum Brook is generally effective at containing the plume and preventing migration to downgradient wells. The plume continues to gradually reduce in size and contaminant concentrations. Downgradient of the slurry wall, residual contamination observed adjacent to the North Branch of Squankum Brook likely pre-dated the construction of the OU2 slurry wall. During this five-year period, 23 air sparging wells were installed to induce VOC aeration downgradient of the slurry wall, thereby addressing this residual contamination. Surface water data does not show impacts from the residual source material. Due to the presence of PFAS in Site groundwater including upgradient monitoring wells, as well as GWTP influent and effluent, it is recommended that analysis for these compounds continues during the next review period with consideration to possible upgradient off-site source(s). Data will continue to be collected across the Site to evaluate the efficacy of new remedy components and confirm that groundwater in this area is not impacting the North Branch of Squankum Brook.

Access to the property and the groundwater is currently restricted and is preventing any unacceptable exposure until final cleanup standards are achieved. The CEA was established by NJDEP on August 6, 2014 to restrict installation of ground water drinking wells and ground water use.

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, cleanup levels and remedial action objectives considered in the decision documents remain valid. The Site is a farmland property located in a rural, agricultural and recreational area with no future use planned for the Site. The established RAOs for OU2 remain valid.

The risk assessment process has changed somewhat since the original risk assessment was performed in 1983 and 1986. In addition, chemical-specific toxicity values have changed since the Site was originally assessed. A streamlined Human Health Risk Assessment conducted in 2005 took into account the changes in toxicity values and exposure assumptions since the original risk assessment was conducted. As discussed above, emerging contaminant sampling identified PFAS compounds in the groundwater, influent and effluent. The EPA Health Advisory (HA) level is 70 nanograms per liter (ng/L) for PFOA and PFOS, individually and combined. NJGWQs for PFOA and PFOS are 14ppt and 13 ppt, respectively. PFOA and PFOS have exceeded the EPA HA or NJGWQS respective screening criteria in either the groundwater monitoring wells including upgradient monitoring wells, and GWTP influent and effluent samples. Multiple COCs continue to exceed their respective drinking water standards, however there is no consumption of Site groundwater and a CEA is in place that prevents the installation of a drinking water well(s).

Soil vapor intrusion was initially evaluated in the 2007 five-year review as a potential future exposure pathway based on the conservative (health protective) assumption that buildings are located above the maximum detected concentration of the contaminants of concern in the groundwater. Current vapor intrusion evaluations include comparison of the maximum detected concentrations to groundwater screening levels identified using the VISL calculator (https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator). The maximum detected concentrations of several contaminants exceeded their respective screening criteria. This does not indicate that a vapor intrusion problem would occur if a building were to be erected over the plume, but merely indicates that further investigation would be necessary, which includes site-specific considerations such as the type of building, the location of the building to the maximum detected concentration, and the subsurface characteristics of the Site. Currently, there are no buildings overlying the affected plume area, with the exception of the pump and treatment facility.

The 2005 screening level ecological risk assessment determined that contaminated sediments and surface water may have an impact on aquatic biota in the North Branch of Squankum Brook due to the presence of 1,2-dichlorobenzene in the sediment and barium in the surface water. The detected contaminants of potential concern however do not pose an ecological risk to piscivorous avian and mammal receptors that utilize the brook. It was noted that the calculated hazard quotient most likely overestimates the direct exposure to 1,2-dichlorobenze since it is highly volatile and only moderately able to adsorb to soil (sediment) making exposure unlikely. For barium, exceedances were noted in only one sample, and there was uncertainty associated with the reference value used for barium as it was based on only one study. However, contaminated sediment was removed to restore the environmental quality of the brook. Residual contamination observed adjacent to the North Branch of Squankum Brook is addressed by 23 air sparging wells downgradient of the slurry wall. Recent surface water and sediment data collected from the North Branch of Squankum Brook do not exhibit concentrations of constituents above screening criteria. Remedial actions taken at the Site (excavation and backfill with clean fill of the Site soils as well as brook sediment and construction of a slurry wall with the groundwater remedy) have resulted in interrupting the exposure pathways for ecological receptors.

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
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
None

VII. PROTECTIVNESS STATEMENT

Protectiveness Statement(s)	
Operable Unit: OU2	*Protectiveness Determination:* Protective
Protectiveness Statement: The OU2 remedy is protective of human health and the environment.	
Sitewide Protectiveness Statement	
Protectiveness Determination: Protective	
Protectiveness Statement: The Site remedy is protective of human health and the environment.	

VIII. NEXT REVIEW

The next five-year review report for the Bog Creek Farm Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

Five-Year Review Report, Bog Creek Superfund Site, EPA, September 1997

Second Five-Year Review Report, Bog Creek Superfund Site, EPA, September 2002

Streamlined Human Health Risk Assessment, Focused Feasibility Study, Bog Creek Farm Superfund Site, Howell Township, NJ, CDM, June 2005

Final Data Summary Report, Focused Feasibility Study, Bog Creek Farm Superfund Site, Howell Township, NJ, CDM, August 2005

Amended OU2 Record of Decision, Bog Creek Farm Superfund Site, Howell, NJ, EPA, September 2005

Final Screening Level Ecological Risk Assessment, Focused Feasibility Study, Bog Creek Farm Superfund Site, Howell Township, NJ, CDM, October 2005

Technical Memorandum, Subsurface Investigation in Support of On-Site Soil Excavation and Removal, Bog Creek, Howell, NJ, REAC, November 2005

Technical Memorandum, Additional Subsurface Investigation in Support of On-Site Remedial Activities, Bog Creek, Howell, NJ, REAC, April 2006

Third Five Year Review Report, Bog Creek Farm Superfund Site, EPA, June 7, 2007

Fourth Five Year Review Report, Bog Creek Farm Superfund Site, EPA, July 2, 2012

LTRA Annual Operations and Maintenance Report for Reporting Period June 2014-April 2015, ECC/USACE, June 2015

LTRA Annual Operations and Maintenance Report for Reporting Period May-November 2015, HGL/USACE, June 2016

Fifth Five Year Review Report, Bog Creek Farm Superfund Site, EPA, March 27, 2017

DPT Investigation Work Plan, HGL/USACE, September 2018

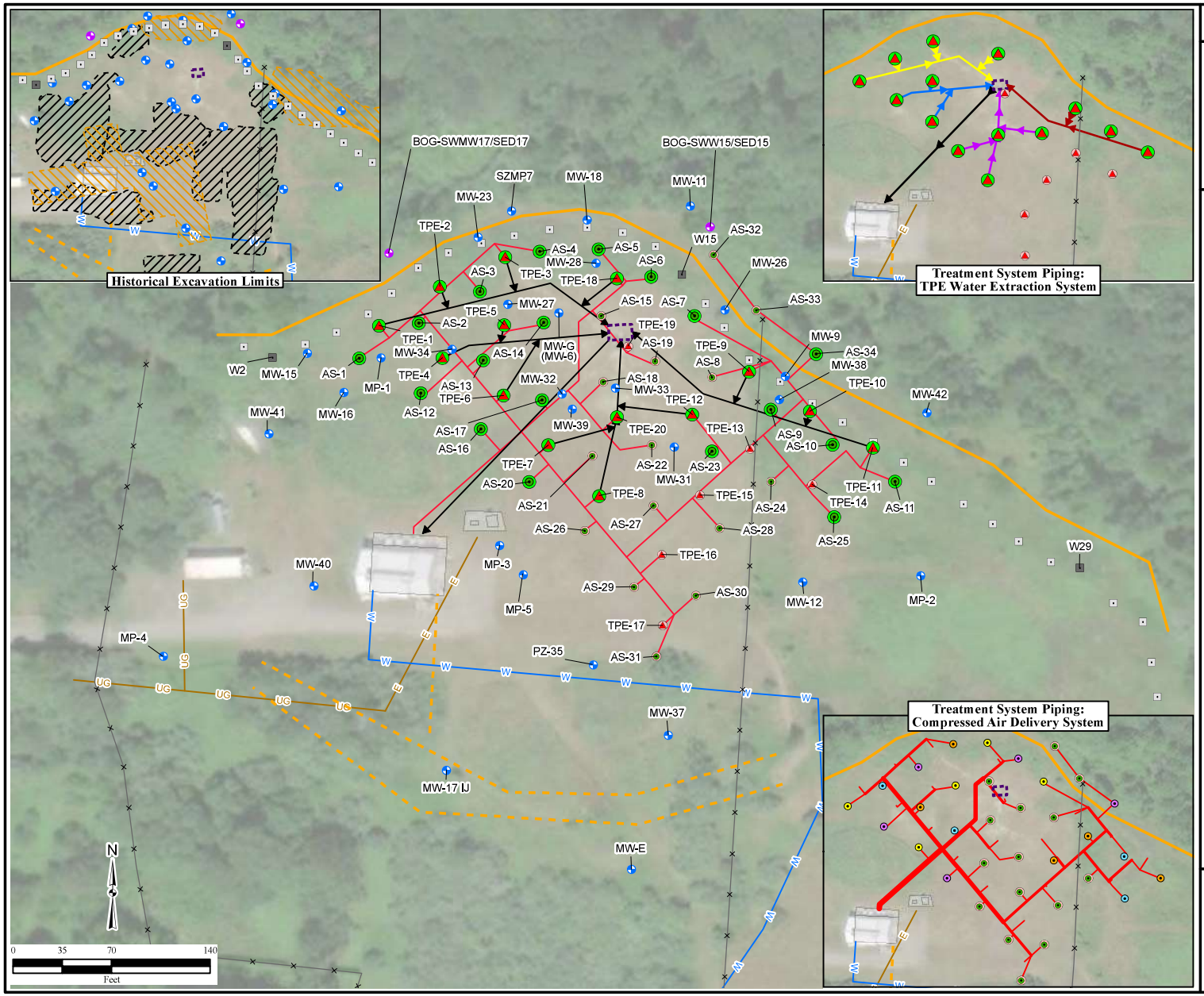
DPT Sampling Memo Report, HGL/USACE, January 2019

LTRA Annual Operations and Maintenance Report for Reporting Period January-December 2019, HGL/USACE, June 2020

Air Sparge Expansion Work Plan, HGL/USACE, November 2020

Emerging Contaminant Data, HGL/USACE, December 2020 and May 2021

LTRA Annual Operations and Maintenance Report for Reporting Period January-December 2020, HGL/USACE, July 2021



HGL—Annual Report
Bog Creek Farm Superfund Site, NJ

Figure 1
Site Layout

Legend

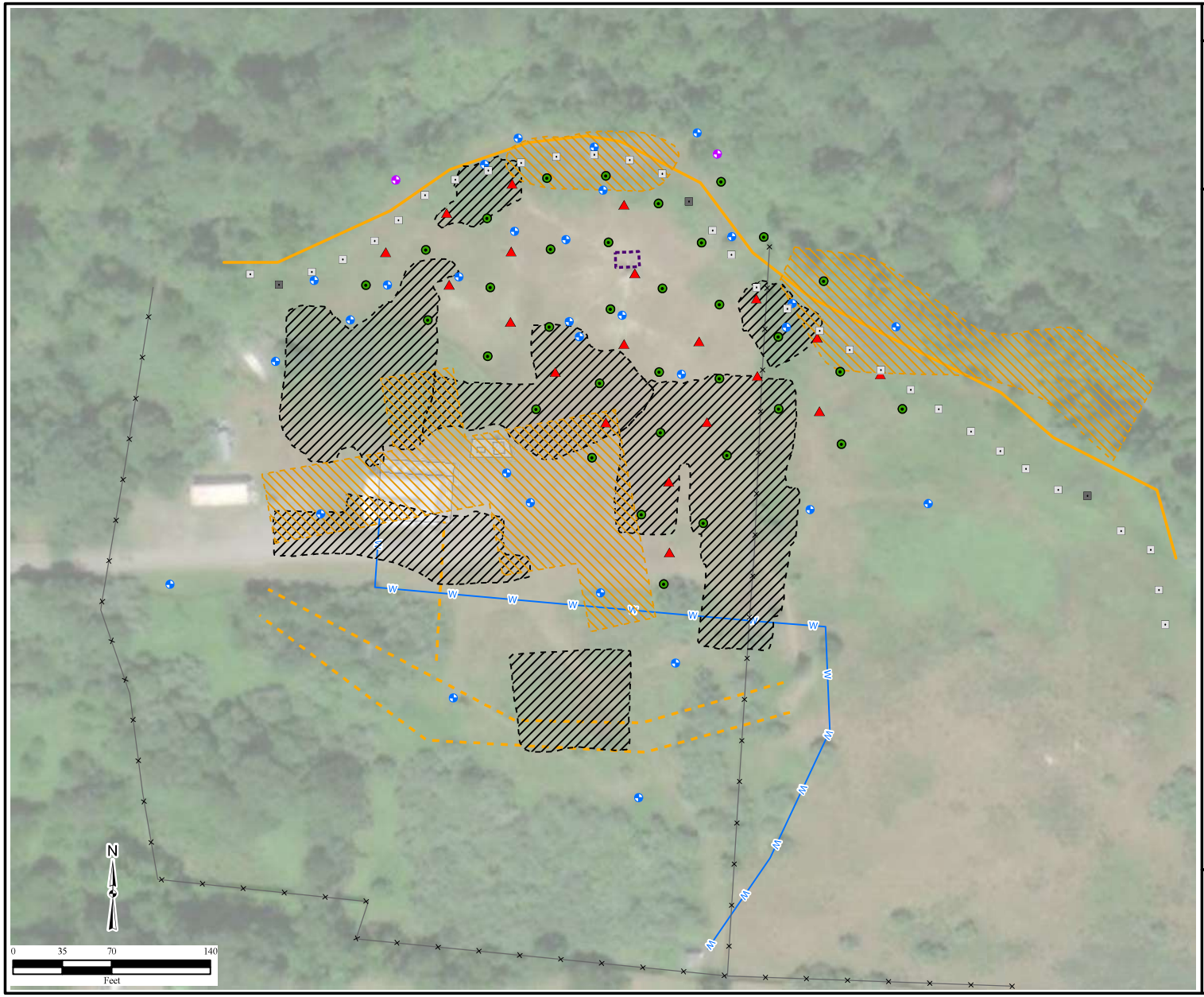
- Air Sparge Well - Active
- Air Sparge Well - Inactive
- Historic Extraction Well
- Historic Extraction Wells - Sampled Annually
- Two Phase Extraction Well - Active
- Two Phase Extraction Well - Inactive
- Monitoring Well/Monitoring Point
- Surface Water/Sediment Sample
- Fence
- Injection Trench
- Underground Extraction Piping
- Potable Water
- Slurry Wall
- Buried Air Feed Lines
- Underground Electric Line
- Underground Utility
- Location of Groundwater Transfer Tank
- Treatment Plant
- Excavated Area (Per June 1989 ROD)
- Excavated Area (Summer 2005/Summer 2006)

Notes:
TPE=two phase extraction

\\srv-gst-01\hglgis\Bog_Creek_MSIW\AnnualReport_2020\(1-02a)Site_Layout.mxd
3/20/2020 TB
Source: HGL, NJGIN, NJDEP, ArcGIS Online Imagery

HGL
HydroGeoLogic, Inc.

Figure 2
Site Map with
Historical Excavation Limits



Legend

- Air Sparge Well
- Historic Extraction Well
- Historic Extraction Wells - Sampled Annually
- Two Phase Extraction Well
- Monitoring Well/Monitoring Point
- Surface Water/Sediment Sample
- Fence
- Injection Trench
- Potable Water
- Slurry Wall
- Location of Groundwater Transfer Tank
- Treatment Plant
- Excavated Area (Per June 1989 ROD)
- Excavated Area (Summer 2005/Summer 2006)

Note:
ROD=record of decision

\\srv-gst-01\hglgis\Bog_Creek_MSIW\AnnualReport_2020\(1-02b)Historic_Excavation.mxd
4/1/2020 TB
Source: HGL, NJGIN, NJDEP, ArcGIS Online Imagery

HGL
HydroGeoLogic, Inc.

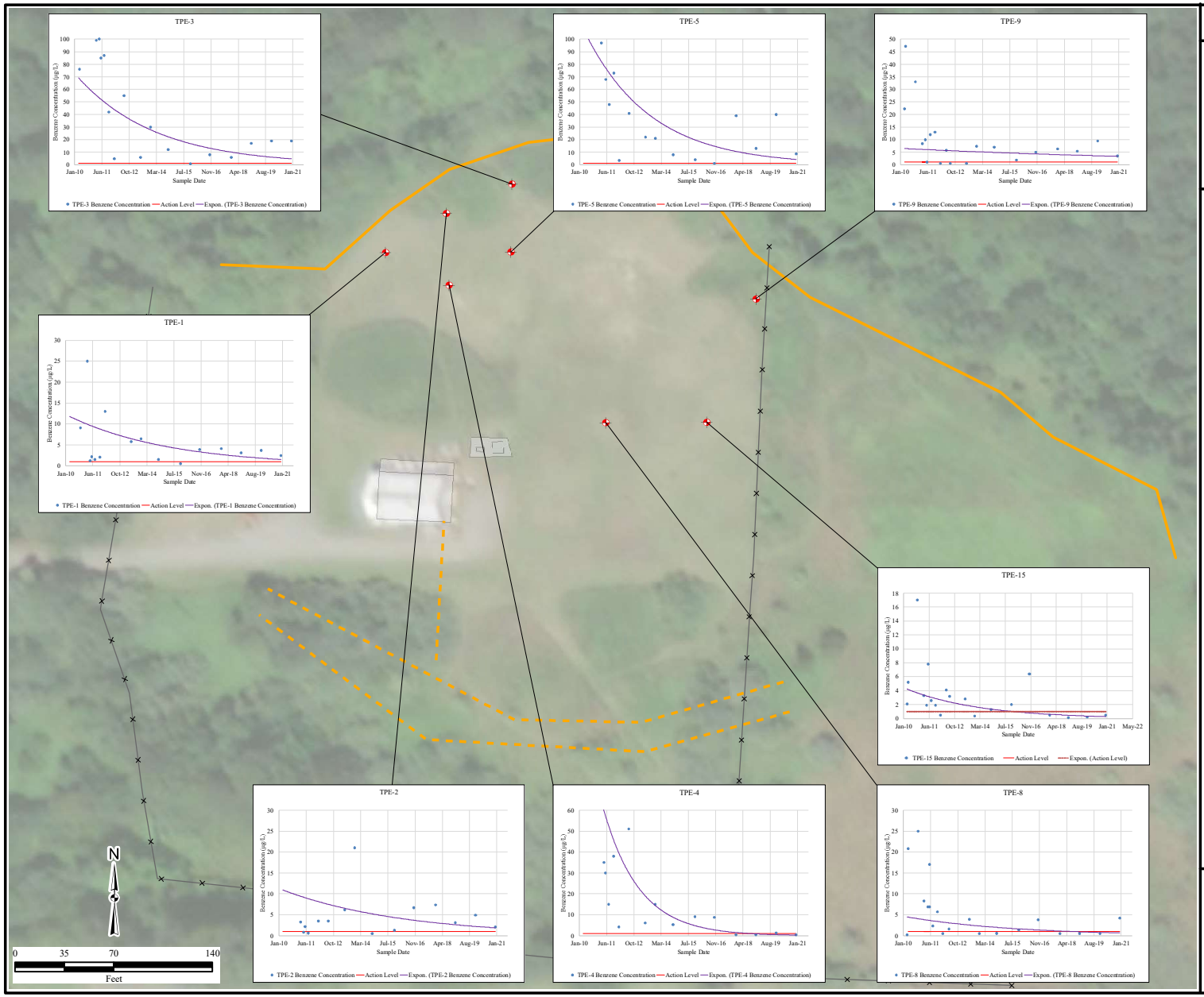


Figure 3
TPE Wells Historical Contaminant Concentrations Benzene

Legend

- Two Phase Extraction Well
- Fence
- Injection Trench
- Slurry Wall
- Treatment Plant

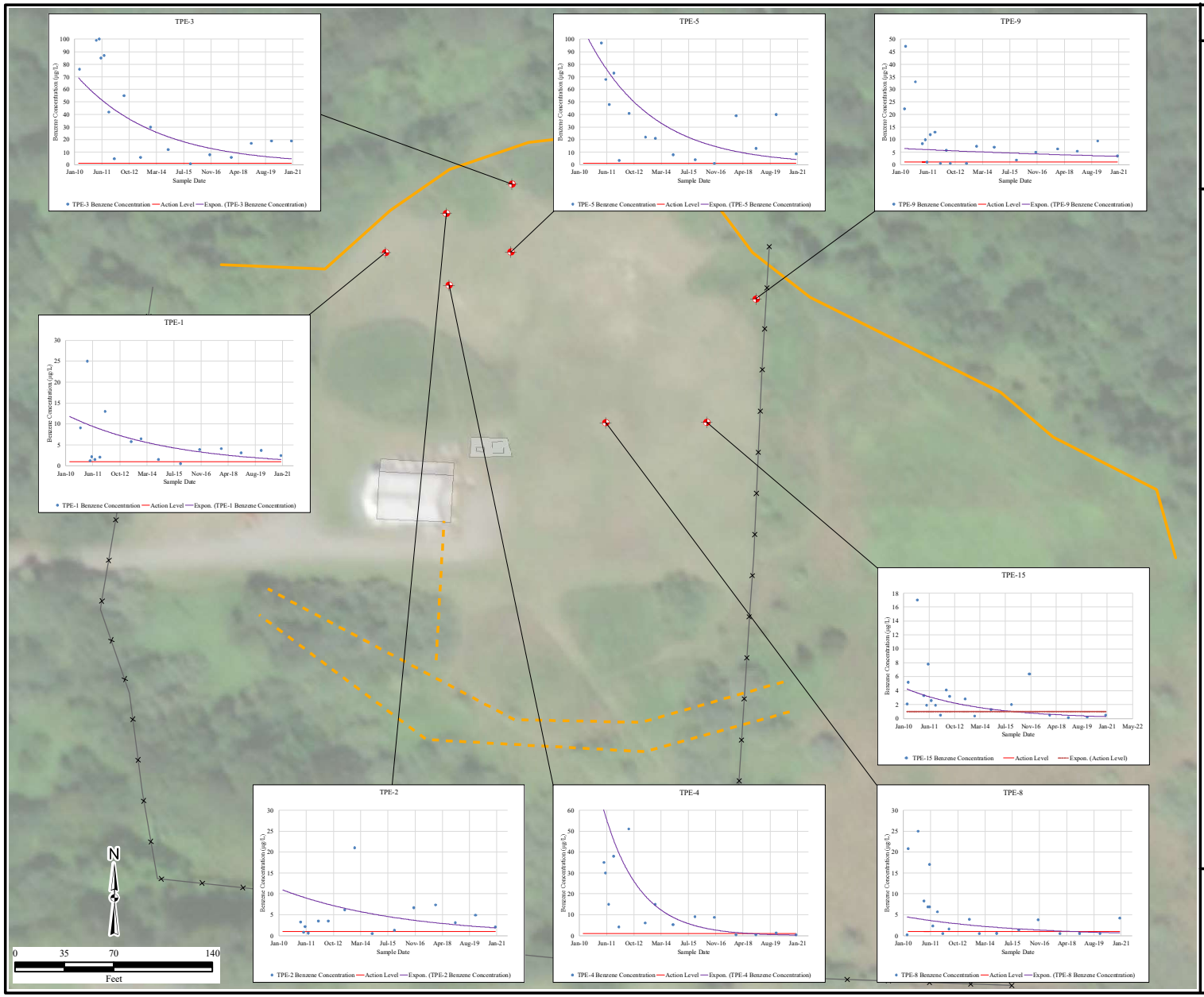
Notes:
Benzene Action Level = 1 µg/L

µg/L=micrograms per liter
TPE=two phase extraction

\\srv-gst-01\HGLGIS\Bog_Creek_K13005_MSIW\AnnualReport_2021\(3-04)TPE_WHCC_Bz.mxd
2/18/2021 TA
Source: HGL, NJGIN, NJDEP, ArcGIS Online Imagery

HydroGeoLogic, Inc.

Figure 4
TPE Wells Historical Contaminant Concentrations
Benzene



Legend

- Two Phase Extraction Well
- Fence
- Injection Trench
- Slurry Wall
- Treatment Plant

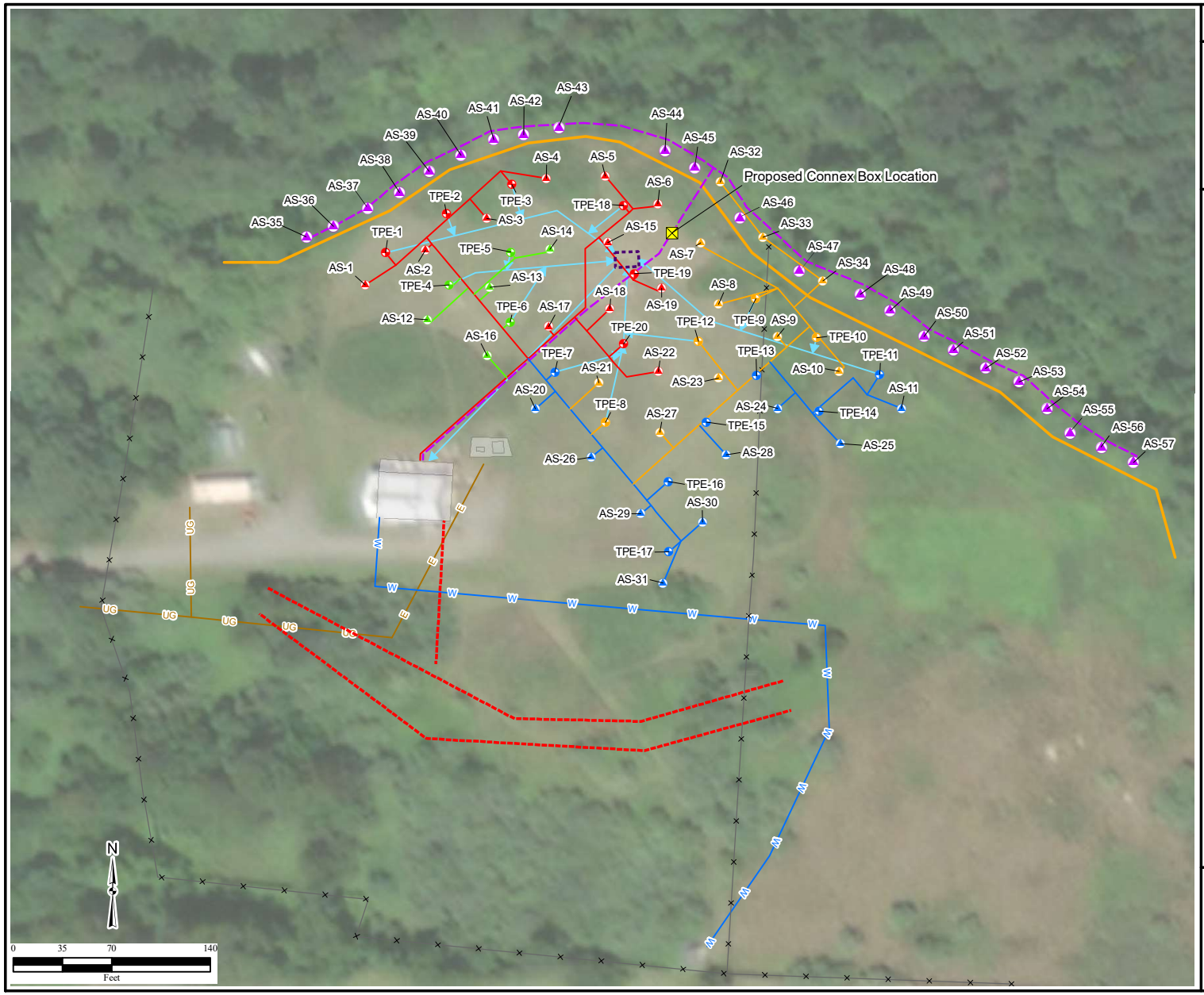
Notes:
Benzene Action Level = 1 µg/L

µg/L=micrograms per liter
TPE=two phase extraction

\\srv-gst-01\HGLGIS\Bog_Creek_K13005_MSIW\AnnualReport_2021\(3-04)TPE_WHCC_Bz.mxd
2/18/2021 TA
Source: HGL, NJGIN, NJDEP, ArcGIS Online Imagery

HydroGeoLogic, Inc.

Figure 5
Air Sparge Well Locations



Legend

- Air Sparge Well
  - Header A
  - Header B
  - Header C
  - Header D
  - CY2020 Staked Air Sparge Location
- TPE Wells
  - Header A
  - Header B
  - Header C
  - Header D
- Treatment System Piping
  - Header A
  - Header B
  - Header C
  - Header D
  - CY2020 Air Sparge Line
- Proposed Connex Box Location
- Fence
- Injection Trench
- Overland Pipeline
- Potable Water
- Slurry Wall
- Underground Electric Line
- Underground Utility
- Overland Groundwater Transfer Tank
- Treatment Plant

\\srv-gst-01\hglgis\Bog_Creek_K13005_Miscellaneous_Figures\(X-X)Air_Sparge_Expansion.mxd
9/29/2020 CNL
Source: HGL, NJGIN, NJDEP, ArcGIS Online Imagery

HydroGeoLogic, Inc

Table 3
TCE, PCE, Vinyl Chloride, and Benzene Historical Groundwater Results Comparison
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Bog Creek Superfund Site

Location (Well)	Sample Date	TCE	PCE	Vinyl Chloride	Benzene	Sample Date	TCE	PCE	Vinyl Chloride	Benzene	Sample Date	TCE	PCE	Vinyl Chloride	Benzene
		µg/L	µg/L	µg/L	µg/L		µg/L	µg/L	µg/L	µg/L		µg/L	µg/L	µg/L	µg/L
Cleanup Goal		**1**	**1**	**5**	**1**		**1**	**1**	**5**	**1**		**1**	**1**	**5**	**1**
SZMP7	Sep-06	---	---	---	---	Nov-11	ND	ND	ND		Nov-12	ND	ND	ND	ND
SZMP8	Sep-06	---	---	---	---	Nov-11	ND	ND	ND	ND	Nov-12	---	---	---	---
MW-G	Sep-06	ND	ND	ND	ND	Nov-11	ND	ND	ND	0.59	Nov-12	ND	ND	**8.7 J**	**45**
W2	Sep-06	---	---	---	---	Nov-11	---	---	---	---	Nov-12	---	---	---	---
W15	Sep-06	**1.0**	**2.7**	**8.9**	**100 J**	Nov-11	---	---	---	---	Nov-12	ND	ND	ND	ND
MP1 (MW-1)	Sep-06	ND	ND	ND	**53**	Nov-11	**2.2**	**1.9**	**2.1**	**3.2**	Nov-12	**5.5**	**4.0**	**1.5 K**	**17**
MP-2	Sep-06	ND	ND	ND	ND	Nov-11	---	---	---	---	Nov-12	---	---	---	---
MP3 (MW-3)	Sep-06	**5.2**	**1.3**	ND	ND	Nov-11	---	---	---	---	Nov-12	---	---	---	---
MW-5	Sep-06	---	---	---	---	Nov-11	ND	ND	ND	ND	Nov-12	---	---	---	---
MW-9	Sep-06	ND	ND	ND	**37**	Nov-11	---	---	---	---	Nov-12	---	---	---	---
MW-12	Sep-06	---	---	---	---	Nov-11	ND	ND	ND	ND	Nov-12	ND	ND	ND	ND
MW-16	Sep-06	---	---	---	---	Nov-11	**8.0**	**10**	**1.2**	**59**	Nov-12	---	---	---	---
MW-18	Sep-06	---	---	---	---	Nov-11	ND	ND	ND	ND	Nov-12	ND	ND	ND	ND
MW-26	Sep-06	---	---	---	---	Nov-11	ND	ND	ND	**1.2**	Nov-12	ND	ND	ND	**3.9**
W29	Sep-06	---	---	---	---	Nov-11	---	---	---	---	Nov-12	---	---	---	---
MW-31	Sep-06	---	---	---	---	Nov-11	ND	ND	ND	ND	Nov-12	**0.56**	ND	ND	ND
MW-37	Sep-06	---	---	---	---	Nov-11	ND	ND	ND	ND	Nov-12	ND	ND	ND	ND
MW-38	Sep-06	---	---	---	---	Nov-11	---	---	---	---	Nov-12	---	---	---	---
MW-39	Sep-06	---	---	---	---	Nov-11	---	---	---	---	Nov-12	---	---	---	---
MW-40	Sep-06	---	---	---	---	Nov-11	---	---	---	---	Nov-12	---	---	---	---
MW-41	Sep-06	---	---	---	---	Nov-11	---	---	---	---	Nov-12	---	---	---	---
MW-23*	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-42**	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Notes:

Bold = Detected Analyte

Bold/Highlighted = Detection Above Cleanup Goal

µg/L = Micrograms per Liter

TCE = Trichloroethene

PCE = tetrachloroethene

*MW-23 added to the annual sampling program in 2015

**MW-42 new monitoring well installed in May 2019

--- = No Data Reported

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		µg/L	µg/L	µg/L	µg/L		µg/L	µg/L	µg/L	µg/L		µg/L	µg/L	µg/L	µg/L
Cleanup Goal		**1**	**1**	**5**	**1**		**1**	**1**	**5**	**1**		**1**	**1**	**5**	**1**
SZMP7	Nov-13	ND	ND	ND	**0.70**	Oct-14	ND	ND	ND	ND	Nov-15	ND	ND	ND	ND
SZMP8	Nov-13	---	---	---	---	Oct-14	---	---	---	---	Nov-15	---	---	---	---
MW-G	Nov-13	**0.14 J**	ND	ND	**11**	Oct-14	**0.59**	ND	**1.2**	**24**	Nov-15	**0.77**	ND	ND	ND
W2	Nov-13	ND	ND	ND	ND	Oct-14	---	---	---	---	Nov-15	ND	ND	ND	**4.0**
W15	Nov-13	ND	ND	ND	**2.3**	Oct-14	ND	ND	ND	**42**	Nov-15	ND	ND	ND	**63**
MP1 (MW-1)	Nov-13	**1.8**	**1.3**	**1.8**	**1.7**	Oct-14	**1.6**	**1.1**	**0.68**	**0.95**	Nov-15	**2.3**	**1.7**	**0.64**	ND
MP-2	Nov-13	---	---	---	---	Oct-14	---	---	---	---	Nov-15	ND	ND	ND	ND
MP3 (MW-3)	Nov-13	---	---	---	---	Oct-14	---	---	---	---	Nov-15	**3.2**	**1.6**	ND	**2.5**
MW-5	Nov-13	---	---	---	---	Oct-14	---	---	---	---	Nov-15	---	---	---	---
MW-9	Nov-13	---	---	---	---	Oct-14	---	---	---	---	Nov-15	---	---	---	---
MW-12	Nov-13	---	---	---	---	Oct-14	ND	ND	ND	ND	Nov-15	---	---	---	---
MW-16	Nov-13	---	---	---	---	Oct-14	**2.3**	**4.1**	**0.6**	**28**	Nov-15	---	---	---	---
MW-18	Nov-13	ND	ND	ND	ND	Oct-14	ND	ND	ND	ND	Nov-15	ND	ND	ND	ND
MW-26	Nov-13	ND	ND	ND	ND	Oct-14	ND	ND	ND	ND	Nov-15	ND	ND	ND	ND
W29	Nov-13	ND	ND	ND	ND	Oct-14	---	---	---	---	Nov-15	ND	ND	ND	ND
MW-31	Nov-13	ND	**0.18 J**	**0.53**	**1.1**	Oct-14	ND	ND	ND	ND	Nov-15	---	---	---	---
MW-37	Nov-13	**0.34 J**	**0.3 J**	ND	ND	Oct-14	ND	ND	ND	ND	Nov-15	---	---	---	---
MW-38	Nov-13	---	---	---	---	Oct-14	---	---	---	---	Nov-15	ND	ND	ND	ND
MW-39	Nov-13	---	---	---	---	Oct-14	---	---	---	---	Nov-15	**1.6**	ND	ND	**2.9**
MW-40	Nov-13	---	---	---	---	Oct-14	---	---	---	---	Nov-15	**0.89**	ND	**9.0**	ND
MW-41	Nov-13	---	---	---	---	Oct-14	---	---	---	---	Nov-15	ND	ND	ND	ND
MW-23*	---	---	---	---	---	---	---	---	---	---	Nov-15	ND	ND	ND	**65**
MW-42**	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

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TCE = Trichloroethene

PCE = tetrachloroethene

*MW-23 added to the annual sampling prog

**MW-42 new monitoring well installed in

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		µg/L	µg/L	µg/L	µg/L		µg/L	µg/L	µg/L	µg/L		µg/L	µg/L	µg/L	µg/L
Cleanup Goal		**1**	**1**	**5**	**1**		**1**	**1**	**5**	**1**		**1**	**1**	**5**	**1**
SZMP7	Nov-16	ND	ND	ND	0.56	Dec-17	ND	ND	ND	ND	Dec-18	ND	ND	ND	ND
SZMP8	Nov-16	---	---	---	---	Dec-17	---	---	---	---	Dec-18	---	---	---	---
MW-G	Nov-16	**1.80**	ND	**9.7**	**110**	Dec-17	**2.00**	ND	**13 J**	**150**	Dec-18	**3.4**	**0.23 J**	**2.3**	**30**
W2	Nov-16	ND	ND	**0.14**	**1.2**	Dec-17	ND	ND	ND	ND	Dec-18	ND	ND	ND	ND
W15	Nov-16	ND	ND	ND	**21**	Dec-17	ND	ND	ND	**6.5**	Dec-18	ND	ND	ND	ND
MP1 (MW-1)	Nov-16	**2.3**	**1.4**	**1.20**	**3.5**	Dec-17	**1.7**	**0.79**	**1.1 J**	**3.6**	Dec-18	**1.2**	**1.5**	**0.2 J**	**1.0**
MP-2	Nov-16	ND	**0.26**	ND	ND	Dec-17	ND	ND	ND	ND	Dec-18	ND	**0.19 J**	ND	ND
MP3 (MW-3)	Nov-16	**4.8**	**0.35**	**0.78**	**6.9**	Dec-17	**4.2**	**0.51**	**0.97 J**	**1.2**	Dec-18	**1.7**	**0.57**	ND	ND
MW-5	Nov-16	---	---	---	---	Dec-17	---	---	---	---	Dec-18	---	---	---	---
MW-9	Nov-16	---	---	---	---	Dec-17	---	---	---	---	Dec-18	---	---	---	---
MW-12	Nov-16	---	---	---	---	Dec-17	---	---	---	---	Dec-18	---	---	---	---
MW-16	Nov-16	---	---	---	---	Dec-17	---	---	---	---	Dec-18	---	---	---	---
MW-18	Nov-16	ND	ND	ND	ND	Dec-17	ND	ND	ND	ND	Dec-18	ND	ND	ND	ND
MW-26	Nov-16	ND	ND	ND	**0.31**	Dec-17	ND	ND	ND	**16**	Dec-18	ND	ND	ND	**8.0**
W29	Nov-16	ND	ND	ND	ND	Dec-17	ND	ND	ND	ND	Dec-18	ND	ND	ND	ND
MW-31	Nov-16	---	---	---	---	Dec-17	---	---	---	---	Dec-18	---	---	---	---
MW-37	Nov-16	---	---	---	---	Dec-17	---	---	---	---	Dec-18	---	---	---	---
MW-38	Nov-16	ND	ND	**3.2**	**9.0**	Dec-17	ND	ND	**69 J**	**100**	Dec-18	ND	ND	**55**	**130**
MW-39	Nov-16	**0.91**	**0.31**	**0.94**	**5.5**	Dec-17	**3.8**	ND	**19**	**120**	Dec-18	**1.7**	**0.28 J**	**0.16 J**	**1.5**
MW-40	Nov-16	**0.5**	ND	**2.8**	**0.35**	Dec-17	ND	ND	**1.4 J**	ND	Dec-18	**0.57**	**0.15 J**	**0.17 J**	ND
MW-41	Nov-16	ND	ND	ND	**0.28**	Dec-17	ND	ND	ND	**0.66**	Dec-18	ND	ND	ND	**0.3 J**
MW-23*	Nov-16	ND	ND	**0.75**	**65**	Dec-17	ND	ND	ND	**320**	Dec-18	ND	ND	**.018 J**	**42**
MW-42**	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Notes:

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µg/L = Micrograms per Liter

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		µg/L	µg/L	µg/L	µg/L		µg/L	µg/L	µg/L	µg/L
Cleanup Goal		**1**	**1**	**5**	**1**		**1**	**1**	**5**	**1**
SZMP7	Dec-19	ND	ND	ND	ND	Dec-20	ND	ND	ND	ND
SZMP8	Dec-19	---	---	---	---	Dec-20	---	---	---	---
MW-G	Dec-19	**1.5**	ND	**1.3**	**0.28 J**	Dec-20	**1.4**	ND	**1.4**	**33**
W2	Dec-19	ND	ND	ND	ND	Dec-20	ND	ND	ND	ND
W15	Dec-19	ND	ND	ND	**1.0**	Dec-20	ND	ND	ND	ND
MP1 (MW-1)	Dec-19	**0.94**	**1.3**	**1.0**	**3.0**	Dec-20	**0.33 J**	**0.39 J**	**0.20 J**	**0.29 J**
MP-2	Dec-19	**0.094 J**	**0.099 J**	ND	ND	Dec-20	ND	**0.22 J**	ND	ND
MP3 (MW-3)	Dec-19	**2.5**	**0.56**	**0.20 J**	**0.13 J**	Dec-20	**2.4**	**0.75**	ND	ND
MW-5	Dec-19	---	---	---	---	Dec-20	---	---	---	---
MW-9	Dec-19	---	---	---	---	Dec-20	---	---	---	---
MW-12	Dec-19	---	---	---	---	Dec-20	---	---	---	---
MW-16	Dec-19	---	---	---	---	Dec-20	---	---	---	---
MW-18	Dec-19	ND	ND	ND	ND	Dec-20	ND	ND	ND	ND
MW-26	Dec-19	ND	ND	ND	**13.0**	Dec-20	ND	ND	ND	**4.5 J**
W29	Dec-19	ND	ND	ND	ND	Dec-20	ND	ND	ND	ND
MW-31	Dec-19	---	---	---	---	Dec-20	---	---	---	---
MW-37	Dec-19	---	---	---	---	Dec-20	---	---	---	---
MW-38	Dec-19	**0.55**	ND	**32.0**	**64.0**	Dec-20	**0.75**	ND	**0.29 J**	**0.37 J**
MW-39	Dec-19	**0.99**	**0.59**	ND	ND	Dec-20	**0.82**	ND	**1.3**	**6.4**
MW-40	Dec-19	**0.29 J**	**0.057 J**	**0.74**	ND	Dec-20	**0.31 J**	ND	**0.24 J**	ND
MW-41	Dec-19	ND	ND	**0.2 J**	**0.35 J**	Dec-20	ND	ND	ND	**0.88**
MW-23*	Dec-19	ND	ND	**0.37 J**	**67.0**	Dec-20	ND	ND	**0.12 J**	**110**
MW-42**	Dec-19	ND	ND	**18.0**	**140**	Dec-20	ND	ND	**14**	**85**

Notes:

Bold = Detected Analyte

Bold/Highlighted = Detection Above Clea

µg/L = Micrograms per Liter

TCE = Trichloroethene

PCE = tetrachloroethene

*MW-23 added to the annual sampling prog

**MW-42 new monitoring well installed in

--- = No Data Reported

K = Reported value may be biased high

J = Estimated Value

ND = Not detected at the reporting limit