RECORD OF DECISION

Fair Lawn Well Field Superfund Site
Borough of Fair Lawn, Bergen County, New Jersey

United States Environmental Protection Agency
Region 2
New York, New York
September 2018

550183

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PART 1 DECLARATION

SITE NAME AND LOCATION

Fair Lawn Well Field Superfund Site
Borough of Fair Lawn, Bergen County, New Jersey
Superfund Site Identification Number: NJD980654107

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) documents the U.S Environmental Protection Agency's (EPA's) selection of a remedy for Fair Lawn Well Field Superfund Site (Site), in Bergen County, New Jersey, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, 42 U.S.C. §§ 9601-9675, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300. This decision document explains the factual and legal basis for selecting the remedy. The attached index (see Appendix III) identifies the items that comprise the administrative record, upon which the selected remedy is based.

The New Jersey Department of Environmental Protection (NJDEP) was consulted on the planned remedy in accordance with Section 121(f) of CERCLA, 42 U.S.C. § 9621(f), and concurs with the selected remedy (see Appendix IV).

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the Site, if not addressed by the implementation of the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare and the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy described in this document actively addresses the contaminated groundwater at the Site. This is the only remedial phase for the Site. For the purposes of this ROD, the area comprised of the underlying contaminated groundwater outside the source area properties and encompassing the Westmoreland Well Field (WMWF), Henderson Brook, and the surrounding residential areas are collectively referred to as the Fair Lawn Well Field Superfund site (Site).

The major components of the selected remedy include the following:

- Groundwater extraction via pumping and ex-situ treatment of recovered groundwater prior to discharge as a water supply source;
- If necessary, additional recovery well(s) with treatment unit(s) to capture any areas with limited hydraulic influence;
- Long-term monitoring program to assess the effectiveness of the groundwater remedy; and
- Implementation of institutional controls.

Active remediation elements will be designed to achieve the remedial action objectives (RAOs) by establishing containment and restoration of groundwater. The extraction and treatment system will operate until remediation goals are attained. The exact number and placement of recovery well(s), pumping rates, and treatment processes, as well as the location of the treatment plant will be determined during the remedial design. If the Borough of Fair Lawn decides not to use the treated groundwater in its water supply system, it will be discharged to Henderson Brook or a public owned treatment works (POTW).

A pre-design investigation to determine the nature and extent of perfluorooctane acid and perfluorooctanoic sulfonate (PFOA) and (PFOS) in groundwater, and a treatability study to demonstrate that appropriate treatment technologies remove 1,4 dioxane and PFOA and PFOS from groundwater will be conducted during the remedial design.

A long-term monitoring program will be implemented to track and monitor changes in the groundwater and surface water contamination to ensure the RAOs are attained. The results from the long-term monitoring program will be used to evaluate the migration and changes in site-related contaminants of concern (COCs) over time.

Institutional controls will be implemented to ensure that the remedy remains protective of human health until RAOs are achieved. EPA will work with NJDEP to implement a classification exemption area/well restriction to prohibit the use of groundwater for drinking purposes while the groundwater recovery and treatment systems remediate the contaminated groundwater.

The total estimated, present-worth cost for the selected remedy is $19,500,000. Further details of the cost are presented in Appendix F of the FS Report. This is an engineering cost estimate that is expected to be within the range of plus 50 percent to minus 30 percent of the actual project cost.

While the remedy will ultimately result in a reduction of contaminant levels in groundwater such that levels will allow for unlimited use and unrestricted exposure, it is anticipated that it will take longer than five years to achieve these levels. As a result, in accordance with CERCLA, the Site remedy will be reviewed at least once every five years until remediation goals are achieved for unrestricted use.

Consistent with EPA Region 2's Clean and Green policy, EPA will evaluate the use of sustainable technologies and practices with respect the remedial alternative selected for the Site.[1] This would include green remediation technologies and practices.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy meets the requirements for remedial actions set forth in Section 121 of CERCLA, 42 U.S.C. § 9621, because it meets the following requirements: 1) it is protective of human health and the environment; 2) it meets a level or standard of control of the hazardous substances, pollutants, and contaminants that at least attains the legally applicable or relevant and appropriate requirements under federal and state laws unless a statutory waiver is justified; 3) it is

[1] See https://www.epa.gov/greenercleanups/epa-region-2-clean-and-green-policy,

cost-effective; and 4) it utilizes permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable. In addition, Section 121 of CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances as a principal element. The selected remedy satisfies this preference, as contaminated groundwater collected by the well field will be treated before distribution to the public or discharge to POTW.

While this remedy will not result in hazardous substances, pollutants, or contaminants remaining on Site above levels that allow for unlimited use and unrestricted exposure, it will take more than five years to attain the remediation goals. EPA will conduct a review within five years of construction completion for the Site to ensure that the remedy is, or will be, protective of human health and the environment.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the administrative record file for this action.

✓ A discussion of the current nature and extent of contamination is included in the "Summary of Site Characteristics" section.
✓ Chemicals of concern and their respective concentrations may be found in the "Summary of Site Characteristics" section.
✓ Potential adverse effects associated with exposure to Site contaminants may be found in the "Summary of Site Risks" section.
✓ A discussion of groundwater and surface water remediation goals for chemicals of concern may be found in the "Remedial Action Objectives" section and in Table 7 and Table 8, respectively, in Appendix II.
✓ A discussion of principal threat waste is contained in the "Principal Threat Wastes" section.
✓ Current and reasonably anticipated future land use assumptions are presented in the "Current and Potential Future Land Uses" section.
✓ Estimated capital, operation and maintenance, and total present-worth costs are discussed in the "Description of Remedial Alternatives" section.
✓ Key factors that led to selecting the remedy (*i.e.*, how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) may be found in the "Comparative Analysis of Alternatives" and "Statutory Determinations" sections.

AUTHORIZING SIGNATURE

A. Carpenter

Angela Carpenter,
Acting Director
Emergency and Remedial Response Division

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Date

PART 2 DECISION SUMMARY

1. SITE NAME, LOCATION, AND DESCRIPTION

The Fair Lawn Well Field Superfund Site (Site) includes the groundwater that impacts four municipal wells located on or around Westmoreland Avenue located in the Borough of Fair Lawn, Bergen County, New Jersey. These wells are part of the Westmoreland Well Field (WMWF). Two of the four wells (FL-10 and FL-14) were at one time used to provide treated drinking water to the residents of the Borough of Fair Lawn. Currently, these two wells have been taken out of service for that purpose and treated water is discharged to a nearby surface water body (Henderson Brook). The other two wells (FL-11 and FL-12) are used for monitoring.

The Site encompasses the contaminated groundwater underlying the commercial properties outside the source areas located in the Fair Lawn Industrial Park to the northeast of Route 208, and a residential neighborhood (and the WMWF) located to the southwest of Route 208. Within the site boundary is Henderson Brook which is impacted by the groundwater contamination and flows west along the southern property line of several source area properties, and southwest on the south side of Route 208 near the WMWF until it reaches the Passaic River. The Passaic River is located approximately one mile to the southwest of the Site. A Site location map is provided as Figure 1. The contaminated groundwater plumes include the overburden/water table, intermediate (upper) bedrock and deep (lower) bedrock aquifers. See Figure 2.

The residences within the Site boundary are serviced by the Fair Lawn Borough Water Department which draws its water supply from several well fields operated by the water department, and augments that supply with purchase of treated water from several other water utilities. The water delivered to these residences is a blend of water from these well fields and the purchased water. Since 1987, the Borough had been treating groundwater pumped from the WMWF with an air stripper and chlorination prior to distribution. Based on a review of well records in the area, private wells are not utilized for drinking water in the area.

A summary of the source area properties located in the Fair Lawn Industrial Park where remediation is being conducted under New Jersey Department of Environmental Protection (NJDEP) authority consists of the following:

<u>Fisher Scientific</u>

The Fisher Scientific Company, LLC (Fisher) facility is situated on 9 acres of land in the northeastern corner of the industrial park. It consists of 10 buildings, six of which are enclosed spaces with the remaining four buildings being open structures that are used for various production, packaging, and administrative purposes. Fisher began manufacturing operations in 1955. Since 1955, the Fisher facility operations have consisted of formulating, distilling, repackaging, and distributing various laboratory reagents and solvents. In 2006, Fisher’s parent company, Fisher Scientific International Inc. merged with Thermo-Electron Corporation to become Thermo-Fisher Scientific Inc. (Thermo-Fisher).

Sandvik

The Sandvik, Inc. (Sandvik) facility is situated on 10.3 acres, adjacent to the Fisher facility in the northern portion of the industrial park. Sandvik began operations in 1955. Between 1955 and 1970, Sandvik manufactured cutting tools, springs, and other components from strip steel. From 1970 through May 2006, Sandvik manufactured cemented carbide cutting tools. In May 2006, Sandvik ceased manufacturing operations at the facility. From 2013 to 2014, Sandvik modified the building, removing the northwestern portion of the building and adding a second story along the southern portion of the building. The facility is currently used as office space and a training center.

Former Eastman Kodak

The former Eastman Kodak (Kodak) facility is situated on 9.95 acres in the southeastern corner of the industrial park. The property was first developed in 1954. Kodak operated a photofinishing lab at the facility from 1961 until 1988. From 1988 to 1994, the photofinishing activities were operated by Qualex Inc. (Qualex), a joint venture between Kodak and U.B. Fuqua Inc. (Fuqua). In 1994, Kodak bought out the interest in Fuqua and continued photofinishing operations as Qualex until 2004. The facility was decommissioned in 2004 and demolished in 2006. On March 9, 2007, Kodak sold this property to Fair Lawn Promenade, LLC (FLP), which completed mixed-use redevelopment of the property in 2014. The property currently consists of three office/retail space single story buildings and two 3-story residential apartment complexes with ground floor parking.

18-01 Pollitt Drive

The 18-01 Pollitt Drive facility is situated on 9.41 acres in the center of the industrial park. The current single one-story building with several tenants was constructed as an addition to the original structure. The property was first developed in 1957 by the Einson Freeman Company, which operated a lithographic printing business from 1958 to the late 1970s. Between 1979 and 1988, the property was used for lithographic printing operations by Unified Data Products (UDP). In 1988, the property was purchased by Polevoy Associates. Between 1988 and 2006, the property was used primarily for office and warehouse space. 18-01 Pollitt Drive LLC (wholly owned by Hampshire Companies) purchased the property on May 11, 2006 and sold it to DSL Pollitt, LLC (DSL Pollitt) in 2017. The property currently houses BCI Communications, Valley Hospital Medical Facility, and Retro Fitness.

EPA has elected to address the conditions at the Site in one phase, or operable unit (OU), for remediation purposes. This OU addresses the cleanup of contaminated groundwater outside the source area properties.

2. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The WMWF was established by the Borough in 1948, beginning with the installation of municipal well FL-10, and is situated in a residential neighborhood adjacent to the Fair Lawn Industrial Park. Between 1948 and 1950, municipal wells FL-11, FL-12, and FL-14 were installed. FL-14 was brought on-line for water supply purposes, and FL-11 and FL-12 were used as monitoring wells. The WMWF wells are illustrated on Figure 2. Between 1952 to 1969, the Borough installed non-potable industrial wells FL-23, located across Pollitt Drive to the east of the former Kodak property, and FL-24, located along the northeastern boundary of the former Kodak property.

In 1978, VOCs including tetrachloroethylene (PCE) and trichloroethylene (TCE) were detected in the WMWF wells. Subsequently, FL-23 and FL-24 were taken off line. To determine the origin of the contamination, the NJDEP investigated all industrial and commercial facilities within a 3,000-foot radius of the contaminated municipal wells. The investigation concluded that the primary source of the contamination is within the Fair Lawn Industrial Park. Based on the investigation findings, facilities owned and operated in the industrial park by two companies, Fisher and Sandvik were identified as contributing sources to the groundwater contamination. The Site was placed on the Superfund National Priorities List (NPL) in September 1983.

EPA sent notice letters to Fisher and Sandvik in February 1984, advising them of their potential liability at the Site. In March 1984, both Fisher and Sandvik signed Administrative Consent Orders (ACOs) with the NJDEP to conduct investigations of soil and groundwater on their properties, remove and dispose of contaminated soils, perform long-term monitoring of on-site groundwater quality, and pay the Borough for the installation, and operation and maintenance of air stripper treatment at the WMWF. In 1986, the Borough installed the air stripper system to treat the contaminated wells located at the WMWF.

EPA became the lead agency for the groundwater portion of the Site in September 1992, and initiated a remedial investigation and feasibility study (RI/FS) to determine the nature and extent of groundwater contamination. NJDEP will continue to be the lead for the response actions at the source area properties while the EPA remedy will address the contaminated groundwater captured by the WMWF, as well as surface water impacted by groundwater.

In May and June 1995, EPA and the Fair Lawn Health and Water Departments conducted a residential well sampling and analysis program to determine the usage and quality of private well water. The results of this program found these wells were being used for both irrigation and drinking water purposes, and the data results indicated they met the established drinking water standards.

In April 1999, EPA entered into an interagency agreement with the United States Geological Survey (USGS) to conduct an area-wide groundwater study of the Fair Lawn area. This groundwater study included development of a flow model used to define areas of influence or capture zones from all existing pumping wells to further determine sources of contamination found at the WMWF, to determine if Henderson Brook is a groundwater discharge area and to recommend any further actions. A groundwater study report submitted by the USGS in May 2005 presented and discussed those areas where contaminated groundwater contributes to the WMWF.

In March 2006, EPA issued notice letters to Fisher, Sandvik and Kodak under CERCLA, requesting them to perform an RI/FS, and reimburse EPA for past costs incurred with respect to the Site. On March 28, 2008, Fisher, Sandvik and Kodak, collectively known as the potentially responsible parties (PRPs), entered into a Settlement Agreement and Administrative Order on Consent (Settlement Agreement) with EPA to conduct the RI/FS.

The PRPs submitted a draft RI/FS workplan which was approved by EPA in January 2009. The workplan was made available to the public at information sessions conducted by the EPA on March 16 and 17, 2009.

In September 2009, the PRPs began installing five new monitoring wells, which were completed in December 2009. Two groundwater and surface water sampling events were conducted in March 2010 and June 2011. EPA held a public availability session in Fair Lawn in October 2012 to update the community on the progress of the RI/FS activities. The information is summarized in an approved Final Site Characterization Summary Report (SCR) submitted in February 2015 and which is in the administrative record file.

Kodak filed for bankruptcy in January 2012, and subsequently notified EPA that it would no longer perform the RI/FS under the Settlement Agreement. Fisher and Sandvik continued to perform the RI/FS.

At the request of EPA, the PRPs submitted a draft RI/FS work plan addendum for additional well installation and sampling in September 2013. The approved December 2013 RI/FS work plan addendum included the installation of five overburden and seven bedrock monitoring wells, and two rounds of comprehensive groundwater and surface monitoring. From May to July 2014, prior to installing the monitoring wells, thirteen temporary overburden monitoring wells were installed and sampled to delineate shallow groundwater at the Site. The monitoring wells were installed between July and September 2014, and two comprehensive groundwater sampling events were performed in November 2015 and June 2016.

NJDEP-Lead Response Activities

The PRPs within the Fair Lawn Industrial Park are required under NJDEP authority to clean-up their source area VOC contamination in soils and groundwater. Though not part of the CERCLA remedy, a summary of the details is provided below to help give context for how the CERCLA remedy will complement the state's efforts. Additional historic information regarding these properties can be found in the June 2018 Final RI Report.

Fisher Scientific

Fisher conducted six soil areas of concern (AOCs) investigations under NJDEP direction between 1984 and 1993. A total of approximately 6,000 cubic yards of soils contaminated with VOCs (PCE, TCE, chloroform 1,2-dichloroethane, and 1,1,1-trichloroethane (1,1,1-TCA)) were removed during excavation activities performed from 1986 to 1989. Fisher proposed and NJDEP approved No Further Action (NFA) determination under NJDEP's cleanup program for each soil area of concern in August 1993.

In February 1986, Fisher proposed a groundwater recovery and treatment system (GRTS) to capture the contaminated groundwater plume at its facility. The bedrock GRTS began operating in 1989. Three bedrock production wells extract groundwater which is treated by carbon adsorption, and discharged to Henderson Brook under a New Jersey Pollutant Discharge Elimination System (NJPDES) Discharge to Surface Water (DSW) permit. Approximately 1.2 billion gallons of bedrock contaminated groundwater has been recovered and treated since 1989.

The overburden GRTS began operating in 1994. Two recovery trenches were enhanced in 1996 with seven extraction wells. Extracted groundwater is treated via air stripping with carbon adsorption, and discharged to the Passaic Valley Sewerage Commission (PVSC) under a publicly owned treatment works (POTW) permit. Approximately 122 million gallons of overburden groundwater have been recovered and treated since 1994.

A network of 44 wells and 14 piezometers monitor the groundwater quality in the overburden and bedrock aquifers. A Classification Exception Area/Well Restriction Area (CEA/WRA) restricting the installation of potable wells in and around the overburden and bedrock contamination plumes was approved by NJDEP in 2002.

Surface water sampling conducted along Henderson Brook began in November 2005. Results indicated that benzene, carbon tetrachloride (CTE), PCE, TCE, and vinyl chloride concentrations were present in Henderson Brook above the applicable NJDEP surface water criteria. Subsequent sampling indicated that concentrations had decreased to levels below the NJDEP surface water criteria. In addition, one round of sediment and pore water sampling along Henderson Brook was conducted in 2006. No compounds were detected above NJDEP’s freshwater sediment screening criteria, but TCE and CTE were observed above the applicable NJDEP surface water criteria in sediment pore water samples.

To further characterize soil impacts on its property and meet NJDEP RI requirements, Fisher conducted additional soils investigation activities between December 2013 and April 2016. The results of the NJDEP RI activities identified three focused source areas for remediation, within previous AOCs. Fisher is evaluating remedial alternatives to address the on-site impacted soils.

A comprehensive groundwater sampling event was conducted in May 2014 using passive sampling techniques. During this event, the presence of Dense Non-Aqueous Phase Liquid (DNAPL) was discovered. Fisher has been conducting routine sampling and recovery events to remove the DNAPL. No DNAPL has been observed since June 2014. Gauge/recovery events are currently conducted on a quarterly basis.

Three additional on-site monitoring wells, and two temporary off-site well points were installed in 2015 to complete overburden groundwater delineation and VI pathway assessment.

Fisher will continue to operate the overburden and bedrock GRTS and groundwater, surface water and DNAPL will be sampled in accordance with Fisher’s NJDEP ACO. In addition, remedial alternatives to address the impacted soils, and is conducting a vapor VI investigation at buildings on its property in accordance with the updated January 2018 NJDEP VI guidance.

Sandvik

From 1983 to 1984, Sandvik conducted investigations and remediation at three soil AOCs on its property under Sandvik's NJDEP ACO. Sandvik removed and disposed of approximately 1,100 cubic yards of soil, 200 buried containers, and a 4,000-gallon waste oil tank. In September 1984, Sandvik completed installation on a network of overburden, and shallow and intermediate bedrock groundwater monitoring wells, and initiated routine groundwater monitoring events.

Between 1985 and 1996, Sandvik conducted monthly water level monitoring and quarterly groundwater sampling at 11 wells and the basement sump. The monitoring/sampling frequency was decreased to quarterly/semi-annual in 1996 and has continued with this schedule through the present time. In 2003, Sandvik began semi-annual sampling of surface water in Henderson Brook.

In May 2006, Sandvik ceased manufacturing operations which triggered compliance obligations under the NJ Industrial Site Recovery Act (ISRA). In accordance with ISRA, a Preliminary Assessment (PA) was conducted from June to August 2006. The PA was supplemented by a Site Investigation (SI) performed between October and November 2006. Nine AOCs were identified during the PA. Remedial investigation activities were conducted in 2007 and 2008, with all but one (groundwater AOC) of the nine AOCs were closed out. Sandvik requested NFAs in May 2010 and August 2010, and NJDEP approved them in letters dated July 5, 2011 and August 29, 2011.

In February 2012, as part of a pre-design investigation that Sandvik was conducting at its property, additional soil boring samples were collected at Pit #1 and the Waste Oil Tank Areas. The results confirmed the NFA designation in that the contaminants found at the facility were below NJDEP soil remediation standards.

A basement sump operated since 1966 to dewater around the foundation of the former office building located on the western side of the property until it was shut down on March 20, 2014, and later demolished along with the former office building as part of Site redevelopment activities.

In May 2012, Sandvik initiated activities associated with the design and implementation of a groundwater remediation system. NJDEP issued a NJPDES Discharge to Groundwater (DGW) Permit-by-Rule (PBR) to Sandvik for pilot testing an enhanced in-situ bioremediation (EISB) using emulsified vegetable oil (EVO), bioaugmentation cultures, and a reductant to address the former waste oil underground storage tank (UST), and exterior drum storage pad source areas for TCE, 1,1,1-TCA, and associated daughter products. Final design parameters were developed and injection methods were selected to accommodate Site redevelopment requirements.

In February 2014, NJDEP issued a NJPDES DGW PBR to implement the full scale EISB injection system. Sandvik initiated the EISB system was initiated in September 2014 and it is planned to run for a 10-year period beginning with three to five years of active remediation via EISB, followed by five years of monitored natural attenuation (MNA). Details regarding the groundwater on this property are documented in the June 2018 Final RI.

Former Kodak Property

In 1990, Kodak conducted remedial activities at its facility under the NJDEP UST program which included the removal of two fuel oil USTs, two gasoline USTs and their appurtenant structures, closure of a dry well, removal of floor drains from the center section of the basement, and installation of a monitor well in the shallow bedrock aquifer. Subsequently, Kodak entered into a Memorandum of Agreement (MOA) with the NJDEP in 1992 which outlined the investigation activities to be conducted on the property.

Between 1990 and 2007, Kodak identified eight AOCs and conducted soil removal activities during the investigation phase. Kodak removed a total of 3,160 tons of impacted soils and material (piping, sludge, concrete and brick) associated with the building demolition, and 2,540 feet of subsurface piping associated with five sumps and five catch basins. Details are provided in the Final RI Report for the Site dated June 2018.

Kodak submitted a Comprehensive Investigation and Remedial Action Report to NJDEP in January 2008, based on which the NJDEP issued NFA determinations for several AOCs on November 20, 2008. Additional remedial investigation and remedial actions were performed on the remaining AOCs, and Kodak submitted a Remedial Action Report for AOC 4.1 and 7.2 in March 2012, indicating NFA was appropriate for the remaining AOCs with the implementation of engineering and institutional controls.

Kodak conducted 30 bedrock groundwater monitoring and sampling events under the NJDEP MOA from 1990 to 2011. Kodak determined that the primary source areas on its property impacting groundwater were from AOC-1 and AOC-3 which have been remediated, resulting in reduced levels of compounds observed in groundwater on the property. Historically, groundwater contaminants on this property include PCE, TCE, 1,1,1-TCA, 1,1-DCA, 1,1-DCE, benzene, bromodichloromethane, vinyl chloride (VC), total chromium, and silver. Monitoring wells were abandoned in late 2011 due to redevelopment plans on the property. However, NAPL residues consisting of highly weathered, highly viscous No. 6 fuel oil from AOC-1 remain in some bedrock fractures. This NAPL is not recoverable and has not dissolved in the groundwater. Details regarding the groundwater on this property are documented in the June 2018 Final RI Report for the Site.

18-01 Pollitt Drive Property

In 2008, Hampshire performed a Phase I Environmental Investigation in connection with refinancing activities. This investigation and subsequent environmental activities identified elevated levels of VOCs on the property. After reporting the discovery of a discharge to NJDEP in February 2008, Hampshire entered into a MOA with NJDEP to conduct remedial investigations.

Hampshire initiated investigation activities to identify potential VOC contaminants on the property in January 2008. Seven AOCs were identified, with five of the AOCs located on the northwestern side of the property where historic lithographic printing operations had been conducted by UDP.

Soil results confirmed VOC contamination on the property associated with AOC-1 through AOC-4. AOCs 5 through 7 did not have any VOCs in soils above the applicable NJDEP soil remediation standards.

Between October 2008 and January 2009, Hampshire excavated and disposed of approximately 11,000 tons of PCE-impacted soils to a depth of 20 feet beneath the on-site building to address soils related to AOCs 1, 2, and 4.

Between May and July 2011, Hampshire excavated approximately 4,301 tons of PCE impacted soil at AOC-3, located outside the building, to a depth of 24 feet below ground surface (bgs).

In 2014, an enhanced in-situ bioremediation program was initiated by Hampshire to address the remaining PCE and daughter products impacting the soils and groundwater on the property. The details of this program are documented in the March 2014 Discharge to Groundwater Permit-By-Rule (DGW PBR) Application and summarized in the July 2018 FS Report for the Site.

A groundwater remediation system was installed and operated by Hampshire to provide hydraulic capture of groundwater emanating from the property and prevent migration to Henderson Brook. The system consists of one overburden and one bedrock recovery well. In accordance with the final NJPDES BGR Discharge Permit, the system is designed with an air stripper to remove CTE, PCE, TCE, chloroform, 1,1-DCE, and cis-1,2-dichloroethene with monitoring of 1,4-dioxane. The treated water discharges to Henderson Brook. Air from the stripper is treated through granular activated carbon (GAC) units under a permit issued by the NJDEP Division of Air Quality–Air Quality Permitting Program. The system has been operating since in February 2017.

A CEA was established to address the horizontal and vertical extent of Hampshire's groundwater plume area, and has an indeterminate time frame. This CEA overlaps the Fisher CEA.

3. HIGHLIGHTS OF COMMUNITY PARTICIPATION

On August 6, 2018, EPA released a Proposed Plan for the cleanup of contaminated groundwater to the public for comment. Supporting documentation comprising the administrative record was made available to the public at the information repositories maintained at the Maurice M. Pine Free Public Library, located at 10-01 Fair Lawn Avenue in Fair Lawn, New Jersey; the EPA Region 2 Office in New York City; and EPA's website for the Site at https://www.epa.gov/superfund/fair-lawn-wellfield. EPA published notice of the start of the public comment period and the availability of the above-referenced documents in the *Bergen Record* on August 6, 2018. A copy of the public notice published in the *Bergen Record* can be found in Appendix V. EPA accepted public comments on the Proposed Plan from August 6, 2018 through September 5, 2018.

On August 23, 2018, EPA held a public meeting at the Fair Lawn Borough Hall, Council Chambers/Court Room located at 8-01 Fair Lawn Avenue, Fair Lawn, New Jersey, to inform officials and community members about the Superfund process, to present the Proposed Plan for the cleanup of contaminated groundwater at the Site, including the preferred remedial alternative, and to respond to questions and comments from the attendees. Responses to the questions and comments received at the public meeting and in writing during the public comment period are included in an attached Responsiveness Summary (See Appendix V).

4. SCOPE AND ROLE OF RESPONSE ACTION

EPA is addressing the cleanup of the Site in one phase, called an operable unit, which addresses contaminants in groundwater and surface water that originated from contributing source areas within the industrial park at the Site. These source area properties are being addressed under NJDEP authority and not as part of the NPL site. EPA will address the contaminated groundwater migrating from the source area properties and impacting the water supply system.

As noted above, EPA has designated the Site as one operable unit. The selected remedy, which is the subject of this ROD, addresses the groundwater and surface water contamination outside the source area properties, and it is the final response action planned to be selected for the Site. The primary objectives of the action set forth in this ROD are to prevent or minimize exposure to the contaminated groundwater, to restore the groundwater and surface water to its most beneficial use by reducing these contaminants, and to minimize the migration of these contaminants.

5. SUMMARY OF SITE CHARACTERISITCS

5.1 Hydrogeology

The Site lies within the Piedmont Physiographic Province which is characterized by low rolling hills which are the erosional remnants of several ancient mountain ranges. In northern New Jersey, Precambrian metamorphic rocks make up the basement of this Province. Above the basement rocks are sedimentary and igneous rocks of the Newark Basin ranging in age from Triassic to Jurassic. Surficial geology is dominated by Pleistocene glacial deposits with Holocene sediments along the river/stream channels.

Unconsolidated surface materials consist of glacial and post-glacial deposits. The post-glacial sediments consist primarily of modern channel and floodplain deposits. The post-glacial modern channel and floodplain alluvium deposits consist of silt to gravel with minor amounts of clay. The water table on-site is primarily in unconsolidated glacial and nonglacial sedimentary deposits, and transitions from overburden into shallow bedrock on the former Kodak property.

The Site is located approximately 80-100 feet above mean sea level, with surface elevations in the area decreasing to the southwest, towards the Passaic River. The localized topography slopes towards Henderson Brook and the Former North Branch of Henderson Brook. Storm water runoff follows these topographic gradients, traveling over paved surfaces and collecting in storm sewer inlets along the nearby streets and parking areas, and discharging to Henderson Brook.

The water table elevations at the Site decrease from northeast to southwest, following trends in topography with the depth to groundwater ranging from approximately 5 to 20 feet below grade surface (bgs). Based on this information, the water table aquifer flows towards Henderson Brook, and to a lesser extent, to the Former North Branch of Henderson Brook. The removal of the Sandvik sump prior to the 2015 and 2016 gauging events has eliminated the groundwater depression observed at the Sandvik facility during the June 2010 and March 2011 events.

Overburden is typically heterogeneous containing lenses or layers of soil whose geological properties contrast with those of their surroundings. Overburden is typically thinnest (about 10 feet) near topographic highs, where glaciofluvial or glaciolacustrine sediments are typically absent, and thickest (about 80 feet) in the area between Henderson Brook and Little Diamond Brook where bedrock elevations are at their lowest on-site.

The Passaic Formation is part of the Newark Basin that underlies the Site and consists of layers of conglomerate, sandstone, and siltstone. The Passaic Formation is a primary source of groundwater for municipal, industrial and other uses at the Site and surrounding areas. Bedrock bedding planes strike generally north 6° east and dip approximately 7° to the northwest.

Groundwater flows in the Passaic Formation through secondary porosity (fractures, joints, bedding plane partings, etc.) rather than primary porosity (rock matrix). Groundwater well pumping rates of up to several hundred gallons per minute have been achieved and sustained in the Passaic Formation. Wells aligned along bedding strike in the Passaic Formation would be hydraulically connected. The water-bearing units are separated from each other by thicker stratigraphic layers with fewer bedding partings or fracture seams. The USGS determined that the water-bearing units have a mean thickness of 50 feet, and the confining units a mean thickness of 83 feet at the Site. The relatively thicker intervening confining units are, however, cross-cut by near-vertical extension fractures, making them leaky and providing a pathway for groundwater to percolate through the confining layers and therefore between transmissive units. Horizontal groundwater flow in bedrock is anisotropic. Anisotropic conditions in bedrock, as seen in the shut-down testing data, showed that the hydraulic radius of influence of each test extended out more parallel to bedrock strike and less parallel to bedrock dip.

Bedrock is divided into upper and lower hydro-stratigraphic zones which are separated by a leaky confining unit. Groundwater flow within the bedrock zones is under semi-confined to confined conditions as interpreted from the hydraulic response observed at monitoring points during shut-down testing. Groundwater recharge occurs generally along the eastern side of the Site.

Under non-pumping conditions in the upper bedrock zone the Passaic River is a regionally significant discharge point for groundwater. Local groundwater flow discharges to Little Diamond and Henderson Brooks.

Under pumping conditions, groundwater in the upper bedrock zone flows toward the production wells at WMWF and Fisher. The pumping in the upper bedrock zone at the WMWF causes groundwater beneath the industrial park to move west/southwest along water bearing units while expanding vertically throughout the upper bedrock zone. The WMWF could capture most, if not all, of the groundwater that flows west and southwest of the industrial park that is not already captured by the Fisher groundwater recovery systems.

In addition, the distribution of PCE, TCE and CTE indicates these COCs migrate to the west/southwest in the overburden and bedrock because of pumping at Fisher and the WMWF. Horizontal migration patterns of contaminants are controlled by bedding plane partings and fracturing in water bearing zones, aligned with strike and dip of the bedrock formation underlying the Site. Vertical migration in the bedrock occurs through vertical fracture spanning the less fractured confining units present underneath the Site.

5.2 Summary of the Remedial Investigation

The RI Report for the Site, dated June 2018, provides the analytical results of groundwater and surface water samples collected from 2010 to 2016 downgradient of the Fisher, Sandvik, Kodak, and 18-01 Pollitt Drive property, and in the residential neighborhood south of Route 208, as well as at the WMWF and in Henderson Brook.

Sampling activities during this RI were conducted at the Site in phases. Four overburden and five bedrock monitoring wells were installed by the PRPs within the Fair Lawn Industrial Park in 2009, and then they conducted two rounds of comprehensive groundwater and surface water monitoring events in June 2010 and March 2011. The samples were collected from a network of select groundwater monitoring wells, and surface water locations from Henderson Brook. Based on these findings, in 2014, the PRPs installed temporary overburden monitoring wells to determine locations for additional permanent overburden monitoring wells and to assess the need for vapor intrusion sampling. An additional five overburden and seven bedrock monitoring wells were installed in the summer of 2015, along with an additional two rounds of comprehensive groundwater and surface water monitoring events conducted in November 2015 and June 2016.

Groundwater Sampling Results

The results of groundwater and surfaces samples from 2015 and 2016 are presented below.

Overburden (Shallow) Zone

Groundwater samples collected from the overburden zone found PCE and TCE in the following areas:

- on the northwest side of the Site at concentrations up to 1,650 micrograms per liter (μg/L) PCE and 85,700 μg/L TCE in 2015, and 3,210 μg/L PCE and 92,600 μg/L TCE in 2016;
- in the center of the Site at concentrations up to 1,560 μg/L PCE and 29.8 μg/L TCE in 2015, and 1,810 μg/L PCE and 67.2 μg/L TCE in 2016; and
- on the southwest side of the Site at concentrations up to 237 μg/L PCE and 10.9 μg/L TCE in 2015, and 74.7 μg/L PCE and 3.9 μg/L TCE in 2016.

CTE was only detected on the northwest side of the Site, at concentrations up to 197,000 μg/L in 2015 and 190,000 μg/L in 2016. Also, 1,4-dioxane was detected at all three locations in the overburden; on the northeast side of the Site at concentrations up to 131 µg/L (2015) and 271 µg/L (2016), in the center of the Site at concentrations 19.1 µg/L (2015) and 4.94 µg/L (2016), and the southeast side of the Site at concentrations up to 13.4 µg/L (2015) and 4.24 µg/L (2016).

The contamination in the overburden zone covers approximately 107 acres from the north/northeast to the south/southwest of the Site.

Intermediate (Upper) Bedrock Zone

Groundwater samples collected in intermediate bedrock detected PCE in the center of the Site at concentrations up to 9,780 µg/L (2015) and 6,530 µg/L (2016), TCE on the northeast side of the Site at concentrations up to 223 µg/L (2015) and 177 µg/L (2016) and in the center of the Site at concentrations up to 134 µg/L (2015) and 206 µg/L (2016). CTE was only detected in the northeast side of the Site at concentrations up to 421 µg/L (2015) and 112 µg/L (2016). 1,4-dioxane is distributed across the Site at elevated concentrations ranging from 44.8 to 147 µg/L (2015) and 12.4 to 53.1 µg/L in (2016).

The contamination in the intermediate bedrock covers approximately 187 acres from the north/northeast to the south/southwest.

Deep (Lower) Bedrock Zone

Groundwater samples collected in the deep bedrock detected PCE and TCE in the center of the Site at concentrations up to 157 µg/L PCE and 131 µg/L TCE (2015), and 130 µg/L PCE and 144 µg/L TCE (2016). CTE had only a few detections, 15 µg/L (2015), and 1.5 µg/L and 17.6 µg/L (2016). 1,4-dioxane in the center of the Site ranged from 6.5 to 30.5 µg/L (2015), and 1.25 to 11.1 µg/L (2016).

The contamination in the deep bedrock zone extends approximately 177 acres from the north/northeast to the south/southwest.

Westmoreland Well Field Wells

Samples collected from groundwater entering the public supply wells, which are open to the entire geological framework, contained PCE concentrations ranging from 2.4 to 324 µg/L (2015) and 2.2 to 220 µg /L (2016); TCE concentrations ranging from 2.2 to 14.9 µg/L (2015) and 1.9 to 18.2 µg/L (2016); CTE concentrations ranged from ND to 1.6 µg/L (2015) and ND to 1.5 µg/L (2016); and 1,4-dioxane concentrations ranged from ND to 7.4 µg/L (2015) and ND to 8.59 µg/L (2016).

In 2013, perfluorooctane acid (PFOA) was detected in the WMWF at concentrations ranging from 30 – 36 (ng/L) nanograms per liter. Perfluorooctanoic sulfonate (PFOS) was detected at concentrations ranging from 58 - 66 ng/L as well. Based on the Site hydrogeology, these compounds could have originated from the contributing source properties located in the Fair Lawn Industrial Park. An investigation to be conducted during the remedial design will determine the nature and extent of these compounds. As described above, none of the WMWF wells are currently being used for drinking water.

Surface Water Sampling Results

Surface water samples collected in November 2015 and June 2016 from Henderson Brook detected the following COCs: PCE, benzene, CTE, and VC (exceeding their surface water screening levels (SWSLs)). PCE was detected most frequently in the lower half of the Henderson Brook ranging from 0.7 to 13.4 µg/L (2015) and 0.76 to 9.4 µg/L (2016). CTE was detected in the upper half of Henderson Brook, near the source areas, at concentrations ranging from 0.37 to 0.6 µg/L (2015) and 0.34 to 3.6 µg/L (2016). Benzene and VC had a few sporadic detections above their SWSLs in the upper half of Henderson Brook.

Additional data collected during the June 2010 and March 2011 surface water sampling events are presented in the 2015 SCR.

Vapor Intrusion

VOC vapors released from contaminated groundwater and/or soil have the potential to move through the soil and seep through cracks in basements, foundations, sewer lines, and other openings. The PRPs conducted VI investigation at the Site in accordance with the January 2009 RI/FS work plan. In March and April 2009, the PRPs collected two rounds of vapor samples. The first round of sampling in March 2009 included sub-slab samples collected underneath the concrete slabs at ten residential properties and four commercial buildings near Route 208. Based on the first round of results, in April 2009, PRPs collected a second round of sub-slab and indoor air samples at the residential properties and commercial buildings sampled in March 2009.

In August 2013, EPA collected sub slab vapor samples from the Westmoreland Elementary school. Later that year, between September and December 2013, EPA collected sub slab samples from twelve additional residential properties. Since that time, at the request of EPA, the PRPs sampled several additional residential properties: two residential properties between March and April 2014, and one residential property between November and December 2015.

In addition to the sampling performed under EPA direction, the PRPs and other parties performed VI investigations at nine commercial and three residential properties under NJDEP authority with several of the commercial buildings requiring the installation of vapor mitigation systems.

Overall, the sample results from the EPA-led investigation found that none of the residential properties are currently at risk for contaminated vapors entering their indoor air spaces, and no additional VI sampling is scheduled. However, if the Site conditions change, EPA would evaluate and determine if additional VI sampling is necessary. The results of VI sampling are documented in the November 2017 VI Investigation Report, which is in the administrative record file.

6. CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

Land Use

The land use at the Site is a mixture of residential, industrial, and commercial areas. The industrial/commercial area is represented mainly by the Fair Lawn Industrial Park located to the northeast of Route 208. Within the park, there are office-oriented operations, manufacturing and distribution, research and development, and a mixed-use commercial/residential community. The residential areas are situated to the southwest of Route 208 and the area consists of private properties, school athletic fields, and recreational open space. Approximately 32,457 people live within one mile of the center of the Site according to the 2010 Census.

EPA anticipates that the future land use will not change from its present scenario.

Groundwater Use

The groundwater at the WMWF was used as a drinking water source after treatment (air strippers and chlorination) prior to distribution to the public. However, in May 2016, the Borough of Fair Lawn made the decision to discontinue using the WMWF as a water supply source after the State of New Jersey lowered the groundwater remediation standard for 1,4 dioxane from 10 ug/L to 0.4 ug/L. The Fair Lawn Water Department currently supplements the water supply system for Fair Lawn by purchasing water from other water utilities. The selected remedy for the Site will upgrade the WMWF treatment system to remove the 1,4 dioxane and other contaminants such that the groundwater would be usable as a drinking water source in the future if the Borough decides to utilize the groundwater from the WMWF.

7. SUMMARY OF SITE RISKS

As part of the RI/FS, a baseline risk assessment to estimate current and future effects of contaminants on human health and the environment. The baseline risk assessment includes a human health risk assessment (HHRA) and an ecological risk assessment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases under current and future land uses. The baseline risk assessment provides the basis for taking an action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the risk document summarizes the results of the baseline risk assessment for the Site.

7.1 Human Health Risk Assessment

A four-step process is used for assessing site-related human health risks for a reasonable maximum exposure (RME) scenario. The process (as discussed below, in more detail) includes:

- *Hazard Identification* – uses the analytical data collected to identify the chemicals of potential concern (COPCs) at the site for each medium with consideration of a number of factors explained below;
- *Exposure Assessment* - estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., inhalation, dermal contact and ingestion of contaminated groundwater and surface water) by which humans are potentially exposed;
- *Toxicity Assessment* - determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response); and
- *Risk Characterization* - summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks. The risk characterization also identifies contaminants with concentrations which exceed acceptable levels, defined in the NCP as an excess lifetime cancer risk greater than 1 x 10^{-6} (one in a million) to 1 x 10^{-4} (one in ten thousand) or a Hazard Index (HI) greater than 1.0 for non-cancer health effects; contaminants at these concentrations are considered COCs and are typically those that will require remediation at the site. Also included in this section is a discussion of the uncertainties associated with these risks and hazards.

7.1.1 Hazard Identification

In this step, the COCs in each medium were identified based on such factors as toxicity, frequency of detection, fate and transport of the contaminants in the environment, concentration, mobility, persistence and bioaccumulation.

COPCs were selected by comparing the maximum detected concentration of each analyte in surface water and groundwater with available risk-based screening values for potentially complete pathways. The primary chemicals identified as COPCs and requiring further evaluation in the BHHRA are VOCs. PCE, TCE, CTE, and 1-4-dioxane were the compounds most widely distributed and persistently detected in the overburden and bedrock aquifers. Additionally, other chemicals such as semi-volatile organic compounds (SVOCs), metals, and pesticides were also retained for additional evaluation.

Only the COCs, or these chemicals requiring a response, are listed in Appendix II, Table 1. However, a full list of all COPCs identified in the HHRA (entitled "*Baseline Human Health Risk Assessment for the Fair Lawn Well Field Superfund Site*" dated March 2018), is available in the administrative record for the Site.

7.1.2 Exposure Assessment

Consistent with Superfund policy and guidance, the HHRA assumes that there will be no remediation or institutional controls to mitigate or remove hazardous substance releases. Cancer risks and noncancer hazard indices were calculated based on an estimate of the reasonable maximum exposure (RME) expected to occur under current and future conditions at a site. The RME is defined as the highest exposure that is reasonably anticipated to occur at a site.

The HHRA evaluated potential human receptors based on a review of current and reasonably foreseeable future land use at the Site. Potentially exposed populations in current and future risk scenarios include residents (young child and adult), construction workers, utility workers, Site workers and transient visitors (preadolescent and adolescent), and the HHRA evaluated several different exposure scenarios under residential, worker, and visitor conditions. Untreated groundwater is not used as a drinking water source at the Site; however, for purposes of evaluating risks from exposure to contaminants in groundwater, the HHRA assumed residential use of groundwater in the absence of treatment because the NJDEP has designated the aquifer as being a Class II-A drinking water source. The frequency of exposure for all receptors is the same under both current and future timeframes. Potential exposure routes evaluated for these receptors included ingestion, inhalation, and dermal contact with COPCs in surface water, designated by the NJDEP as FW2-NT (fresh water body-non-trout), and groundwater.

A summary of the exposure pathways included in the HHRA screening can be found in Appendix II - Table 2. Typically, exposures were evaluated using either the maximum value of a contaminant or a statistical estimate of the exposure point concentration (EPCs) in each medium of interest, which is typically an upper-bound estimate of the average concentration for each contaminant. A summary of EPCs for the COCs in groundwater and surface water can be found in Appendix II - Table 1. A comprehensive list of exposure point concentrations for all COPCs can be found in the HHRA (Langan, 2018).

7.1.3 Toxicity Assessment

In this step, the types of adverse health effects associated with contaminant exposures and the relationship between magnitude of exposure and severity of adverse health effects were determined. Potential health effects are contaminant-specific and may include the risk of developing cancer over a lifetime or other noncancer health effects, such as changes in the normal functions of organs within the body (e.g., changes in the effectiveness of the immune system). Some contaminants are capable of causing both cancer and noncancer health effects.

Under current EPA guidelines, the likelihood of carcinogenic risks and non-carcinogenic hazards because of exposure to site chemicals are considered separately. Consistent with current EPA policy, it was assumed that the toxic effects of the site-related chemicals would be additive. Thus, cancer and noncancer risks associated with exposures to individual COPCs were summed to indicate the potential risks and hazards associated with mixtures of potential carcinogens and non-carcinogens, respectively.

Toxicity data for the HHRA were provided by the Integrated Risk Information System (IRIS) database, the Provisional Peer Reviewed Toxicity Database (PPRTV), or another source that is identified as an appropriate reference for toxicity values consistent with EPA's guidance (http://www.epa.gov/oswer/riskassessment/pdf/tier3-toxicityvalue-whitepaper.pdf). This information is presented in Appendix II, Table 3 (non-carcinogenic toxicity data summary) and Table 4 (cancer toxicity data summary). Additional toxicity information for all COPCs is presented in the HHRA for the Site.

7.1.4 Risk Characterization

This step summarized and combined outputs of the exposure and toxicity assessments to provide a quantitative assessment of Site risks. Exposures were evaluated based on the potential risk of developing cancer and the potential for noncancer health hazards. The HHRA concluded that the untreated groundwater including the overburden, intermediate and deep bedrock, and the public water supply, if untreated, poses risks exceeding EPA's acceptable cancer or noncancer target levels for the child and adult resident, construction worker and Site worker receptors. The principal COCs exceeding risk based levels calculated for human health risk in the overburden due to ingestion, and inhalation of groundwater, are VOCs. Other COCs contributing to risk in these areas include 1,4-dioxane.

Noncarcinogenic risks were assessed using a hazard index (HI) approach, based on a comparison of expected contaminant intakes and benchmark comparison levels of intake (reference doses, reference concentrations). Reference doses (RfDs) and reference concentrations (RfCs) are estimates of daily exposure levels for humans (including sensitive individuals) that are thought to be safe over a lifetime of exposure. The estimated intake of chemicals identified in environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) is compared to the RfD or the RfC to derive the hazard quotient (HQ) for the contaminant in the particular medium. The HI is obtained by adding the HQs for all compounds within a particular medium that impacts a particular receptor population.

The HQ for oral and dermal exposures is calculated as below. The HQ for inhalation exposures is calculated using a similar model that incorporates the RfC, rather than the RfD.

HQ = Intake/RfD

Where: HQ = hazard quotient
Intake = estimated intake for a chemical (mg/kg-day)
RfD = reference dose (mg/kg-day)

The intake and the RfD will represent the same exposure period (i.e., chronic, subchronic, or acute).

As previously stated, the HI is calculated by summing the HQs for all chemicals for likely exposure scenarios for a specific population. An HI greater than 1.0 indicates that the potential exists for noncarcinogenic health effects to occur as a result of site-related exposures, with the potential for health effects increasing as the HI increases. When the HI calculated for all chemicals for a specific population exceeds 1, separate HI values are typically calculated for those chemicals that are known to act on the same target organ. These discrete HI values are then compared to the acceptable limit of 1 to evaluate the potential for noncarcinogenic health effects on a specific target organ. For the purposes of the streamlined HHRA screening, however, target organ effects were not specifically evaluated since each of the total residential groundwater hazard estimates were well above 1. Each chemical contributed individual HIs above 1 as well, meaning that the target organs impacted by each chemical would also be above 1. The HIs calculated provide a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. A summary of the noncarcinogenic hazards associated with the future groundwater exposure pathway is provided in Appendix II, Table 5.

As summarized in Table 5, the noncancer hazard estimates exceeded EPA's threshold value of 1 for the future child resident exposed to groundwater for all the exposure areas, with HIs totals ranging from 16 to 2,500. The future adult resident exposed to groundwater for all exposure areas was found to have HI totals ranging from 6.8 to 950. The future construction/site worker exposed to groundwater for all the exposure areas was found to have HI total ranging from 3.7 to 92.

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a carcinogen, using the cancer slope factor (SF) for oral and dermal exposures and the inhalation unit risk (IUR) for inhalation exposures. Excess lifetime cancer risk for oral and dermal exposures is calculated from the following equation, while the equation for inhalation exposures uses the IUR, rather than the SF:

Risk = LADD x SF

Where: Risk = a unitless probability (1×10^{-6}) of an individual developing cancer
LADD = lifetime average daily dose averaged over 70 years (mg/kg-day)
SF = cancer slope factor, expressed as [1/(mg/kg-day)]

These risks are probabilities that are usually expressed in scientific notation (such as 1×10^{-4}). An excess lifetime cancer risk of 1×10^{-4} indicates that one additional incidence of cancer may occur in a population of 10,000 people who are exposed under the conditions identified in the Exposure Assessment. Current Superfund regulations and guidance identify the threshold range for determining whether a remedial action is necessary as being an individual lifetime excess cancer risk in exceedance of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk), with 10^{-6} being the point of departure.

As shown in Appendix II, Table 6, total carcinogenic risks greater than 1×10^{-4} were identified for the future (child/adult) resident exposed to the groundwater in the overburden and intermediate bedrock aquifers, and the future site worker exposed to groundwater in the overburden water table aquifer. PCE and TCE were the primary chemicals responsible for elevated risk in groundwater, although CTE and 1,4-dioxane contributed as well. For the future child resident scenario, risks from ingestion of overburden groundwater from individual contaminants were: benzene (cancer risk of 3×10^{-5}), CTE (cancer risk of 2×10^{-3}), chloroform (cancer risk of 1×10^{-4}), PCE (cancer risk of 4×10^{-5}), TCE (cancer risk of 1×10^{-3}), and VC (cancer risk of 6×10^{-4}). All are within the acceptable risk range except CTE and TCE. For future child resident from dermal contact to overburden groundwater for individual contaminants: CTE (cancer risk of 4×10^{-4}) and TCE (cancer risk of 1×10^{-3}). For future child resident from inhalation to overburden groundwater for individual contaminants: benzene (cancer risk of 1×10^{-4}), CTE (cancer risk of 4×10^{-3}), chloroform (cancer risk of 2×10^{-3}), PCE (cancer risk of 1×10^{-4}), and TCE (cancer risk of 2.5×10^{-3}).

Several constituents (cyanide, cobalt, arsenic) slightly exceed EPA's risk and hazard thresholds under some scenarios. They have been included in the risk assessment tables for completeness but are not believed to be Site-related. Additionally, some VOCs that did not exceed risk and hazard thresholds are considered COCs because they exceed groundwater and drinking water standards.

7.1.5 Uncertainties in the Risk Assessment

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis;
- environmental parameter measurement;
- fate and transport modeling;
- exposure parameter estimation; and
- toxicological data.

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the risk assessment provides upper-bound estimates of the risks to populations near the Site, and is highly unlikely to underestimate actual risks related to the Site.

A noteworthy source of uncertainty in the HHRA for the Site groundwater derives from the fact that there was no evaluation for risk of exposure to non-aqueous phase liquids (NAPL). Additionally, since EPA has not yet determined whether PFOA and PFOS are Site-related, they were not included in the risk assessment, which could result in an underestimation of risk to hypothetical future receptors.

In instances where the 95% upper confidence limit on the mean (UCLM) was greater than the maximum concentration, the maximum value was used as the EPC. This occurred for n-heptane in overburden and intermediate bedrock wells, and 1,4-dioxane, bromodichloromethane, and cyanide in public water-supply wells. The use of the UCL95 as the EPC may under-estimate EPCs when the maximum concentration is higher than the UCL95 and the receptor is exposed to hot spots or localized areas of greater impacts. If the UCL95 chemical concentration is used as the EPC, it is likely to overestimate actual exposure concentrations.

Chromium was not speciated during analysis. Therefore, all chromium results are assumed to be trivalent chromium for the screening process and calculating risks and hazards. Hexavalent chromium is not the prevalent form of chromium, so it is expected to be a minor proportion of the total chromium reported. Risks and hazards derived for the ingestion and dermal pathways may be underestimated. Inhalation risks and hazards are not affected. However, while total chromium is evaluated in this HHRA as trivalent chromium, chromium analysis will be speciated for both trivalent and hexavalent during the RD phase to confirm the assumptions made in this BHHRA.

Ingestion of surface water as a drinking water exposure scenario was not included in the HHRA and the risks to potential future receptors are underestimated.

Soil direct-contact pathways are being addressed under NJDEP authority. Risks and hazards associated with soil exposure are not characterized in this HHRA. Consequently, cumulative risk to receptors with potentially complete soil direct contact pathways (e.g., hypothetical construction worker, child and adult residents) is likely underestimated.

Although the exposure frequencies used in evaluating human exposure in the HHRA are generally health protective, it is possible that some receptors could be exposed at a greater frequency than that evaluated. For instance, an adolescent transient visitor was evaluated based on an exposure frequency of 60 days/year. It is possible that a visitor may be on-Site more than 60 days/year, during the warm months of the year, which may underestimate risks.

The potential for vapor intrusion into buildings was evaluated throughout the plume and was determined to not be a pathway of concern in the residential areas downgradient of the Industrial Park. Vapor intrusion in the source areas being addressed under NJDEP authority continue to be evaluated but were not characterized in this HHRA.

More detailed information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the comprehensive human health risk assessment report for the Site.

7.2 Ecological Risk Assessment

A screening-level ecological risk assessment (SLERA) was also performed that describes existing habitats and ecological receptor species that have been noted or are expected to be present on the Site, and evaluates the potential risks associated with the exposure of the biota to surface water and sediment COPCs. EPA uses an eight-step process, including numerous scientific/management decision points, for evaluating potential risks to potential receptors. The SLERA is intended to allow a rapid determination as to whether the Site poses no ecological risks, or to identify which contaminants and exposure pathways require further evaluation. Using conservative assumptions about potential ecological risks, if no risks are estimated during the screening level evaluation, the ecological risk assessment process stops with the SLERA. If ecological risks are indicated by the

SLERA, EPA may proceed to a more comprehensive baseline ecological risk assessment (BERA) to further refine and better evaluate the site-specific ecological risk.

Based upon the SLERA, historic releases associated with the Site are not causing adverse effects to aquatic biota in Henderson Brook. While the presence of VOCs (and other COCs) has been detected in the overburden groundwater and surface water at elevated levels, the surface water does not show Site-related impacts that would pose an ecological risk to the Henderson Brook aquatic system. Therefore, no further ecological investigation was necessary. It is important to note that this evaluation is based on current Site conditions. Risk will be re-evaluated in the future if Site conditions change.

7.3 Risk Characterization Conclusion

The risk characterization combined the exposure and toxicity information to determine estimated risks to the selected exposure groups. The HHRA concluded that the untreated groundwater including in the overburden, intermediate and deep bedrock, and the public water supply, if untreated, poses risks exceeding EPA's acceptable cancer or noncancer target levels for the child and adult resident, construction worker and Site worker receptors. The principal COCs exceeding risk-based levels calculated for human health risk in the overburden due to ingestion and inhalation of groundwater are VOCs. Other COCs contributing to risk in these areas include 1,4-dioxane. These compounds, and the other compounds identified as COCs in Table B, also exceed state and federal drinking water quality standards.

No threats to human health were identified from COPCs found in the surface water throughout the Site. However, because contaminated groundwater continues to discharge to surface water, several COCs were detected in the surface water above NJ Surface Water Quality Standards (SWQS) and EPA National Recommend Water Quality Criteria (NRWQC). The SLERA indicated that the Site does not pose any unacceptable risks to ecological receptors at the Site.

7.4 Basis for Taking Action

Based on the results of the RI/FS and the risk assessment screening, EPA has determined that the response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

8. REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), requirements to-be-considered (TBC), and site-specific, risk-based levels established using the risk assessments described above.

Based on the site-specific human health and ecological risk assessment results, COCs in groundwater pose an unacceptable human health risk, and the following remedial action objectives (RAOs) address those risks at the Site:

- Prevent or minimize current and future exposure (via ingestion, dermal contact and inhalation) to Site-related contaminants in groundwater and surface water at concentrations greater than federal and state standards.
- Restore the impacted aquifer to its most beneficial use as a source of drinking water by reducing Site-related contaminant levels to the most stringent of federal and state standards.
- Restore the impacted surface water to its most beneficial use by reducing Site-related contaminant levels to the most stringent of federal and state standards.
- Minimize the potential for further migration of groundwater containing Site-related contaminants at concentrations greater than federal and state standards.

EPA and the NJDEP have promulgated maximum contaminant levels (MCLs) and NJDEP has promulgated Groundwater Quality Standards (GWQSs), which are enforceable, health-based, protective standards for various drinking water contaminants. In the Proposed Plan, for groundwater, EPA selected the more stringent of the MCL and GWQS as preliminary remediation goals (PRGs). In addition, the State of New Jersey is in the process of establishing MCLs for PFOA and PFOS, which were detected at the WMWF. The New Jersey Drinking Water Quality Institute recommended health-based MCLs for PFOA and PFOS are 14 ng/L and 13 ng/L, respectively. While not yet finalized, these standards are TBCs that EPA adopted as PRGs in the Proposed Plan.

Similarly, EPA recommends surface water quality criteria that are not expected to cause adverse effects to human health while NJDEP designates streams based on uses to protect open state waters. For surface water, the more stringent of the New Jersey Freshwater Category 2 Non-Trout Bearing Surface Water Quality Standards or the EPA National Recommended Water Quality Criteria for the Consumption of Water and Organisms were identified as PRGs in the Proposed Plan.

PRGs become final remediation goals when EPA selects a remedy after taking into consideration all public comments. EPA has selected the PRGs identified in the Proposed Plan as the remediation goals for the Site. The remediation goals for groundwater and surface water are presented in Tables 7 and 8.

9. DESCRIPTION OF REMEDIAL ALTERNATIVES

Section 121(b)(1) of CERCLA, 42 U.S.C. § 9121(b)(1), mandates that remedial actions must be protective of human health and the environment, cost-effective, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants at a site. Section 121(d) further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants that at least meets ARARs under federal and state laws, unless a waiver can be justified pursuant to Section 121(d)(4) CERCLA, 42 U.S.C. §9621(d)(4).

Detailed descriptions of the remedial alternatives presented in this ROD can be found in the Feasibility Study Report, dated July 2018.

The construction time provided for each alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate the performance of the remedy with any potentially responsible parties, or procure contracts for design and construction, or operation and maintenance.

9.1 Description of Common Elements among Remedial Alternatives

Each remedial alternative, except for the no action alternative, includes long-term monitoring (LTM) and institutional controls.

Long-Term Monitoring:

LTM will be implemented to ensure that groundwater and surface water quality improves following implementation of these alternatives until remediation goals are achieved. LTM would also be performed to collect groundwater and surface water data to evaluate the effectiveness of the groundwater treatment.

Institutional Controls:

Institutional controls are administrative and legal controls that help to minimize the potential for human exposure to contaminants. Institutional controls in the form of a classification exemption area/well restriction area (CEA/WRA) limiting future use of the Site groundwater and are common components of each of the alternatives except the No Action Alternative. Implementation of institutional controls for groundwater use restrictions would be required until RAOs are achieved to ensure the remedy remains protective.

While each of the alternatives, except for No Action, would ultimately result in a reduction of contaminant levels in groundwater and surface water such that levels would allow for unlimited use and unrestricted exposure, EPA anticipates that it would take longer than five years to achieve these levels. As a result, in accordance with CERCLA, under each alternative the Site remedy would be reviewed at least once every five years until remediation goals are achieved for unrestricted use and unlimited exposure.

9.2 Description of the Remedial Alternatives

Alternative 1: No Action

Capital Cost:	$0
Annual O&M Costs:	$0
Present-Worth Cost:	$0
Construction Time:	Not Applicable

The NCP requires that a "No Action" alternative be developed and considered as a baseline for comparing other remedial alternatives. Under this alternative, there would be no remedial action conducted at the Site. This alternative does not include any monitoring or institutional controls.

Alternative 2: Groundwater Recovery and Ex-Situ Treatment; Long-Term Monitoring; Institutional Controls

Capital Cost:	$5,215,000
Total O&M Costs:	$14,291,000
Present-Worth Cost:	$19,500,000
Construction Time:	6 months to 1 year

For this alternative, the existing groundwater recovery and air stripping treatment systems located at Fisher and 18-01 Pollitt Drive would continue to operate removing and treating groundwater contaminated with VOCs under NJDEP authority and oversight. See Figure 3. In addition, the Fair Lawn Water Department's WMWF water supply treatment system would be enhanced to treat for VOCs as well as 1,4-dioxane and PFOA/PFOS. During these enhancement activities, the WMWF would continue to operate, and discharge treated water to Henderson Brook under a NJPDES in compliance with substantive NJPDES permit discharge requirements.

Currently, two of the WMWF municipal wells (FL-10 and FL-14) are being operated at a combined flow rate of 150 gallons per minute (gpm). It is estimated that annual mass removal of VOCs and 1,4-dioxane from the existing WMWF would be approximately 535 pounds per year. If the other two WMWF municipal wells (FL-11 and FL-12) were restarted as part of this alternative a cumulative flow rate of 300 gpm would remove and treat up to 1,075 pounds of VOCs and 1,4-dioxane per year.

An advanced oxidation process (AOP) to treat VOCs and 1,4-dioxane, and liquid-phase granular activated carbon (LGAC) to treat VOCs and PFOA/PFOS prior to chlorination and entry into the water supply would enhance the WMWF in addition to the technologies currently used. Figure 4 illustrates the conceptual treatment process for the water supply enhancement in comparison to the current air stripper system. A treatability study would be completed during the remedial design phase that would determine the final components of the treatment system. It is likely that one ultra-violet light with hydrogen peroxide (UV/H202) AOP unit would be suitable to treat the 1,4-dioxane, and three 10,000-pound LGAC vessels may be sufficient to treat excess hydrogen peroxide (H202), VOCs and PFOA/PFOS. A pH adjustment process is included to control the natural scaling effects of elevated hardness and total dissolved solids in the water at the Site, and minimize operation issues. The footprint of a treatment building would be about 1,200 square-feet and placed adjacent to the existing air stripper to utilize the piping and utilities to the extent possible.

If necessary, this alternative would also include installing additional recovery well(s) with treatment unit(s) to capture any areas limited by hydraulic influence, and treat groundwater contaminated with site-related COCs.

Any decision regarding the final operation design of the WMWF upgrade would be made in coordination with the Borough and the NJDEP during the preparation of the engineering design of the selected remedy. The Borough would evaluate whether the treated water from the WMWF would be used as a water supply source. If the treated water from the WMWF was used as a water supply source, the new treatment equipment would become part of the water supply system. For purposes of estimating costs, it is assumed that the intended use of treated water is for drinking water

During the remedial design, groundwater modeling and capture zone analysis would be performed to estimate the hydraulic influence of the existing pump-and-treat systems and to identify potential gaps in the capture zones. This new information would be used to determine the location of any recovery well(s), if necessary.

For purposes of this alternative, EPA estimated that all four WMWF wells would be utilized at a combined estimated flow rate of 300 gpm, and one bedrock recovery well would be installed in the 1,4-dioxane plume at a pumping rate between 25 and 50 gpm, with treatment assumed to be AOP (for 1,4-dioxane) and LGAC (for VOCs and PFOA/PFOS) before being distributed for consumption. The treatability study that would be completed during the remedial design phase would determine the final components of the treatment system.

For cost estimating and planning purposes, a remediation duration of 30 years was used for developing costs associated with operation and maintenance (O&M) activities. However, using the data collected during the RI and the change in concentrations over a 6 -year period of time, EPA estimated the timeframe for reducing contaminant levels to below cleanup standards for the Site at approximately 36 to 40 yrs.

Under this alternative, the pumping rates established for groundwater recovery would mitigate COCs migrating to the Henderson Brook.

LTM would be performed by collecting groundwater and surface water data to evaluate the effectiveness of groundwater recovery. It assumes 46 existing groundwater and surface water locations, and four additional monitoring wells (if needed) would be used to measure groundwater quality.

An institutional control, in the form of a CEA/WRA, would restrict wells from being installed in the contaminated groundwater area.

While this alternative would ultimately result in a reduction of contaminant levels in groundwater and surface water such that levels would allow for unlimited use and unrestricted exposure, it is anticipated that it would take longer than five years to achieve these levels. As a result, in accordance with CERCLA, the Site remedy will be reviewed at least once every five years until remediation goals are achieved for unrestricted use and unlimited exposure.

Alternative 3: Groundwater Recovery and Ex-Situ Treatment; Air Sparging/Soil Vapor Extraction (AS/SVE); Aerobic Cometabolic Bioremediation; Long-Term Monitoring; Institutional Controls

Capital Cost:	$14,009,000
Total O&M Costs:	$14,891,000
Present-Worth Cost:	$28,900,000
Construction Time:	6 months to 1 year

Similar to Alternative 2, this remedial alternative includes the existing groundwater recovery and ex-situ treatment systems, coupled with the appropriate upgrades to address VOCs, 1,4-dioxane, and PFOA/PFOS contamination at the WMWF. This remedial alternative also includes in-situ air sparging (AS)/soil vapor extraction (SVE) with in-well air stripping, and aerobic cometabolic bioremediation systems to address the VOCs and 1,4-dioxane contaminant mass in the most concentrated areas of the groundwater plume.

In-well air stripping, a modified AS/SVE technique, combines the two technologies with air stripping, groundwater extraction and re-circulation to address the VOCs and 1,4-dioxane in overburden groundwater. Stripped contaminants are recovered and transferred to an above ground vapor-phase granular activated carbon (VGAC) unit for effluent vapor treatment.

In-well air stripping would require a pilot test to assess feasibility and determine the radius of influence (ROI) for the treatment area. For purposes of developing a conceptual design and cost estimate for comparison with other technologies, it is assumed that a total of 43 wells with a 60-foot ROI would cover the proposed treatment area (of 105,700 square feet) in the overburden to target groundwater contaminated with PCE concentrations ranging from 100 μg/L to 1,000 μg/L.

In addition, in-situ aerobic cometabolic bioremediation through gas infusion would address the 1,4-dioxane impacts in the intermediate bedrock source area(s). In this process, microbes derive energy from the metabolism of propane/oxygen which releases enzymes that degrade 1,4-dioxane. The oxygen/propane saturated groundwater migrates by advective flow path, further increasing the ROI around the gas infusion well. Only areas with 1,4-dioxane concentrations higher than 4 μg/L (10 times the GWQS) would be addressed using aerobic cometabolic bioremediation. LTM would assess reduction of mass over time for areas with 1,4-dioxane concentration below 4 μg/L.

Since gas infusion is a relatively new technology and has limited demonstration in the bedrock, prior to full scale implementation would require feasibility testing of gas infusion with a microcosm study and a pilot test would be required. Full-scale implementation would include an injection well network, gas infusers, gas cylinders, below grade piping to connect gas infusers to gas cylinders, and gas cylinder storage areas. Below-grade piping would be installed 6 inches to 1 foot below grade. For purposes of cost estimation, it is assumed that ROI is 30 feet, indicating that around 80 injection wells are needed to cover the treatment area, and that five gas infusers would be sufficient for each injection well.

As with Alternative 2, this alternative would also utilize the pumping rates established for groundwater recovery to mitigate COCs from migrating to the Henderson Brook. In addition, the in-situ AS/SVE and aerobic cometabolic bioremediation systems would reduce contaminant mass in the groundwater thus reducing the concentrations in the brook. An institutional control, in the form of a CEA/WRA, would restrict wells from being installed in the contaminated groundwater area.

The estimated timeframe for reducing concentrations to below standards is the same as Alternative 2 (about 36 to 40 yrs.) except this timeframe could be reduced if the in-situ treatments (AS/SVE and aerobic cometabolic bioremediation) prove to be effective during the remedial design/treatability study.

10. COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting a remedy for a site, EPA considers the factors set forth in Section 121 of CERCLA, 42 U.S.C. § 9621, and conducts a detailed analysis of the viable remedial alternatives in accordance with the NCP, 40 C.F.R Section 300.430(e)(9), the EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies*, OSWER Directive 9355.3-01, and the EPA's *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*, OSWER 9200.1-23.P. The detailed analysis consists of an assessment of the individual alternatives set forth in the FS against each of the nine evaluation criteria set forth at Section 300.430(e)(9)(iii) of the NCP and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

A comparative analysis of these alternatives, based upon the nine evaluation criteria noted below, follows.

Threshold Criteria - *The first two remedy selection criteria are known as "threshold criteria" because they are the minimum requirements that each response measure must meet in order to be eligible for selection as a remedy.*

10.1 Overall Protection of Human Health and the Environment

"Overall Protection of Human Health and the Environment" determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

Alternative 1 (No Action) would not meet the RAOs and would not be protective of human health and the environment since no action would be taken.

Alternatives 2 and 3 are the active remedies that address groundwater contamination and would restore groundwater quality over the long-term. Protectiveness under Alternatives 2 and 3 requires a combination of actively reducing contaminant concentrations in groundwater and limiting exposure to residual contaminants through institutional controls for groundwater use restrictions until RAOs are met. In addition, in the event that the Fair Lawn Water Department puts any of the

WMWF wells back into service as part of the drinking water supply system, protectiveness under Alternatives 2 and 3 relies upon the continued effectiveness of wellhead treatment along with appropriate upgrades at the supply wells impacted by the contamination to ensure that the water from these wells continues to meet state and federal drinking water standards. Alternative 3 relies on additional technologies to reduce mass concentrations of VOCs and 1,4-dioxane within the groundwater plume area but requires studies and testing to determine its effectiveness in the field. Alternative 2 is easily implemented and effective at remove the site COCs.

Alternatives 2 and 3 include LTM for groundwater and surface water to assess the effectiveness of the remedy. If necessary, additional recovery well(s) and treatment unit(s) would be implemented based on data collected during the remedial design. Also, an institutional control in the form of an NJDEP CEA/WRA would prohibit the installation of groundwater wells used for drinking purposes.

10.2 Compliance with ARARs, to be Considered (TBCs) and other Guidance

Section 121(d) of CERCLA, 42 U.S.C. § 9621(d), and Section 300.430(f)(1)(ii)(B) of the NCP, 40 C.F.R. § 300.430(f)(1)(ii)(B), require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal and state requirements, standards, criteria, and limitations, collectively referred to as "ARARs," unless such ARARs are waived under Section 121(d)(4) of CERCLA. "Compliance with ARARs" addresses whether a remedy will meet all ARARs or whether there is a basis for invoking a waiver.

EPA and the NJDEP have promulgated MCLs (40 CFR Part 141 and N.J.A.C. 7:10-5.2, respectively), which are enforceable standards for various drinking water contaminants (and are chemical-specific ARARs). If any state standard is more stringent than the federal standard, then compliance with the more stringent ARAR is required. The aquifer at the Site is classified as Class II-A, meaning that it is designated as a potable drinking water supply. As groundwater within Site boundaries is a source of drinking water, achieving the more stringent of the federal MCLs, New Jersey MCLs, and New Jersey GWQS in the groundwater is necessary. In addition, the State of New Jersey is in the process of promulgating MCLs for PFOA and PFOS, which were detected at the WMWF. While not yet finalized, these standards are TBCs that EPA has adopted as remediation goals. The New Jersey recommended health-based MCLs for PFOA and PFOS are 14 ng/L and 13 ng/L, respectively.

Alternative 1 would not comply with chemical-specific ARARs for groundwater and surface water. Action-specific ARARs do not apply to this alternative because no remedial action would be conducted.

Alternatives 2 and 3 would achieve chemical-specific ARARs, including New Jersey Ground Water Quality Standards, N.J.A.C. 7:9C, and New Jersey Primary Drinking Water Standards – Maximum Contaminant Levels, N.J.A.C. 7:10-5.2, through extraction and *ex-situ* treatment of contaminated groundwater. Alternative 3 would achieve chemical-specific ARARs and TBCs through in-well AS/SVE and aerobic cometabolic bioremediation;

For Alternatives 2 and 3, location- and action-specific ARARs would be met, including compliance with treatment requirements for air emissions and water quality discharge criteria, if applicable. A list of chemical-specific, location-specific, and action-specific ARARs can be found in Tables 11, 12, and 13, respectively, in Appendix II of this ROD.

Primary Balancing Criteria - *The next five remedy selection criteria, 3 through 7, are known as "primary balancing criteria." These five criteria are factors with which tradeoffs between response measures are assessed so that the best option will be chosen, given site-specific data and conditions.*

10.3 Long-Term Effectiveness and Permanence

"Long-term Effectiveness and Permanence" considers the ability of an alternative to maintain protection of human health and the environment over time.

Alternative 1 would not provide long-term effectiveness and permanence as no active remedial measure is proposed. Alternatives 2 and 3 are considered effective technologies for treatment, and for containment and restoration of the contaminated groundwater, if designed and constructed properly.

Alternatives 2 and 3 rely on a combination of treatment and institutional controls to achieve long-term effectiveness and permanence.

Alternative 2 would be more reliable than Alternative 3 since there is uncertainty as to whether in-well vapor stripping and bioremediation could effectively remove contamination. Air stripping, LGAC, and AOP have been proven to be effective technologies in reducing the concentrations of VOC contaminated groundwater in the treatment area.

Alternative 3, AS/SVE with in-well stripping, could potentially be effective and reliable at significantly reducing the VOC contamination mass in groundwater. However, implementing this technology has not been demonstrated. The effectiveness of this alternative is limited by the ROI of the treatment system. The ROI will depend on pumping capacity of each stripping well and hydrogeologic characteristics of the aquifer. The effectiveness of this alternative could also be limited due to the possibility that creation of a circulation cell may not be possible because of the potential influence from pumping of nearby public supply wells. A pilot study would be conducted to evaluate the ROI, to determine the effectiveness of in-well stripping and to obtain specific design parameters prior to full scale implementation. Also, the lack of effective vapor recovery in the bedrock aquifer is a concern as uncontrolled contaminated vapors could migrate along unpredictable saturated zone fracture pathways toward the surface. While this technology is not applicable to the surface water, it could reduce the concentration in the overburden groundwater which is connected to Henderson Brook.

AS/SVE with in-well air stripping and aerobic cometabolic bioremediation can, under some circumstances, accelerate contaminant mass reduction, but may not be effective at accelerating remediation over the existing GWTS. Alternative 3 is expected to have a similar overall time to construct and achieve remediation goals as Alternative 2.

As mentioned previously, the effectiveness of AS/SVE and aerobic cometabolic bioremediation is contingent upon the proper design, including the installation of infrastructure such as injection wells, extraction wells, and vacuum extraction wells in the most appropriate locations to treat the contamination. Because the areas requiring remediation are in a populated area with limited available space for construction, there may be limitations on the ability to make adjustments to improve the effectiveness of the technology. Among the alternatives, the challenges posed by the populated area to the effectiveness of the technology are greatest for Alternative 3 and would require further evaluation during the remedial design.

Alternatives 2 and 3 would provide control of risk to human health through the implementation of institutional controls until RAOs are achieved.

10.4 Reduction in Toxicity, Mobility, or Volume Through Treatment

"Reduction in Toxicity, Mobility, or Volume of Contaminants through Treatment" evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

Alternative 1 would not provide any reduction of toxicity, mobility, or volume of contaminants through treatment because no remedial action would be conducted, and the alternative does not include long-term monitoring of groundwater and surface water conditions. Alternatives 2 and 3 would reduce the toxicity, mobility, and volume of contaminants through treatment of contaminated groundwater.

Alternative 2 removes contaminated groundwater via extraction and treats the contamination via air stripping, AOP and LGAC, and is anticipated to be the most reliable alternative for reducing toxicity, mobility, or volume through treatment because these are proven technologies.

Alternative 3, using AS/SVE system and aerobic cometabolic bioremediation, would be less reliable mass reduction technology than Alternative 2 because of the limitations on the effectiveness of this technology in the bedrock aquifer and the low permeability of soil types (clay/silty soils). Alternative 3 may result in reductions in the volume of contaminants in the overburden and intermediate bedrock beyond those reductions achieved by the existing pump and treat systems alone, and if its effectiveness could be demonstrated and verified in a pilot study, would be reliable at reducing toxicity, mobility, or volume through treatment, though less so than Alternative 2.

10.5 Short-Term Effectiveness

"Short-term Effectiveness" considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

Alternative 1 would not have short-term impacts since no action would be implemented.

Alternatives 2 and 3 would have significant short-term impacts to remediation workers, the public, and the environment during implementation. Remedy-related construction (e.g., trench excavation) under Alternatives 2 and 3 (estimated construction timeframe of 6-12 months) would require street closings for extended periods. Efforts would be taken to minimize traffic disruption, such as the development of a traffic plan to re-route the traffic through alternate streets during remedial design. Coordination and access would be required from the municipality and County for work that requires road-closures. In addition, Alternative 2 and Alternative 3 have aboveground treatment components and infrastructure that may create a minor noise nuisance and inconvenience to residents during construction.

The possibility of exposure of workers, the surrounding community, and the local environment to contaminants during the implementation of Alternatives 2 and 3 is present, but minimal. VOC vapors may be generated by the remedial activities. Drilling activities, including the potential installation of monitoring, extraction, and injection wells for Alternatives 2 and 3, could produce contaminated liquids that present some risk to remediation workers at the Site. The potential for remediation workers to have direct contact with contaminants in groundwater could also occur when groundwater remediation systems are operating under Alternatives 2 and 3. Alternatives 2 and 3 could increase the risks of exposure through ingestion, inhalation, and dermal contact of contaminants by workers because contaminated groundwater would be extracted to the surface for treatment. However, occupational health and safety controls would be implemented to mitigate exposure risks, such as the installation of fencing to restrict access to above-grade treatment components.

Alternative 3 would have more short-term impacts to the community than Alternative 2 since more wells would be installed and the in-well stripping system would require more space for the installation of multiple well vaults to hold necessary equipment, valves, and fittings. In-well stripping system operations might generate noise that could be harder to mitigate.

The implementation of Alternatives 2 and 3 would require a health and safety plan, traffic controls, noise control and managing the hours of construction operation which could minimize the impacts to the community. Risk from exposure to contaminated groundwater during any construction, and operation and maintenance activities would require management through occupational health and safety controls to protect Site workers.

Both Alternatives 2 and 3 have similar timeframes for achieving RAOs. However, among the active alternatives, Alternative 2 would have the lowest short-term impact to the community.

10.6 Implementability

"Implementability" addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

All the alternatives are implementable. Alternative 1 would be the easiest to implement, both technically and administratively, since there are no activities. Alternatives 2 and 3 are both implementable, although each present different challenges. Alternative 2 is readily implementable since ground water recovery with ex-situ treatment is a well-established remedial technology with commercially available equipment.

Alternative 3 incorporates similar features as Alternative 2 with the addition of in-situ active remediation systems (AS/SVE with in-well stripping and aerobic cometabolic bioremediation) in select areas of the Site. Alternative 3 requires treatability studies and pilot tests to assess the effectiveness of remediation technologies. The AS/SVE with in-well air stripping occurs solely within the well. This process depends upon the same flushing mechanism and would be no more effective than with conventional pump and treat systems. The limitations of AS/SVE in clay/silty layers and concentrations of contaminants in the source area present significant make implementation challenges. The gas infusion technology approach for aerobic cometabolic bioremediation is a relatively new technology that would require pilot testing during the design phase to obtain Site-specific design parameters to ensure efficacy, with no guarantee of an accelerated clean-up time. There is a limited number of vendors available for the construction of in-well air stripping technology and gas infusion technology, which could affect cost and schedule.

Although technically implementable, Alternative 3 would have an impact on certain local businesses, privately owned properties, transportation infrastructure, and other operations near the Site. They will require traffic re-routing and management near McBride Avenue and Pollitt Drive. The installation of injection and extraction wells would impact adjacent areas because of the limited space for construction which poses implementability challenges.

Alternative 1 does not require any permits. In accordance with CERCLA, no permits would be required for on-site work for Alternatives 2 and 3 (although such activities would comply with substantive requirements of otherwise required permits).

Alternative 3 would require construction on private properties and installation of numerous wells and related systems, and would require access to be obtained from those property. If an additional recovery well is needed on-Site, both Alternative 2 and 3 may need to comply with substantive requirements of road opening permits or building permits for ex-situ treatment systems.

Alternatives 2 and 3 would require routine groundwater quality, performance and administrative monitoring including five-year CERCLA reviews. Alternative 2 is more readily implementable relative to Alternative 3.

10.7 Cost

"Cost" includes estimated capital and annual operation and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent. This is a standard assumption in accordance with EPA guidance.

The estimated capital costs, O&M costs, and present worth costs for the alternatives are discussed in detail in the FS Report dated July 2018. The cost estimates are based on the best available information. Alternative 1 has no cost because no activities are proposed. The present worth cost, using a discount rate of 7%, for Alternatives 2 and 3 are as follows:

Alternative	Capital Cost ($)	Total O&M Cost ($)	Present Worth ($)
1.No Action	0	0	0
2. Groundwater Recovery and Ex-Situ Treatment, Long-Term Monitoring, and Institutional Controls	**5,215,000**	**14,291,000**	**19,500,000**
3. Groundwater Recovery and Ex-Situ Treatment, AS/SVE with In-Well Stripping, and Aerobic Cometobolic Bioremediation, Long-Term Monitoring, and Institutional Controls	14,009,000	14,891,000	28,900,000

Note: The selected remedy is shown in bold.

Modifying Criteria *- The final two remedy selection criteria, 8 and 9, are called "modifying criteria" because new information or comments from the state or the community on the Proposed Plan may modify the preferred response measure or cause another response measure to be considered.*

10.8 State/Support Agency Acceptance

"State/Support Agency Acceptance" considers whether the State and/or Support Agency agrees with the EPA's analyses and recommendations.

NJDEP concurs with the selected remedy. A letter of concurrence is attached in Appendix IV.

10.9 Community Acceptance

"Community Acceptance" considers whether the local community agrees with the EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

EPA solicited input from the community on the remedial alternatives proposed at the Site. Verbal comments received from community members at the August 23, 2018, public meeting did not support or oppose the preferred alternative. Comments were generally inquiries about the nature and extent of contamination at the Site and public health and safety. During the comment period from August 6, 2018 to September 5, 2018, two comment letters were received via email. Copies of the comment letters are provided as Attachment D to Appendix V. A summary of significant comments contained in the letters and the comments received at the public meeting on August 23, 2018, as well as EPA's responses to those comments, are provided in the Responsiveness Summary (Appendix V).

11. PRINCIPAL THREAT WASTES

The NCP establishes an expectation that the EPA will use treatment to address the principal threats posed by a site wherever practicable (40 C.F.R. § 300.430(a)(1)(iii)(A)). Identified principal threat waste combines concepts of both hazard and risk. Principal threat wastes are considered source materials, i.e., materials that contain hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or as a source for direct exposure. Contaminated groundwater is generally not considered to be source material; however, non-aqueous phase liquid (NAPL) in groundwater may be viewed as potential source material. Analytical results from the remedial investigation did not reveal concentrations of contaminants in groundwater indicative of the presence of NAPL. However, NAPL was identified during investigations conducted by PRPs on their properties and is being addressed under NJDEP-led actions. As described above, soil contamination that may be considered principal threat waste has been or is being addressed through several NJDEP actions.

12. SELECTED REMEDY

12.1 Description of the Selected Remedy

The selected remedy for the Site is Alternative 2. Groundwater Recovery and Ex-Situ Treatment; Long-Term Monitoring; Institutional Controls.

The major components of the selected remedy at the Site include the following:

- Groundwater extraction via pumping and ex-situ treatment of recovered groundwater prior to discharge as a water supply source;
- If necessary, additional recovery well(s) with treatment unit(s) to capture any areas with limited hydraulic influence;
- Long-term monitoring program to assess the effectiveness of the groundwater remedy; and
- Implementation of institutional controls.

Active remediation elements will be designed to achieve the RAOs by establishing containment and restoration of groundwater. The extraction and treatment system will operate until remediation goals are attained. The exact number and placement of recovery well(s), pumping rates, and treatment processes, as well as the location of the treatment plant will be determined during the remedial design. If the Borough of Fair Lawn decides not to use the treated groundwater as part of their water supply system, it will be discharged to Henderson Brook or a POTW.

A pre-design investigation to determine the nature and extent of PFOA and PFOS in groundwater, and a treatability study to demonstrate that appropriate treatment technologies remove 1,4 dioxane and PFOA and PFOS from groundwater will be conducted during the remedial design.

A long-term monitoring program will be implemented to track and monitor changes in the groundwater and surface water contamination to ensure the RAOs are attained. The results from the long-term monitoring program will be used to evaluate the migration and changes in site-related COCs over time.

Institutional controls will be placed to ensure that the remedy remains protective until RAOs are achieved for protection of human health over the long term. EPA will work with NJDEP to implement a CEA/WRA to prohibit the use of groundwater for drinking purposes while the groundwater recovery and treatment systems remediate the contaminated groundwater.

The total estimated, present-worth cost for the selected remedy is $19,500,000. Further details of the cost are presented in Appendix F of the FS Report. This is an engineering cost estimate that is expected to be within the range of plus 50 percent to minus 30 percent of the actual project cost.

While this alternative will ultimately result in a reduction of contaminant levels in groundwater such that levels would allow for unlimited use and unrestricted exposure, it is anticipated that it will take longer than five years to achieve these levels. As a result, in accordance with CERCLA, the Site remedy will be reviewed at least once every five years until remediation goals are achieved.

Consistent with EPA Region 2's Clean and Green, EPA will evaluate the use of sustainable technologies and practices with respect the remedial alternative selected for the Site.[2] This would include green remediation technologies and practices.

12.2 Summary of the Rationale for the Selected Remedy

Based upon the requirements of CERCLA, the results of the site investigation, the detailed analysis of the alternatives, and public comments, EPA has determined that Alternative 2 (Groundwater Recovery and Ex-Situ Treatment; Long-Term Monitoring; Institutional Controls) best satisfies the requirements of Section 121 of CERCLA, 42 U.S.C. § 9621, and provides the best balance of tradeoffs among the remedial alternatives with respect to the NCP's nine evaluation criteria, as set forth at 40 C.F.R. § 300.430(e)(9).

Under Alternative 2, the current pump and treat systems along with the potential for additional recovery well(s), to be determined during the remedial design phase, will provide mass reduction in the long term and hydraulic control of Site-related contaminants and ultimately achieve MCLs and risk-based levels. As source control efforts continue at the Fisher, Sandvik and 18-01 Pollitt Drive facilities under NJDEP oversight, the concentration of groundwater contamination will be reduced. Site-related COCs are expected to remain in the groundwater for 36 to 40 years, and institutional controls and long-term monitoring will ensure that human health and the environment are protected during the operation of the pump and treat systems. Alternative 2 will be more reliable than Alternative 3 since with Alternative 3 there is uncertainty as to whether the in-well vapor stripping and bioremediation processes could effectively remove contamination. Under Alternative 2, air stripping (Fisher and 18-01 Pollitt Drive), AOP and LGAC (WMWF) are effective technologies for reducing the concentrations of the site-related COCs in groundwater.

[2] See https://www.epa.gov/greenercleanups/epa-region-2-clean-and-green-policy.

The treatability study to be completed during the remedial design phase will determine the final components of the treatment system. Under Alternative 3, the long-term reliability and effectiveness of the proposed AS/SVE system and aerobic cometabolic bioremediation have not yet been well demonstrated, and the bedrock aquifer presents additional complexity with this treatment technology. Alternative 3 would not reduce the overall time frame for mass removal compared with Alternative 2.

Alternative 2, groundwater extraction and treatment, is a proven technology which has demonstrated effectiveness at reducing contaminant mass and providing containment to achieve cleanup standards for VOC-contaminated groundwater. While AS/SVE with in-well vapor stripping and aerobic cometabolic bioremediation has been effective under some site conditions, these technologies would require pilot testing to demonstrate that the in-situ technologies are effective at this Site. Furthermore, the gas infusion aerobic cometabolic bioremediation may not be able to treat areas with the levels of 1,4 dioxane detected at the Site. Alternative 2 is more reliable and effective at remediating the groundwater, and easily implementable in the community.

Although the densely populated residential area poses some logistical challenges to the implementation of each active remedial alternative, EPA believes that Alternative 2 would be significantly less disruptive than Alternative 3 to the residents. For example, it was estimated for cost estimating purposes that for Alternative 3 a total of 43 wells would be configured in the overburden on private property, with a 60-foot ROI covering the treatment area to target groundwater contaminated with PCE concentrations ranging between 100 µg/L and 1,000 µg/L. A final determination for the number of treatment wells could differ if the 60-foot radius of influence is incorrect.

Based upon the information currently available, EPA believes the selected alternative meets the threshold criteria *(protection of human health and the environmen*t and c*ompliance with ARARs*) and provides the best balance of tradeoffs among the other alternatives with respect to the balancing criteria. The selected alternative satisfies the following statutory requirements of Section 121(b) of CERCLA: 1) it is protective of human health and the environment; 2) it complies with ARARs; 3) it is cost effective; 4) it utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) it satisfies the preference for treatment as a principal element. Long-term monitoring will be performed to assure the protectiveness of the remedy. With respect to the two modifying criteria of the comparative analysis (*state acceptance* and *community acceptance*), NJDEP concurs with the preferred alternative, and EPA received no public comments in opposition to the selected remedy.

12.3 Summary of the Estimated Selected Remedy Costs

The estimated capital, O&M, and present worth costs of the selected remedy are discussed in detail in the July 2018 FS Report. The cost estimates, which are based on available information, are order-of-magnitude engineering cost estimates that are expected to be within +50 to -30 percent of the actual cost of the project. Changes to the cost estimate can occur as new information and data collected during the design of the remedy.

A cost estimate summary for the selected remedy is presented in Table 9 in Appendix II. The estimated capital, O&M, and total present-worth costs are presented below:

Alternative	Capital Cost ($)	Total O&M Cost ($)	Present Worth ($)
Alternative 2; Groundwater Recovery and Ex-Situ Treatment; Long-Term Monitoring; Institutional Controls	5,215,000	14,291,000	19,500,000

12.4 Expected Outcomes of the Selected Remedy

The selected remedy actively addresses the contamination identified in the groundwater and surface water. The overall expected outcome of the selected remedy is to meet the Site RAOs of: 1) preventing or minimizing current and future exposure (via ingestion, dermal contact and inhalation) to Site-related contaminants in groundwater and surface water at concentrations greater than federal and state standards; 2) restoring the impacted aquifer to its most beneficial use as a source of drinking water by reducing Site-related contaminant levels to the most stringent of federal and state standards; 3) restoring the impacted surface water to its most beneficial use by reducing Site-related contaminant levels to the most stringent of federal and state standards; and, 4) minimizing the potential for further migration of groundwater containing Site-related contaminants at concentrations greater than federal and state standards.

Remediation of the sources of groundwater contamination under NJDEP authority will address principal threat waste material which acts as a reservoir for continued contamination of the groundwater. The selected remedy will restore the aquifer at the Site. Additionally, remediation of the soils and groundwater in the source areas under NJDEP authority will be beneficial to the selected remedy since that remediation will eliminate the continuing sources of contamination to the aquifer. The soil and groundwater remediation in the source areas will reduce the timeframe for aquifer restoration. The results of the risk assessment indicate excess cancer risk and non-cancer health hazards associated with future human ingestion of groundwater above acceptable levels under baseline conditions. The response action selected in this ROD will eliminate risks associated with this pathway, and upon completion should allow for unrestricted use and unlimited exposure. Groundwater and surface water remediation goals for the COCs at the Site are presented in Tables 7 and Table 8. Achieving the remediation goals will restore the aquifer to its beneficial use.

13. STATUTORY DETERMINATIONS

EPA has determined that the selected remedy complies with the CERCLA and NCP provisions for remedy selection, meets the threshold criteria, and provides the best balance of tradeoffs among the alternatives with respect to the balancing and modifying criteria. CERCLA and NCP provisions require the selection of remedies that are protective of human health and the environment, comply with ARARs (or justify a waiver from such requirements), are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances as a principal element (or justify not satisfying the preference). The following sections discuss how the selected remedy meets those statutory requirements.

13.1 Protection of Human Health and the Environment

The selected remedy will protect human health and the environment because over the long-term it will address sources of contamination that will result in the restoration of groundwater quality at the Site to drinking-water standards. Protection will also be achieved by eliminating the remaining direct-contact risks to human health associated with contaminated groundwater.

Institutional controls will also assist in protecting human health over both the short- and long-term at the Site by helping to control and limit exposure to hazardous substances until RAOs are achieved.

13.2 Compliance with ARARs

The selected remedy complies with chemical-specific, location-specific and action-specific ARARs. A complete list of the ARARs and TBCs for the selected remedy is presented in Table 11, Table 12, and Table 13, which can be found in Appendix II.

13.3 Cost Effectiveness

A cost-effective remedy is one whose costs are proportional to its overall effectiveness (40 C.F.R. § 300.430(f)(1)(ii)(D)). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence, reduction in toxicity, mobility, and volume through treatment, and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness.

Each of the alternatives underwent a detailed cost analysis. In that analysis, capital and annual O&M costs were estimated and used to develop present-worth costs. In the present-worth cost analysis, annual O&M costs were calculated for the estimated life of each alternative. The total estimated present worth cost for implementing the selected remedy is $19,500,000.

Based on the comparison of overall effectiveness to cost, the selected remedy meets the statutory requirement that Superfund remedies be cost effective (40 C.F.R. § 300.430(f)(1)(ii)(D)) in that it represents reasonable value for the money to be spent. The overall effectiveness of the selected remedy has been determined to be proportional to the costs, and the selected remedy therefore represents reasonable value for the money to be spent.

13.4 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to Maximum Extent Practicable

The selected remedy complies with the statutory mandate to utilize permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. Of the two alternatives that are protective of human health and the environment and comply with ARARs (or provide a basis for invoking an ARAR waiver), EPA has determined that the selected remedy provides the best balance of tradeoffs among the alternatives with respect to the balancing criteria set forth in the Section 300.430(f)(1)(i)(B) of the NCP and represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. The selected remedy satisfies the criteria for long-term effectiveness and permanence by permanently reducing the mass of contaminants in the groundwater at the Site, thereby reducing the toxicity, mobility, and volume of contamination.

13.5 Preference for Treatment as a Principal Element

Through the use of AOP with hydrogen peroxide and liquid granular active carbon technologies, the selected remedy satisfies the statutory preference for remedies that employ treatment as a principal element.

13.6 Five-Year Review Requirements

While the selected remedy will ultimately result in a reduction of contaminant levels in groundwater and surface water such that levels would allow for unlimited use and unrestricted exposure, it is anticipated that it would take longer than five years to achieve these levels. As a result, in accordance with CERCLA, the Site remedy will be reviewed at least once every five years from the completion of construction until remediation goals are achieved.

14. DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Site was released on August 6, 2018. The Proposed Plan identified Alternative 2 as the preferred alternative for remediating contaminated groundwater of the Site.

EPA considered all comments at the public meeting on August 23, 2018, and reviewed all written (including electronic formats, such as e-mail) during the public comment period and has determined that no significant changes to the remedy, as originally identified in the Proposed Plan, are necessary or appropriate.

APPENDIX I

FIGURES

Legend

General Site Area

Notes:
USGS 7.5-Minute quadrangles, 2016
(Hackensack and Paterson, NJ Quadrangles)

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SCALE IN FEET

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Collectively known as Langan

Project

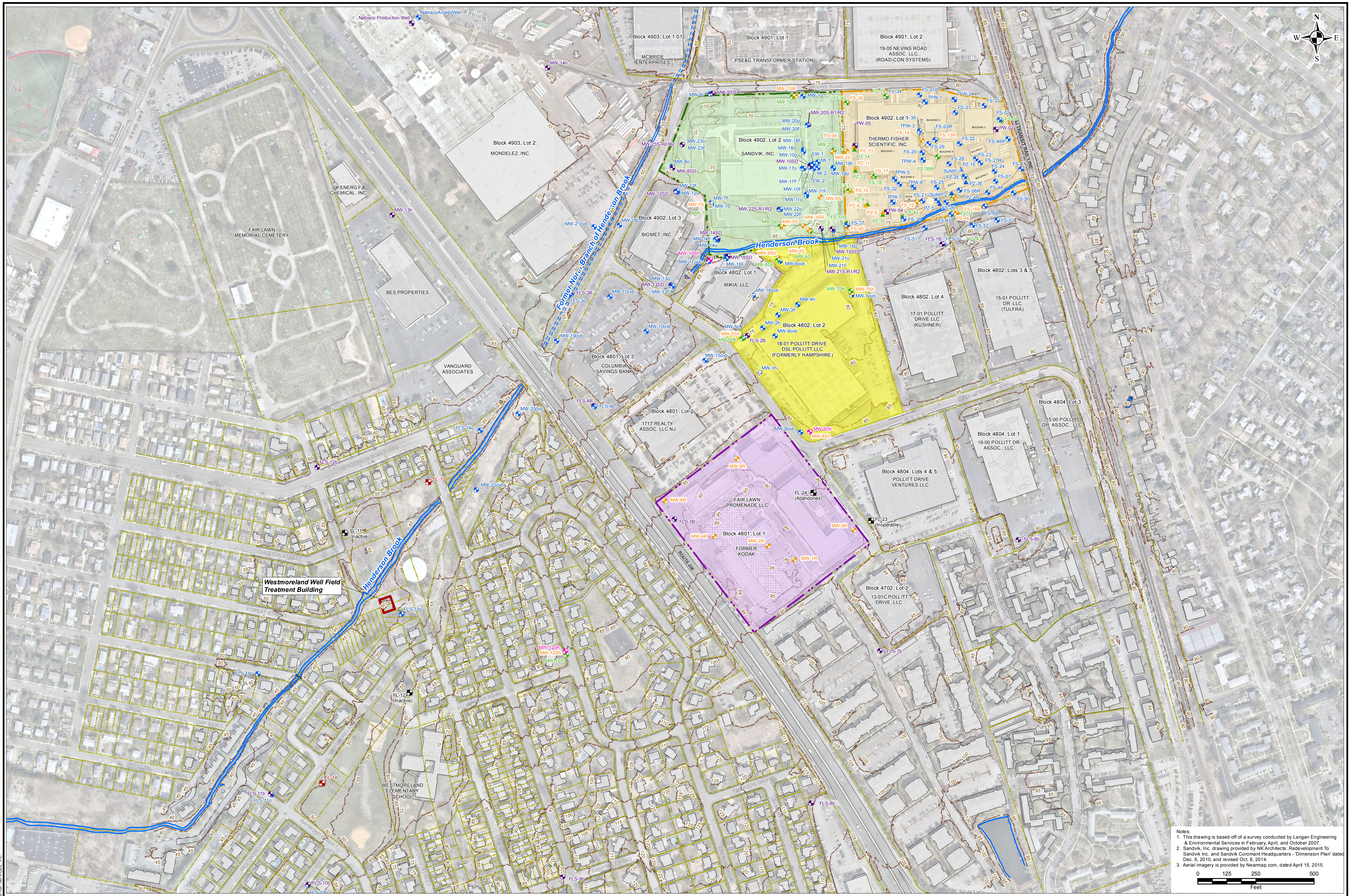
FAIR LAWN WELL FIELD SUPERFUND SITE
FAIR LAWN
BERGEN COUNTY NEW JERSEY

Drawing Title

SITE LOCATION MAP

Project No. 2587020	Figure 1
Date 5/21/2018	
Scale 1"=2,000'	
Drawn By MH	
Submission Date 5/21/2018	

Path: \\langan.com\data\PHL\data0\2587020\ArcGIS\Mapdocuments\2018_FS\Final\Figure 1 - Site Location Map_5-21-18.mxd Date: 5/21/2018 User: mmking Time: 10:59:31 AM



Legend

	Property Boundary
	Stream (dashed where culverted)
	Recovery Trench for Overburden Groundwater
	Railroad
	Building or Covered Structure
	Former Building
FS-02	Overburden Monitoring Well
TPW-5	Overburden Recovery Well
PZ-5	Overburden Piezometer
FS-12	Shallow Bedrock Monitoring Well
PZ-11	Shallow Bedrock Piezometer
FS-18	Intermediate Bedrock Monitoring Well
PZ-9	Intermediate Bedrock Piezometer
MW-8Dh	Deep Bedrock Monitoring Well
MW-17Bh	Deep Bedrock Production Well
MW-15SD	Bedrock FLUTe ™ Well
PW-02	Bedrock Production Well
FL-10	Fair Lawn Well Field Well
FL-11	Fair Lawn Well Field Well (Inactive)
	Fisher Property Boundary
	Sandvik Property Boundary
	Kodak Property Boundary
	18-01 Pollitt Drive, LLC Property Boundary
	Westmoreland Well Field Treatment Building

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Langan International LLC
Collectively known as Langan

Project

FAIR LAWN WELL FIELD SUPERFUND SITE

FAIR LAWN

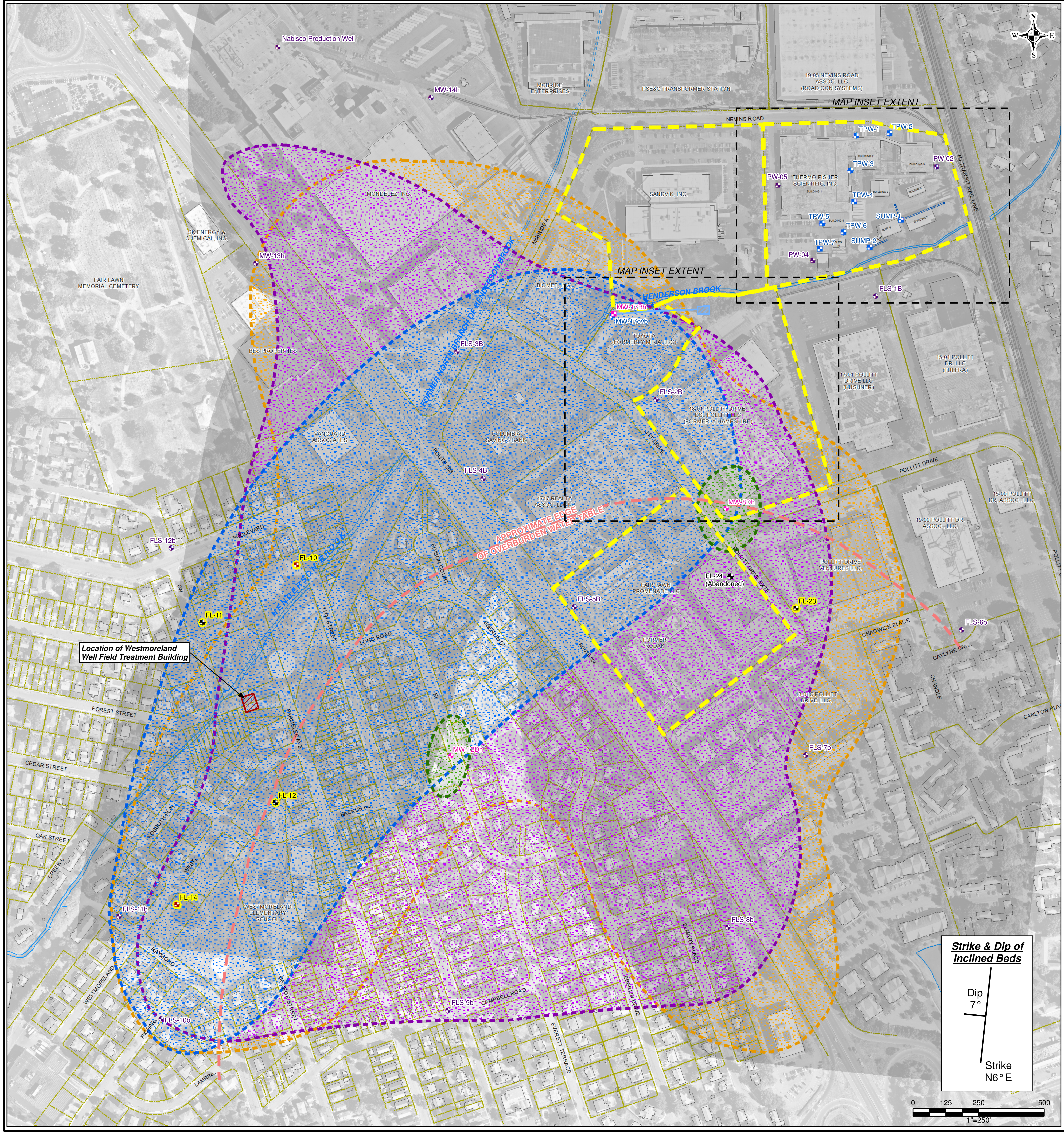
BERGEN COUNTY NEW JERSEY

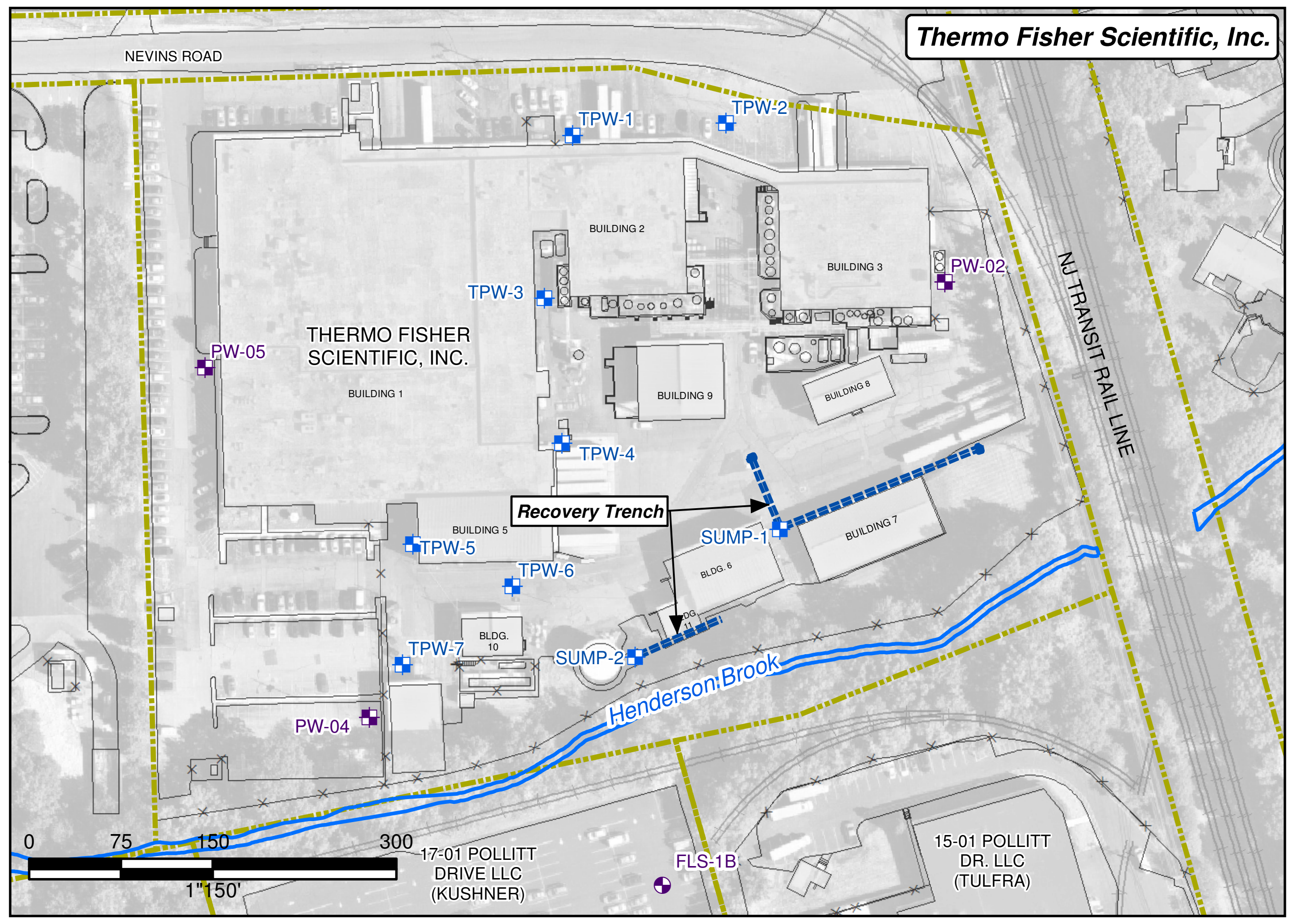
Drawing Title

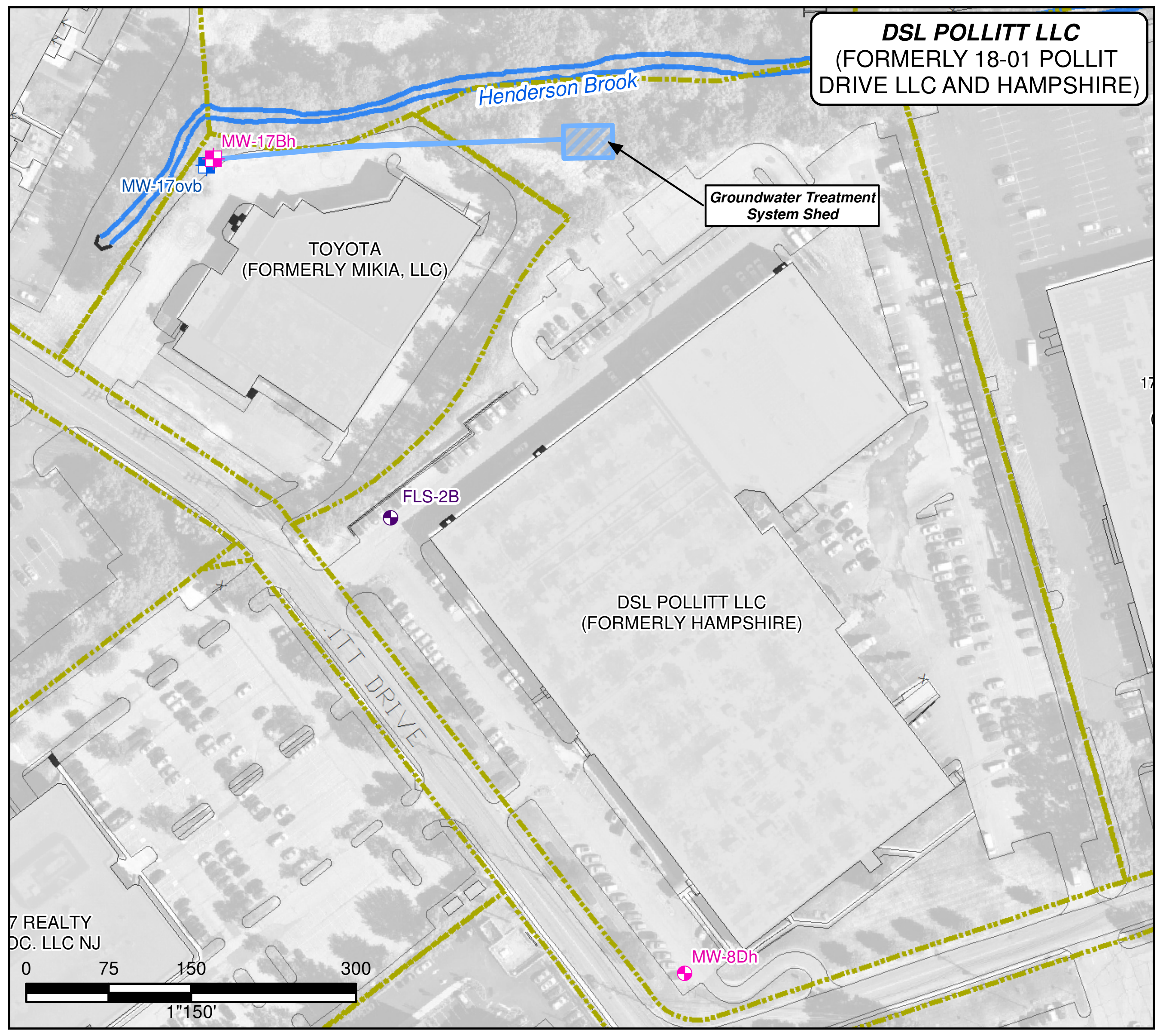
SITE PLAN AND WELL LOCATIONS

Project No.	2587020
Date	5/21/2018
Scale	1"=250'
Drawn By	MH
Submission Date	
Figure	2

Path: \\langan.com\data\PHL\data0\2587020\ArcGIS\Mapdocuments\2018_FS\Final\Figure 2 - Site Plan_5-21-18.mxd







Legend

- Overburden Recovery Well
- Bedrock FLUTe ™ Well
- Bedrock Production Well
- Deep Bedrock Monitoring Well
- Deep Bedrock Production Well
- Fair Lawn Well Field Well
- Fair Lawn Well Field Well (Inoperable)
- Railroad
- Property Boundary
- Recovery Trench for Overburden Groundwater
- Stream (dashed where culverted)
- Approximate Edge of Overburden Water Table
- Hampshire GRS Treatment Units (Approximate)
- Property Boundary where remedies have been or will be implemented to address soil and groundwater impacts
- Approximate Deep Bedrock PCE Plume Distribution
- Approximate Deep Bedrock TCE Plume Distribution
- Approximate Deep Bedrock Carbon Tetrachloride Plume Distribution
- Approximate Deep Bedrock 1,4-Dioxane Plume Distribution
- Westmoreland Well Field Treatment Building
- Deep Bedrock Pumping Influence

Notes:
1. This drawing is based off a survey conducted by Langan in 2007.
2. Sandvik, Inc. drawing provided by NK Architects: Redevelopment To Sandvik Inc. and Sandvik Coromant Headquarters - 'Dimension Plan' dated Dec. 6, 2010, and revised Oct. 8, 2014.
3. Strike and Dip of Inclined beds from Arm Geophysical/Survey December 2009/January 2013.
4. Aerial imagery is provided by Nearmap.com, dated April 15, 2015.
5. Plume contours are based on recent sampling data collected as part of the Fair Lawn Well Field Superfund Site as well as data collected under the facilities' NJDEP-led investigations. These contours are considered approximate and are in constant flux due to localized pumping and seasonal fluctuations.

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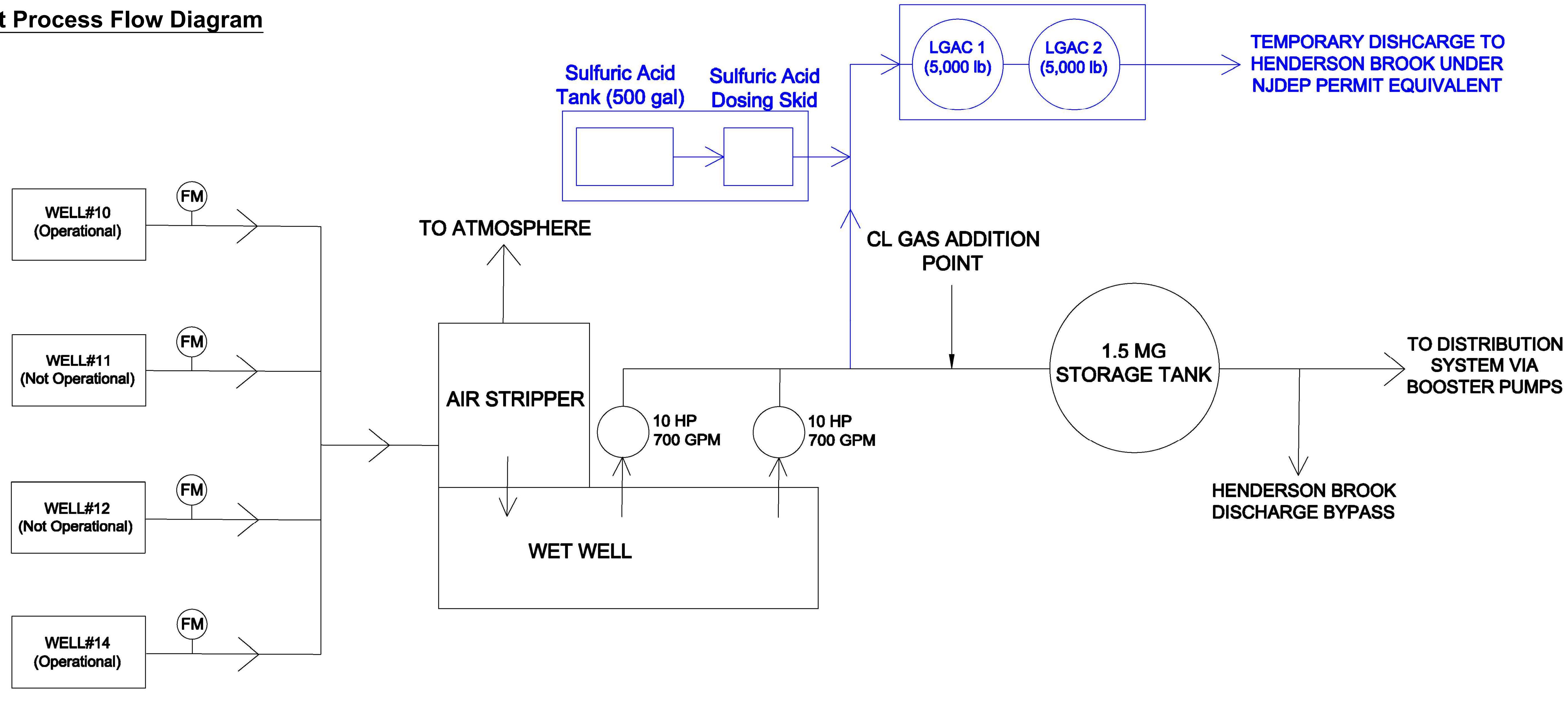
Project
FAIR LAWN WELL FIELD SUPERFUND SITE
FAIR LAWN
BERGEN COUNTY NEW JERSEY

Drawing Title
REMEDIAL ALTERNATIVE 2 AND 3 - GROUNDWATER RECOVERY SYSTEM LOCATIONS

Project No. 2587020	Figure 3
Date 7/10/2018	
Scale SEE MAP	
Drawn By MH	
Submission Date	

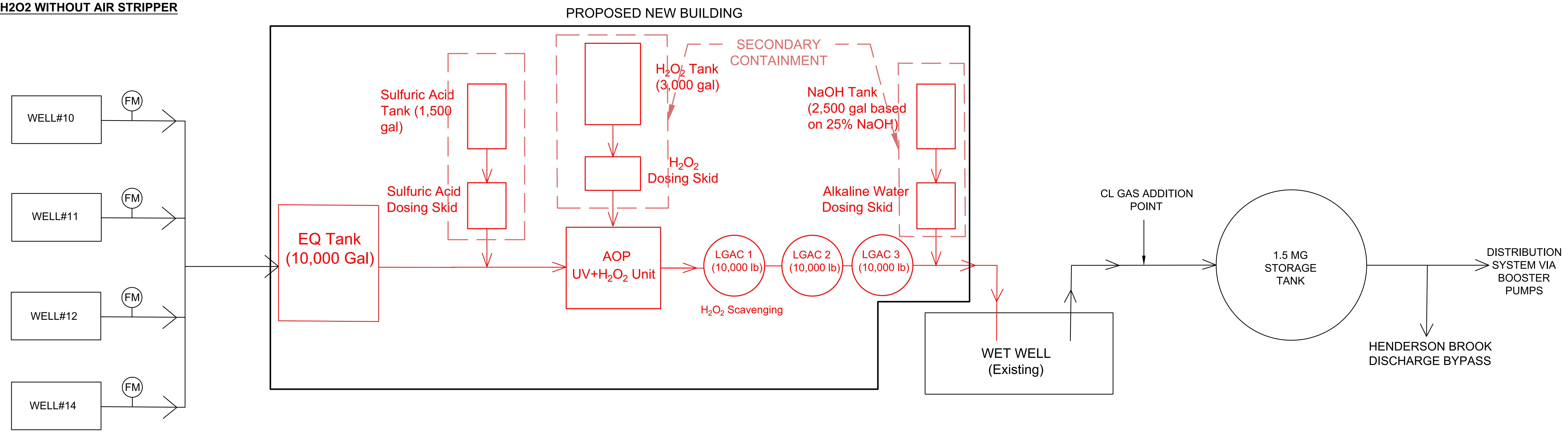
Path: \\langan.com\data\PHL\data0\2587020\ArcGIS\Mapdocuments\2018_FS\Final\Figure 21 - Remedial Alternative 2 and 3 GW Recovery System_7-11-18.mxd Date: 7/11/2018 User: MHAGAN Time: 12:00:35 PM

Current Westmoreland Well Field Treatment Process Flow Diagram



Proposed Upgrade Westmoreland Well Field Treatment Process Flow Diagram

UV/H2O2 WITHOUT AIR STRIPPER



NOTES:

1. THE PROPOSED TREATMENT PROCESS FLOW DIAGRAM IS PRELIMINARY AND NOT FOR CONSTRUCTION. THE PROPOSED CONFIGURATION MAY CHANGE DURING THE FINAL DESIGN PHASE.
2. THE TEMPORARY LGAC UNITS AND RELATED PIPING AR SHOWN IN BLUE.
3. THE PROPOSED NEW TREATMENT PROCESSES ARE SHOWN IN RED.

ABBREVIATIONS:

MG : MILLION GALLON
GAL: GALLON
LB: POUND
PPM: PARTS PER MILLION
LGAC : LIQUID-PHASE GRANULAR ACTIVATED CARBON
CL : CHLORINE
EQ: EQUALIZATION
FM : FLOW METER
UV: ULTRA-VIOLET
H_2O_2 : HYDROGEN PEROXIDE
NaOH: SODIUM HYDROXIDE

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Project	Drawing Title	Project No.	Drawing No.
FAIR LAWN WELL FIELD SUPERFUND SITE FAIR LAWN BERGEN COUNTY NEW JERSEY	COMPREHENSIVE PROCESS FLOW DIAGRAM	002587024 Date: 7/9/2018 Drawn By: MH Checked By: YG	4

LANGAN
PROJECT NO. 002587024

Filename: \\langan.com\data\PHL\data0\002587024\Cadd Data - 002587024\2D-DesignFiles\Preliminary AOP Design\Completion Report\Westmoreland Well Field Treatment Process Flow Diagram_7-9-18.dwg Date: 7/18/2018 Time: 12:43 User: mhagan Style Table: Langan.stb Layout: ARCHC-BL

APPENDIX II

TABLES

Table 1
Summary of Chemicals of Concern and
Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current/Future
Medium: Overburden Groundwater
Exposure Medium: Potable Water

Exposure Point	Chemical of Concern	Concentration Detected (Qualifier)		Concentration Units	Frequency of Detection	Exposure Point Concentration[1] (EPC)	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Groundwater Overburden	Arsenic	1.2	141	ug/l	52/232	6.792	ug/l	c
	Benzene	0.14	4960	ug/l	35/287	138.7	ug/l	a
	Carbon Tetrachloride	0.32	197000	ug/l	55/287	5971	ug/l	a
	Chloroform	0.18	29100	ug/l	150/287	757.7	ug/l	a
	cis-1,2-Dichlororethylene	0.25	25400	ug/l	143/287	733.8	ug/l	a
	Cobalt	0.6	291	ug/l	65/221	13.52	ug/l	b
	Cyanide	6.4	420	ug/l	17/101	14.21	ug/l	b
	1,2-Dichloroethane	0.45	14	ug/l	15/287	1.049	ug/l	a
	m-xylene	0.24	41900	ug/l	41/287	2249	ug/l	e
	1,4-dioxane	0.0987	271	ug/l	54/158	2.071	ug/l	b
	Ethylbenzene	0.43	8400	ug/l	16/287	205.9	ug/l	c
	Manganese	2.3	27000	ug/l	197/221	2932	ug/l	a
	Tetrachloroethylene (PCE)	0.26	162000	ug/l	128/287	4251	ug/l	a
	Trichloroethylene (TCE)	0.24	92600	ug/l	168/287	2828	ug/l	a
	Vinyl chloride	0.19	3150	ug/l	49/287	94.84	ug/l	a

Table 1
Summary of Chemicals of Concern and
Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current/Future
Medium: Intermediate Bedrock Groundwater
Exposure Medium: Potable Water

Exposure Point	Chemical of Concern	Concentration Detected (Qualifier)		Concentration Units	Frequency of Detection	Exposure Point Concentration[1] (EPC)	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Groundwater Intermediate Bedrock	Arsenic	1.4	73	ug/l	106/223	6.305	ug/l	a
	Benzene	0.16	260	ug/l	32/348	7.111	ug/l	a
	Carbon Tetrachloride	0.22	13800	ug/l	215/348	252.2	ug/l	a
	Chloroform	0.19	4440	ug/l	294/348	173.7	ug/l	a
	cis-1,2-Dichlororethylene	0.24	1660	ug/l	232/348	60.28	ug/l	a
	Cobalt	0.4	37	ug/l	57/313	9.57	ug/l	a
	Cyanide	10	300	ug/l	18/137	24.19	ug/l	a
	1,2-Dichloroethane	0.28	1780	ug/l	89/348	34.66	ug/l	a
	1,1-Dichloroethane	0.29	123	ug/l	179/348	7.089	ug/l	a
	1,4-dioxane	0.0714	147	ug/l	108/204	14.6	ug/l	c
	Tetrachloroethylene (PCE)	0.25	18600	ug/l	239/348	830.7	ug/l	a
	Trichloroethylene (TCE)	0.23	687	ug/l	315/348	49.44	ug/l	a
	Vinyl chloride	0.37	71.50	ug/l	66/348	1.654	ug/l	b

Table 1
Summary of Chemicals of Concern and
Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current/Future
Medium: Deep Bedrock Groundwater
Exposure Medium: Potable Water

Exposure Point	Chemical of Concern	Concentration Detected (Qualifier)		Concentration Units	Frequency of Detection	Exposure Point Concentration[1] (EPC)	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Groundwater Deep Bedrock	Arsenic	2	2060	ug/l	60/100	9.84	ug/l	a
	Carbon Tetrachloride	0.27	293	ug/l	21/105	3.995	ug/l	c
	Chloroform	0.22	60.5	ug/l	64/105	13.77	ug/l	a
	1,2-Dichloroethane	0.26	3.7	ug/l	15/105	0.619	ug/l	c
	1,4-dioxane	0.104	51.4	ug/l	35/111	1.859	ug/l	c
	Tetrachloroethylene (PCE)	0.33	761	ug/l	60/105	55.88	ug/l	a
	Trichloroethylene (TCE)	0.32	91	ug/l	70/105	16.81	ug/l	a
	Vinyl chloride	0.48	40.4	ug/l	13/105	4.908	ug/l	a

Table 1
Summary of Chemicals of Concern and
Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current/Future
Medium: Groundwater -Public Water Supply
Exposure Medium: Potable Water

Exposure Point	Chemical of Concern	Concentration Detected (Qualifier)		Concentration Units	Frequency of Detection	Exposure Point Concentration[1] (EPC)	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Groundwater: Public Water Supply	Arsenic	1.6	29.1	ug/l	9/20	11.63	ug/l	c
	Chlordane	0.025	0.07	ug/l	8/11	0.0538	ug/l	d
	Chloroform	0.37	9.4	ug/l	18/20	6.659	ug/l	e
	cis-1,2-Dichlororethylene	0.7	878	ug/l	17/20	646.3	ug/l	f
	Cobalt	0.6	8.7	ug/l	9/20	21.01	ug/l	c
	1,1-Dichloroethane	0.52	18.5	ug/l	17/20	8.478	ug/l	a
	1,4-dioxane	3.74	8.59	ug/l	3/9	8.59	ug/l	Maximum (l)
	Tetrachloroethylene (PCE)	2.2	473	ug/l	20/20	387.9	ug/l	h
	Trichloroethylene (TCE)	0.45	25.8	ug/l	20/20	12.78	ug/l	i

Footnotes:

(1) The UCLs were calculated using EPA's ProUCL software (Version 5); when available, UCLs were used as EPCs.

(a) 95% KM (Chebyshev) UCL
(b) 95% KM (t) UCL
(c) Gamma- Adjusted KM-UCL (use when k<1 and 15<n<50 but k<=1)
(d) KM H-UCL
(e) 95% GROS Adjusted UCL
(f) 99% KM (Chebyshev) UCL
(h) 95% Adjusted Gamma UCL
(i) 95% Students-t UCL
(k) The maximum concentration was chosen as the EPC because the UCL exceeded the maximum concentration; therefore, the maximum concentration is more representative of expected exposure based on the chemical concentrations detected in the public water supply.
(l) The maximum concentration was chosen as the EPC because a UCL could not be calculated because of the limited detected concentrations in the dataset

Definitions:

EPC = Exposure point concentration
UCL = Upper confidence limit of mean

Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

This table presents the chemicals of concern (COCs) along with exposure point concentrations (EPCs) for each of the COCs detected in site media (*i.e* ., the concentration used to estimate the exposure and risk from each COC). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC and how it was derived.

Table 2
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Water	Surface Water	Henderson Brook - Wading	Transient Visitor	Adolescent (12-17 years old) Pre-Adolescent (7-11 years old)	Ingestion Dermal	Quant	Transient visitors have the potential for exposure to surface water in Henderson Brook while wading.
				Transient Visitor		Inhalation	Qual	Inhalation of VOCs from surface water is considered an insignificant exposure pathway and will not be assessed in the HHRA.
Current/Future	Surface Water	Surface Water	Henderson Brook - Biota	Transient Visitor	Adolescent (12-17 years old) Pre-Adolescent (7-11 years old)	Ingestion	Qual	Ingestion of contaminated biota (e.g. fish) is not a complete exposure pathway because there are no higher trophic level fish available for consumption in Henderson Brook. The biota within Henderson Brook are limited to small minnows.
Future	Groundwater	Groundwater	Potable Water	Resident	Adult (7-26 years old) Child (0-6 years old)	Ingestion Inhalation Dermal	Quant	Residents have the potential for ingestion, dermal contact and inhalation of vapors when groundwater is used as a potable water source. Inhalation of groundwater will be assessed using the Andelman (modified by Schaum et al) showering model.
Future	Groundwater	Groundwater	Potable Water	Site Worker	Adult (18-65 years old	Ingestion Dermal Inhalation	Quant	Site Workers have the potential for ingestion and dermal contact when groundwater is used as a potable water source. Inhation of groundwater vapor from tap water use is an incomplete pathway.
Future	Groundwater	Groundwater - Irrigation Well	Lawn Watering	Resident	Adult (7-26 years old) Child (0-6 years old)	Ingestion Dermal Inhalation	Quant	Ingestion, dermal contact and inhalation of vapors from groundwater from irrigation wells aree quantitatively assessed in HHRA if these wells are actively used.Given the volatile nature of the cemical residuals, it is more likely that the VOCs would be rapidly diluted in abient air. Therefore, this is a insignficnt exposure pathway and will not be quantitatively assessed in the HHRA.
			Swimming Pools			Ingestion Dermal Inhalation	Quant	Ingestion, dermal contact and inhalation of vapors from groundwater from irrigation wells will quantitatively assessed in the HHRA if these wells are actively used. Given the volatile nature of the chemical residuals, it is most likely that the VOCs would be rapidly diluted in ambient air. Therefore, this is a insignificant exposure pathway and will not be quantitatively assessed in the HHRA.
Current/Future	Groundwater	Soil Gas in Subsurface Soil and Groundwater (Indoor Air)	Vapors	Site Worker	Adult (18-65 years old)	Inhalation	Quant/Qual	Soil gas and Indoor Air Samples will be compared to the USEPA RSLs/Soil Gas Targets/NJDEP Soil Gas Criteria to determine potential COPCs on a property by property basis and evaluated in the Vapor Intrusion Investigation Reportfor residential and industrial exposure. The results are discussed qualitatively.
Current/Future	Groundwater	Soil Gas in Subsurface Soil and Groundwater (Indoor Air)	Vapors	Resident	Adult (7-26 years old) Child (0-6 years old)	Inhalation	Quant/Qual	Soil gas and Indoor Air Samples will be compared to the USEPA RSLs/Soil Gas Targets/NJDEP Soil Gas Criteria to determine potential COPCs on a property by property basis and evaluated in the Vapor Intrusion Investigation Reportfor residential and industrial exposure. The results are discussed qualitatively.
Current/Future	Groundwater	Soil Gas in Subsurface Soil and Groundwater (Indoor Air)	Vapors	Construction Worker	Adult (18-65 years old)	Inhalation	Qual	The construction worker is an outdoor worker scenario. Therefore, this exposre pathway will not be quantified in the HHRA.
Current/Future	Groundwater	Soil Gas in Subsurface Soil and Groundwater (Indoor Air)	Vapors	Utility Worker	Adult (18-65 years old)	Inhalation	Qual	The utility worker is an outdoor worker scenario. Therefore, this exposure will not be quantified in the HHRA.
Current/Future	Groundwater	Ambient Air	Vapors	Site Worker	Adult (18-65 years old)	Inhalation	Qual	Given the volatile nature of the chemical residuals, it is most likely that the VOCs would be rapidly diluted in ambient air. Therefore, this is an insignificant exposure pathway amd will not be quantiatively assessed in the HHRA.
Current/Future	Groundwater	Ambient Air	Vapors	Resident	Adult (7-26 years old) Child (0-6 years old)	Inhalation	Qual	Given the volatile nature of the chemical residuals, it is most likely that the VOCs would be rapidly diluted in ambient air. Therefore, this is an insignificant exposure pathway amd will not be quantiatively assessed in the HHRA.
Current/Future	Groundwater	Ambient Air	Vapors	Construction Worker	Adult (18-65 years old)	Inhation	Qual	Ambient Air inhalation from groundwater will be evaluated. Inhalation of vapors of ambient air from groundwater volatilization into trench air will be evaluated in the
Current/Future	Groundwater	Ambient Air	Vapors	Utility Worker	Adult (18-65 years old)	Inhalation	Qual	Ambient Air inhalation from groundwater will be evaluated. Inhalation of vapors of ambient air from groundwater volatilization into trench air will be evaluated in the BHHRA.

Definitions:

Quant = Quantitative risk analysis performed

Qual = Qualitative risk analysis performed

Summary of Selection of Exposure Pathways

This table describes the exposure pathways associated with the varying media (soil, sediment, surface water and groundwater) that were evaluated in the risk assessment along with the rationale for the inclusion of each pathway. Exposure media, exposure points, and characteristics of receptor populations are also included.

Table 3
Noncancer Toxicity Data Summary

Pathway: Ingestion/Dermal

Chemicals of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Absorp. Efficiency (Dermal)	Adjusted RfD for Dermal[1]	Adj. Dermal RfD Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD Target Organ	Date of RfD Source Publication
Arsenic	Chronic	3.0E-04	mg/kg-day	1	3.0E-04	mg/kg-day	cardiovascular/dermal	3	IRIS	10/26/2016
Benzene	Chronic	4.0E-03	mg/kg-day	1	4.0E-03	mg/kg-day	Immune	300	IRIS	10/26/2016
Carbon Tetrachloride	Subchronic	4.0E-03	mg/kg-day	1	4.0E-03	mg/kg-day	hepatic	1000	IRIS	10/26/2016
Chloroform	Chronic	0.01	mg/kg-day	1	0.01	mg/kg-day	hepatic	100	IRIS	10/26/2016
cis-1,2-Dichlororethylene	Subchronic	2.0E-03	mg/kg-day	1	2.0E-03	mg/kg-day	Kidney	3000	IRIS	10/26/2016
Cobalt	Chronic	3.0E-04	mg/kg-day	1	3.0E-04	mg/kg-day	NA	NA	PPRTV	10/27/2016
Cyanide	Subchronic	6.0E-04	mg/kg-day	1	6.0E-04	mg/kg-day	reproductive	3000	IRIS	10/26/2016
1,1-Dichloroethane	NA	2.0E-01	mg/kg-day	1	2.0E-01	mg/kg-day	NA	NA	PPRTV	10/27/2016
1,2-Dichloroethane	Chronic	6.0E-03	mg/kg-day	1	6.0E-03	mg/kg-day	NA	NA	PPRTV	10/27/2016
m-xylene	Chronic	2.0E-01	mg/kg-day	1	2.0E-01	mg/kg-day	reduced body weight	1000	IRIS	10/26/2016
1,4-dioxane	Chronic	3.0E-02	mg/kg-day	1	3.0E-02	mg/kg-day	hepatic	300	IRIS	10/26/2016
Ethylbenzene	Subchronic	1.0E-01	mg/kg-day	1	1.0E-01	mg/kg-day	hepatic/urinary	1000	IRIS	10/26/2016
Manganese	Chronic	1.4E-01	mg/kg-day	1	1.4E-01	mg/kg-day	nervous system	1	IRIS	10/26/2016
Tetrachloroethylene (PCE)	Subchronic	6.0E-03	mg/kg-day	1	6.0E-03	mg/kg-day	neurotoxicity	1000	IRIS	10/26/2016
Trichloroethylene (TCE)	Subchronic	5.0E-04	mg/kg-day	1	5.0E-04	mg/kg-day	thymus	100	IRIS	10/26/2016
Vinyl chloride	Chronic	3.0E-03	mg/kg-day	1	3.0E-03	mg/kg-day	hepatic	30	IRIS	10/26/2016

Table 3
Noncancer Toxicity Data Summary

Pathway: Inhalation

Chemicals of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Inhalation RfD (If available)	Inhalation RfD Units (If available)	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfC Target Organ	Date of RfC Source Publication
Arsenic	NA	1.5E-05	mg/m^3	NA	NA	NA	NA	CalEPA	10/27/2016
Benzene	Chronic	3.0E-02	mg/m^3	NA	NA	Immune	300	IRIS	10/26/2016
Carbon Tetrachloride	Chronic	1.0E-01	mg/m^3	NA	NA	hepatic	100	IRIS	10/26/2016
Chlordane	Chronic	7.0E-04	mg/m^3	NA	NA	hepatic	1000	IRIS	8/31/2017
Chloroform	NA	9.8E-02	mg/m^3	NA	NA	NA	NA	ATSDR	10/27/2016
cis-1,2-Dichlororethylene	NA	NA	mg/m^3	NA	NA	NA	NA	NA	10/27/2016
Cobalt	NA	6.0E-06	mg/m^3	NA	NA	NA	NA	PPRTV	10/27/2016
Cyanide	Subchronic	0.0008	mg/m^3	NA	NA	Endocrine	3000	IRIS	10/27/2016
1,1-Dichloroethane	Chronic	NA	mg/m^3	NA	NA	NA	NA	NA	10/27/2016
1,2-Dichloroethane	Chronic	NA	mg/m^3	NA	NA	NA	NA	NA	10/27/2016
m-xylene	Chronic	1.0E-01	mg/m^3	NA	NA	NA	NA	NA	10/27/2016
1,4-dioxane	Chronic	3.0E-02	mg/m^3	NA	NA	nervous /respiratory	1,000	IRIS	10/26/2016
Ethylbenzene	Subchronic	1.0E+00	mg/m^3	NA	NA	developmental	300	IRIS	10/26/2016
Manganese	Subchronic	5.0E-05	mg/m^3	NA	NA	nervous system	1,000	IRIS	10/26/2016
Tetrachloroethylene (PCE)	Subchronic	4.0E-02	mg/m^3	NA	NA	neurotoxicity	1,000	IRIS	10/26/2016
Trichloroethylene (TCE)	Subchronic	2.0E-03	mg/m^3	NA	NA	thymus	100	IRIS	10/26/2016
Vinyl chloride	Chronic	1.0E-01	mg/m^3	NA	NA	hepatic	30	IRIS	10/27/2016

Footnotes:

(1) Adjusted RfD for Dermal = Oral RfD x Oral Absorption Efficiency for Dermal (RAGS E, 2004)

Definitions:

ATSDR= Agency for Toxic Substance and Disease Registry
CalEPA= California Environmental Protection Agency
IRIS = Integrated Risk Information System, U.S. EPA
mg/m^3 = Milligrams per cubic meter
mg/kg-day = Milligrams per kilogram per day
NA = Not available
PPRTV = Provisional Peer Reviewed Toxicity Values, U.S. EPA
RfC = reference concentration
RfD = reference dose

Table 4
Cancer Toxicity Data Summary

Pathway: Ingestion/ Dermal

Chemical of Concern	Oral Cancer Slope Factor	Units	Adjusted Cancer Slope Factor (for Dermal)	Slope Factor Units	Weight of Evidence/ Cancer Guideline	Source	Date of Slope Factor Source Publication
Arsenic	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	10/26/2016
Benzene	5.5E-02	$(mg/kg\text{-}day)^{-1}$	1.0E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	10/26/2016
Carbon Tetrachloride	7.0E-02	$(mg/kg\text{-}day)^{-1}$	1.0E+00	$(mg/kg\text{-}day)^{-1}$	Likely	IRIS	10/26/2016
Chlordane	3.5E-01	$(mg/kg\text{-}day)^{-1}$	1.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	10/26/2016
Chloroform	3.1E-01	$(mg/kg\text{-}day)^{-1}$	1.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	10/26/2016
cis-1,2-Dichlororethylene	NA	NA	1.0E+00	NA	Inadequate	NA	10/26/2016
Cobalt	NA	NA	1.0E+00	NA	NA	NA	10/27/2016
Cyanide	NA	NA	1.0E+00	NA	Inadequate	NA	10/26/2016
1,1-Dichloroethane	5.7E-03	$(mg/kg\text{-}day)^{-1}$	1.0E+00	$(mg/kg\text{-}day)^{-1}$	C	CalEPA	10/26/2016
1,2-Dichloroethane	9.1E-02	$(mg/kg\text{-}day)^{-1}$	1.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	10/26/2016
m-xylene	NA	NA	NA	NA	Inadequate	NA	10/26/2016
1,4-dioxane	1.0E-01	$(mg/kg\text{-}day)^{-1}$	1.0E+00	$(mg/kg\text{-}day)^{-1}$	Likely	IRIS	10/26/2016
Ethylbenzene	1.1E-02	$(mg/kg\text{-}day)^{-1}$	1.0E+00	$(mg/kg\text{-}day)^{-1}$	D	CalEPA	10/26/2016
Manganese	NA	NA	NA	NA	D	NA	10/26/2016
Tetrachloroethylene (PCE)	2.1E-03	$(mg/kg\text{-}day)^{-1}$	1.0E+00	$(mg/kg\text{-}day)^{-1}$	Likely	IRIS	10/26/2016
Trichloroethylene (TCE)	4.6E-02	$(mg/kg\text{-}day)^{-1}$	1.0E+00	$(mg/kg\text{-}day)^{-1}$	Carcinogen	IRIS	10/26/2016
Vinyl chloride	7.2E-01	$(mg/kg\text{-}day)^{-1}$	1.0E+00	$(mg/kg\text{-}day)^{-1}$	A	NA	10/26/2016

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline	Source	Date of Slope Factor Source Publication
Arsenic	4.3E-03	$(ug/m^3)^{-1}$	NA	NA	A	IRIS	10/26/2016
Benzene	7.8E-06	$(ug/m^3)^{-1}$	NA	NA	A	IRIS	10/26/2016
Carbon Tetrachloride	6.0E-06	$(ug/m^3)^{-1}$	NA	NA	Likely	IRIS	10/26/2016
Chlordane	1.0E-04	$(ug/m^3)^{-1}$	NA	NA	B2	IRIS	8/31/2017
Chloroform	2.3E-05	$(ug/m^3)^{-1}$	NA	NA	B2	IRIS	10/26/2016
cis-1,2-Dichlororethylene	NA	NA	NA	NA	Inadequate	IRIS	10/26/2016
Cobalt	9.0E-03	$(ug/m^3)^{-1}$	NA	NA	NA	PPRTV	10/27/2016
Cyanide	NA	NA	NA	NA	Inadequate	NA	10/26/2016
1,1-Dichloroethane	1.6E-06	$(ug/m^3)^{-1}$	NA	NA	C	CalEPA	10/26/2016
1,2-Dichloroethane	2.6E-05	$(ug/m^3)^{-1}$	NA	NA	B2	IRIS	10/26/2016
m-xylene	NA	NA	NA	NA	Inadequate	NA	10/26/2016
1,4-dioxane	5.0E-06	$(ug/m^3)^{-1}$	NA	NA	Likely	IRIS	10/26/2016
Ethylbenzene	2.5E-06	$(ug/m^3)^{-1}$	NA	NA	D	CalEPA	10/26/2016
Manganese	NA	NA	NA	NA	D	NA	10/26/2016
Tetrachloroethylene (PCE)	2.6E-07	$(ug/m^3)^{-1}$	NA	NA	Likely	IRIS	10/26/2016
Trichloroethylene (TCE)	4.1E-06	$(ug/m^3)^{-1}$	NA	NA	Carcinogen	IRIS	10/26/2016
Vinyl chloride	4.4E-06	$(ug/m^3)^{-1}$	NA	NA	A	IRIS	10/26/2016

Definitions:

CalEPA= California Environmental Protection Agency
IRIS = Integrated Risk Information System, U.S. EPA
NA = Not available
PPRTV = Provisional Peer Reviewed Toxicity Values, U.S. EPA
$(\mu g/m^3)^{-1}$ = Per micrograms per cubic meter
$(mg/kg\text{-}day)^{-1}$ = Per milligrams per kilogram per day

EPA Weight of Evidence (EPA, 1986):

A = Human carcinogen
B1 = Probable Human Carcinogen - based on sufficient evidence of carcinogenicity in animals and limited evidence in humans
B2 = Probable Human Carcinogen - based on sufficient evidence of carcinogenicity in animals and inadequate or no evidence in humans
C = Possible Human Carcinogen
D = Not classifiable as to human carcinogenicity
Data inadequate = inadequate information to assess carcinogenic potential

Summary of Toxicity Assessment

This table provides carcinogenic risk information which is relevant to the contaminants of concern at the Site. Toxicity data are provided for the ingestion, dermal and inhalation routes of exposure.

Table 5
Risk Characterization Summary - Noncarcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Noncarcinogenic Hazard Quotient			
					Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater Overburden	Drinking Water	Groundwater as Potable Water	Arsenic	Cardiovascular/Dermal	1.1			1.1
			Benzene	Immune	1.7			1.7
			Carbon Tetrachloride	Hepatic	74			74
			Chloroform	Hepatic	3.8			3.8
			cis-1,2-Dichloroethylene	Kidney	18			18
			Cobalt	NA	2.2			2.2
			Cyanide	Reproductive	1.2			1.2
			Tetrachloroethylene (PCE)	Neurotoxicity	35			35
			Trichloroethylene (TCE) (Total)	Thymus	280			280
			Vinyl chloride (ADAF = 2, 0-6)	Hepatic	1.6			1.6
			Chemical Total		420			419
	Potable Water	Groundwater as Potable Water - Shower	Carbon Tertrachloride	Hepatic		18		18
			cis-1,2-Dichlororethylene	Kidney		2		2
			Tetrachloroethylene (PCE)	Neurotoxicity		18		18
			Trichloroethylene (TCE) (Total)	Thymus		41		41
			Chemical Total			80		80
	Air	Groundwater as Poatble Water - Volatilization during Showering	Benzene	Immune			5.7	5.7
			Carbon Tetrachloride	Hepatic			71	71
			Chloroform	NA			9.9	9.9
			m-xylene	Nervous System			24	24
			Tetrachloroethylene (PCE)	Neurotoxicity			120	120
			Trichloroethylene (TCE) (Total)	Thymus			1700	1700
			Vinyl chloride (ADAF = 2, 0-6)	Hepatic			1.3	1.3
			Chemical Total				2000	2000
							Groundwater Medium Hazard Index Total[1]=	**2.5E+03**
							Receptor Hazard Index[1] =	**2.5E+03**
							Total Cardiovascular HI Across All Media =	**1.1E+00**
							Total Thymus HI Across All Media =	**2.0E+03**
							Total Dermal Across All Media =	**1.1E+00**
							Total Development Across All Media =	**2.2E-01**
							Total Hepatic HI Across All Media =	**1.7E+02**
							Total Immune HI Across All Media =	**7.6E+00**
							Total Kidney HI Across All Media =	**2.0E+01**
							Total Nervous System HI Across All Media =	**2.0E+02**
							Total Reproductive HI Across All Media =	**1.2E+00**
							Total Respiratory HI Across All Media =	**8.6E-02**
							Total Urinary HI Across All Media =	**1.6E-01**

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Noncarcinogenic Hazard Quotient			
					Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater Overburden	Drinking Water	Groundwater as Potable Water	Benzene	Immune	1			1
			Carbon Tetrachloride	Hepatic	45			45
			Chloroform	Hepatic	2.3			2.3
			cis-1,2-Dichloroethylene	Kidney	11			11
			Cobalt	NA	1.4			1.4
			Tetrachloroethylene (PCE)	Neurotoxicity	21			21
			Trichloroethylene (TCE) (Total)	Thymus	170			170
			Chemical Total		250			250
	Potable Water	Groundwater as Potable Water - Shower	Carbon Tetrachloride	Hepatic		12		12
			cis-1,2-Dichloroethylene	Kidney		1.3		1.3
			Tetrachloroethylene (PCE)	Neurotoxicity		12		12
			Trichloroethylene (TCE) (Total)	Thymus		27		27
			Chemical Total			53		53
	Air	Groundwater as Potable Water - Volatilization During Showering	Benzene	Immune			1.9	1.9
			Carbon Tetrachloride	Hepatic			23	23
			Chloroform	NA			3.2	3.2
			m-xylene	Nervous System			7.9	7.9
			Tetrachloroethylene (PCE)	Neurotoxicity			40	40
			Trichloroethylene (TCE) (Total)	Thymus			560	560
			Chemical Total				640	640
							Groundwater Medium Hazard Index Total[1]=	**9.5E+02**
							Receptor Hazard Index[1] =	**9.5E+02**
							Total Cardiovascular HI Across All Media =	**6.8E-01**
							Total Thymus HI Across All Media =	**7.6E+02**
							Total Dermal Across All Media =	**6.8E-01**
							Total Development Across All Media =	**7.2E-02**
							Total Hepatic HI Across All Media =	**8.4E+01**
							Total Immune HI Across All Media =	**2.9E+00**
							Total Kidney HI Across All Media =	**1.2E+01**
							Total Nervous System HI Across All Media =	**8.2E+01**
							Total Urinary HI Across All Media =	**9.8E-02**

Table 5
Risk Characterization Summary - Noncarcinogens

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Noncarcinogenic Hazard Quotient Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater Overburden	Air	Groundwater - Volatilization within Trench	Trichloroethylene (TCE) (Total)	Thymus			3.9	3.9
			Chemical Total				4	4
							Groundwater Medium Hazard Index Total[1]=	**4.1E+00**
							Receptor Hazard Index[1] =	**4.1E+00**
							Total Thymus HI Across All Media =	**3.9E+00**
							Total Hepatic HI Across All Media =	**1.8E-01**
							Total Immune HI Across All Media =	**2.5E-04**
							Total Urinary HI Across All Media =	**1.9E-02**
							Total Nervous System HI Across All Media =	**5.7E-05**

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult (18-65 years old)

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Noncarcinogenic Hazard Quotient Ingestion	Dermal	Inhalation	Exposure
Groundwater Overburden	Drinking Water	Groundwater - as a Potable Water	Carbon Tetrachloride	Hepatic	16			16
			cis-1,2-Dichloroethylene	Kidney	3.9			3.9
			Tetrachloroethylene (PCE)	Neurotoxicity	7.6			7.6
			Trichloroethylene (TCE)	Thymus	61			61
			Chemical Total		90			90
	Potable Water	Groundwater as a Potable Water - Shower	Trichloroethylene (TCE)	Thymus		1.3		1.3
			Chemical Total			2.5		2.5
							Groundwater Medium Hazard Index Total[1]=	**9.2E+01**
							Receptor Hazard Index[1] =	**9.2E+01**
							Total Thymus HI Across All Media =	**6.2E+01**
							Total Dermal HI Across All Media =	**2.4E-01**
							Total Hepatic HI Across All Media =	**1.8E+01**
							Total Immune HI Across All Media =	**3.7E-01**
							Total Urinary HI Across All Media =	**2.2E-02**
							Total Nervous System HI Across All Media =	**8.2E+00**
							Total Cardiovascular HI Across All Media =	**2.1E-01**

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Noncarcinogenic Hazard Quotient Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater Intermediate Bedrock	Drinking Water	Groundwater as Potable Water	Arsenic	Cardiovascular/Dermal	1			1
			Carbon Tetrachloride	Hepatic	3.1			3.1
			cis-1,2-Dichloroethylene	Kidney	1.5			1.5
			Cobalt	NA	1.6			1.6
			Cyanide	Reproductive	2			2
			Tetrachloroethylene (PCE)	Neurotoxicity	6.9			6.9
			Trichloroethylene (TCE)	Thymus	4.9			4.9
			Chemical Total		22			22
	Potable Water	Groundwater as Potable Water - Shower	Tetrachloroethylene (PCE)	Neurotoxicity		3.6		3.6
			Chemical Total					5.5
	Air	Groundwater as Potable Water - Volatilization during Showering	1,2-Dichloroethane	NA			6.4	6.4
			Carbon Tetrachloride	Hepatic			3	3
			Chloroform	NA			2.3	2.3
			Tetrachloroethylene (PCE)	Neurotoxicity			24	24
			Trichloroethylene (TCE)	Thymus			30	30
			Chemical Total				67	67
							Groundwater Medium Hazard Index Total[1]=	**9.5E+01**
							Receptor Hazard Index[1] =	**9.5E+01**
							Total Thymus HI Across All Media =	**3.6E+01**
							Total Dermal HI Across All Media =	**1.0E+00**
							Total Hepatic HI Across All Media =	**8.2E+00**
							Total Immune HI Across All Media =	**3.8E-01**
							Total Kidney HI Across All Media =	**1.5E+00**
							Total Nervous System HI Across All Media =	**3.5E+01**
							Total Cardiovascular HI Across All Media =	**1.0E+00**
							Total Reproductive HI Across All Media =	**2.0E+00**
							Total Respiratory HI Across All Media =	**6.1E-01**

Table 5
Risk Characterization Summary - Noncarcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Noncarcinogenic Hazard Quotient			
					Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater Intermediate Bedrock	Drinking Water	Groundwater as Potable Water	Carbon Tetrachloride	Hepatic	1.9			1.9
			Cyanide	Reproductive	1.2			1.2
			Tetrachloroethylene (PCE)	Neurotoxicity	4.1			4.1
			Trichloroethylene (TCE)	Thymus	3			3
			Chemical Total		12			12
	Potable Water	Groundwater as Potable Water - Shower	Tetrachloroethylene (PCE)	Neurotoxicity		2.4		2.4
			Chemical Total					3.7
	Air	Groundwater as Potable Water - Volatilization during Showering	1,2-Dichloroethane	NA			2.1	2.1
			Tetrachloroethylene (PCE)	Neurotoxicity			7.9	7.9
			Trichloroethylene (TCE)	Thymus			9.8	9.8
			Chemical Total				22	22
Groundwater Medium Hazard Index Total[1]=								**3.7E+01**
Receptor Hazard Index[1] =								**3.7E+01**
Total Thymus HI Across All Media =								**1.3E+01**
Total Dermal HI Across All Media =								**6.3E-01**
Total Hepatic HI Across All Media =								**4.2E+00**
Total Immune HI Across All Media =								**1.5E-01**
Total Nervous System HI Across All Media =								**1.5E+01**
Total Cardiovascular HI Across All Media =								**6.3E-01**
Total Reproductive HI Across All Media =								**1.2E+00**
Total Respiratory HI Across All Media =								**2.1E-01**

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Noncarcinogenic Hazard Quotient			
					Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater - Intermediate Bedrock	Drinking Water	Groundwater as Potable Water	Tetrachloroethylene (PCE)	Neurotoxicity	1.5			1.5
			Trichloroethylene (TCE)	Thymus	1.1			1.1
			Chemical Total		3.7			3.7
Groundwater Medium Hazard Index Total[1]=								**3.7E+00**
Receptor Hazard Index[1] =								**3.7E+00**
Total Thymus HI Across All Media =								**1.1E+00**
Total Dermal HI Across All Media =								**2.2E-01**
Total Hepatic HI Across All Media =								**9.0E-01**
Total Immune HI Across All Media =								**1.9E-02**
Total Nervous System HI Across All Media =								**1.5E+00**
Total Cardiovascular HI Across All Media =								**2.2E-01**

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Noncarcinogenic Hazard Quotient			
					Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater - Deep Bedrock	Drinking Water	Groundwater as Potable Water	Arsenic	Cardiovascular/Dermal	1.6			1.6
			Trichloroethylene (TCE)	Thymus	1.7			1.7
			Chemical Total		3.5			3.5
	Air	Groundwater as Potable Water - Volatilization During Showering	Tetrachloroethylene (PCE)	Neurotoxicity			1.6	1.6
			Trichloroethylene (TCE)	Thymus			10	10
			Chemical Total				12	12
Groundwater Medium Hazard Index Total[1]=								**1.6E+01**
Receptor Hazard Index[1] =								**1.6E+01**
Total Thymus HI Across All Media =								**1.2E+01**
Total Dermal HI Across All Media =								**1.6E+00**
Total Hepatic HI Across All Media =								**5.8E-01**
Total Nervous System HI Across All Media =								**1.6E+00**
Total Cardiovascular HI Across All Media =								**1.6E+00**

Table 5
Risk Characterization Summary - Noncarcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Noncarcinogenic Hazard Quotient			
					Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater Deep Bedrock	Drinking Water	Groundwater as Potable Water	Trichloroethylene (TCE)	Thymus	1			1
			Chemical Total		2.4			2.4
	Air	Groundwater as Potable Water - Volatilization During Showering	Trichloroethylene (TCE)	Thymus			3.3	3.3
			Chemical Total				4	4
							Groundwater Medium Hazard Index Total[1]=	**6.8E+00**
							Receptor Hazard Index[1] =	**6.8E+00**
							Total Thymus HI Across All Media =	**4.5E+00**
							Total Dermal HI Across All Media =	**9.8E-01**
							Total Hepatic HI Across All Media =	**3.4E-01**
							Total Nervous System HI Across All Media =	**8.3E-01**
							Total Cardiovascular HI Across All Media =	**9.8E-01**
							Total Respiratory HI Across All Media =	**2.5E-02**

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Noncarcinogenic Hazard Quotient			
					Ingestion	Dermal	Inhalation	Exposure Routes Total
Potable Water Supply	Drinking Water	Potable Water Supply as Potable Water	Arsenic	Cardiovascular/Dermal	1.9			1.9
			cis-1,2-Dichloroethylene	Kidney	16			16
			Cobalt	NA	3.5			3.5
			Tetrachloroethylene (PCE)	Neurotoxicity	3.2			3.2
			Trichloroethylene (TCE)	Thymus	1.3			1.3
			Chemical Total		26			26
	Potable Water	Public Water Supply as Potable Water - Shower	cis-1,2-Dichloroethylene	Kidney		1.8		1.8
			Tetrachloroethylene (PCE)	Neurotoxicity		1.7		1.7
			Chemical Total			3.5		3.5
	Air	Public Water Supply as Potable Water - Volatilization During Showering	Tetrachloroethylene (PCE)	Neurotoxicity			11	11
			Trichloroethylene (TCE)	Thymus			7.8	7.8
			Chemical Total				20	20
							Groundwater Medium Hazard Index Total[1]=	**4.9E+01**
							Receptor Hazard Index[1] =	**4.9E+01**
							Total Thymus HI Across All Media =	**9.1E+00**
							Total Dermal HI Across All Media =	**1.9E+00**
							Total Hepatic HI Across All Media =	**1.4E-01**
							Total Renal HI Across All Media =	**1.8E+01**
							Total Nervous System HI Across All Media =	**1.7E+01**
							Total Cardiovascular HI Across All Media =	**1.9E+00**
							Total Respiratory HI Across All Media =	**3.8E-01**

Table 5
Risk Characterization Summary - Noncarcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Noncarcinogenic Hazard Quotient			
					Ingestion	Dermal	Inhalation	Exposure Routes Total
Public Water Supply	Drinking Water	Public Water Supply as Potable Water	Arsenic	Cardiovascular/Dermal	1.2			1.2
			cis-1,2-Dichloroethylene	Kidney	9.7			9.7
			Cobalt	NA	2.1			2.1
			Tetrachloroethylene (PCE)	Neurotoxicity	1.9			1.9
			Chemical Total		16			16
	Potable Water	Public Water Supply as Potable Water - Shower	cis-1,2-Dichloroethylene	Kidney		1.2		1.2
			Tetrachloroethylene (PCE)	Neurotoxicity		1.1		1.1
			Chemical Total			2.4		2.4
	Air	Public Water Supply as Potable Water - Volatilization During Showering	Tetrachloroethylene (PCE)	Neurotoxicity			3.7	3.7
			Trichloroethylene (TCE)	Thymus			2.5	2.5
			Chemical Total				6.4	6.4
							Groundwater Medium Hazard Index Total[1]=	**2.4E+01**
							Receptor Hazard Index[1] =	**2.4E+01**
							Total Thymus HI Across All Media =	**3.3E+00**
							Total Dermal HI Across All Media =	**1.2E+00**
							Total Hepatic HI Across All Media =	**1.3E-01**
							Total Renal HI Across All Media =	**1.1E+01**
							Total Nervous System HI Across All Media =	**6.9E+00**
							Total Cardiovascular HI Across All Media =	**1.2E+00**
							Total Respiratory HI Across All Media =	**1.2E-01**

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Noncarcinogenic Hazard Quotient			
					Ingestion	Dermal	Inhalation	Exposure Routes Total
Public Water Supply	Drinking Water	Public Water Supply as Potable Water	cis-1,2-Dichloroethylene	Kidney	3.5			3.5
			Chemical Total		4.9			4.9
							Groundwater Medium Hazard Index Total[1]=	**4.9E+00**
							Receptor Hazard Index[1] =	**4.9E+00**
							Total Thymus HI Across All Media =	**2.7E-01**
							Total Dermal HI Across All Media =	**4.1E-01**
							Total Hepatic HI Across All Media =	**1.0E-02**
							Total Renal HI Across All Media =	**3.5E+00**
							Total Nervous System HI Across All Media =	**6.9E-01**
							Total Cardiovascular HI Across All Media =	**4.1E-01**

Footnotes:
(1) The Hazard Index (HI) shown in this table represents the summed Hazard Quotients (HQs) for all chemicals of potential concern (COPCs) at the site, not just those requiring remedial action (*i.e.*, the chemicals of concern [COCs]), which are identified in this table.
(2) RfD target organ or effect/ RfC target organ or effect

Definitions:
NA = Not available

Table 6
Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater - Overburden	Drinking Water	Groundwater as Potable Water	Carbon Tetrachloride	1.8E-03			1.8E-03
			Chloroform	1.0E-04			1.0E-04
			Trichloroethylene (TCE) (ADAF = 10, 0-2)	3.7E-04			3.7E-04
			Trichloroethylene (TCE) (ADAF = 3, 2-6)	2.2E-04			2.2E-04
			Trichloroethylene (TCE) (NHL and Liver with no ADAF	4.5E-04			4.5E-04
			Trichloroethylene (TCE) (Total)	1.0E-03			1.0E-03
			Vinyl Chloride (ADAF = 2, 0-6)	5.8E-04			5.8E-04
		Chemical Total		3.6E-03			3.6E-03
	Potable Water	Groundwater as Potable Water - Shower	Carbon Tetrachloride		4.2E-04		4.2E-04
			Trichloroethylene (TCE) (ADAF = 10, 0-2)		3.7E-04		3.7E-04
			Trichloroethylene (TCE) (ADAF = 3, 2-6)		2.2E-04		2.2E-04
			Trichloroethylene (TCE) (NHL and Liver with no ADAF		4.5E-04		4.5E-04
			Trichloroethylene (TCE) (Total)		1.0E-03		1.0E-03
		Chemical Total			1.6E-03		1.6E-03
	Air	Groundwater as Potable Water - Volatilization During Showering	Benzene			1.1E-04	1.1E-04
			Carbon Tetrachloride			3.6E-03	3.6E-03
			Chloroform			1.9E-03	1.9E-03
			Tetrachloroethylene (PCE)			1.1E-04	1.1E-04
			Trichloroethylene (TCE) (ADAF = 10, 0-2)			9.9E-04	9.9E-04
			Trichloroethylene (TCE) (ADAF = 3, 2-6)			5.9E-04	5.9E-04
			Trichloroethylene (TCE) (NHL and Liver with no ADAF			9.2E-04	9.2E-04
			Trichloroethylene (TCE) (Total)			2.5E-03	2.5E-03
		Chemical Total				8.4E-03	8.4E-03
						Groundwater Risk Total[1]=	**1.4E-02**

Table 6
Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk Ingestion	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Exposure Routes Total
Groundwater - Overburden	Drinking Water	Groundwater as Potable Water	Chloroform	2.0E-04			2.0E-04
			Trichloroethylene (TCE) (ADAF = 10, 0-2)	3.4E-04			3.4E-04
			Trichloroethylene (TCE) (ADAF = 3, 2-6)	1.1E-04			1.1E-04
			Trichloroethylene (TCE) (NHL and Liver with no ADAF	9.0E-04			9.0E-04
			Trichloroethylene (TCE) (Total)	1.0E-03			1.0E-03
			Vinyl Chloride (ADAF = 2, 7-16)	5.8E-04			5.8E-04
			Vinyl Chloride (ADAF = 2, 17-26)	2.9E-04			2.9E-04
		Chemical Total		7.6E-03			7.6E-03
	Potable Water	Groundwater as Potable Water - Shower	Carbon Tetrachloride		9.3E-04		9.3E-04
			Trichloroethylene (TCE) (ADAF = 10, 0-2)		5.4E-05		5.4E-05
			Trichloroethylene (TCE) (ADAF = 3, 2-6)		1.8E-05		1.8E-05
			Trichloroethylene (TCE) (NHL and Liver with no ADAF		1.4E-04		1.4E-04
			Trichloroethylene (TCE) (Total)		2.2E-04		2.2E-04
		Chemical Total			1.5E-03		1.5E-03
	Air	Groundwater as Potable Water - Volatilization During Showering	Benzene			1.2E-04	1.2E-04
			Carbon Tetrachloride			4.0E-03	4.0E-03
			Chloroform			2.1E-03	2.1E-03
			Tetrachloroethylene (PCE)			1.2E-04	1.2E-04
			Trichloroethylene (TCE) (ADAF = 10, 0-2)			4.8E-04	4.8E-04
			Trichloroethylene (TCE) (ADAF = 3, 2-6)			1.6E-04	1.6E-04
			Trichloroethylene (TCE) (NHL and Liver with no ADAF			1.0E-03	1.0E-03
			Trichloroethylene (TCE) (Total)			1.6E-03	1.6E-03
		Chemical Total				9.7E-03	9.7E-03
						Groundwater Risk Total[1]=	**1.6E-02**

Table 6
Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater - Overburden	Groundwater	Direct Contact with Groundwater	Carbon Tetrachloride		3.60E-04		3.6E-04
		Chemical Total					3.6E-04
						Groundwater Risk Total[1]=	4.8E-04

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater - Overburden	Drinking Water	Groundwater as Potable Water	Carbon Tetrachloride	1.6E-03			1.6E-03
			Trichloroethylene (TCE)	5.0E-04			5.0E-04
			Vinyl Chloride	2.6E-04			2.6E-04
		Chemical Total		2.6E-03			2.6E-03
						Groundwater Risk Total[1]=	2.6E-03

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater - Intermediate Bedrock	Air	Groundwater as Potable Water - Volatilization During Showering	Carbon Tetrachloride			1.5E-04	1.5E-04
			Chloroform			4.4E-04	4.4E-04
		Chemical Total				7.5E-04	7.5E-04
						Groundwater Risk Total[1]=	1.0E-03

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater Intermediate Bedrock	Drinking Water	Groundwater As Potable Water	Carbon Tetrachloride	1.5E-04			1.5E-04
		Chemical Total		3.8E-04			3.8E-04
	Air	Groundwater As Potable Water - Volatilization During Showering	1,2-Dichloroethane			1.1E-04	1.1E-04
			Carbon Tetrachloride			1.7E-04	1.7E-04
			Chloroform			4.8E-04	4.8E-04
		Chemical Total				8.2E-04	8.2E-04
						Groundwater Risk Total[1]=	1.3E-03

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater - Deep Bedrock	Drinking Water	Groundwater as Potable Water	Arsenic	1.3E-04			1.9E-04
		Chemical Total		1.9E-04			1.9E-04
						Groundwater Risk Total[1]=	2.7E-04

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Public Water Supply	Drinking Water	Public Water Supply as Potable Water	Arsenic	1.5E-04			1.5E-04
		Chemical Total		1.8E-04			1.8E-04
						Groundwater Risk Total[1]=	2.4E-04

Footnotes:
(1) Total Risk values represent cumulative estimates from exposure to all chemicals of potential concern (COPCs) as identified in the RAGS D table 2 series, and not only from those identified in this table (i.e, the chemicals of concern [COCs]).

Table 7
Remediation Goals for Groundwater
Fair Lawn Well Field Superfund Site
Fair Lawn, New Jersey

Site Related Contaminants of Concern Groundwater	CAS Number	NJDEP Groundwater Quality Standards (ug/L)	New Jersey Primary Drinking Water MCLs (ug/L)	USEPA Primary Drinking Water MCLs (ug/L)	Remediation Goals (ug/L)
1,1,1-Trichloroethane	71-55-6	30	30	200	30
1,1-Dichloroethane	75-34-3	50	50	NA	50
1,2-Dichlorobenzene	95-50-1	600	600	600	600
1,2-Dichloroethane	107-06-2	2	2	5	2
Benzene	71-43-2	1	1	5	1
Carbon Tetrachloride	56-23-5	1	2	5	1
Chlorobenzene	108-90-7	50	50	100	50
Chloroform	67-66-3	70	NA	80	70
Cis-1,2-dichloroethylene	156-59-2	70	NA	70	70
Ethylbenzene	100-41-4	700	NA	700	700
n-Heptane	142-82-5	100*	NA	NA	100*
Tert-Butyl-Methyl-Ether	1634-04-4	70	70	NA	70
Tetrachloroethylene (PCE)	127-18-4	1	1	5	1
Toluene	108-88-3	600	NA	1000	600
Total Xylene	1330-20-7	1000	1000	10000	1000
Trichloroethylene (TCE)	79-01-6	1	1	5	1
Vinyl Chloride	75-01-4	1	NA	2	1
1,4-Dioxane (P-Dioxane)	123-91-1	0.4	NA	NA	0.4
Perfluorooctanoic Acid (PFOA)	335-67-1	NA	0.014**	NA	0.014
Perfluorooctane Sulfonate (PFOS)	1763-23-1	NA	0.013**	NA	0.013

Legend
NJDEP New Jersey Department of Environmental Protection
USEPA United States Environmental Protection Agency
NA Not Applicable
* - Value listed is an NJDEP interim generic groundwater quality of 100 for non-carcinogens and 5 for carcinogens
** - Recommended by the NJDEP DWQI for drinking water purposes. To Be Considered remediation goal.

Table 8
Remediation Goals for Surface Water
Fair Lawn Well Field Superfund Site
Fair Lawn, New Jersey

Site Related Contaminants of Concern Surface Water	CAS Number	NJDEP Fresh Water Category 2 Non-Trout Bearing Surface Water Quality Standards (ug/L)	USEPA NRWQC for the Consumption of Water and Organisms (ug/L)	Remediation Goals (ug/L)
Volatile Organic Compounds				
Benzene	71-43-2	0.15	2.1	0.15
Carbon Tetrachloride	56-23-5	0.33	0.4	0.33
Chloroform	67-66-3	68	60	60
Cis-1,2-dichloroethylene	156-59-2	NA	NA	NA
Tetrachloroethylene (PCE)	127-18-4	0.34	10	0.34
Total Xylene	1330-20-7	NA	NA	NA
Trichloroethylene (TCE)	79-01-6	1	0.6	0.6
Vinyl Chloride	75-01-4	0.082	0.022	0.022
Semi Volatile Organic Compounds				
1,4-Dioxane (P-Dioxane)	123-91-1	NA	NA	NA
Perfluorooctanoic Acid (PFOA)	335-67-1	NA	NA	NA
Perfluorooctane Sulfonate (PFOS)	1763-23-1	NA	NA	NA

Legend
NJDEP New Jersey Department of Environmental Protection
USEPA United States Environmental Protection Agency
NRWQC National Recommended Water Quality Criteria
NA Not Applicable

Table 9
Cost Estimates for the Selected Remedy
Fair Lawn Well Field Superfund Site
Fair Lawn, New Jersey

Item No.	**Item Description**	**Estimated Cost**
CAPITAL COSTS		
1.	Remedial Modeling	$125,000
2.	Installation of the Proposed Recovery Well and Treatment System	$1,543,550
3.	Installation of Additional Monitoring Wells	$160,500
	Subtotal	$1,829,050
	Contingency (30%)	$548,715
	Subtotal	$2,377,765
	Project Construction Management	$687,478
	Subtotal	$3,065,243
4.	Westmoreland Well Field Upgrade (300 gallons per minute)	$2,150,000
	TOTAL CAPITAL COSTS	**$5,215,243**
OPERATION, MAINTENANCE & MONITORING COSTS – Years 1 and 2		
	Westmoreland Well Field P&T	$472,668
	Proposed Additional P&T	$56,000
	Contingency (20%)	$11,200
	Project Management/Technical Support (8%)	$4,480
	Subtotal	$71,680
	Natural Degradation Groundwater Sampling	$350,000
	Long-Term Monitoring	$62,000
	Reporting	$45,000
	Subtotal	$1,001,348
	Contingency (20%)	$200,270
	Project Management/Technical Support (8%)	$80,108
	TOTAL ANNUAL OM&M COSTS-years 1 and 2	**$1,281,726**
OPERATION, MAINTENANCE & MONITORING COSTS – Years 3 thru 30		
	Westmoreland Well Field P&T	$472,668
	Proposed Additional P&T	$55,025

Long-Term Monitoring	$46,500
Reporting	$45,000
Subtotal	$619,193
Contingency (20%)	$123,839
Project Management/Technical Support	$49,535
TOTAL ANNUAL OM&M COSTS-Years 3 thru 30	**$792,567**
PERIODIC COSTS	
Establishment of CEA	$25,000
Contingency (30%)	$7,500
Project Management (8%)	$2,000
Technical Support (15%)	$3,750
Total Periodic Costs-Year 1	***$38,250***
Natural Degradation Groundwater Sampling-*Years 4 thru 30*	$90,000
Contingency (30%)	$27,000
Project Management (8%)	$7,200
Technical Support (15%)	$13,500
Total Periodic Costs-Year 2	***$137,700***
Total Periodic Costs-Every 2 Years from Years 4 thru 30	***$1,927,800***
Five Year Review Report-Year 5	$25,000
Update Institutional Controls	$20,000
Subtotal	$45,000
Contingency (30%)	$13,500
Project Management (8%)	$3,600
Technical Support (15%)	$6,750
Total Periodic Costs-Five Year Reviews-Year 5	***$68,850***
Total Periodic Costs-Five Year Reviews-Year 10	***$68,850***
Total Periodic Costs-Five Year Reviews-Year 15	***$68,850***
Total Periodic Costs-Five Year Reviews-Year 20	***$68,850***
Total Periodic Costs-Five Year Reviews-Year 25	***$68,850***
Five Year Review Report-Year 30	$25,000
Update Institutional Controls	$20,000
Demobilization/Terminate P&Ts	$15,000

Well Abandonment	$90,000
Subtotal	$150,000
Contingency (30%)	$45,000
Project Management (8%)	$12,000
Technical Support (15%)	$22,500
Total Periodic Costs at Year 30	***$229,500***
TOTAL PERIODIC COSTS	**$2,677,500**

Notes:

1. Present worth calculation assumes 7% discount rate after inflation is considered.
2. The project costs presented herein are prepared to facilitate alternative comparison.
   Expected accuracy range of the cost estimate is -30% to +50%.

Table 10
Chemical-Specific ARARs, TBCs, and Other Guidance
Fair Lawn Well Field Superfund Site
Fair Lawn, New Jersey

Regulatory Level	Authority/Source	Citation	Status	Requirement Synopsis	Comments
Federal	Federal Safe Drinking Water Act National Primary Drinking Water Standards Maximum Contaminant Level Goals (MCLGs) and Maximum Contaminant Levels (MCLs)	40 CFR 141.62	ARAR	Establishes health based standards for public drinking water systems. Also establishes drinking water quality goals set at levels at which no adverse health effects are anticipated, with an adequate margin of safety. Under the NCP (40 C.F.R. 300.430(e)(2)(i)(B)-(C)), non-zero MCLGs and, if none, the MCLs, are generally relevant and appropriate for any aquifer that is or may be used for drinking.	Relevant and appropriate to remediation of the groundwater. New Jersey classifies all ground water in the area as Class IIA ground water, considered suitable for drinking water. See Table 7 (Remediation Goals)
Federal	EPA National Recommended Water Quality Criteria (NRWQC)	Clean Water Act Section 304(a)	ARAR	Establishes standards for surface water.	Federally recommended water quality criteria established under Section 304(a) of the Clean Water Act that are more stringent than state criteria may be relevant and appropriate.
State	New Jersey Ground Water Quality Standards	N.J.A.C.7:9C	ARAR	Defines groundwater classifications and establishes groundwater quality standards for various compounds. The site groundwater is classified as Class IIA suitable for drinking water.	
State	New Jersey Primary Drinking Water Standards MCLs	N.J.A.C. 7:10-5.2	ARAR	Establishes state's discretionary MCLs that are generally equal to or more stringent than federal Safe Drinking Water Act MCLs.	See Table 7
State	New Jersey State-Secondary Drinking Water Regulations	N.J.A.C. 7:10-7	TBC	Establishes standards for public drinking water systems for those contaminants which impact the aesthetic qualities of drinking water.	
State	New Jersey Surface Water Quality Standards (SWQS)	N.J.A.C. 7:9B	ARAR	Establishes standards for surface water.	Applicable for monitoring the surface water quality. See Table 8.
State	New Jersey Safe Drinking Water Act- Drinking Water Quality Institute (DWQI)	N.J.S.A. 58:12A1	TBC	New Jersey is in the process of promulgating MCLs for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). Until finalized, these standards are TBC advisories criteria or guidelines. The New Jersey Drinking Water Quality Institute (N.J.S.A. 58:12A-20) recommended MCL for PFOA is 14 ng/L, and the recommend MCL for PFOS is 13 ng/L.	Recommended MCL for PFOA/PFOS by NJ DWQI for drinking water purposes. EPA has adopted New Jersey's recommended MCLs for PFOS/PFOS as remediation goals for the Site. See Table 7

Table 11
Location-Specific ARARs, TBCs, and Other Guidance
Fair Lawn Well Field Superfund Site
Fair Lawn, New Jersey

Regulatory Level	Act/Authority	Citation	Status	Requirement Synopsis	Comments
State	New Jersey Freshwater Wetland Protection Act	NJAC 7:7A	ARAR	Establishes requirements for the protection of freshwater wetlands.	ARAR impacts/remedial action in wetland areas and buffer zones.
State	New Jersey Flood Hazard Area Control Act Rules	N.J.A.C. 7:13	ARAR	Regulates placement of fill, grading and other disturbances within floodplain.	ARAR for remedial activities that occur in or near a 100-or 500-year floodplain.
State	New Jersey Flood Hazard Area Control Act	N.J.S.A. 58: 16A-50, et seq.	ARAR	Provisions include restrictions on placement or storage of hazardous substances within a 100-year flood plain.	Potential ARAR if remedial activities are located in or near a 100-or, 500-year floodplain.

Table 12
Action-Specific ARARs, TBCs, and Other Guidance
Fair Lawn Well Field Superfund Site, Fair Lawn, New Jersey

Regulatory Level	Authority/Source	Citation	Status	Requirement Synopsis	Comments
Federal	Clean Air Act, Standards of Performance for New Stationary Sources	40 CFR Part 60	ARAR	Air emissions standards apply to owners and operators of stationary sources.	During excavation, treatment, and/or stabilization, air emissions will be properly controlled and monitored to comply with these standards.
Federal	Clean Air Act, National Emission Standards for Hazardous Air Pollutants	40 CFR Part 61	ARAR	Provide air quality standards for hazardous air pollutants.	During excavation, treatment, and/or stabilization, air emissions will be properly controlled and monitored to comply with these standards.
Federal	Clean Air Act, National Primary and Secondary Ambient Air Quality Standards (NAAQS)	40 CFR Part 50	ARAR	Establishes national ambient air quality standards with respect to health-based criteria.	Potential ARAR for remedial activities which emit contaminants into the atmosphere.
State	New Jersey Air Pollution Control Act	N.J.A.C 7:27-22 N.J.5.A 26:2C	ARAR	Rules that govern the emission of contaminants into the ambient atmosphere.	This standard would apply to air emissions from remediation activities performed at the site.
State	New Jersey Well Construction and Maintenance; Sealing of Abandoned Wells Rules	N.J.S.A. 58:4A-5 N.J.A.C. 7:90	ARAR	Requirements for drilling and installing wells, licensing of well driller and pump installer, construction, and well casing specifications.	Applicable to the installation of monitoring wells, extraction wells, or reinjection wells.
State	New Jersey Pollutant Discharge Elimination System	N.J.A.C. 7:14A	ARAR	Rules for discharge of any wastes into or adjacent to State waters that may alter the physical, chemical, or biological properties of State waters.	Project will meet substantive requirements for surface discharge as upgrades to the current treatment system would require the municipal water to be discharged to Henderson brook.
State	Water Supply Allocation Permits Rules	N.J.A.C. 7:19	ARAR	Requirements for persons diverting or having the ability to divert more than 100,000 gallons of water per day.	These regulations may apply to a groundwater recovery system of a drinking water treatment system, depending on the production capacity. Potential ARAR if Borough of Fair Lawn opts to upgrade the treatment system and maintain the Westmoreland Well Field as a public water supply. Substantive requirements are applicable for treatment equipment upgrades for the drinking water system.
State	New Jersey Technical Requirements for Site Remediation	N.J.A.C 7:26E	ARAR	This regulation provides the minimal technical requirements to investigate and remediate contamination at the site.	The regulation will be applied to any hazardous waste operation during remediation of the site.

APPENDIX III

ADMINISTRATIVE RECORD

ADMINISTRATIVE RECORD INDEX OF DOCUMENTS

FINAL

08/03/2018

REGION ID: 02

Site Name: FAIR LAWN WELL FIELD
CERCLIS ID: NJD980654107
OUID: 01
SSID: 0258
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
538325	08/03/2018	ADMINISTRATIVE RECORD INDEX FOR THE FAIR LAWN WELL FIELD SITE	2	Administrative Record Index		(US ENVIRONMENTAL PROTECTION AGENCY)
528410	06/25/2018	FINAL REMEDIAL INVESTIGATION REPORT FOR THE FAIR LAWN WELL FIELD SITE	371	Report	(SANDVIK INCORPORATED)	(LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES)
538336	06/25/2018	FINAL REMEDIAL INVESTIGATION REPORT - APPENDIX A - DRAFT SITE CHARACTERIZATION SUMMARY REPORT DATED FEBRUARY 2015 FOR THE FAIR LAWN WELL FIELD SITE	8410	Report	(SANDVIK INCORPORATED)	(LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES)
538338	06/25/2018	FINAL REMEDIAL INVESTIGATION REPORT - APPENDIX C - PARKER TEST RESULTS AND WELL CONSTRUCTION RECOMMENDATIONS FOR THE FAIR LAWN WELL FIELD SITE	6401	Report	(SANDVIK INCORPORATED)	(LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES)
538337	06/25/2018	FINAL REMEDIAL INVESTIGATION REPORT - APPENDIX B - 2014 OVERBURDEN GROUNDWATER AND SURFACE WATER SAMPLING RESULTS AND PROPOSAL FOR ADDITIONAL ACTIVITIES FOR THE FAIR LAWN WELL FIELD SITE	9	Report	(SANDVIK INCORPORATED)	(LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES)
538339	06/25/2018	FINAL REMEDIAL INVESTIGATION REPORT - APPENDIX D - PROPOSED SCOPE OF WORK MODIFICATION - GROUNDWATER AND SURFACE WATER SAMPLING TASK REVISED - RI/FS WORK PLAN ADDENDUM FOR THE FAIR LAWN WELL FIELD SITE	26	Report	(SANDVIK INCORPORATED)	(LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES)
538340	06/25/2018	FINAL REMEDIAL INVESTIGATION REPORT - APPENDIX E - REVISED QUALITY ASSURANCE PROJECT PLAN FOR THE FAIR LAWN WELL FIELD SITE	923	Report	(SANDVIK INCORPORATED)	(LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES)

ADMINISTRATIVE RECORD INDEX OF DOCUMENTS

FINAL

08/03/2018

REGION ID: 02

Site Name: FAIR LAWN WELL FIELD
CERCLIS ID: NJD980654107
OUID: 01
SSID: 0258
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
538341	06/25/2018	FINAL REMEDIAL INVESTIGATION REPORT - APPENDIX F - FINAL SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT REPORT FOR THE FAIR LAWN WELL FIELD SITE	278	Report	(SANDVIK INCORPORATED)	(LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES)
538342	06/25/2018	FINAL REMEDIAL INVESTIGATION REPORT - APPENDIX G - VAPOR INTRUSION INVESTIGATION REPORT JUNE 2018 FOR THE FAIR LAWN WELL FIELD SITE	23585	Report	(SANDVIK INCORPORATED)	(LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES)
538343	06/25/2018	FINAL REMEDIAL INVESTIGATION REPORT - APPENDIX H - BASELINE HUMAN HEALTH RISK ASSESSMENT FOR THE FAIR LAWN WELL FIELD SITE	4748	Report	(SANDVIK INCORPORATED)	(LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES)
538344	06/25/2018	FINAL REMEDIAL INVESTIGATION REPORT - APPENDIX I - FACILITY INFORMATION AND APPENDIX J - ENVIRONMENTAL STANDARDS INCORPORATED DATA VALIDATION REPORTS FOR THE FAIR LAWN WELL FIELD SITE	25979	Report	(SANDVIK INCORPORATED)	(LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES)
538346	06/25/2018	FINAL REMEDIAL INVESTIGATION REPORT - APPENDIX K THROUGH APPENDIX O FOR THE FAIR LAWN WELL FIELD SITE	347	Report	(SANDVIK INCORPORATED)	(LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES)
538289	07/25/2018	FEASIBILITY STUDY FOR THE FAIR LAWN WELL FIELD SITE	4774	Report		(LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES)
538311	08/03/2018	PROPOSED PLAN FOR THE FAIR LAWN WELL FIELD SITE	31	Publication		(US ENVIRONMENTAL PROTECTION AGENCY)

APPENDIX IV

NEW JERSEY CONCURRENCE

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Site Remediation and Waste Management
401 East State Street
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Trenton, NJ 08625-0420
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PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

CATHERINE R. MCCABE
Commissioner

July 27, 2018

John Prince, Acting Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency - Region 2
290 Broadway
New York, NY 10007-1866

Re: Fair Lawn Well Field Superfund Site – Proposed Plan
Fair Lawn, Bergen County

Dear Mr. Prince:

The New Jersey Department of Environmental Protection (Department) has completed its review of the July 2018 Proposed Plan for the Fair Lawn Well Field Superfund Site and concurs with the preferred remedy. The preferred remedy, Alternative 2 in the Proposed Plan, consists of the following:

Ground water will be addressed through ongoing ground water recovery and treatment at the Thermo Fisher Scientific, Inc. and 18-01 Pollitt Remediation sites in the area. Remediation also involves pumping and treating of the supply wells in the Fair Lawn Well Field for treatment of volatile organic compounds, 1,4-dioxane, PFOA and PFOS. Treatability studies are ongoing for the removal of 1,4-dioxane. If successful, the wells will be put back in use for water supply. Otherwise, the ground water will still be pumped and treated, but only as part of remediation. In addition, a Classification Exception Area will be put in place and long term monitoring will occur.

The Department looks forward to working with the EPA on the issuance of the Record of Decision and remediation of the Fair Lawn Well Field Superfund Site.

Sincerely,

Mark J. Pedersen
Assistant Commissioner

APPENDIX V

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

RECORD OF DECISION

Fair Lawn Well Field Site

Borough of Fair Lawn, Bergen County, New Jersey

INTRODUCTION

As required by Superfund policy, this Responsiveness Summary provides an outline of the public's comments and concerns regarding the Proposed Plan for the Fair Lawn Well Field Superfund Site (Site) and the U.S. Environmental Protection Agency's (EPA's) responses to those comments and concerns. At the time of the public comment period, EPA proposed a response action to address the contaminated groundwater at the Site. All comments summarized in this document have been considered in EPA's final decision for selection of a remedial alternative for the Site.

This Responsiveness Summary is divided into the following sections:

- Background of Community Involvement and Concerns - This section provides the history of community involvement and concerns regarding the Fair Lawn Well Field Site.

- Comprehensive Summary of Significant Questions, Comments, Concerns and Responses - This section contains summaries of written comments received by EPA during the public comment period and EPA's responses to those comments.

The last section of this Responsiveness Summary includes attachments which document public participation in the remedy selection process for this Site. They are as follows:

- Attachment A is the Proposed Plan that was distributed for public comment;
- Attachment B contains the public notice that was published in the Bergen Record;
- Attachment C contains the transcript of the public meeting; and
- Attachment D contains written comments received by EPA during the public comment period.

I. BACKGROUND OF COMMUNITY INVOLVEMENT AND CONCERNS

On March 17 & 18, 2009, EPA held day and evening public availability sessions with the community to present an overview of the site remedial history, and to discuss the vapor intrusion, and remedial investigation and feasibility study activities to be conducted for the Fair Lawn Well Field site.

On October 4, 2012, EPA invited Fair Lawn residents and other interested parties to attend a meeting to present the findings on the Site characterization summary report as well as inform the community on the status of the field activities, and discuss the next steps in the remedial investigation and feasibility study process for the Fair Lawn Well Field site.

On August 6, 2018, EPA released a Proposed Plan and supporting documentation for the remedial alternatives to the public for comment. EPA made these documents available to the public in the administrative record repositories maintained at the EPA Region 2 office (290 Broadway, New York, New York) and the Maurice M. Pine Free Public Library, 10-01 Fair Lawn Avenue, Fair Lawn, New Jersey. EPA published a notice of availability regarding these documents in the Bergen Record on August 6, 2018. At the same time, EPA opened a public comment period that ran from August 6, 2018 through September 5, 2018. On August 23, 2018, EPA held a public meeting at the Fair Lawn Borough Hall (Borough) Council Chambers/Court Room to inform Fair Lawn residents and officials about the Superfund process, to present the preferred remedial alternative for the Site, solicit comments, and to respond to any questions. Attachment C includes the entire transcript of the public meeting.

II. COMPREHENSIVE SUMMARY OF SIGNIFICANT QUESTIONS, COMMENTS, CONCERNS AND RESPONSES

Part 1: Verbal Comments

This section provides a summary of verbal comments received from the public during the public meeting along with EPA's responses.

A. SUMMARY OF QUESTIONS AND EPA'S RESPONSES FROM THE PUBLIC MEETING CONCERNING THE FAIR LAWN WELL FIELD SUPERFUND SITE

A summary of comments raised by the public following EPA's presentation are categorized by relevant topics and presented below:

Questions on the Timeline for Implementing the Remedy

Comment #1: How long will it take for the proposed remedy to meet cleanup objectives? When is this going to take place and what are you going to do?

EPA Response: *Design of the remedy would take approximately 6 to 12 months followed by another 6 to 12 months to construct the selected remedy. Once the system is up and running, the groundwater cleanup has an estimated timeframe of approximately 35-40 years. We expect the design of the remedy to be performed by the potentially responsible parties for the Site, and for the design work to begin after there is a settlement agreement or other enforcement document in place which will require the PRPs to perform that work.*

Comment #2: The issues have been identified, we know who the potentially responsible parties (PRPs) are. Why will it take an additional 18 months before remediation will we begin?

EPA Response: *There has been an ongoing pump and treat system to remediate the groundwater since the air strippers were implemented in 1987. This has prevented the contamination from moving towards the Passaic River and underneath homes. In addition, there* *have been source control response actions and groundwater containment activities in the source areas since the 1980s This work has been conducted under New Jersey Department of Environmental Protection (NJDEP) authorities. When EPA became the lead agency for the site in 1992 it recognized that the groundwater was contaminated but the horizontal and vertical distribution of the groundwater contamination needed to be identified. Over the past 10 years, the potentially responsible parties under EPA oversight have investigated the nature and extent of the contaminated groundwater. The investigation has taken this long because the site geology is a complicated bedrock system and a significant effort was needed to install300-foot deep wells, sample and conduct chemical analysis on each groundwater sample over several sampling events and then produce interpretative reports.*

Comment #3: Since there are contaminants in these wells, why not close the wells, and get water from Passaic Valley or Suez to supplement the loss? Does that seem reasonable?

EPA Response: *The decision about future use of the Westmoreland Well Field will be determined by the Borough. The Borough currently purchases water from Passaic Valley and Suez while the well field is not being used as a drinking water supply. The proposed upgraded treatment system will remove the Site related contaminants from the groundwater so that if the Borough decides to use the treated water it will meet all federal and state drinking water quality standards.*

Comment #4: Fair Lawn Well Field site has been a Superfund site since 1992. We're all very frustrated. Was there something that triggered the EPA to finally do something?

EPA Response: *The Site was listed on the National Priorities List in 1983, but EPA did not become the lead agency for the groundwater contamination until 1992. After becoming the lead agency, EPA began an extensive potentially responsible party search for the site contamination. In addition, in May and June 1995, EPA and the Fair Lawn Health and Water Departments conducted a residential well sampling and analysis program to determine the usage and quality of private well water, and in 1999 EPA entered into an interagency agreement with the United States Geological Survey (USGS) to conduct an area-wide groundwater study of the Fair Lawn area. EPA subsequently entered into an agreement with the potentially responsible parties to conduct a remedial investigation and feasibility study to investigate the nature and extent of the groundwater contamination and evaluate remedial alternatives. During this time, source control work has been ongoing in the identified source areas.*

Comment #5: Take me through the first six months, when you mentioned the negotiating period. Is there anything to be done to shorten that time span? This is 25 years with the EPA now. Is there a reason that will take so long?

EPA Response: *EPA will invite the potentially responsible parties to negotiate the legal terms of a settlement agreement under which they would design and construct the selected remedy. If they accept and if the negotiations are successful, we estimate that it will take twelve to eighteen months to complete the negotiations and finalize a settlement agreement, which would need to be approved by a court. While we estimate the negotiations to take between twelve to eighteen months, the time could greater or less than that.*

<u>Questions about Site History and Investigation</u>

Comment #6: This site has been identified since at least 2010 but maybe existed for decades.

EPA Response: *In 1978, volatile organic compounds (VOCs), primarily PCE, TCE and carbon tetrachloride were identified in several municipals wells including the Westmoreland well field wells. In 2013, unregulated*[1] *compounds such as 1,4 dioxane, and perfluorooctane acid (PFOA) and perfluorooctanoic sulfonate (PFOS) were detected at the distribution entry point of the Westmoreland Well Field under a state-wide sampling program.*

Comment #7: Who are the "responsible parties."

EPA Response: *EPA has identified Fisher-Scientific Company, LLC, (Fisher-Scientific), Sandvik, Inc. (Sandvik), and Eastman Kodak as responsible for the contamination at the Site.*

Comment #8: Where and how did the contamination start? Did it come from Kodak?

EPA Response: *Based on the investigation, the contamination originated from the Fair Lawn Industrial Park. Sources of contamination include the Fisher-Scientific, Sandvik, and former Eastman Kodak Company facilities.*

Comment #9: There are three wells in the Westmoreland Well Field. Is this correct?

EPA Response: *There are four municipal wells. In the past, two were used to supply drinking water to the public, and the other two were used as monitoring wells.*

Comment #10: A water tower at the end of Forest Street was put up in the '70s. It has ping-pong balls and constantly runs. There is also a million or million and-a-half-gallon water tank on 11th Street. Do you know what that's for? Is that in case Fair Lawn Industrial Park catches fire?

EPA Response: *The water tower with ping-pong balls is the air stripper treatment system that has been operating since 1987. The water tank is used for storage of clean water prior to distribution to the public*

Comment #11: If this was discovered in 1978, why wasn't Kodak forced to close or stop doing whatever dumping they were doing?

EPA Response: *Kodak was not identified as a contributor to the contaminated groundwater until 2005. I 2008, Kodak Fisher Scientific and Sandvik signed a settlement agreement with EPA to perform the Remedial Investigation and Feasibility Study (RI/FS). Kodak ceased performing RI/FS work under the agreement after it files for bankruptcy in 2012. By 2012, the buildings on the Kodak property were demolished and removed and the property sold to a developer.*

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[1] The 1996 Safe Drinking Water Act amendments require that once every five years EPA issue a new list of no more than 30 unregulated contaminants to be monitored by public water systems. *See* https://www.epa.gov/dwucmr/third-unregulated-contaminant-monitoring-rule

Comment #12: The contamination was found to be two or three hundred feet underground. How is that going to affect anybody?

EPA Response: *The Westmoreland Well Field wells were constructed to a depth of 300 to 400 feet below ground surface. Over time the contamination in the groundwater which originated at the industrial park was captured by the pumping from these wells so that the groundwater contamination entered the wells. This contamination was identified in 1978, and treatment was implemented in 1987 to provide clean water to the public.*

<u>Questions about Remedial Alternatives</u>

Comment #13: What are the differences between remedy options two and three, and why did you choose Alternative 2 over 3? Did it have to do with the cost? Because if the polluters are paying for it, why not go for the Cadillac plan?

EPA Response: *The difference between Alternatives 2 and 3 is the additional treatment technologies (air sparging with in-well stripping, and aerobic cometabolic bioremediation) included in Alternative 3 that would be used to reduce the mass of contaminant concentrations in the groundwater. This would require studies and testing to determine if these technologies could be feasible to implement effectively. These technologies provide no guarantee of working at the Site. Aerobic cometabolic bioremediation for removing 1,4-dioxane has not been demonstrated to be effective in the complicated bedrock aquifer found at the Site. In addition, Alternative 3 would result in a substantially greater amount of disruption to the local public due to the large number of treatment wells that would be required. Even if Alternative 3 were successful, EPA determined that Alternative 3 would not reduce the time it takes to achieving the remediation goals under Alternative 2. Please see Section 12 of the Record of Decision for a more detailed discussion of EPA's rationale for the selected remedy.*

Comment #14: I'm concerned about safety. This has been going on and it's going to take 18 months before they start work. Why not select both Alternatives 2 and 3 since the responsible parties will fund the projects?

EPA Response: *Alternatives 2 and 3 are both protective of human health and the environment, although Alternatives 3 poses a greater risk to the community and workers during construction because it would involve the installation of more wells and in-well stripping system would require more space for the installation of multiple well vaults to hold necessary equipment, valves, and fittings. In-well stripping system operations might generate noise that could be harder to mitigate. Since Alternative 3 includes the ex-situ treatment components of Alternative 2, selecting both alternatives is effectively the same as selecting Alternative 3.*

Comment #15: Alternative 3 requires a pilot test to determine whether it would be effective. Was consideration given to having the responsible parties conduct the pilot test while also implementing Alternative 2. If the pilot test was proven effective, it could be added?

EPA Response: *The Feasibility Study did not provide the option of mixing the components of each alternative. EPA selected the best option based on an evaluation of each alternative against* *remedy selection criteria in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, which are EPA's regulations for implementing the Superfund program. As explained in the ROD, EPA determined that Alternative 2 was the best option. Part of the reasoning was that aerobic cometabolic bioremediation for removing 1,4-dioxane, as called for in Alternative 3, has not been demonstrated to be effective in the complicated bedrock aquifer found at the Site. In addition, Alternative 3 would result in a substantially greater amount of disruption to the local public due to the large number of treatment wells that would be required. Even if Alternative 3 were successful, it was not expected to reduce the time it takes to achieve the remediation goals over Alternative 2.*

Comment #16: We've been talking about the expensive options, two and three. What about the first option, not to do anything, and keep those wells completely shut down? That way no contaminated water gets into the drinking supply.

EPA Response: *Option one is a baseline for the alternative evaluation process that EPA is required to evaluate. However, EPA's objective is to restore the groundwater to its most beneficial use as a drinking water source, and the No Action alternative would not be effective in achieving that objective. No action also would not be protective of human health and the environment, nor would it comply with applicable or relevant and appropriate requirement (ARARs) for the cleanup (or justify a waiver). Protectiveness and compliance with ARARs are two "threshold" criteria under that all remedies must meet. Once the selected remedy is implemented, the Borough will decide if it wants to use the groundwater as a drinking water source.*

<u>Questions about Drinking Water Status</u>

Comment #17 What area was drinking contaminated water since 1978? How long were the people drinking the contaminated water for? Is the water contaminated now or it isn't?

EPA Response: *The public is not drinking contaminated groundwater. After identifying the contamination in 1978, the Westmoreland Well Field wells were shut down until 1987 when the system was restarted with treatment in the form of air strippers to remove the contaminants from groundwater. Since 2016, the well field has not been used as part of the water supply system.*

Comment #18: And I want to know what's going to happen to the value of the homes. My parents are trying to sell their house. They got notified of this and now buyers are going to be concerned that they have contaminated water with little kids.

EPA Response: *EPA does not evaluate impacts on real estate values as a part of the remedy selection process. The upgrades to the treatment system and institutional controls will restrict exposure to the contaminated groundwater.*

Comment #19: It's easy to get lost within the details and scientific data. As EPA presenter, do you consider Fair Lawn water safe? Is this something you would give to your son or daughter to drink or your mother to drink?

EPA Response: *The water distributed by the Fair Lawn utility has been free of site related contaminants above federal and state standards since 1987 when the air stripper was turned on. Prior to 1987, the Westmoreland Well Field was turned off. Currently, the groundwater recovered by the Westmoreland Well Field wells is treated and discharged to Henderson Brook. After the treatment system is upgraded, the Site related contaminants will be removed from groundwater.*

Comment #20: Groundwater is used as drinking water. Most people are more concerned with what they are drinking and what contaminants are in their drinking water. Can you be specific about what water you're talking about, the groundwater or the drinking water?

EPA Response: *Generally, a well field used for a water supply pumps groundwater to the surface, removes the contaminants through treatment and distributes the clean water to the public water supply system. Essentially, groundwater becomes drinking water after treatment. However, as stated in response to Comment 17, water from the Westmoreland Well Field is not currently used in Fair Lawn's public water supply system.*

Comment #21: It's discharged into the system, it's treated to the standards that are in effect at the time. Which changes from 10 to 20 years from now?

EPA Response: *The standards for chemicals in drinking water can change over time as science evolves in the environmental field.*

Comment #22: Clarify the dates of when the water will be drinkable. Is it safe now, will it be safe in 2021 or it will be safe in 30, 40 years. Doesn't discharging to the brook make the water there unsafe?

EPA Response: *With proper treatment the groundwater can be used as a drinking water supply. The selected remedy will remediate the contaminated groundwater to its most beneficial use as a drinking water source. The upgraded treatment system will allow the community to use the groundwater from the Westmoreland Well Field as a source of drinking water. Water discharged to Henderson Brook is treated using the air stripper and meets state and federal drinking water standards.*

Questions about Vapor Intrusion

Comment #23: On 11th Street, Forest Street, Cedar Street, are those homes going to be affected, alongside the brook? Have you gone to each house to find out if they have any cancer or any medical problems or tried to remediate those properties? Have you gone to anybody's house?

EPA Response: *As part of a vapor intrusion investigation, EPA and the PRPs conducted tests for vapor intrusion and to determine if any vapors from the contaminated groundwater have entered the homes. Commercial properties have also been sampled for vapor intrusion. EPA sampled the Westmoreland Elementary School back in the summer of 2014. The results from sampling found that none of the residential homes, or the school are at risk from contaminated groundwater vapors entering the open spaces their homes or businesses.*

Comment #24: My house was sampled for vapors around 2012 or 2013, and found no vapors. In the proposed plan on page 26, PCE overburden plume area was smaller in June 2010 and March 2011 compared to November 2015 and June 2016. With the plume being larger in 2016, is EPA going to go around once again to check for vapors? Is there going to be another round or not?

EPA Response: *Between 2011 and 2015, more wells were installed, to better understand the extent and nature of the plume thus the reason that the plume appears larger in figures representing later (and more) data. EPA continues to review data to determine if additional vapor testing is necessary. Had these wells been installed and sampled in 2010 and 2011, the plume would have been depicted as the same size as the 2015 and 2016 plume area. The plume has not spread.*

Comment #25: Drainage water comes and goes under my house towards the Passaic River. Are the chemical concentrations from drainage water underneath my house dangerous?

EPA Response: *Rainwater drains into the ground thereby raising the shallow water table. Vapors from chemicals found in the shallow water table can migrate into open space or basements within homes and buildings. EPA has tested many homes and businesses in the area and found no risk to owners from potential migrating vapors.*

Questions about Exposure to Site Related Contaminants

Comment #26: The tables in the presentation show the amounts in microgram per liter. Where are the limits? Is there a way to compare how much above the limit?

EPA Response: *The remediation goals were provided in a table attached to the Proposed Plan and in Tables 7 and 8 attached to the Record of Decision. A summary comparing the sample results to these goals can be found in the RI Report.*

Comment #27: Has anything been done to look at teratogenic effects or deferred carcinogenic at this site?

EPA Response: *Although teratogenic effects and deferred carcinogenic were not looked at for this Site, a human health risk assessment was conducted as part of the RI/FS. It consists of a four-step process that includes hazard identification, exposure assessment, toxicity assessment, and risk characterization. The hazard identification evaluates which sample result concentrations exceed a risk level. The exposure assessment identifies the potential receptors exposed to concentrations founds at the Site. The toxicity assessment, which is what you were talking about, looks at data for the toxicity for all the chemicals that are posing or could potentially pose a risk at the site. The combination of these steps evaluates what the risks are for each receptor. A risk assessment considers the toxicity information.*

Comment #28: Can the concentrations of chemicals cause health hazards?

EPA Response: *Exposure to chemicals above their health based standard over a period time through ingestion, dermal contact or inhalation can potentially cause health issues. However, EPA has not identified any individuals exposed to chemicals via ingestion, dermal contact or inhalation.*

Comment #29: It's unclear what's going on with the plume and the different chemicals. Are the plumes improving? Or is it spreading to other well fields other than Westmoreland?

EPA Response: *The figures show the plumes for different chemicals during the sampling events between 2010 and 2016. The sizes of the plumes are different because new monitoring wells were installed and sampled between monitoring events 2011 and 2015 illustrating the extent and nature of the groundwater plume as it has existed over the years. Had these wells been installed and sampled in 2010 and 2011, the plume would have been depicted as the same size as the 2015 and 2016 plume area. So, the plume has not spread.*

Comment #30: With those two wells turned off and none of that water getting to the population, what is the current risk to the population right now?

EPA Response: *There is no unacceptable risk to the population from exposure to contaminated groundwater.*

Comment #31: Since the drinking water standard would be higher, meaning a lower number of parts per billion than the groundwater, the groundwater standard is not considered as rigorous as the drinking water standard.

EPA Response*:* *For many of the contaminants at the Site, the contaminant levels are the same for the New Jersey Groundwater Quality Standards and the New Jersey Primary Drinking Water Maximum Contaminant Levels (See ROD Table 7). None of the data currently show that contaminants in the drinking water exceed MCLs which would result an unacceptable risk level.*

Comment #32: Regarding the unregulated chemicals not tested since 2013, how dangerous were those chemicals in our drinking water by today's standards? Were the residents drinking that water before the wells were shut down in 2016? How hazardous was the drinking water?

EPA Response: *For 1,4-dioxane the groundwater remediation standard was lowered from 10 ug/L (micrograms per liter) to 0.4 ug/L by the State of New Jersey in 2015. The highest levels detected in the Westmoreland Well Field were between 7 and 8 ug/L. The NCP defines an acceptable excess lifetime cancer risk greater than 1×10^{-6} (one in a million) to 1×10^{-4} (one in ten thousand). Exposure 1,4-dioxane at a level of 0.4 ug/L results in an excess cancer risk of 1×10^{-6}, 4.0 ug/L results in an excess cancer risk of 1×10^{-5}, and 40 ug/L results in an excess cancer risk of 1×10^{-4}. Seven to 8 ug/L is approximately a 1×10^{-5} risk level, which is within EPA's acceptable risk range.*

<u>Questions about Costs of Implementing the Remedy</u>

Comment #33 Who ensures that the remedy cost is going to be borne by the responsible parties and the State and it's not going to be impacted my property taxes.

EPA Response: Neither the *Borough or the State will bear the cost of implementing the selected remedy. EPA expects that the potentially responsible parties will design, construct and initiate the operations of the new treatment system under an agreement or other enforcement document with EPA.*

Comment #34: What happens if it goes over budget or find that more work is needed? Can EPA go back to Kodak and the other offenders and ask for more money? Would the Fair Lawn residents have to incur the costs?

EPA Response: *The costs to implement the selected remedy will be the responsibility of the potentially responsible parties, and any settlement agreement or other enforcement document would require the PRPs to establish financial assurance to ensure the availability of funding to complete the work.*

Comment #35: If the selected remedy doesn't fully remediate in a timely fashion so that the Borough feels comfortable allowing its residents to drink the water and needs to purchase water to provide our residents with the safest drinking water, are the responsible parties going to pick up the cost of how much it would cost the Borough?

EPA Response: *If EPA determines that the remedy is not protective or will not achieve the remedial action objectives in a timely manner, it will evaluate options to complete the remediation of the contaminated groundwater and to ensure protection of public health. EPA will not speculate at this time as to whether purchasing water from an alternate source would be required as part of a modified remedy or whether the PRPs would be liable under CERCLA for the costs of alternate water.*

Comment #36: Is the operation and maintenance cost something that the responsible parties would pay for or would they be required to set up a funding source to cover that cost over the 30 or 40 years that operation and maintenance is expected to occur for?

EPA Response: *EPA anticipates that the PRPs will design, implement and initiate operations of the new treatment system at the Westmoreland Well Field. We expect the PRPs to determine how they plan to fund the operation and maintenance costs of the remedy. Any settlement agreement would require the PRPs to establish financial assurance to ensure that funding is available to pay the operation and maintenance costs.*

<u>Questions about Unregulated Compounds</u>

Comment #37: Has the 1,4-dioxane been a problem going back to the '70s or maybe even earlier. Is that correct?

EPA Response: *1,4 dioxane was not detected at the Site until 2013. In addition, the Westmoreland Well Field was turned off beginning in 1978 until 1987 when the system was* *restarted with treatment. No one was aware of the contamination prior to 1978, and since 1978, the residents have not been exposed to the contaminants in the groundwater.*

Comment #38: 1,4-dioxane is an unregulated chemical that was detected at 3.24 *ug/L*. in the 2013 Fair Lawn annual water quality report. What is the standard for this unregulated chemical? What would be the drinking water standard?

EPA Response: *1,4-dioxane has a groundwater quality standard (GWQS) of 0.4 ug/L. This is a standard developed by the State of New Jersey for the remediation of groundwater. This is not a drinking water standard. It is uncertain what drinking water standard will be developed for 1,4 dioxane.*

Comment #39: 1,4-dioxane is an unregulated chemical with a standard of 0.4 ug/L, and the well field wells have a reading in 2013 of 3.24 *ug/L*. How high does it have to get before its looked at?

EPA Response: *When 1,4-dioxane was detected in the well field wells at 3.24 ug/L in 2013, the State GWQS was 10 ug/L. In November 2015, the State lowered the GWQS to 0.4 ug/L. The system was not turned off at that time because this water was diluted into the entire water supply system. But in May 2016, the system was turned off for precautionary reasons. Currently, the residents are not drinking the water from the Westmoreland Well Field Wells.*

Comment #40: If you proceed with the treatment, what would be the target for 1,4-dioxane? There is no standard for drinking water, so what would be the target for treatment?

EPA Response: *EPA will proceed with remediating the groundwater and use a groundwater quality standard of 0.4 ug/L for 1,4-dioxane.*

<u>Questions about the Treatment Technologies</u>

Comment #41: The water flowing through the wells is coming from that groundwater. Is the water going to be as clean as the currently tested water or is it going to have all those chemicals? Is the water going to be okay for everybody to drink even with this new system?

EPA Response: *The selected remedy with the new treatment system will remove all the Site related contaminants from the groundwater recovered by the Westmoreland Well Field Wells at concentrations above the remediation goals. The new treatment system will be tested and sampled similar to the testing the Borough conducts on a monthly basis now. The treated water will meet drinking water standards and the GWQS for 1,4-dioxane.*

Comment #42: Is there data on the anticipated removal efficiencies for Alternatives 2 and 3?

EPA Response: *Removal efficiency data will be collected during the startup phase for the selected remedy.*

Comment #43: Are there typical removal efficiencies with these treatment methods when implemented elsewhere for these types of contaminants? Was that reviewed as part of your comparison between Alternatives 2 and 3? Can that information be shared with the public?

EPA Response: *There are typical removal efficiencies from case studies for these types of technologies such as advance oxidation process (AOP) and liquid granulated activated carbon (LGAC) which were reviewed by the PRPs as part of the Feasibility Study.*

Questions about Source Control

Comment #44: What is the state of the chemicals going into the contaminated groundwater plume from those responsible industries? What is being done to remove the source of this contamination?

EPA Response: *Since the 1980's, Fisher Scientific and Sandvik have been conducting remedial activities on their properties under NJDEP authority to eliminate the contaminated soils and reduce their migration to groundwater. Pump and treat systems and bioremediation programs are containing and removing these contaminants from the soils and groundwater on the properties.*

Part 2: Other Written and Verbal Comments Received During the Public Comment Period

Written comments were received from various people and organizations during the public comment period. They are included below, followed by EPA's responses. Responses are divided into sections, as needed, for clarity.

The following written comments were received via email:

Drinking Water Supply

Commenter 1 asked:
1a) Does a Brita filter water pitcher remove 1,4-dioxane, PFOA, or PFOS from the water?

EPA Response 1a:
The treated groundwater from the Westmoreland Well Field municipal wells is currently not being distributed to the residents of Fair Lawn so residents are not being exposed to the Westmoreland well field groundwater contaminated with VOCs, 1,4-dioxane and PFOS/PFOA. As for filtering PFOA/PFOS, a carbon filter will remove these chemicals since PFOA/PFOS are organic chemicals. However, most in-home water filters, including activated carbon filters, do not remove 1,4-dioxane effectively. Reverse osmosis filters are better, removing a significant portion of the chemical from tap water, but still fall short.

1b) Does boiling remove these chemicals from the water or break them down into nonhazardous chemicals?

EPA Response 1b:

"Boiling or disinfection will not destroy other contaminants, such as heavy metals, salts, and most other chemicals." See link https://www.epa.gov/ground-water-and-drinking-water/emergency-disinfection-drinking-water

1c) If the answer to both questions above is no, is there anything Fair Lawn residents can do to remove even low levels of these toxic chemicals from the water?

EPA Response 1c:
As I indicated above, the residents of Fair Lawn are not drinking the treated contaminated groundwater from the Westmoreland Well Field. The proposed upgrade of the treatment system will effectively address all the contaminants of concern at the Site to meet health-based standards.

Commenter 2 asked:
2a) Thank you for your presentation to the Fair Lawn community last week and for taking the time to answer all questions from residents! I have now read through the full remediation proposal at the EPA web site and have an additional question. The proposal states the following in the section on Alternative 2 (page 14): "The Borough would evaluate whether the treated water from the WMWF would be used as a water supply source. If the treated water from the WMWF is used as a water supply source, the new treatment equipment would become part of the water supply system. **For purposes of estimating costs, it is assumed that the intended use of treated water is for drinking water.**" If the town decides *not* to use the treated water for the municipal drinking water supply, why would it have any impact on costs or anything else?

EPA Response 2a:
There are no impacts to costs associated with whether the Borough accepts the treated water. The remedy selected in the ROD assumes all four of the Westmoreland Well Field wells will be used to recover and treat contaminated groundwater. Although, this will need to be verified by collecting additional information during the remedial design phase. The estimates in the Feasibility Study dated July 25, 2018 include the cost of using all four municipal wells.

2b) If I understand correctly, the 2 wells that are currently shut down would need to be brought online any way for the most efficient extraction of the contaminated water in the aquifer, so the operational cost for them must already be included in the EPA estimates regardless of whether the treated water is discharged into Henderson Brook via the bypass or into the drinking water supply. Are there any other considerations?

EPA Response 2b:
The Borough has indicated that the Westmoreland Well Field would not be utilized if the costs to operate and maintain the new, upgraded treatment system exceeds the costs of purchasing water through other sources (i.e., public water utilities such as SUEZ). The Borough is considering the purchasing of water from other public water utilities along with the costs of operating and maintaining the upgrade treatment system.

Commenter 3 asked:

3a) I just became privy to an article about dangerous levels of chemicals found in Fair Lawn water. As a father of 2 young children, I am gravely concerned about the water quality coming out of our taps. I was also not aware of EPA meeting to discuss this issue. Was this a closed-door meeting?

EPA Response 3a:
Contaminated groundwater from the Westmoreland Well Field is currently being treated and discharge to Henderson Brook. No one is drinking water from the Westmoreland Well Field. This was not a closed-door meeting. EPA notified the public by advertising in the Bergen Record and announcing it on the Borough and Free Library web pages.

3b) I understand that EPA does not have concerns about the drinking water quality, but I would like to get some basic information that was used to draw this conclusion.

(i) What are the present level of 1,4-dioxane and PFOA level in our tap water and what are EPA limits?

EPA Response 3b(i):
In 2016, 1,4-dioxane was detected at FL-10 of the Westmoreland Well Field at 8.59 ug/L, and in 2013, as part of the UCMR (Unregulated Contaminants Monitoring Rule) monitoring program, PFOS/PFOA was detected at the distribution entry point of the Westmoreland Well Field at concentrations ranging from 30 – 36 ng/l (nanograms per liter) for PFOS and 58 – 66 ng/L for PFOA, respectively. No federal MCL for drinking water has been established for these contaminants. EPA has established the health advisory level for PFOS/PFOA at 70 ng/L. Click on link for more information on PFOS/PFOA. https://www.epa.gov/pfas/pfas-laws-and-regulations

EPA has also calculated a tap water screening level of 0.46 ug/L for 1.4-dioxane, based on 1x 10^{-6} lifetime excess cancer risk. Click on link below for more information on 1,4 dioxane.

https://www.epa.gov/sites/production/files/2014-03/documents/ffrro_factsheet_contaminant_14-dioxane_january2014_final.pdf

(ii) How frequently is the water tested? I would like to see the latest water quality report.

EPA Response 3b(ii):
The water is tested throughout the year by the Borough of Fair Lawn, and an annual water quality report is prepared by the Water Department. Click on the link for the 2017 water quality report prepared by the Water Department
http://www.fairlawn.org/filestorage/205/395/2017_Water_Report.pdf

(iii) What disinfection methods are currently used to treat our tap water?

EPA Response 3b(iii):
Chlorination is used to disinfect the treated groundwater at the Westmoreland Well Field.

(iv) What is the proposed treatment suggested by EPA or the concerned engineers?

EPA Response 3b(iv):
The selected remedy includes advance oxidation with hydrogen peroxide and liquid granulated activated carbon to remove VOCs, 1,4 -dioxane, and PFOA/PFOS from the groundwater recovered at the Westmoreland Well Field.

3c) Does the city plan on holding a town hall meeting to address the water quality concerns? As someone who has worked within the water industry for over a decade, I have high confidence in our water systems in general. However, we definitely would like to avoid a crisis of Michigan level by being proactive.

EPA Response 3c:
EPA believes that the Borough Council Members were scheduled to hold a meeting on September 4, 2018 to discuss the residents water quality concerns and the EPA preferred remedy.

Commenter 4 asked:
Thank you for the information, it provided me with a history of the issue. I do have a question on your presentation, slide#13 shows an increase in the 3 of the 4 toxic chemicals between Nov2015 and Jun2016 water tables. Is there an explanation for change? Do you have this data for 2018?

EPA Response 4:
The increase in concentrations for the chemicals shown on slide 13 between 2015 and 2016 could be the result of remaining subsurface soil contamination found on "source area" properties within the Fair Lawn Industrial Park. For example, during a rain event, precipitation moves through the contaminated soils, picking up some of the contaminants, and into the groundwater, or possible the water table rises into the subsurface soil contaminated area and flushes out the contaminants into the groundwater. These areas are still under NJDEP investigation to address the subsurface soil contamination through active remediation using bioremediation technologies. No samples were collected for the EPA-lead RI/FS work in 2018. Additional information the source area investigations may be available from NJDEP.

Commenter 5 asked:
I want to address the well problem in Fair Lawn, and ask since you knew about the questionable wells since 1978, why did you not close the wells at that time. The wells were in use, and have jeopardized the health of the whole town for many years. The way you did that was not very responsible. Also, if you need to close those wells now, why don't you permanently close them and use the wells that are okay and have the town continue buying additional water that is needed. I don't think the town people trust those wells to be ever in use.

EPA Response 5:
EPA was unaware of the contamination found at the Westmoreland Well Field in 1978. NJDEP begin testing the municipal wells in the late 1970's. When the contaminants were discovered within these wells, the Well Field was shut down until the air stripper/chlorination system began operating in 1987. The wells are not currently being used for drinking water purposes. The

contaminated groundwater from the Westmoreland Well Field system is currently being treated and discharged to Henderson Brook.

The future use of the municipal well water will be decided by the Borough working in conjunction with the NJDEP. Whichever direction the Borough decides, EPA will move forward with remediating the contaminated groundwater by implementing the selected remedy.

Commenter 6 asked:
We live in Fair Lawn, and use tap water from municipal wells. As you know, the water is contaminated with volatile organic compounds (VOCs) and 1,4 dioxane. We have a reverse osmosis filter at home, which we use for all drinking water. It is a regular filter we got on Amazon. My question is: Does the filter clean the water from the contaminants?

EPA Response 6:
Reverse osmosis can significantly reduce some of the most dangerous impurities including VOCs. Unfortunately, filters such as carbon filters and reverse osmosis filters can't effectively remove 1,4 - dioxane. However, the contaminated groundwater recovered by the Westmoreland Well Field is currently being treated and discharged to Henderson Brook, and not distributed to the residents of Fair Lawn.

Commenter 7 asked:
Please accept this email as an indication of concern about Fair Lawn's Westmoreland Well Field. I have spoken with numerous neighbors, most who did not know about the comment period, and many who did not know about the contamination. I can tell you that there is widespread concern about this from those who know about it. As in most small towns, information, especially negative information, is not widely shared. Please note the importance of EPA's intervention and action in keeping thousand's safe and aware.

EPA Response 7:
EPA notified the Borough and published a notice in the Bergen Record. EPA understands your concern with the drinking water. The contaminated groundwater from Westmoreland Well Field is currently being treated and then discharged to Henderson Brook. It is not distributed to the residents of Fair Lawn. Click on the link below to EPA's website for the Fair Lawn Well Field Site: https://www.epa.gov/superfund/fair-lawn-wellfield

Letter from the 38th Legislative District, Senator Joseph A. Lagana, Assemblywoman Lisa Swain, and Assemblyman Christopher Tully, (August 31, 2018)

Commenter 8 asked:
8a) Harmful contaminants, including carcinogens 1,4-dioxane, PFOA and PFOS, as well as PCE, benzene and chloroform, have been detected in the groundwater at and around the site for decades. This poses significant long-term risks to the health of Fair Lawn residents, who rely on the site for their drinking water. Likewise, this is extremely dangerous to the local ecosystems of Fair Lawn and along the Henderson Brook and the Passaic River. The "Proposed Plan for the Fair Lawn Well Field Site," put forward by the EPA in consultation with the NJDEP, takes an

important step towards fully and permanently addressing the Westmoreland Well Field contamination.

EPA Response 8a
EPA agrees that the remedy is an important step towards addressing the contamination at the Westmoreland Well Field, and the cleanup of the contaminated groundwater plume. EPA notes that there is no long-term risk to the residents of Fair Lawn because the drinking water from the Westmoreland well field is not being pumped into the water supply system. All contaminated groundwater from the Westmoreland Well Field is treated using the air stripper and chlorination system prior to discharge to Henderson Brook. There is no risk of exposure to habitat and ecological receptors.

8b) While we support the final determinations of the EPA, NJDEP and the Fair Lawn Council, **we also strongly urge the full consideration of additional remedies that will increase the likelihood of success, as well as the speed and impact of remediation in restoring the site to an uncontaminated state**. Alternative 2, the plan currently recommended by the EPA and NJDEP, does not include in-situ air sparging (AS), soil vapor extraction (SVE) with in-well air stripping or aerobic cometabolic bioremediation systems, all prescribed remedies in Alternative 3. According to the EPA's proposed plan, AS/SVE techniques and aerobic cometabolic bioremediation systems, in combination with other remediation techniques/systems, would address specific issues plaguing the Fair Lawn site and could potentially remediate the site more quickly than Alternative 2. We ask the EPA and NJDEP to fully consider the health and other needs of Fair Lawn residents in deciding a final remediation plan and ask the EPA and NJDEP to reconsider Alternative 3 as the best course of action for the Westmoreland Well Field. Complete remediation of the site to a state that is safe for Fair Lawn's residents and ecosystems is our highest priority.

EPA Response 8b
As discussed in the Proposed Plan and at the public meeting each alternative was compared to seven of the nine remedy evaluation criteria in the NCP to determine the alternatives' relative advantages and disadvantages. This screening process found that both Alternatives 2 and 3 were similar in overall protectiveness, compliance with ARARs, meeting the site cleanup goals, reducing toxicity, mobility, and volume through treatment, and short-term effectiveness. Where the two alternatives differ, is the addition of treatment technologies (air sparging/soil vapor extraction with in-welling stripping, and aerobic cometabolic bioremediation) in Alternative 3 to reduce mass concentrations within the contaminated groundwater plume. A treatability study and pilot test would be required to determine the design parameters for implementability and long-term effectiveness of these technologies. In addition, the site geology and pumping influences from other wells would impact the area of treatment further reducing the likelihood of these technologies succeeding in reducing mass and overall timeframe of the groundwater recovery and treat system. Implementation issues are more problematic for Alternative 3 than Alternative 2 since a large number of injection wells would need to be installed and most would be on private property requiring access agreements. Please see Section 12 of the ROD for additional discussion for EPA's rationale for selecting Alternative 2.

8c) We also cannot state strongly enough our conviction that the full value of all remediation costs at the Westmoreland Well Field should be covered by the polluters who caused the contamination. The residents and taxpayers of Fair Lawn, District 38 and New Jersey have already faced too high a burden due to the actions of a few negative actors. Asking the taxpayers to further foot the bill for site remediation, as well as for Fair Lawn's potential need to bring drinking water in from other sources, would be extremely unjust and overly burdensome on the true victims of the contamination.

EPA Response 8c
The PRPs reimbursed the Borough for the costs of the implementation, and operation and maintenance of the treatment system at the Westmoreland Well Field, conducted the investigation and remediation activities on their properties through NJDEP authority and completed the RI/FS required by EPA. In addition, the PRPs and the Borough water engineering department have been working closely to upgrade the treatment system to remove contaminants of concern from the drinking water. EPA expects that this partnership between the PRPs and the Borough will continue going forward.

Letter from Sierra Club, New Jersey Chapter (September 5, 2018)

Commenter 9 asked
9a) The New Jersey Sierra Club is concerned that the EPA's proposed clean-up plan for the Westmoreland Well Field contamination site is not enough to protect the communities and environment of the region. The site has contaminated groundwater and some municipal wells with volatile compounds (VOCs), including 1,4 dioxane. Fair Lawn has some of the highest concentrations of 1,4 dioxane in New Jersey. Most of the contaminates have come for the Fair Lawn Industrial Park however the State of New Jersey is still addressing the source of contamination. The people of Fair Lawn's health is at risk because they are drinking contaminated water.

EPA Response 9a
The residents of Fair Lawn are not drinking contaminated groundwater. The treated groundwater from the Westmoreland Well Field is discharged to Henderson Brook.

9b) We believe that the current clean-up proposal in insufficient because it would only expand the current pumping system that has not been successful to treat the water. Pumping will not get rid of the toxic chemicals, such as 1,4 dioxane toxins in their groundwater. Focus should be on attacking these chemicals and more importantly finding the source of contamination. Dioxane is a serious threat to the town's public health and a threat to nearby water sources. It is important that the EPA's expanded cleanup will not only remove harmful contaminates in the Fair Lawn's water but find the main source of where those contaminates are coming from.

EPA Response 9b:
The current treatment system continues to remove VOCs from the groundwater recovered by the Westmoreland Well Field. The selected remedy will provide containment of the contaminated groundwater plume, and remove VOCs, 1,4-dioxane and PFOA/PFOS from the groundwater using advanced oxidation process and liquid granular activated carbon. The sources are known

to originate within the Fair Lawn Industrial Park and are being addressed through NJDEP authority.

9c) The Fair Lawn Well field site is comprised of three municipal wells that supply drinking water to the 32,000 residents of Fair Lawn, Bergen County, New Jersey. All three wells are part of the Westmoreland Well Field. In 1978 volatile organic compounds, such as 1,4-dioxane were found in these wells. Three companies in the park agreed to remove contaminated soil, monitor nearby groundwater however, sampling conducted as recently as 2011 found chemicals were still above acceptable levels in the soil and groundwater. The EPA found that 1,4-dioxane is more likely to cause cancer than previously thought: Cancer could occur in one person out of 1 million exposed to 0.35 milligrams per liter of the chemical over a lifetime.

EPA Response 9c:
There are four municipal wells that make up the Westmoreland Well Field. Two were used to supply drinking water to the public, and the other two wells were used as monitoring wells. 1,4-dioxane was discovered at the Well Field during the 3rd UCMR event in 2013, not in 1978. There were four companies that agreed to conduct remedial activities under NJDEP authority; Fisher, Sandvik, Kodak, and the owners of 18-01 Pollitt Drive. Kodak files for bankruptcy in 2012.

9d) The EPA's expanded clean up proposal also involves restarting two other municipal wells at the Westmoreland Well Field to further control the contamination plume. We urge the agency to be sure their plan includes effective long-term monitoring and measures to restrict the use of contaminated groundwater from the site. Throughout the cleanup, monitoring, testing, and further studies must be conducted to ensure the effectiveness of the cleanup. There's no safe standard set for 1,4 dioxane. It's a dangerous chemical that can lead to severe kidney and liver effects and possibly death. Breathing vapors of 1,4-dioxane also affects the nasal cavity.

EPA Response 9d:
The selected remedy includes long-term monitoring for groundwater and surface water, and institutional controls in the form of a Classification Exemption Area/Well Restriction to limit exposure to contaminated groundwater. Prior to the construction of the preferred remedy, a pre-design investigation will be conducted to determine nature and extent of groundwater contamination, plume containment and treatment cleanup effectiveness.

9e) The Fair Lawn Well Field Superfund site has some of the highest concentrations of 1,4- dioxane in their wells. This is a public health problem because 1,4-dioxane is a cancer-causing substance and can cause liver and kidney damage. The town has been waiting for 40 years for clean water and they deserve a thorough, effective clean-up and includes an investigation into all possible sources of contamination.

EPA Response 9e:
The Borough has treated groundwater to meet all drinking water standards since 1987, utilizing air strippers to remove VOCs. Prior to 1987, the wells were off-line and not being used to supply drinking water to the public. The current treatment system will be upgraded to remove VOCs 1,4-dioxane and PFOA/PFOS. Based on previous investigation activities, the sources of the contamination are known to have originated from within the Fair Lawn Industrial Park.

E-mail from Sandvik, Inc., and Fisher Scientific Company L.L.C.

(September 5, 2018)

Commenter 10 asked

10a) In its description of the Preferred Alternative (Alternative 2) on pages 14-15 of the Proposed Plan, EPA states that "[d]uring the remedial design, modeling and capture zone analysis would be performed to estimate the hydraulic influence of the existing pump-and-treat systems to identify potential gaps in the capture zones. This new information would be used to determine the location of the recovery well(s), if necessary." (emphasis added). However, on page 1 of the Proposed Plan, EPA states that "[t]he remedy would also include installing an additional recovery well(s) with treatment unit(s) to provide further hydraulic control and contaminant removal of impacted groundwater." Similarly, in the description of Alternative 2 on page 14 of the Proposed Plan (the alternative chosen by EPA) EPA states that "[t]he remedy would also include installing an additional recovery well(s) with treatment unit(s) to capture any areas limited by hydraulic influence and contaminant removal of the 1,4-dioxane plume." In the description of the Preferred Alternative (Alternative 2) on page 19 of the Proposed Plan, EPA states that a component of the Preferred Alternative is "[a]dditional recovery well(s) with treatment unit(s) to capture any areas limited by hydraulic influence." The Record of Decision ("ROD") should be clear that additional recovery wells with treatment units will only be installed as part of the remedy if estimates of the hydraulic influence of the existing pump-and-treat systems indicate that additional recovery wells would be necessary to capture contaminated groundwater not already being captured by the existing systems.

EPA Response 10a:

Section 12.1 (Description of the Selected Remedy) of the Record of Decision states that "[i]f necessary, additional recovery well(s) with treatment unit(s) to capture any areas with limited hydraulic influence." In addition, this section indicates that the number of recovery wells, treatment units and pumping rates will be determined during the remedial design.

10b) The Preferred Alternative identified in the Proposed Plan includes the use of the existing Borough of Fair Lawn production wells and the treatment systems that exist on those wells (the "Borough Wells") as an important component of the remedy. The Preferred Alternative will treat the water from the Borough Wells so that the water will meet federal drinking water standards. The Preferred Alternative does not indicate whether the post-treatment water from the Borough Wells will be distributed by the Borough as drinking water. As stated on page 1 of the Proposed Plan, "[t]he Borough would evaluate whether the treated water from the [Borough Wells] will be used as a water supply source…" The ROD should be clear that the Borough of Fair Lawn will decide whether to distribute post-treatment water from the Borough Wells to the residential water supply system based on the Borough's analysis of the post-treatment water and any other pertinent factors. The ROD should also be clear that any water from the Borough Wells not distributed by the Borough to the residential water supply system will be treated and discharged to Henderson Brook.

EPA Response 10b:

Section 12.1 (Description of the Selected Remedy) of the Record of Decision states, "If the Borough of Fair Lawn decides not to use the treated groundwater as part of their water supply system, it will be discharged to Henderson Brook or a POTW."

10c) As stated on page 19 of the Proposed Plan, Alternative 3 "requires the construction on private properties and installation of numerous wells and related systems." Specifically, Alternative 3 would require the construction of an estimated 120 treatment wells, and related trenching and piping, over the six to twelve month estimated construction period. Road closures and detours, as well as mitigation measures for other short-terms hazards including fugitive dust and physical hazards, would be far more prevalent during construction of Alternative 3 than Alternative 2. Longer term, Alternative 3 would require significantly more aboveground equipment to be located and maintained on private commercial and residential properties in the area, causing additional dislocation and other nuisances (e.g., noise). Consequently, EPA appropriately concluded that "Alternative 2 would be significantly less disruptive than Alternative 3 to the residents." See page 20 of the Proposed Plan. Moreover, Alternative 3 requires the use of unproven technologies, does not significantly reduce the overall estimated duration of the remediation and is substantially higher in cost, without a measurable benefit over Alternative 2. Therefore, Alternative 2 is clearly a preferred alternative over Alternative 3 based on the nine evaluation criteria set out in the National Contingency Plan ("NCP"). Fisher and Sandvik support EPA's evaluation of the remedial alternatives in the Proposed Plan, and believe EPA has fully and appropriately considered the NCP criteria in this respect.

EPA Response 10c:
EPAs evaluated the alternatives against the NCP's nine criteria which provided the rationale for the selected remedy in the ROD.

10d) The Remedial Investigation included extensive vapor intrusion sampling at numerous residential and commercial properties, as well as the Westmoreland Elementary School. As stated on page 10 of the Proposed Plan, "the sample results from the EPA-led investigation found that all residential properties are currently not at risk for contaminated vapors entering their space, and no [vapor intrusion] sampling is scheduled." Therefore, unless there is evidence of a significant change in conditions warranting additional vapor intrusion investigation since the completion of the Remedial Investigation, no additional vapor intrusion sampling is warranted at the Site. The Respondents support EPA's statements in the Proposed Plan with respect to the status of the vapor intrusion investigation.

EPA Response 10d:
Although the vapor intrusion data collected during the remedial investigation phase found that there is currently no risk from contaminated vapors entering the open space of residential properties. The most recent data (from 2015 and 2016) have not been evaluated by EPA to determine if there is a need to conduct additional residential vapor intrusion sampling. EPA will evaluate this data either at the request of a residential homeowner or during the remedial design.

10e) On page 2 of the Proposed Plan, EPA states "[t]wo of the four wells are used to provide treated drinking water to the residents of the Borough." This statement is not accurate because the Borough ceased using any wells in the Westmoreland Well Field for drinking water supply in May 2016, and the Westmoreland Well Field has not been used for drinking water supply since May 2016.

EPA Response 10e:
The ROD (Part 2, Section 1) states that the two wells were at one time used to provide drinking water to the residents of Fair Lawn but are not currently in service for that purpose.

10f) On pages 13, 15 and 20 of the Proposed Plan, EPA describes long-term monitoring ("LTM") as a component of both active alternatives, and notes that the results of the LTM program "would be used to evaluate the migration and changes in site-related contaminants of concern over time." In addition, as described in the Feasibility Study Report dated June 2018, the LTM program will include sampling parameters that can be used to evaluate whether natural degradation of contaminants of concern is occurring in groundwater, or whether such degradation has the potential to occur in the future. The ROD should clarify that if LTM data indicate that natural degradation is an effective method of achieving the final remediation goals, monitored natural degradation may be incorporated into the remedy at some point in the future after the groundwater recovery and ex-situ treatment system has significantly reduced contaminant levels in groundwater.

EPA Response 10f:
The ROD states that a long-term monitoring program will be implemented. The evaluation of the effectiveness of natural attenuation should be included in the preparation of the long-term monitoring work plan.

10g) In Table B of the Proposed Plan, EPA identifies preliminary remediation goals ("PRGs") for surface water. Based on the pathways identified in the approved March 2018 Baseline Human Health Risk Assessment ("BHHRA"), no unacceptable risk exists for exposure to surface water, and ingestion (of either water or fish) was not an identified pathway for exposure. As specified in the NCP, PRGs should be modified as more information becomes available through the Remedial Investigation/Feasibility Study process (which includes the BHHRA), and such additional evaluation should inform the identification of any remediation goals ultimately included in the remedy. Based on the information developed in the BHHRA, there is no unacceptable risk from surface water, and therefore surface water PRGs are not necessary. The ROD should not include any PRGs for surface water, or, in the alternative, utilize only the component of the EPA's National Recommended Water Quality Criteria derived from the ingestion of drinking water (not the ingestion of fish), as described more fully in the Respondents' July 25, 2018 Response to Comments letter to EPA.

EPA Response 10g:
Under the NCP, "Water quality criteria established under sections 303 or 304 of the Clean Water Act shall be attained where relevant and appropriate under the circumstances of the release." 40 C.F.R. § 300.430(e)(2)(i)(E). In addition, the Preamble to the NCP states:

> *EPA believes that MCLs or non-zero [maximum contaminant level goals] generally will be the relevant and appropriate standard for surface water designated as a drinking water supply, unless the state has promulgated water quality standards (WQS) for the water body that reflect the specific conditions of the water body. However, surface water bodies may be designated for uses other than drinking water supply, and therefore an*

> *[federal water quality criterion or "FWQC"] intended to be protective of such uses, such as the FWQC for consumption of fish or for protection of aquatic life, may very well be relevant and appropriate in such cases."*

55 Fed. Reg. 8666, 8755(March 8, 1990)

As reported in the RI, Henderson Brook is a gaining (from groundwater) surface water body in some areas of the site and a losing (to groundwater) surface water body in other areas of the site. Because Henderson Brook can serve as a source of contamination to groundwater, it is important to limit the concentrations of chemical discharged to the brook over the long term in order for remedial goals to be achieved in the groundwater. In addition, the ROD includes a remedial action objective (RAO) to "restore the impacted surface water to its most beneficial use by reducing Site-related contaminant levels to the most stringent of federal and state standards." Because of the hydraulic connection between Henderson Brook and the groundwater, the RAO, and NJDEP's designation of the brook as an FW2-NT (fresh water body-non-trout) stream, EPA has determined that the surface water criteria and standards are relevant and appropriate to the remedial action. Long-term monitoring will be conducted to collect data to evaluate protection of the surface water resource.

10h) On page 3 of the Proposed Plan, EPA describes the historic use of the Westmoreland Well Field Wells. The ROD should clarify that, prior to May 2016 (when the Westmoreland Well Field Wells ceased to be used as a drinking water source as noted in Comment 5 above), only wells FL-10 and FL-14 were operational. Well FL-11 was taken out of service in 1996, and has since been used only as an observation well.

EPA Response 10h:
The ROD (Part 2, Section 1) states that the two wells municipals were at one time used to provide drinking water to the residents of Fair Lawn, and that the other two wells were being used for monitoring the groundwater.

Attachment A

Proposed Plan

Superfund Program
Proposed Plan

U.S. Environmental Protection Agency, Region 2

Fair Lawn Well Field Superfund Site

Borough of Fair Lawn, New Jersey

August 2018

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan describes the remedial alternatives that the United States Environmental Protection Agency (EPA) considered to remediate contaminated groundwater at the Fair Lawn Well Field Superfund Site (Site) in the Borough of Fair Lawn (Borough), Bergen County, New Jersey, and identifies EPA's preferred alternative along with the reasons for this preference. The Site was placed on the Superfund National Priorities List (NPL) in September 1983.

EPA is addressing the cleanup of the Site in one phase, called an operable unit, which addresses contaminated groundwater and surface water found at the Site. This remedy is the final remedial action for the Site.

The proposed remedy includes relying on state-lead source control remedies at Fisher and 18-01 Pollitt Drive, as well as the Westmoreland Well Field (WMWF) to continue removing and treating groundwater contaminated with volatile organic compounds (VOCs). In addition, the WMWF water supply system will be enhanced to treat for 1,4-dioxane and perfluoro octane acid and perfluoro octanoic sulfonate (PFOA/PFOS). The remedy would also include installing an additional recovery well(s) with treatment unit(s) to provide further hydraulic control and contaminant removal of impacted groundwater.

Any decision regarding the final design of the WMWF upgrade will be made in coordination with the Borough, the New Jersey Department of Environmental Protection (NJDEP) and EPA. The Borough would evaluate whether the treated water from the WMWF will be used as a water supply source, but it is assumed that this would be the case.

This Proposed Plan was developed by the EPA, the lead agency for the Site, in consultation with the NJDEP, the support agency. EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund). EPA, in consultation with NJDEP, will select a final remedy for contaminated groundwater at the Site after reviewing and considering all information submitted during the 30-day public comment period.

EPA, in consultation with NJDEP, may modify the preferred alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the

MARK YOUR CALENDARS

Public Comment Period
August 6 – September 5, 2018
EPA will accept written comments on the Proposed Plan during the public comment period.

Public Meeting
August 23, 2018 at 7:00 P.M.
EPA will hold a public meeting to explain the Proposed Plan and the other alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at

Fair Lawn Borough Hall
Council Chambers/Court Room
8-01 Fair Lawn Avenue
Fair Lawn, NJ 07410

For more information, see the Administrative Record at the following locations:

EPA Records Center, Region 2
290 Broadway, 18th Floor
New York, New York 10007-1866
(212) 637-4308
Hours: Monday-Friday – 9 A.M. to 5 P.M.

Maurice M. Pine Free Public Library
10-01 Fair Lawn Avenue
Fair Lawn, New Jersey 07410
(201) 796-3400
Please refer to website for hours:
http://www.fairlawnlibrary.org/

EPA's website for the Fair Lawn Well Field Site:
https://www.epa.gov/superfund/fair-lawn-wellfield

alternatives presented in this Proposed Plan. This Proposed Plan summarizes information that can be found in greater detail in the final Remedial Investigation (RI) Report and final Feasibility Study (FS) Report and other documents contained in the administrative record file for this Site.

SITE DESCRIPTION

The Site includes the groundwater that impacts four municipal wells located on or around Westmoreland Avenue. These wells are part of the WMWF. Two of the four wells are used to provide treated drinking water to the residents of the Borough.

The Site encompasses the groundwater underlying the source area properties located within the Fair Lawn Industrial Park to the northeast and the WMWF to the southwest, as well as the surface water impacted by the groundwater contamination. Henderson Brook flows west along the southern property line of several source area facilities and southwest on the south side of Route 208 near the WMWF until it reaches the Passaic River. See Figure 1. The contaminated plumes include the overburden/water table, intermediate bedrock and deep bedrock aquifers. See Figures 3 and 4.

A summary of the source area properties located in the Fair Lawn Industrial Park where remediation is being conducted under NJDEP oversight consists of the following:

<u>Fisher Scientific</u>

The Fisher Scientific Company, LLC (Fisher) facility is situated on 9 acres of land in the northeastern corner of the industrial park. It consists of 10 buildings, six of which are enclosed spaces and the remaining 4 buildings are open structures that are used for various production, packaging, and administrative purposes. Fisher began manufacturing operations in 1955. Since 1955, the Fisher facility operations consists of formulating, distilling, repackaging, and distributing various laboratory reagents and solvents. In 2006, Fisher's parent company, Fisher Scientific International Inc. merged with Thermo-Electron Corporation to become Thermo-Fisher Scientific Inc. (Thermo-Fisher).

<u>Sandvik</u>

The Sandvik, Inc. (Sandvik) facility is situated on 10.3 acres, adjacent to the Fisher facility in the northern portion of the industrial park. Sandvik began operations in 1955. Between 1955 and 1970, Sandvik manufactured cutting tools, springs, and other components from strip steel. From 1970 through May 2006, Sandvik manufactured cemented carbide cutting tools. In May 2006, Sandvik ceased manufacturing operations. From 2013 to 2014, Sandvik modified the building, removing the northwestern portion of the building and adding a second story along the southern portion of the building. The facility is currently used as office space and a training center.

<u>Former Eastman Kodak</u>

The former Eastman Kodak (Kodak) facility is situated on 9.95 acres in the southeastern corner of the industrial park. The property was first developed in 1954. Kodak operated a photofinishing lab at the facility from 1961 until 1988. From 1988 to 1994, the photofinishing activities were operated by Qualex Inc. (Qualex), a joint venture between Kodak and U.B. Fuqua Inc. (Fuqua). In 1994, Kodak bought out the interest in Fuqua and continued photofinishing operations as Qualex until 2004. The facility was decommissioned in 2004 and demolished in 2006. On March 9, 2007, Kodak sold this property to Fair Lawn Promenade (FLP), LLC, Inc., which completed mixed-use redevelopment of the property in 2014. The property currently consists of three office/retail space single story buildings and two 3-story residential apartment complexes with ground floor parking.

<u>18-01 Pollitt Drive</u>

The 18-01 Pollitt Drive facility is situated on 9.41 acres in the center of the industrial park. The current single one-story building with several tenants was constructed as an addition to the original structure. The property was first developed in 1957 by the Einson Freeman Company, which operated a lithographic printing business from 1958 to the late 1970s. Between 1979 and 1988, the property was used for lithographic printing operations by Unified Data Products (UDP). In 1988, the property was purchased by Polevoy Associates. Between 1988 and 2006, the property was used primarily for office and warehouse space. 18-01 Pollitt Drive LLC (wholly owned by Hampshire Companies) purchased the property on May 11, 2006 and sold it to DSL Pollitt, LLC (DSL Pollitt) in 2017. The property currently houses BCI Communications, Valley Hospital Medical Facility, and Retro Fitness.

SITE HISTORY

The WMWF was established by the Borough in 1948, beginning with the installation of municipal well FL-10, and is situated in a residential neighborhood adjacent to the Fair Lawn Industrial Park. Between 1948 and 1950, municipal wells FL-11, FL-12, and FL-14 were installed. FL-11 and FL-14 were brought on-line, and FL-12, which produced little water, was used as an observation well. The WMWF wells are illustrated on Figure 2. From 1952 to 1969, the Borough installed non-potable industrial wells FL-23, located across Pollitt Drive to the east of the former Kodak property, and FL-24, located along the northeastern boundary of the former Kodak property.

In 1978, VOCs including tetrachloroethylene (PCE), and trichloroethylene (TCE) were detected in these municipal wells. Subsequently, FL-23 and FL-24 were taken off line. To determine the origin of the contamination, the NJDEP investigated all industrial and commercial facilities within a 3,000-foot radius of the contaminated municipal wells. The investigation concluded that the primary source of the contamination originated from the Fair Lawn Industrial Park. Based on the investigation findings, two local companies, Fisher and Sandvik, were identified as contributing sources to the groundwater contamination.

EPA sent notice letters to Fisher and Sandvik in February 1984, advising them of their potential liability at the Site. In March 1984, both Fisher and Sandvik signed Administrative Consent Orders (ACOs) with the NJDEP to conduct on-site investigations of soil and groundwater, remove and dispose of contaminated soils, perform long-term monitoring of on-site groundwater quality, and pay the Borough for the installation, and operation and maintenance of air stripper treatment at the WMWF. In 1986, the Borough installed the air stripper system to treat the contaminated wells located at the WMWF.

EPA became the lead agency for the Site groundwater cleanup in September 1992, and initiated a remedial investigation and feasibility study (RI/FS) to determine the nature and extent of groundwater contamination. NJDEP will continued to be the lead at the source area properties while the EPA remedy will address the contaminated groundwater captured by the Westmoreland well field, as well as surface water impacted by groundwater.

In May and June 1995, EPA and the Fair Lawn Health and Water Departments conducted a residential well sampling and analysis program to determine the usage and quality of residential well water. The results of this program found these wells were being used for both irrigation and drinking water purposes, and the data results indicated they met the established drinking water standards.

In April 1999, EPA entered into an interagency agreement with the United States Geological Survey (USGS) to conduct an area-wide groundwater study of the Fair Lawn area. This groundwater study developed a flow model used to define areas of influence or capture zones from all existing pumping wells to determine sources of contamination found at the WMWF, to determine if Henderson Brook is a groundwater discharge area and to recommend any further actions. A groundwater study report submitted by the USGS in May 2005 presented and discussed those areas where contaminated groundwater contributes to the WMWF.

In March 2006, EPA issued notice letters to Fisher, Sandvik and Kodak under CERCLA, advising them to perform an RI/FS, and reimburse EPA for past costs incurred with respect to the Site. On March 28, 2008, Fisher, Sandvik and Kodak, collectively known as the potentially responsible parties (PRPs), entered into a Settlement Agreement and Administrative Order on Consent (Settlement Agreement) with EPA to conduct the RI/FS.

The PRPs submitted a draft RI/FS workplan which was approved by EPA in January 2009. The workplan was made available to the public at information sessions conducted by the EPA on March 16 and 17, 2009.

In September 2009, the PRPs began installing five new monitoring wells, which were completed in December 2009. Two groundwater and surface water sampling events were conducted in March 2010 and June 2011. A public meeting conducted by EPA was held in Fair Lawn in October 2012 to update the community on the progress of the RI/FS activities. The information is summarized in an approved Final Site Characterization Summary Report (SCR) submitted in February 2015 and which is in the administrative record file.

Kodak filed for bankruptcy in January 2012, and subsequently notified EPA that it would no longer perform the RI/FS under the Settlement Agreement. Fisher and Sandvik continued to perform the RI/FS.

At the request of EPA, the PRPs submitted a draft RI/FS work plan addendum in September 2013. The approved December 2013 RI/FS work plan addendum included the installation of five overburden and seven bedrock monitoring wells, and two rounds of comprehensive groundwater and surface monitoring. From May to July 2014, prior to installing the monitoring wells, twelve temporary overburden monitoring wells were installed and sampled to delineate shallow groundwater at the Site. Monitoring wells were installed between July and September 2014, and two comprehensive groundwater sampling events were performed in November 2015 and June 2016.

NJDEP-Lead Response Activities

The PRPs within the Fair Lawn Industrial Park are required under NJDEP authority to clean-up their source area VOC contamination in soils and groundwater. Though not part of the CERCLA remedy, a summary of the details is provided below to help provide a context for how the CERCLA remedy will complement the state's efforts. However, additional historic information regarding these properties can be found in the June 2018 Final RI Report.

<u>Thermo-Fisher</u>

Fisher conducted six soil areas of concern (AOCs) investigations under NJDEP direction between 1984 and 1993. A total of approximately 6,000 cubic yards of soils contaminated with VOCs (PCE, TCE, chloroform 1,2-dichloroethane, and 1,1,1-trichloroethane) were removed during excavation activities performed from 1986 to 1989. Fisher proposed and NJDEP approved No Further Action (NFA) for each soil area of concern in August 1993.

In February 1986, Fisher proposed a groundwater recovery and treatment system (GRTS) to capture the contaminated groundwater plume at its facility. The bedrock GRTS began operating in 1989. Three bedrock production wells extract groundwater which is treated by carbon adsorption, and discharged to Henderson Brook under a New Jersey Pollutant Discharge Elimination System (NJPDES) Discharge to Surface Water (DSW) permit. Approximately 1.2 billion gallons of bedrock contaminated groundwater has been recovered and treated since 1989.

The overburden GRTS began operating in 1994. Two recovery trenches were enhanced in 1996 with seven extraction wells. Extracted groundwater is treated via air stripping with carbon adsorption, and discharged to the Passaic Valley Sewerage Commission (PVSC) under a POTW permit. Approximately 122 million gallons of overburden groundwater have been recovered and treated since 1994.

A network of 44 wells and 14 piezometers monitor the groundwater quality in the overburden and bedrock aquifers. A Classification Exception Area (CEA) restricting the installation of potable wells in and around the overburden and bedrock contamination plumes was approved by NJDEP in 2002.

Surface water sampling conducted along Henderson Brook under NJDEP began in November 2005. Results indicated that benzene, carbon tetrachloride (CT), PCE, TCE, and vinyl chloride concentrations were present in Henderson Brook above the applicable NJDEP surface water criteria. Subsequent sampling indicated that concentrations decreased to levels below the NJDEP surface water criteria. In addition, one round of sediment and pore water sampling along Henderson Brook was conducted in 2006. No compounds were detected above NJDEP's freshwater sediment screening criteria, but TCE and CT were observed above the applicable NJDEP surface water criteria in sediment pore water samples.

To further characterize soil impacts on their property and meet NJDEP RI requirements, Fisher conducted additional soils investigation activities between December 2013 and April 2016. The results of the NJDEP RI activities identified three focused source areas for remediation, within previous AOCs. Fisher is evaluating remedial alternatives to address the on-site impacted soils.

A comprehensive groundwater sampling event was conducted in May 2014 using passive sampling techniques. During this event, the presence of Dense Non-Aqueous Phase Liquid (DNAPL) was discovered. Fisher has been conducting routine sampling and recovery events to remove the DNAPL. No DNAPL has been observed since June 2014. Gauge/recovery events are currently conducted on a quarterly basis.

Three additional on-site monitoring wells, and two temporary off-site well points were installed in 2015 to complete overburden groundwater delineation and VI pathway assessment.

The overburden and bedrock GRTS will continue to operate and groundwater, surface water and DNAPL will be sampled in accordance with the NJDEP ACO. In addition, remedial alternatives are being evaluated to address the impacted soils, and a vapor VI investigation is being conducting at on-site buildings in accordance with the updated January 2018 NJDEP VI guidance.

Sandvik

From 1983 to 1984, Sandvik conducted investigations and remediation at three soil AOCs on its property under an NJDEP ACO. Sandvik removed and disposed of approximately 1,100 cubic yards of soil, 200 buried containers, and a 4,000-gallon waste oil tank. In September 1984, Sandvik completed installation on a network of overburden, and shallow and intermediate bedrock groundwater monitoring wells, and initiated routine groundwater monitoring events.

Between 1985 and 1996, Sandvik conducted monthly water level monitoring and quarterly groundwater sampling at 11 wells and the Basement Sump. The monitoring/sampling frequency was decreased to quarterly/semi-annual in 1996 and has continued with this schedule through the present time. In 2003, Sandvik began semi-annual sampling of surface water in Henderson Brook.

In May 2006, Sandvik ceased manufacturing operations which triggered compliance obligations under the NJDEP Industrial Site Recovery Act (ISRA). In accordance with ISRA, a Preliminary Assessment (PA) was conducted from June to August 2006. The PA was supplemented by a Site Investigation (SI) performed between October and November 2006. Nine AOCs were identified during the PA. Remedial investigation activities were conducted in 2007 and 2008, with all but one of the nine AOCs closed out (groundwater). NFAs were recommended in May 2010 and August 2010, and approved by NJDEP in letters dated July 5, 2011 and August 29, 2011.

In February 2012, as part of a pre-design investigation being conducted at the property, additional soil boring samples were collected at Pit #1 and the Waste Oil Tank Areas. The results confirmed the NFA designation because the contaminants found at the facility were below NJDEP soil remediation standards.

A basement sump operated since 1966 to dewater around the foundation of the former office building located on the western side of the property until it was shut down on March 20, 2014, and later demolished along with the former office building as part of Site redevelopment activities.

In May 2012, Sandvik initiated activities associated with the design and implementation of a groundwater remediation system. NJDEP issued a NJPDES Discharge to Groundwater (DGW) Permit-by-Rule (PBR) to Sandvik for pilot testing an enhanced in-situ bioremediation (EISB) using emulsified vegetable oil (EVO), bioaugmentation cultures, and a reductant to address the former waste oil underground storage tank (UST), and exterior drum storage pad source areas for TCE, 1,1,1-TCA, and associated daughter products. Final design parameters were developed and injection methods were selected to accommodate Site redevelopment requirements.

In February 2014, NJDEP issued a NJPDES DGW PBR to implement the full scale EISB injection system. The EISB system was initiated in September 2014 and is planned to run for a 10-year period beginning with three to five years of active remediation via EISB, followed by five years of monitored natural attenuation (MNA). Details regarding the groundwater on this property are documented in the June 2018 Final RI.

Former Kodak Property

In 1990, Kodak conducted remedial activities at its facility under the NJDEP UST program which included the removal of two fuel oil USTs, two gasoline USTs and their appurtenant structures, closure of a dry well, removal of floor drains from the center section of the basement, and installation of a monitor well in the shallow bedrock aquifer. Subsequently, Kodak entered into a Memorandum of Agreement (MOA) with the NJDEP in 1992 which outlined the investigation activities to be conducted on the property.

Between 1990 and 2007, eight AOCs were identified, along with soil removal activities conducted during the investigation phase. A total of 3,160 tons of impacted soils and material (piping, sludge, concrete and brick) associated with the building demolition, and 2,540 feet of subsurface piping associated with five sumps and five catch basins. Details are provided in the Final RI report dated June 2018.

Kodak submitted a Comprehensive Investigation and Remedial Action Report to NJDEP in January 2008, to which the NJDEP issued NFA determinations for several AOCs on November 20, 2008. Additional remedial investigation and remedial actions were performed on the remaining AOCs, and Kodak submitted a Remedial Action Report for AOC 4.1 and 7.2 in March 2012, indicating NFA was appropriate for the remaining AOCs with the implementation of engineering and institutional controls.

Kodak conducted 30 bedrock groundwater monitoring and sampling events under the NJDEP MOA from 1990 to 2011. Kodak determined that the primary source areas impacting groundwater were from AOC-1 and AOC-3 which have been remediated, resulting in reduced levels of compounds observed in groundwater on the property. Historically, groundwater contaminants on this property include PCE, TCE, 1,1,1-TCA, 1,1-DCA, 1,1-DCE, benzene, bromodichloromethane, vinyl chloride, total chromium, and silver. Monitoring wells were abandoned in late 2011 due to redevelopment plans on the property. However, NAPL residues consisting of highly weathered, highly viscous No. 6 fuel oil from AOC-1 remain in some bedrock fractures. This NAPL is not recoverable and has not dissolved in the groundwater. Details regarding the groundwater on this property are documented in the June 2018 Final RI.

<u>18-01 Pollitt Drive Property</u>

A Phase I Environmental Investigation was performed coinciding with the former property owner (Hampshire) refinancing activities. This investigation and subsequent environmental activities identified elevated levels of VOCs on the property. After reporting the discovery of a discharge to NJDEP in February 2008, Hampshire agreed to an MOA with NJDEP to conduct remedial investigations.

Subsequently, seven AOCs were identified, with five of the AOCs located in the northwestern side of the property where historic lithographic printing operations had been conducted by UDP, which owned the property in the 1980's.

Hampshire initiated investigation activities to identify potential VOC contaminants on the property in January 2008. Soil results confirmed VOC contamination on the property associated with AOC-1 through AOC-4. AOCs 5 thru 7 did not have any VOCs in soils above the applicable NJDEP soil remediation standards.

Between October 2008 and January 2009, Hampshire excavated and disposed of approximately 11,000 tons of PCE-impacted soils to a depth of 20 feet beneath the on-site building to address soils related to AOCs 1, 2, and 4.

Between May and July 2011, Hampshire excavated approximately 4,301 tons of PCE impacted soil at AOC-3, located outside the building, to a depth of 24 feet ground surface (bgs).

In 2014, an enhanced in-situ bioremediation program was initiated by Hampshire to address the remaining PCE and daughter products impacting the soils and groundwater on the property. The details of this program are documented in the March 2014 Discharge to Groundwater Permit-By-Rule (DGW PBR) Application and summarized in the May 2018 FS report.

A groundwater remediation system was installed and operated by Hampshire to provide hydraulic capture of groundwater emanating from the property and prevent migration to Henderson Brook. The system consists of one overburden and one bedrock recovery well. In accordance with the final NJPDES BGR Discharge Permit, the system is designed with an air stripper to remove CT, PCE, TCE, chloroform, 1,1-DCE, and cis-1,2-DCE with monitoring of 1,4-dioxane. The treated water discharges to Henderson Brook. Air from the stripper is treated through granular activated carbon (GAC) units under a permit issued by the NJDEP Division of Air Quality–Air Quality Permitting Program. The system has been operating since in February 2017.

A CEA was established to address the horizontal and vertical extent of Hampshire's groundwater plume area, and has an indeterminate time frame. This CEA overlaps with the CEA established by Fisher.

SITE CHARACTERISTICS

Physical Settings

The Site lies within the Piedmont Physiographic Province which is characterized by low rolling hills which are the erosional remnants of several ancient mountain ranges. In northern New Jersey, Precambrian metamorphic rocks make up the basement of this Province. Above the basement rocks are sedimentary and igneous rocks of the Newark Basin ranging in age from Triassic to Jurassic. Surficial geology is dominated by Pleistocene glacial deposits with Holocene sediments along the river/stream channels.

The Site is located approximately 80-100 feet above mean sea level, with surface elevations in the area decreasing to the southwest, towards the Passaic River. The localized topography slopes towards Henderson Brook and the Former North Branch of Henderson Brook. Storm water runoff follows these topographic gradients, traveling over paved surfaces and collecting in storm sewer inlets along the nearby streets and parking areas, and discharging to Henderson Brook.

Site Geology

Unconsolidated surface materials consist of glacial and post-glacial deposits. The post-glacial sediments consist primarily of modern channel and floodplain deposits. The post-glacial modern channel and floodplain alluvium deposits consist of silt to gravel with minor amounts of clay. The water table on-site is primarily in unconsolidated glacial and nonglacial sedimentary deposits, and transitions from overburden into shallow bedrock on the former Kodak property.

Overburden is typically heterogeneous containing lenses or layers of soil whose geological properties contrast with those of their surroundings. Overburden is typically thinnest (about 10 feet) near topographic highs, where glaciofluvial or glaciolacustrine sediments are typically absent, and thickest (about 80 feet) in the area between Henderson Brook and Diamond Brook where bedrock elevations are at their lowest on-site.

The Site is underlain by the Passaic Formation which consists of layers of conglomerate, sandstone, and siltstone. The Passaic Formation is a primary source of groundwater for municipal, industrial and other uses at the Site and surrounding areas. Bedrock bedding planes strike generally north 6° east and dip approximately 7° to the northwest. Fractures and bedding plane partings (approximately 350 feet below ground surface or greater) are often filled with minerals such as gypsum.

Hydrogeology

Groundwater flows in the Passaic Formation through secondary porosity (fractures, joints, bedding plane partings, etc.) rather than primary porosity (rock matrix). Groundwater well pumping rates of up to several hundred gallons per minute have been achieved and sustained in the Passaic Formation. Wells aligned along bedding strike in the Passaic Formation would be hydraulically connected. The water-bearing units are separated from each other by thicker stratigraphic layers with fewer bedding partings or fracture seams. The USGS determined that the water-bearing units have a mean thickness of 50 feet, and the confining units a mean thickness of 83 feet at the Site. The relatively thicker intervening confining units are, however, cross-cut by near-vertical extension fractures, making them leaky and providing a pathway for groundwater to percolate through the confining layers and therefore between transmissive units. Horizontal groundwater flow in bedrock is anisotropic. Anisotropic conditions in bedrock, as seen in the shut-down testing data, showed that the hydraulic radius of influence of each test extended out more parallel to bedrock strike and less parallel to bedrock dip.

Bedrock is divided into upper and lower hydro-stratigraphic zones which are separated by a leaky confining unit. Groundwater flow within the bedrock zones is under semi-confined to confined conditions as interpreted from the hydraulic response observed at monitoring points during shut-down testing.

Groundwater recharge occurs generally along the eastern side of the Site.

Under non-pumping conditions in the upper bedrock zone the Passaic River is a regionally significant discharge point for groundwater. Local groundwater flow discharges to Diamond and Henderson Brooks.

Under pumping conditions, groundwater in the upper bedrock zone flows toward the production wells at WMWF and Fisher. The pumping in the upper bedrock zone at the WMWF causes groundwater beneath the industrial park to move west/southwest along water bearing units while expanding vertically throughout the upper bedrock zone. The WMWF could capture most, if not all, of the groundwater that flows west and southwest of the industrial park that is not already captured by the Fisher groundwater recovery systems.

In addition, the distribution of PCE, TCE and CT indicates the COCs migrate to the west/southwest in the overburden and bedrock because of pumping at Fisher and the WMWF. Horizontal migration patterns of contaminants are controlled by bedding plane partings and fracturing in water bearing zones, aligned with strike and dip of the bedrock formation underlying the Site. Vertical migration in the bedrock occurs through vertical fracture spanning the less fractured confining units present underneath the Site. See Figures 5 thru 7 illustrate the orientation of the PCE overburden and bedrock plumes migrating from the industrial park to the WMWF.

Surface Water

Surface water (i.e., Henderson Brook) flows from the north/northeast to the south/southwest through the Site, draining into the Passaic River. Current flow conditions show external inputs (i.e., discharges from 18-01 Pollitt Drive's and Fisher NJPDES permits) make up the primary flow source, and account for approximately 55% of flow in Henderson Brook.

Site contaminants in the overburden near 18-01 Pollitt Drive and Fisher are present in Henderson Brook but decrease to below the SWSL before the brook exits the industrial park, except for PCE and CT. PCE entering Henderson Brook from the overburden groundwater originating at 18-01 Pollitt Drive continues to be present in the south portion of the brook. CT entering Henderson Brook from the overburden groundwater originating at Fisher decreases in concentration in the southern portion of the brook.

Groundwater Elevations

The water table elevations at the Site decrease from northeast to southwest, following trends in topography. Based on this information, the water table aquifer flows towards Henderson Brook, and to a lesser extent, to the Former North Branch of Henderson Brook. The removal of the Sandvik Sump prior to the 2015 and 2016 gauging events has eliminated the groundwater depression observed at the Sandvik facility during the June 2010 and March 2011 events.

RESULTS OF THE REMEDIAL INVESTIGATION

Nature and Extent of Contamination

As documented in the February 2015 SCR and the April 2018 RI, PCE, TCE, CT, and 1-4-dioxane were the compounds most widely distributed and persistently detected in the overburden and bedrock aquifers at the Site. Other site-related compounds detected in the groundwater include: benzene: 1,1-dichloroethylene (1,1-DCE); cis-1,2-dichloroethylene (cis-1,2-DCE); vinyl chloride (VC); chloroform; 1,1,1-trichloroethane (1,1,1-TCA); 1,1-dichloroethane (1,1-DCA); 1,2-dichloroethane (1,2-DCA); chlorobenzene; total xylenes; ethylbenzene; toluene; 1,2-dichlorobenzene (1,2-DCB); n-heptane; and, methyl tertiary butyl ether (MTBE).

These site-related compounds migrate from various source areas at the facilities in the north/northeast side of the Site to the west/southwest in the direction of the WMWF.

Horizontal migration patterns of contaminants are primarily controlled by bedding plane partings and fracturing in water-bearing zones, aligned with strike and dip of the bedrock formation underlying the Site.

Vertical migration in the bedrock occurs through vertical fracture spanning the less fractured confining units present underneath the Site.

GROUNDWATER SAMPLING RESULTS

Overburden Zone

Groundwater samples collected from the overburden zone found PCE and TCE in the following areas;

- on the northwest side of the Site at concentrations up to 1,650 micrograms per liter (μg/L) PCE and 85,700 μg /L TCE in 2015, and 3,210 μg/L PCE and 92,600 μg/L TCE in 2016;

- in the center of the Site at concentrations up to 1,560 μg/L PCE and 29.8 μg/L TCE in 2015, and 1,810 μg/L PCE and 67.2 μg/L TCE 2016; and

- on the southwest side of the Site at concentrations up to 237 μg/L PCE and 10.9 μg/L TCE in 2015, and 74.7 μg/L PCE and 3.9 μg/L TCE in 2016.

CT was only detected on the northwest side of the Site, at concentrations up to 197,000 μg /L in 2015 and 190,000 μg /L in 2016. Also, 1,4-dioxane was detected at all three locations in the overburden; on the northeast side of the Site at concentrations up to 131 μg/L (2015) and 271 μg/L (2016), in the center of the Site at concentrations 19.1 μg/L (2015) and 4.94 μg/L (2016), and the southeast side of the Site at concentrations up to 13.4 μg/L (2015) and 4.24 μg/L (2016).

A table summarizing the highest concentrations of contaminants found in the overburden is provided below.

	Northeast Side of Site (μg/L*)		Center of Site (μg /L)		Southeast Side of Site (μg /L)	
	2015	2016	2015	2016	2015	2016
PCE	1,650	3,210	1,560	1,810	237	74.7
TCE	85,700	92,600	29.8	67.2	10.9	3.9
CT	197,000	190,000	ND	ND	ND	ND
1,4-dioxane	131	271	19.1	4.94	13.4	4.24

*μg/L = microgram per liter

The contamination in the overburden zone covers approximately 107 acres from the north/northeast to the south/southwest of the Site.

Intermediate Bedrock

Groundwater samples collected in intermediate bedrock detected PCE in the center of the Site at concentrations up to 9,780 μg/L (2015) and 6,530 μg/L (2016), TCE on the northeast side of the Site at concentration up to 223 μg/L (2015) and 177 μg/L (2016) and center of the Site at concentration up to 134 μg/L (2015) and 206 μg/L (2016). CT was only detected in the northeast side of the Site at concentrations up to 421 μg/L (2015) and 112 μg/L (2016). 1,4-dioxane is distributed across the Site at elevated concentrations ranging from 44.8 to 147 μg/L (2015) and 12.4 to 53.1 μg/L in (2016).

The contamination in the intermediate bedrock covers approximately 187 acres from the north/northeast to the south/southwest.

Deep Bedrock

Groundwater samples collected in the deep bedrock detected PCE and TCE in the center of the Site at concentrations up to 157 μg/L PCE and 131 μg/L TCE (2015) and 130 μg/L PCE and 144 μg/L TCE (2016).

CT had only a few detections, 15 μg/L (2015), and 1.5 μg/L and 17.6 μg/L (2016). 1,4-dioxane in the center of the Site ranged from 6.5 to 30.5 μg/L (2015), and 1.25 to 11.1 μg/L (2016).

The contamination in the deep bedrock zone extends approximately 177 acres from the north/northeast to the south/southwest.

Westmoreland Well Field

Samples collected from groundwater entering the public supply wells, which are open to the entire geological framework, contained PCE concentrations ranging from 2.4 to 324 μg/L (2015) and 2.2 to 220 μg /L (2016); TCE concentrations ranging from 2.2 to 14.9 μg/L (2015) and 1.9 to 18.2 μg/L (2016); CT concentrations ranged from ND to 1.6 μg/L (2015) and ND to 1.5 μg/L (2016); and 1,4-dioxane concentrations ranged from ND to 7.4 μg/L (2015) and ND to 8.59 μg/L (2016).

In 2013, PFOA was detected in the WMWF at concentrations ranging from 30 – 36 (ng/L) nanograms per liter. PFOS was detected at concentrations ranging from 58 - 66 ng/L as well. Based on the Site hydrogeology, these compounds could have originated from the contributing source properties located in the Fair Lawn Industrial Park. An investigation to be conducted during the remedial design will determine the nature and extent of these compounds.

Surface Water

Surface water samples collected in November 2015 and June 2016 from Henderson Brook detected the following chemicals of concern (COCs): PCE; benzene; CT; and, VC (exceeding their surface water screening levels (SWSLs). PCE was detected most frequently in the lower half of the Henderson Brook ranging from 0.7 to 13.4 μg /L (2015) and 0.76 to 9.4 μg /L (2016). CT was detected in the upper half of Henderson Brook, near the source areas, at concentrations ranging from 0.37 to 0.6 μg /L (2015) and 0.34 to 3.6 μg /L (2016). Benzene and VC had a few sporadic detections above their SWSL in the upper half of Henderson Brook.

Additional data collected during the June 2010 and March 2011 surface water sampling events are presented in the 2015 SCR.

Principal Threat Wastes

Principal threat wastes are considered source materials, i.e., materials that contain hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or as a source for direct exposure. Contaminated groundwater is generally not considered to be source material; however, non-aqueous phase liquid (NAPL) in groundwater may be viewed as potential source material. Analytical results from the remedial investigation did not reveal concentrations of contaminants in groundwater indicative of the presence of NAPL. However, NAPL was identified during investigations conducted by PRPs on their properties and is being addressed under NJDEP-led actions. As described above, soil contamination that may be considered principal threat waste has been or is being addressed through several NJDEP actions.

Vapor Intrusion

VOC vapors released from contaminated groundwater and/or soil have the potential to move through the soil and seep through cracks in basements, foundations, sewer lines, and other openings. In accordance with the January 2009 RI/FS work plan, the PRPs conducted VI investigations at the Site. In March and April 2009, the PRPs collected two rounds of vapor samples. The first round of sampling in March 2009 included sub-slab samples collected underneath the concrete slabs at ten residential properties and four commercial buildings near Route 208. Based on the first round of results, in April 2009, EPA collected a second round of sub-slab and indoor air samples at the residential properties and commercial buildings sampled in March 2009.

In August 2013, EPA collected sub slab vapor samples from the Westmoreland Elementary school. Later that year, between September and December 2013, EPA collected sub slab samples from twelve additional residential properties. Since that time, at the request of EPA, the PRPs sampled several additional residential properties; two residential properties between March and April 2014, and one residential property between November and December 2015.

In addition to the sampling performed under EPA direction, the PRPs and other parties performed additional VI investigations at nine commercial and three residential properties with several of the commercial buildings requiring the installation of vapor mitigation systems under NJDEP-led authority.

Overall, the sample results from the EPA-led investigation found that all the residential properties are currently not at risk for contaminated vapors entering their space, and no additional VI sampling is scheduled. However, if the Site conditions change, EPA would evaluate and determine if additional VI sampling is necessary. The results of VI sampling are documented in the November 2017 VI Investigation Report, which is in the administrative record file.

SCOPE AND ROLE OF THE ACTION

EPA is addressing the cleanup of the Site in one phase, called an operable unit, which addresses contaminants in groundwater and surface water that originated from contributing source areas within the industrial park found at the Site. These source area properties will be addressed under NJDEP-led authority and are not part of the NPL site. EPA will address the contaminated groundwater migrating from the source area properties and impacting the water supply system.

This remedy is the final remedial action planned for the Site. The primary objectives of this action are to remediate the groundwater contamination, minimize the migration of the contaminants in groundwater (within the aquifer and into surface water), and minimize any potential future health impacts from exposure to groundwater contaminants at the Site. This action will restore the aquifer to its most beneficial use as source of drinking water.

SUMMARY OF SITE RISKS

Human Health Risk Assessment:

As part of the RI/FS, a baseline human health risk assessment (BHHRA) was conducted to estimate current and future effects of contaminants on human health. A BHHRA is an analysis of the potential adverse human health effects caused by hazardous substance exposure in the absence of any actions to control or mitigate these exposures under current and future Site uses.

A four-step human health risk assessment process was used for assessing site-related cancer risks and noncancer health hazards. The four-step process consists of: hazard identification of chemicals of potential concern (COPCs), exposure assessment, toxicity assessment, and risk characterization (see box entitled "What is Risk and How is it Calculated" for more details on the risk assessment process).

COPCs were selected by comparing the maximum detected concentration of each analyte in surface water and groundwater with available risk-based screening values for potentially complete pathways. The primary chemicals identified as COPCs and requiring further evaluation in the BHHRA are VOCs. PCE, TCE, CT, and 1-4-dioxane were the compounds most widely distributed and persistently detected in the overburden and bedrock aquifers. Additionally, other chemicals such as semi-volatile organic compounds (SVOCs), metals, and pesticides were also retained for additional evaluation.

The exposure assessment identified potential human receptors based on a review of current and reasonably foreseeable future land use at the Site. The land use in Fair Lawn is a mixture of residential, industrial, and commercial areas. The industrial/commercial area is represented mainly by the Fair Lawn Industrial Park located to the northeast of Route 208. Within the park, there are office-oriented operations, manufacturing and distribution, research and development, and a mixed-use commercial/residential community. The residential areas are situated to the southwest of Route 208 and the area consists of private properties, school athletic fields, and recreational open space. EPA anticipates that the future land use would not change from its present scenario. Potentially exposed populations in current and future risk scenarios include residents (young child and adult), construction workers, utility workers, Site workers and transient visitors (preadolescent and adolescent), and the BHHRA evaluated several different exposure scenarios under residential, worker, and visitor conditions. Untreated groundwater is not used as a drinking water source at the Site; however, for purposes of evaluating risks from exposure to contaminants in groundwater the BHHRA assumed residential use of groundwater in the absence of treatment because the NJDEP has designated the aquifer as being a Class II-A drinking water source. The frequency of exposure for all receptors is the same under both current and future timeframes. Potential exposure routes evaluated for these receptors included ingestion, inhalation, and dermal contact with COPCs in surface water, designated by the NJDEP as FW2-NT (fresh water body-non-trout), and groundwater.

The toxicity assessment identified potential effects generally associated with exposure to the COPCs. Two types of toxic effects were evaluated for each receptor in the risk assessment: carcinogenic effects and noncarcinogenic effects. Calculated risk estimates for each receptor were compared to EPA's range of carcinogenic risk of 1×10^{-6} (one-in-one million, or one additional incidence of cancer in a population of one million people, based on exposure to the site-related contaminants under the scenarios described in the BHHRA) to 1×10^{-4} (one-in-ten thousand), and EPA's target noncancer hazard quotient less than or equal to a target value of one.

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a Site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at the Site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and ingestion of and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health hazards, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health hazards.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of Site risks for all COPCs. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one in ten thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to Site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of 10^{-4} to 10^{-6}, corresponding to a one in ten thousand to a one in a million excess cancer risk. For non-cancer health effects, a "hazard index" (HI) is calculated. The key concept for a non-cancer HI is that a "threshold" (measured as an HI of less than or equal to 1) exists below which non-cancer health hazards are not expected to occur. The goal of protection is 10^{-6} for cancer risk and an HI of 1 for a non-cancer health hazard. Chemicals that exceed a 10^{-4} cancer risk or an HI of 1 are typically those that will require remedial action at the Site.

Table A. Summary of hazards and risks associated with groundwater.

Overburden GW	Cancer Risk	Hazard Index
Future Child Resident	**1x10E-2**	**2,500**
Future Adult Resident	**2x10E-2**	**950**
Construction Worker	5x10E-5	**4.5**
Site Worker	**3x10E-3**	**94**
Intermediate Bedrock		
Future Child Resident	**1x10E-3**	**97**
Future Adult Resident	**1x10E-3**	**40**
Site Worker	**2x10E-4**	**5**
Deep Bedrock		
Future Child Resident	**2x10E-4**	**18**
Future Adult Resident	**3x10E-4**	**8**
Site Worker	8x10E-5	**1.1**
Public Water Supply w/o Treatment		
Future Child Resident	**2x10E-4**	**52**
Future Adult Resident	**3x10E-4**	**26**
Site Worker	8x10E-5	**6**

*Bold indicates value above the acceptable risk range or value.

The risk characterization combined the exposure and toxicity information to determine estimated risks to the selected exposure groups. The BHHRA concluded that the untreated groundwater including the overburden, intermediate and deep bedrock, and the public water supply, if untreated, pose risks exceeding EPA's acceptable cancer or noncancer target levels for the child and adult resident, construction worker and Site worker receptors. See Table A above. The principal COCs exceeding risk based levels calculated for human health risk in the overburden due to ingestion, and inhalation of groundwater, are VOCs. Other COCs contributing to risk in these areas include 1,4-dioxane. As an example, for the future child resident, the risks and hazards from ingestion of overburden groundwater were as follows: benzene (cancer risk of $3.3x10^{-5}$ and HQ of 1.7), carbon tetrachloride (cancer risk of $1.8x10^{-3}$ and HQ of 74), chloroform (cancer risk of $1x10^{-4}$ and HQ of 3.8), cis-1,2-DCE (HQ of 18), PCE (cancer risk of $3x10^{-5}$ and HQ of 35), TCE (cancer risk of $1x10^{-3}$ and HQ of 280), vinyl chloride (cancer risk of $5.8x10^{-4}$ and HQ of 1.6). These compounds, and the other compounds identified as COCs in Table B, also exceed state and federal drinking water quality standards. No threats to human health due to COPCs were found in the surface water throughout the Site. However, several COCs were detected in the surface water above state and federal surface water quality standards. A complete list of COCs can be found in Table B.

Ecological Risk Assessment:

A screening-level ecological risk assessment (SLERA) was also performed that describes existing habitats and ecological receptor species that have been noted or are expected to be present on the Site, and evaluates the potential risks associated with the exposure of the biota to surface water and sediment COPCs. EPA uses an 8-step process, including numerous scientific/ management decision points, for evaluating potential risks to potential receptors. The SLERA is intended to allow a rapid determination as to whether the Site either poses no ecological risks, or to identify which contaminants and exposure pathways require further evaluation. Using conservative assumptions about potential ecological risks, if no risks are estimated during the screening level evaluation, the ecological risk assessment process stops with the SLERA. If ecological risks are indicated by the SLERA, EPA may proceed to a more comprehensive baseline ecological risk assessment (BERA) to further refine and better evaluate the site-specific ecological risk.

Based upon the SLERA, historic releases associated with the Site are not causing adverse effects to aquatic biota in Henderson Brook. While the presence of VOCs (and other COCs) has been detected in the overburden groundwater and surface water at elevated levels, the surface water does not show Site-related impacts that would pose an ecological risk to the Henderson Brook aquatic system. Therefore, no further ecological investigation is necessary. It is important to note that this evaluation is based on current Site conditions. Risk will be re-evaluated in the future if Site conditions change.

It is EPA's current judgment that the preferred alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect human health and the environment from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

Based on the site-specific human health and ecological risk assessment results, VOCs in groundwater pose an unacceptable human health risk, and the following remedial action objectives (RAOs) address those risks at the Site:

- Prevent or minimize current and future exposure (via ingestion, dermal contact and inhalation) to Site-related contaminants in groundwater and surface water at concentrations greater than federal and state standards.
- Restore the impacted aquifer to its most beneficial use as a source of drinking water by reducing Site-related contaminant levels to the most stringent of federal and state standards.
- Restore the impacted surface water to its most beneficial use by reducing Site-related contaminant levels to the most stringent of federal and state standards.
- Minimize the potential for further migration of groundwater containing Site-related contaminants at concentrations greater than federal and state standards.

Preliminary Remediation Goals:

The preliminary remediation goals (PRGs) for groundwater and surface water are identified in Table B. PRGs are developed for the COCs identified in this document to aid in defining the extent of the contaminated media requiring remedial action. PRGs are generally chemical-specific remediation goals for each medium and/or exposure route that are established to protect human health and the environment. They can be derived from applicable or relevant and appropriate requirements (ARARs), risk-based levels (human health and ecological), and from comparison to background concentrations, where available. In addition, the State of New Jersey is in the process of promulgating MCLs for PFOA and PFOS, which were detected at the WMWF. While not yet finalized, these standards are To Be Considered (TBCs) advisories, criteria or guidelines used as cleanup goals. The New Jersey recommended health-based MCLs for PFOA and PFOS is 14 ng/L and 13 ng/L, respectively.

SUMMARY OF REMEDIAL ALTERNATIVES

Section 121(b)(1) of CERCLA, 42 U.S.C. § 9621(b)(1), mandates that remedial actions must be protective of human health and the environment, cost-effective, comply with ARARs, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) of CERCLA also establishes a preference for remedial actions that employ, as a principal element, treatment to reduce permanently and significantly the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants at a Site. Section 121(d) of CERCLA, 42 U.S.C. § 9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants that at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to Section 121(d)(4) of CERCLA, 42 U.S.C. § 9621(d)(4).

Detailed descriptions of the remedial alternatives presented in this Proposed Plan for addressing the site-wide groundwater contamination is provided in the FS Report, dated June 2018.

The construction time for each alternative listed below reflects only the actual time required to construct or implement the action and does not include the time required to design the remedy, negotiate the performance of the remedy with any potentially responsible parties, and procure the contracts for design and construction.

Common Elements

Each remedial alternative except Alternative 1 (No Action) includes long-term monitoring (LTM), and institutional controls. LTM will be implemented to ensure that groundwater and surface water quality improves following implementation of these alternatives until clean up levels are achieved. Institutional controls are administrative and legal controls that help to minimize the potential for human exposure to contaminants. Institutional controls in the form of a classification exemption area/well restriction area (CEA/WRA) would be implemented along with all alternatives except the No Action alternative. Institutional controls limit future use of the Site groundwater and are common components of each of the alternatives.

While this alternative would ultimately result in a reduction of contaminant levels in groundwater and surface water such that levels would allow for unlimited use and unrestricted exposure, it is anticipated that it would take longer than five years to achieve these levels. As a result, in accordance with CERCLA, the Site remedy will be reviewed at least once every five years until remediation goals are achieved for unrestricted use and unlimited exposure.

Alternative 1 - No Action

Total Capital Cost	$0
Annual O&M	$0
Total Present Worth	$0
Timeframe	Not Applicable

The NCP requires that a "No Action" alternative be developed and considered as a baseline for comparing other remedial alternatives. Under this alternative, there would be no remedial action conducted at the Site. This alternative does not include any monitoring or institutional controls.

This alternative is not protective and long-term human health effects would remain above EPA's acceptable risk levels. There are no five-year reviews for a No Action alternative.

Alternative 2 – Groundwater Recovery and Ex-Situ Treatment, Long-Term Monitoring and Institutional Controls

Total Capital Cost	$5,209,000
Annual O&M	$441,545 (avg.)
Total Present Worth	$19,500,000
Timeframe	30 yrs. O&M

This remedial alternative consists of utilizing the existing groundwater recovery and air stripping treatment systems at each facility (located at Fisher, 18-01 Pollitt Drive, and the WMWF) to continue removing and treating groundwater contaminated with VOCs. See Figure 8. In addition, the WMWF water supply treatment system would be enhanced to treat for 1,4-dioxane and PFOA/PFOS. During these enhancement activities, the WMWF system would continue to operate and discharge treated water to Henderson Brook under a NJPDES in compliance with substantive NJPDES permit discharge requirements.

The existing WMWF operates two municipal wells (FL-10 and FL-14) at a combined flow rate of 150 gallons per minute (gpm). It is estimated that annual mass removal of VOCs and 1,4-dioxane from the existing WMWF would be approximately 535 pounds per year. If the other two municipal wells (FL-11 and FL-12) are restarted as part of the existing WMWF, a cumulative flow rate of 300 gpm would remove and treat up to 1,075 pounds of VOCs and 1,4-dioxane per year.

An advanced oxidation process (AOP) to treat VOCs and 1,4-dioxane, and liquid-phase granular activated carbon (LGAC) to treat VOCs and PFOA/PFOS prior to chlorination and entry into the water supply would enhance the WMWF in addition to the technologies used. Figure 9 illustrates the conceptual treatment process for the water supply enhancement in comparison to the current air stripper system. The treatability study to be completed during the remedial design phase will determine the final components of the treatment system. It is likely that one ultra-violet light with hydrogen peroxide (UV/H202) AOP unit would be suitable to treat the 1,4-dioxane, and three 10,000-pound LGAC vessels may be sufficient to treat excess hydrogen peroxide (H202), VOCs and PFOA/PFOS. A pH adjustment process is included to control the natural scaling effects of elevated hardness and total dissolved solids in the water at the Site, and minimize operation issues. The footprint of a treatment building would be about 1,200 square-feet and placed adjacent to the existing air stripper to utilize the piping and utilities to the extent possible.

The remedy would also include installing an additional recovery well(s) with treatment unit(s) to capture any areas limited by hydraulic influence and contaminant removal of the 1,4-dioxane plume.

Any decision regarding the final operation design of the WMWF upgrade will be made in coordination with the Borough, the NJDEP and EPA during the preparation of the engineering design of the selected remedy. The Borough would evaluate whether the treated water from the WMWF would be used as a water supply source. If the treated water from the WMWF is used as a water supply source, the new treatment equipment would become part of the water supply system. For purposes of estimating costs, it is assumed that the intended use of treated water is for drinking water

During the remedial design, groundwater modeling and capture zone analysis would be performed to estimate the hydraulic influence of the existing pump-and-treat systems and to identify potential gaps in the capture zones. This new information would be used to determine the location of the recovery well(s), if necessary.

For the conceptual design, EPA estimates that all four WMWF wells would be utilized at a combined estimated flow rate of 300 gpm, and one bedrock recovery well would be installed in the southern portion of the 1,4-dioxane plume at a pumping rate between 25 and 50 gpm, with treatment assumed to be AOP (for 1,4-dioxane) and LGAC (for VOCs and PFOA/PFOS) before being distributed for consumption. The treatability study to be completed during the remedial design phase will determine the final components of the treatment system.

For cost estimating and planning purposes, a remediation duration of 30 years was used for developing costs associated with O&M activities. It was assumed that active remediation would be employed in the targeted treatment areas until MCLs of COCs are attained. However, an estimated timeframe using change in concentrations over time (6 years of data) for reducing contaminant levels to below cleanup standards at the Site would be approximately 36 to 40 yrs.

Under this alternative, the pumping rates established for groundwater recovery would mitigate COCs migrating to the Henderson Brook.

LTM would be performed by collecting groundwater and surface water data to evaluate the effectiveness of groundwater recovery. It assumes 46 existing groundwater and surface water locations, and four additional monitoring wells (if needed) would be used to measure groundwater quality.

An institutional control, in the form of a CEA/WRA, would restrict wells from being installed in the contaminated groundwater area.

While this alternative would ultimately result in a reduction of contaminant levels in groundwater and surface water such that levels would allow for unlimited use and unrestricted exposure, it is anticipated that it would take longer than five years to achieve these levels. As a result, in accordance with CERCLA, the Site remedy will be reviewed at least once every five years until remediation goals are achieved for unrestricted use and unlimited exposure.

Alternative 3 – Groundwater Recovery and Ex-Situ Treatment, AV/SVE with In-Well Air Stripping, Aerobic Cometabolic Bioremediation, Long-Term Monitoring and Institutional Controls

Total Capital Cost	$14,009,000
Annual O&M	$430,232 (avg.)
Total Present Worth	$28,900,000
Timeframe	30 yrs. O&M

Similar to Alternative 2, this remedial alternative includes the existing groundwater recovery and ex-situ treatment systems along with the appropriate upgrades to address VOCs, 1,4-dioxane, and PFOA/PFOS contamination at the WMWF. This remedial alternative also includes in-situ air sparging (AS)/soil vapor extraction (SVE) with in-well air stripping, and aerobic cometabolic bioremediation systems to address the VOCs and 1,4-dioxane contaminant mass in the most concentrated areas of the groundwater plume.

In-well air stripping, a modified AS/SVE technique, combines the two technologies with air stripping, groundwater extraction and re-circulation to address the VOCs and 1,4-dioxane in overburden groundwater. Stripped contaminants are recovered and transferred to an above ground vapor-phase granular activated carbon (VGAC) unit for effluent vapor treatment.

In-well air stripping would require a pilot test to assess feasibility and determine the radius of influence (ROI) for the treatment area. For purposes of developing a conceptual design and cost estimate for comparison with other technologies, a total of 43 wells with a 60-foot ROI would cover the proposed treatment area (of 105,700 square feet) in the overburden on private property to target groundwater contaminated with PCE concentrations ranging from 100 μg/L to 1,000 μg/L.

In addition, in-situ aerobic cometabolic bioremediation through gas infusion would address the 1,4-dioxane impacts in the intermediate bedrock source area(s). In this process, microbes derive energy from the metabolism of propane/oxygen which releases enzymes that degrade 1,4-dioxane. The oxygen/propane saturated groundwater migrates by advective flow path, further increasing the ROI around the gas infusion well.

Only areas with 1,4-dioxane concentrations higher than 4 μg/L (10 times the GWQS) would be addressed using aerobic cometabolic bioremediation. LTM would assess reduction of mass over time for areas with 1,4-dioxane concentration below 4 µg/L.

Since gas infusion is a relatively new technology and has limited demonstration in the bedrock, full scale implementation would require feasibility testing of gas infusion with a microcosm study and a pilot test.

Full-scale implementation would include an injection well network, gas infusers, gas cylinders, below grade piping to connect gas infusers to gas cylinders, and gas cylinder storage areas. Below-grade piping would be installed 6 inches to 1 foot below grade. For purposes of cost estimation, it is assumed that ROI is 30 feet, indicating that around 80 injection wells are needed to cover the treatment area, and that five gas infusers would be sufficient for each injection well.

As with Alternative 2, this alternative would also utilize the pumping rates established for groundwater recovery to mitigate COCs from migrating to the Henderson Brook. In addition, the in-situ AS/SVE and aerobic cometabolic bioremediation systems would reduce contaminant mass in the groundwater thus reducing the concentrations in the brook.

The estimated timeframe for reducing concentrations to below standards is the same as Alternative 2 (about 36 to 40 yrs.) except this timeframe could be reduced if the in-situ treatments (AS/SVE and aerobic cometabolic bioremediation) prove to be effective during the remedial design/treatability study.

LTM would also be performed to collect groundwater and surface water data to evaluate the effectiveness of the groundwater treatment.

While this alternative would ultimately result in a reduction of contaminant levels in groundwater and surface water such that levels would allow for unlimited use and unrestricted exposure, it is anticipated that it would take longer than five years to achieve these levels. As a result, in accordance with CERCLA, the Site remedy would be reviewed at least once every five years until remediation goals are achieved for unrestricted use and unlimited exposure.

EVALUATION OF ALTERNATIVES

In evaluating the remedial alternatives, each alternative is assessed against nine evaluation criteria set forth in the NCP, namely overall protection of human health and the environment; compliance with ARARs; long-term effectiveness and permanence; reduction of toxicity; mobility, or volume through treatment; short-term effectiveness; implementability; cost; and state and community acceptance. See box entitled, “The Nine Superfund Evaluation Criteria”, below for a more detailed description of these evaluation criteria.

This section of the Proposed Plan evaluates the relative performance of each alternative against the nine criteria, noting how each compares to the other options under consideration. A detailed analysis of alternatives can be found in the May 2018 FS Report.

Overall Protection of Human Health and the Environment

Alternative 1 (No Action) would not meet the RAOs and would not be protective of human health and the environment since no action would be taken.

Alternatives 2 and 3 are the active remedies that address groundwater contamination and would restore groundwater quality over the long-term. Protectiveness under Alternatives 2 and 3 requires a combination of actively reducing contaminant concentrations in groundwater and limiting exposure to residual contaminants through existing institutional controls for groundwater use restrictions until RAOs are met. In addition, protectiveness under Alternatives 2 and 3 relies upon the continued effectiveness of wellhead treatment along with appropriate upgrades at the supply wells impacted by the contamination to ensure that the water distributed by these wells continues to meet state and federal drinking water standards.

Alternatives 2 and 3 include LTM to assess the effectiveness of the remedy. If necessary, additional recovery well(s) and treatment unit(s) would be implemented based on data collected during the remedial design. Also, an institutional control in the form of an NJDEP CEA/WRA would prohibit the installation of groundwater wells used for drinking purposes, and a LTM program for groundwater and surface water to assess the effectiveness of the remedy over time.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

EPA and NJDEP have promulgated MCLs (40 CFR

Part 141 and N.J.A.C. 7:9C, respectively), which are enforceable standards for various drinking water contaminants (and are chemical-specific ARARs). If any state standard is more stringent than the federal standard, then compliance with the more stringent ARAR is required. As groundwater within Site boundaries is a source of drinking water, achieving the more stringent of the federal MCLs, New Jersey MCLs, and New Jersey Groundwater Quality Standards (NJGWQS) in the groundwater is an ARAR.

Alternative 1 would not comply with ARARs. Action specific ARARs do not apply to this alternative since no remedial action would be conducted.

THE NINE SUPERFUND EVALUATION CRITERIA

1. Overall Protectiveness of Human Health and the Environment evaluates whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

3. Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

4. Reduction of Toxicity, Mobility, or Volume (TMV) of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

5. Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during implementation.

6. Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

7. Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

8. State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.

9. Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Alternatives 2 and 3 would achieve chemical-specific ARARs, including New Jersey Ground Water Quality Standards, N.J.A.C. 7:9C, and New Jersey Primary Drinking Water Standards – Maximum Contaminant Levels, N.J.A.C. 7:10-5.2, through extraction and *ex-situ* treatment of contaminated groundwater.

Alternative 3 would achieve chemical specific ARARs through in-well AS/SVE and aerobic cometabolic bioremediation;

For Alternatives 2 and 3, location- and action-specific ARARs would be met, including compliance with treatment requirements for air emissions and water quality discharge criteria, if applicable.

Long-Term Effectiveness and Permanence

Alternative 1 would not provide long-term effectiveness and permanence since groundwater contamination would not be addressed. Alternatives 2 and 3 are considered effective technologies for treatment to contain and restore the contaminated groundwater.

Alternatives 2 and 3 rely on a combination of treatment and institutional controls to achieve long-term effectiveness and permanence.

Alternative 2 would be more reliable than Alternative 3 since there is uncertainty as to whether in-well vapor stripping and bioremediation could effectively remove contamination. Air stripping and AOP have been proven to be effective technologies in reducing the concentrations of VOC contaminated groundwater in the treatment area.

Alternative 3, AS/SVE with in-well stripping, could potentially be effective and reliable at significantly removing the VOC contamination in groundwater. However, implementing this technology has not been demonstrated. The effectiveness of this alternative is limited by the ROI of the treatment system. The ROI will depend on pumping capacity of each stripping well and hydrogeologic characteristics of the aquifer. The effectiveness of this alternative could also be limited due to the possibility that creation of a circulation cell may not be possible because of the potential influence from pumping of nearby public supply wells. A pilot study would be conducted to evaluate the ROI, to determine the effectiveness of in-well stripping and to obtain specific design parameters prior to full scale implementation.

AS/SVE with in-well air stripping and aerobic cometabolic bioremediation can, under some circumstances, accelerate contaminant mass reduction, but may not be effective at accelerating remediation over the existing GWTS. Alternative 3 is expected to have a similar overall duration of the remediation as Alternative 2.

Alternatives 2 and 3 would both control risk to human health through the implementation of institutional controls until RAOs are achieved.

Reduction of Toxicity, Mobility, or Volume (TMV) through Treatment

Alternative 1 (No Action), does not address the contamination through treatment, so there would be no reduction in TMV and the alternative does not include long-term monitoring of groundwater conditions. Alternatives 2 and 3 would provide the greatest reduction of toxicity, mobility, and volume of contaminants through treatment of contaminated groundwater.

Alternative 2 removes contaminated groundwater via extraction and treats the contamination via air stripping, AOP and liquid phase granular activated carbon at the treatment plant and is anticipated to be the most reliable alternative for reducing TMV through treatment because these are proven technologies.

Alternative 3, AS/SVE with in-well stripping or aerobic cometabolic bioremediation may result in reductions in the volume of contaminants in the intermediate bedrock and overburden beyond those reductions achieved by the existing pump and treat systems alone, and is anticipated to be the next most reliable at reducing TMV. However, its effectiveness must be demonstrated and verified in a pilot study.

Short-Term Effectiveness

Alternative 1 would not have short-term impacts since no action would be implemented.

Alternatives 2 and 3 may have short-term impacts to remediation workers, the public, and the environment during implementation. Remedy-related construction (e.g., trench excavation) under Alternatives 2 (estimated construction timeframe of 6 months) would require disruptions in traffic and street closure permits. In addition, Alternative 2 and Alternative 3 (estimated construction timeframe of 6-12 months) have aboveground treatment components and infrastructure that may create a minor noise nuisance and inconvenience to residents during construction.

Exposure of workers, the surrounding community, and the local environment to contaminants during the implementation of Alternatives 2 and 3 is expected to be minimal. Drilling activities, including the potential installation of wells for monitoring, extraction, and treatment for Alternatives 2 and 3 could produce contaminated liquids that present some risk to remediation workers at the Site. The potential for remediation workers to have direct contact with contaminants in groundwater could also occur when groundwater remediation systems are operating under Alternatives 2 and 3. Alternatives 2 and 3 could increase the risks of exposure through ingestion, inhalation, and dermal contact of contaminants by workers because contaminated groundwater would be extracted to the surface for treatment. However, occupational health and safety controls would be implemented to mitigate exposure risks.

Among the active alternatives, Alternative 2 would have the lowest short-term impact to the community. Alternative 3 would have more short-term impacts to the community than Alternative 2 since more wells would be installed and the in-well stripping system would require more space for the installation of multiple well vaults to hold necessary equipment, valves, and fittings. In-well stripping system operations might generate noise that could be harder to mitigate.

For Alternatives 2 and 3, implementation of a health and safety plan, traffic controls, noise control and managing the hours of construction operation could minimize the impacts to the community. Health and safety measures implemented during operation and maintenance activities would protect Site workers.

Both Alternatives 2 and 3 have similar timeframes for achieving RAOs.

Implementability

Alternative 1 requires no action, and therefore would be the easiest of all the alternatives to implement. Alternatives 2 and 3 are both implementable, although each present different challenges. Alternative 2 is readily implementable since ground water recovery and ex-situ treatment is a well-established remedial technology with commercially available equipment.

Alternative 3 incorporates similar features as Alternative 2 with the addition of in-situ active remediation systems (AS/SVE with in-well stripping and aerobic cometabolic bioremediation) in select areas of the Site. Alternative 3 requires treatability studies and pilot tests to assess the effectiveness of remediation technologies for the Site. The AS/SVE with in-well air stripping occurs solely within the well. This process depends upon the same flushing mechanism and would be no more effective than with conventional pump and treat systems. The gas infusion technology approach for aerobic cometabolic bioremediation is a relatively new technology that requires pilot testing to ensure efficacy with no guarantee of an accelerated clean-up time. There are a limited number of vendors available for the construction of in-well air stripping technology and gas infusion technology, which may limit the competitiveness of bids.

Alternative 1 does not require any permits. In accordance with CERCLA, no permits would be required for on-site work for Alternatives 2 and 3 (although such activities would comply with substantive requirements of otherwise required permits).

Alternative 3 requires construction on private properties and installation of numerous wells and related systems. If an additional recovery well is needed on-Site, both Alternative 2 and Alternative 3 may need to comply with substantive requirements of road opening permits of building permits for ex-situ treatment systems.

Alternative 2 is more readily implementable relative to Alternative 3.

Alternatives 2 and 3 would require routine groundwater quality, performance and administrative monitoring including five-year CERCLA reviews.

Cost

The estimated capital cost, O&M, and present worth cost are discussed in detail in the May 2018 FS Report. For cost estimating and planning purposes, a 30-year time frame and a discount rate of 7% were used for developing present worth costs under Alternatives 2 and 3. The cost estimates are based on the available information. Alternative 1 (No Action) has no cost because no activities would be implemented. The highest present worth cost is Alternative 3 at $28.5 million. Of the two alternatives with active remedial components, Alternative 2 is the least expensive at $19.5 million. The estimated capital, O&M, and present-worth costs for each of the alternatives are as follows:

Alternative	Capital Cost	Annual O&M Cost	Total Present-Worth Cost
1	$0	$0	$0
2	$5,209,000	$441,545	$19,500,000
3	$14,009,000	$430,232	$28,900,000

State Acceptance

State of New Jersey concurs with the preferred alternative.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and all comments are reviewed. Comments received during the public comment period will be addressed in the Responsiveness Summary section of the Record of Decision (ROD). The ROD is the document in which EPA will select the remedy for the Site.

PREFERRED ALTERNATIVE

Based upon an evaluation of the remedial alternatives, EPA, with the concurrence of NJDEP, proposes Alternative 2 (Groundwater Recovery and Ex-situ Treatment, Long-Term Monitoring and Institutional Controls) as the preferred remedial alternative for the Fair Lawn Well Field Superfund Site. Alternative 2 has the following key components:

Groundwater recovery via pumping and ex-situ treatment of recovered groundwater prior to discharge as a water supply source;

Additional recovery well(s) with treatment unit(s) to capture any areas limited by hydraulic influence;

Long-term groundwater monitoring to assess the effectiveness of the groundwater remedy; and

Implementation of institutional controls.

Active remediation elements would be designed to achieve the RAOs by establishing containment and restoration of groundwater. The extraction and treatment system would operate until remediation goals are attained. The exact number and placement of recovery well(s), pumping rates, and treatment processes, as well as the location of the treatment plant would be determined during the remedial design.

A long-term groundwater monitoring program would be implemented to track and monitor changes in the groundwater contamination to ensure the RAOs are attained. The results from the long-term monitoring program would be used to evaluate the migration and changes in site-related COCs over time.

Institutional controls will be placed to ensure that the remedy remains protective until RAOs are achieved for protection of human health over the long term. Institutional controls are anticipated to include a CEA/WRA to prohibit the use of groundwater for drinking purposes.

Consideration will be given during the remedial design, to technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green Energy Policy. This would include green remediation technologies and practices.

The total estimated, present-worth cost for the selected remedy is $19,500,000. Further details of the cost are presented in Appendix F of the FS Report. This is an engineering cost estimate that is expected to be within the range of plus 50 percent to minus 30 percent of the actual project cost.

While this alternative would ultimately result in a reduction of contaminant levels in groundwater such that levels would allow for unlimited use and unrestricted exposure, it is anticipated that it would take longer than five years to achieve these levels. As a result, in accordance with CERCLA, the Site remedy will be reviewed at least once every five years until remediation goals are achieved for unrestricted use.

Basis for the Remedy Preference

Under Alternative 2, the current pump and treat systems along with the potential for additional recovery well(s), to be determined during the remedial design phase, will provide mass reduction in the long term and hydraulic control of site-related contaminants and ultimately achieve MCLs and risk based levels. As source control efforts continue at the Fisher, Sandvik and 18-Pollitt Drive facilities under NJDEP oversight, the concentration of groundwater contamination will be reduced. Site-related COCs are expected to remain in the groundwater for 36 to 40 years, and institutional controls and long-term monitoring will ensure that human health and the environment are protected during the operation of the pump and treat systems. Alternative 2 will be more reliable than Alternative 3 since there is uncertainty as to whether in-well vapor stripping and bioremediation could effectively remove contamination. Air stripping, AOP and LGAC are effective technologies for reducing the concentrations of the site-related COCs in groundwater. The treatability study to be completed during the remedial design phase will determine the final components of the treatment system. The long-term reliability and effectiveness of the proposed AS/SVE system and aerobic cometabolic bioremediation under Alternative 3 have not yet been well demonstrated. Alternative 3 would not reduce the overall time frame for mass removal compared with Alternative 2.

Alternative 2, groundwater extraction and treatment, is a proven technology which has demonstrated effectiveness at reducing contaminant mass and providing containment to achieve cleanup standards for VOC-contaminated groundwater. While Alternative 3, AS/SVE with in-well vapor stripping and aerobic cometabolic bioremediation has been effective under some site conditions, these technologies would require pilot testing to demonstrate that the in-situ technologies are effective at this Site. Furthermore, the gas infusion aerobic cometabolic bioremediation may not be able to treat areas with concentrations as high as ten times the GWQS for 1,4 dioxane.

Although the densely populated residential area poses some logistical challenges to the implementation of each active remedial alternative, EPA believes that Alternative 2 would be significantly less disruptive than Alternative 3 to the residents. For example, it was estimated for cost estimating purposes that for Alternative 3 a total of 43 wells would be configured in the overburden on private property, with a 60-foot ROI covering the treatment area to target groundwater contaminated with PCE concentrations ranging between 100 μg/L and 1,000 μg/L. A final determination for the number of treatment wells could differ if the 60-foot radius of influence is incorrect.

Based upon the information currently available, EPA believes the preferred alternative meets the threshold criteria *(protection of human health and the environment* and *compliance with ARARs*) and provides the best balance of tradeoffs among the other alternatives with respect to the balancing criteria. The preferred alternative satisfies the following statutory requirements of Section 121(b) of CERCLA: 1) the proposed remedy is protective of human health and the environment; 2) it complies with ARARs; 3) it is cost effective; 4) it utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) it satisfies the preference for treatment as a principal element. Long-term monitoring would be performed to assure the protectiveness of the remedy. With respect to the two modifying criteria of the comparative analysis (*state acceptance* and *community acceptance*), NJDEP concurs with the preferred alternative, and community acceptance will be evaluated upon the close of the public comment period.

COMMUNITY PARTICIPATION

EPA and NJDEP provided information regarding the cleanup of the Fair Lawn Well Field Superfund Site to the public through meetings, the Administrative Record file for the Site, and announcements published in the Bergen Record. EPA and NJDEP encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted. The dates for the public comment period, the date, location and time of the public meeting, and the locations of the administrative record file, are provided on the front page of this Proposed Plan.

For further information on the Fair Lawn Well Field Superfund Site, please contact:

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Written comments on this Proposed Plan should be submitted on or before August 18, 2018 to Mr. Michael Zeolla at the address or email below.

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The public liaison for EPA's Region 2 is:

George H. Zachos
Regional Public Liaison
Toll-free (888) 283-7626
(732) 321-6621

U.S. EPA Region 2
2890 Woodbridge Avenue, MS-211
Edison, New Jersey 08837-3679

Figure 1
Site Location

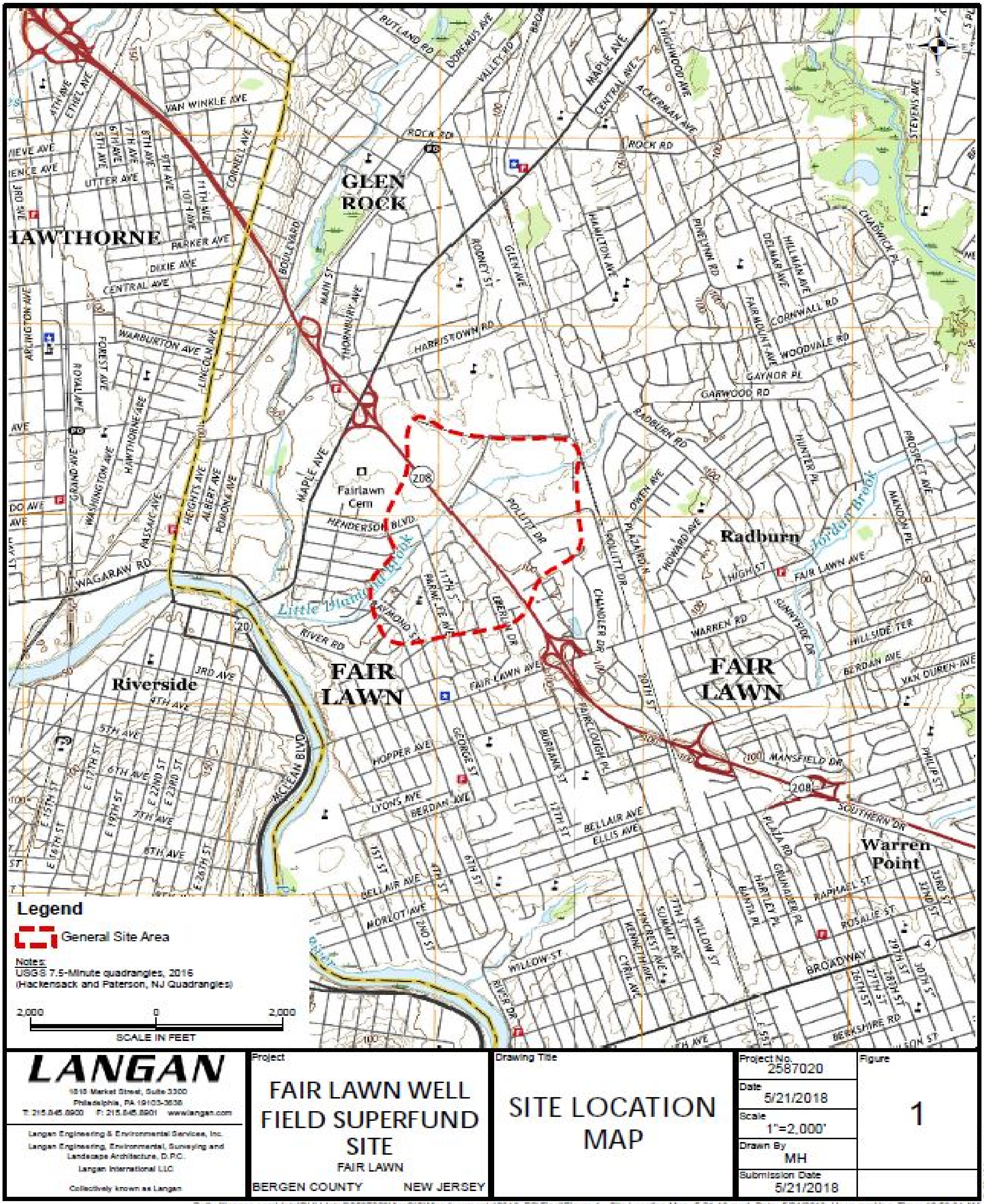

Figure 2
Well Locations

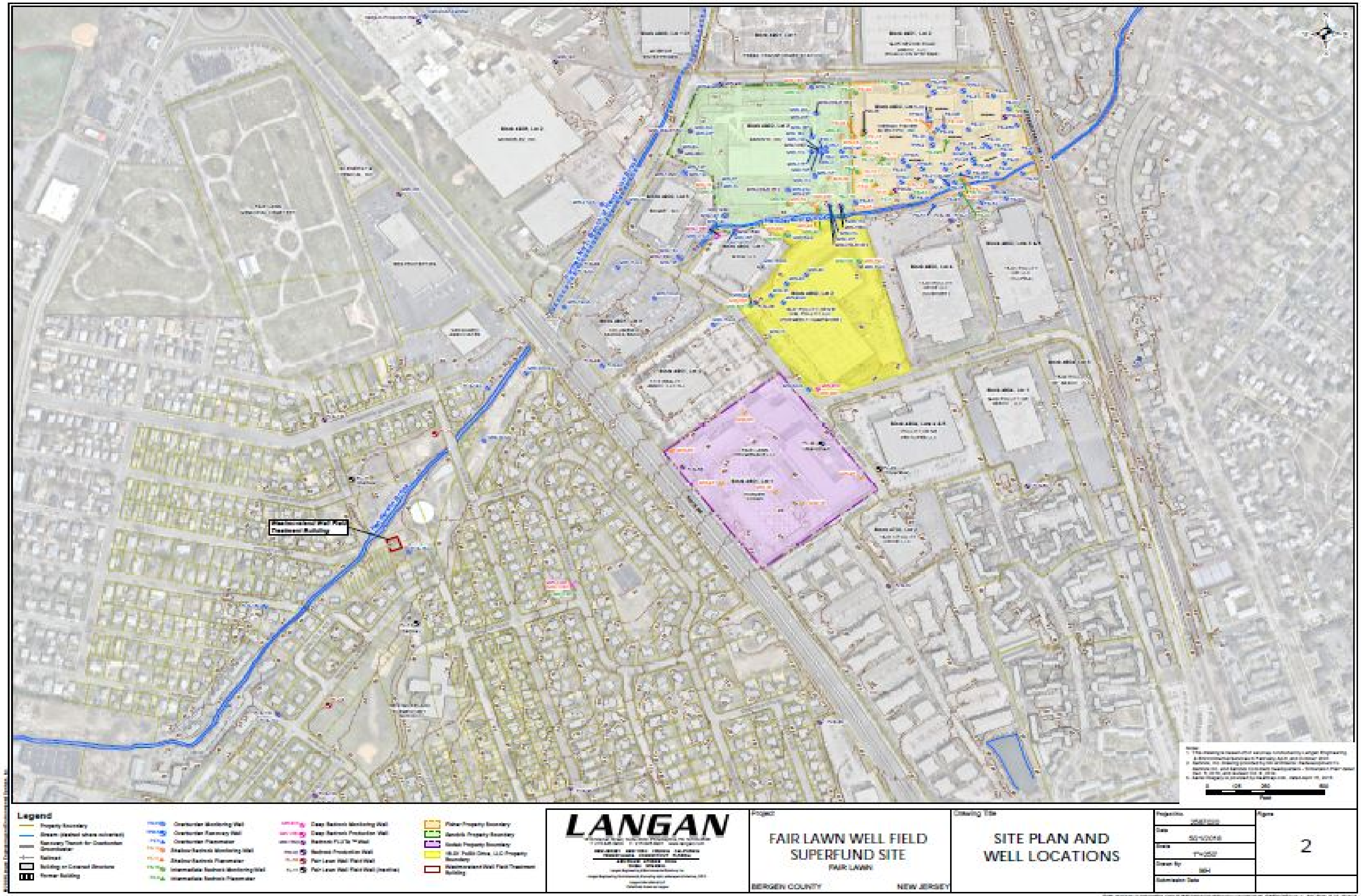

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Figure 3
Overall Plume Extent Map View

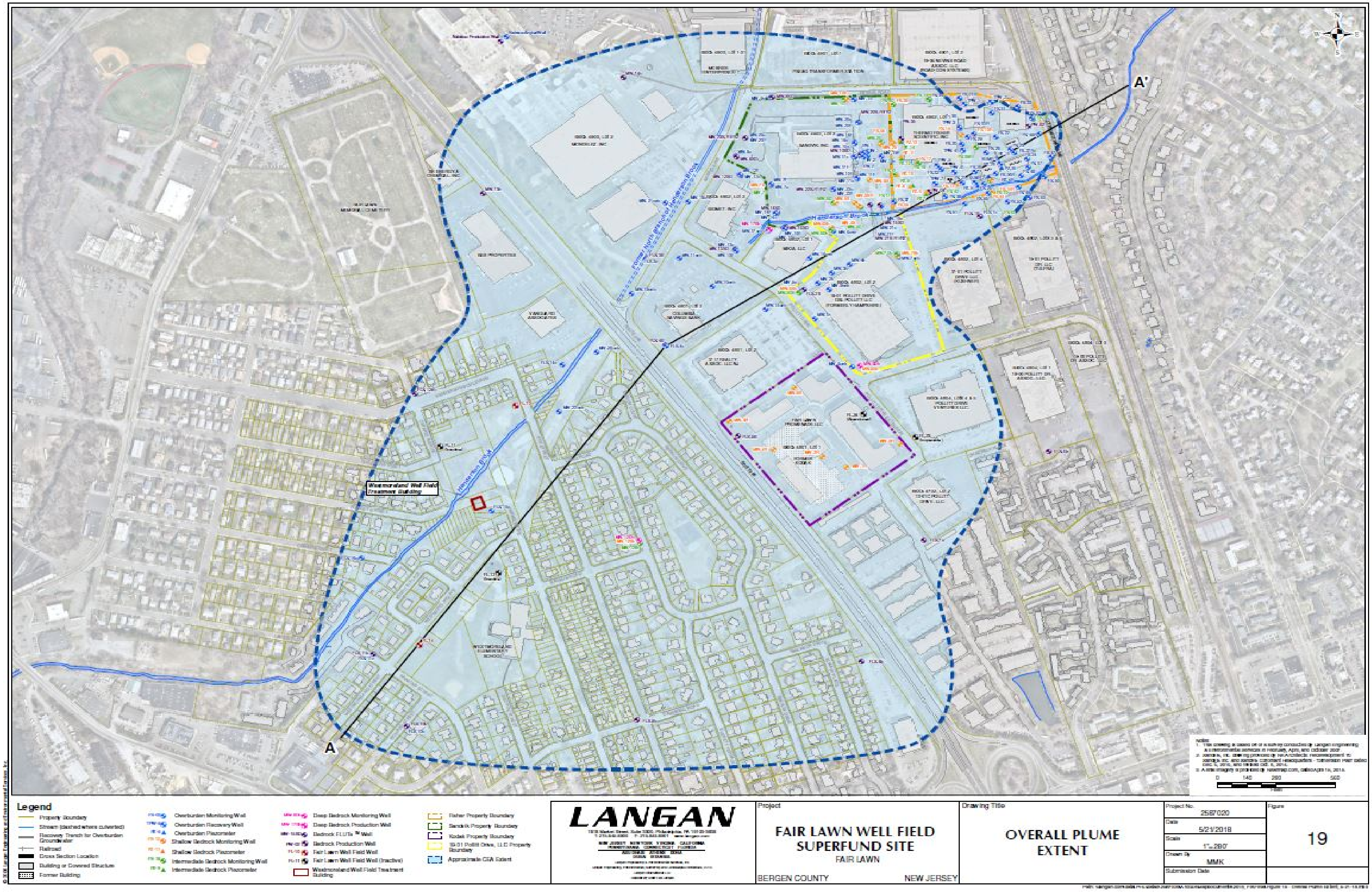


Figure 4
Overall Plume Extent Cross-Sectional

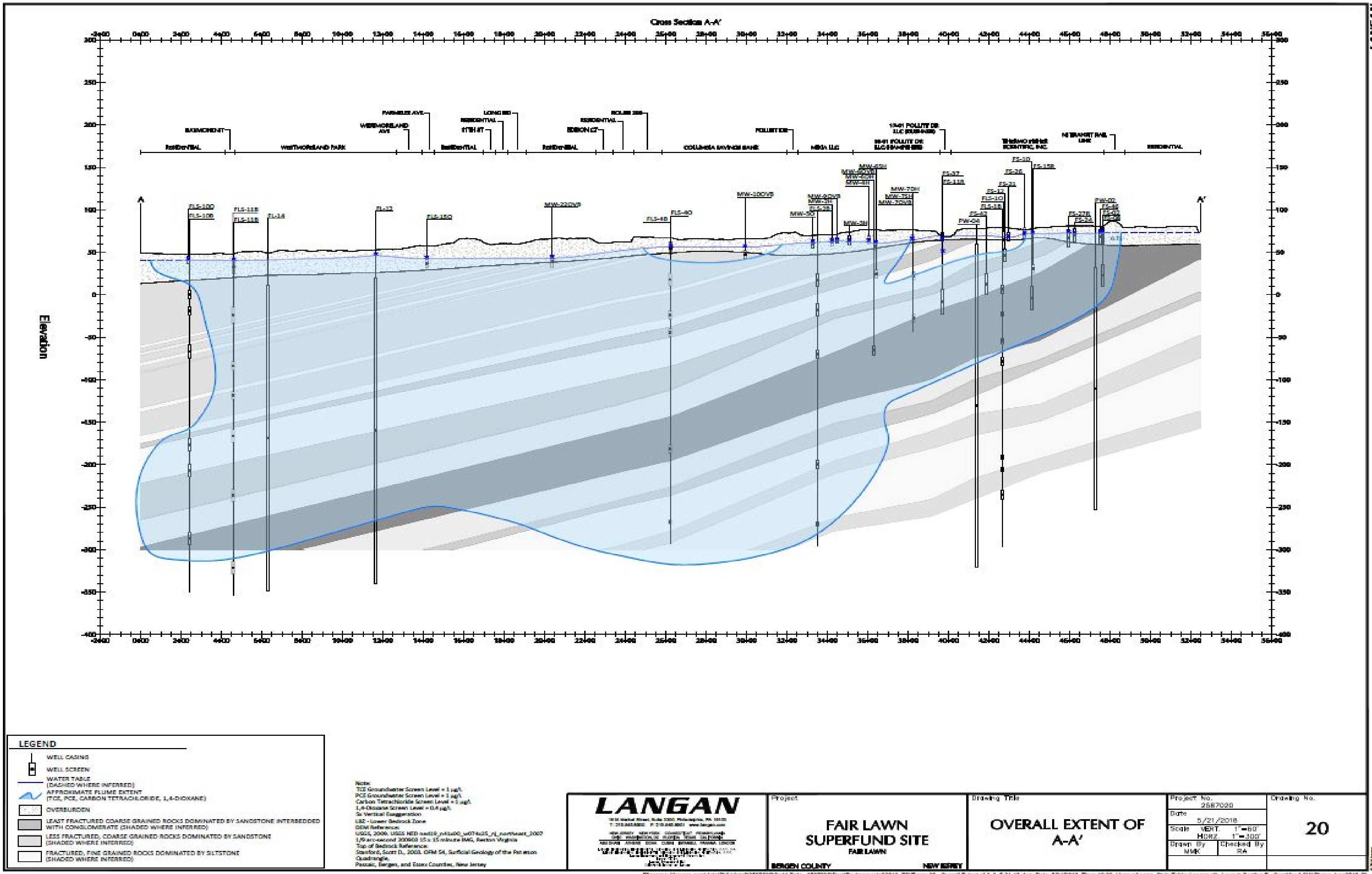


Figure 5
PCE Overburden Plume (2010 - 2016)

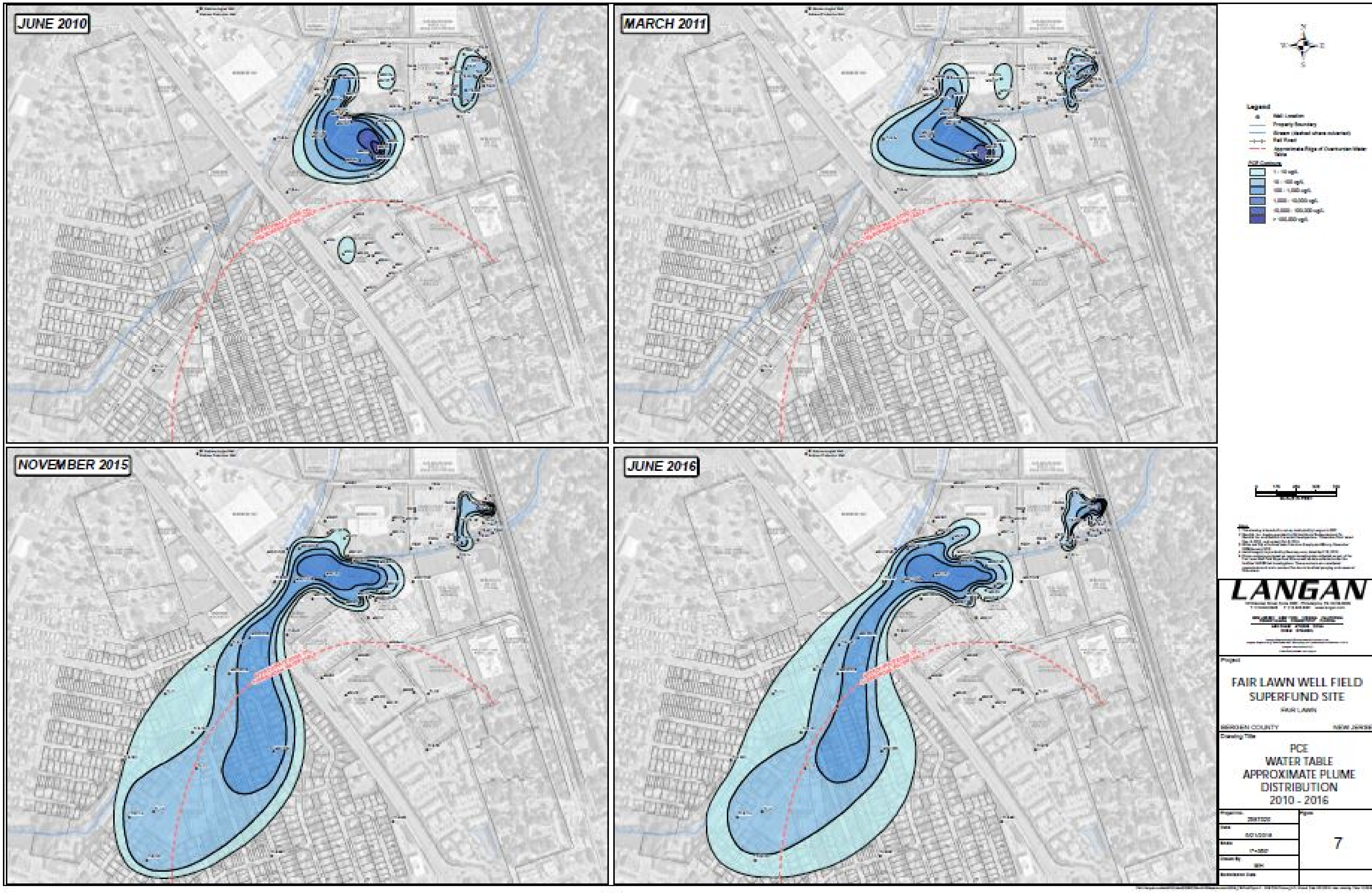


Figure 6
PCE Intermediate Bedrock Plume (2010-2016)

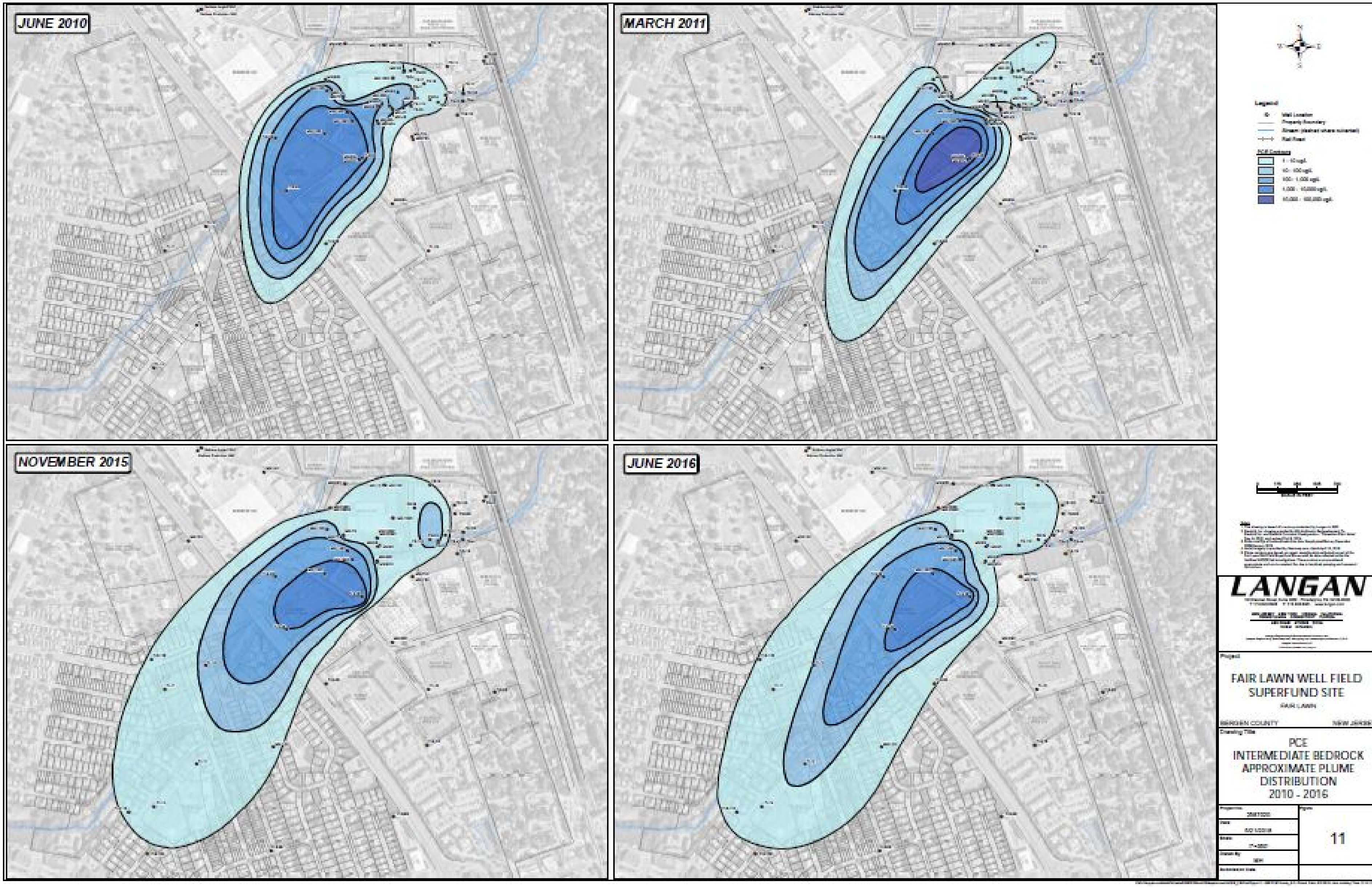


Figure 7
PCE Deep Bedrock Plume (2010-2016)

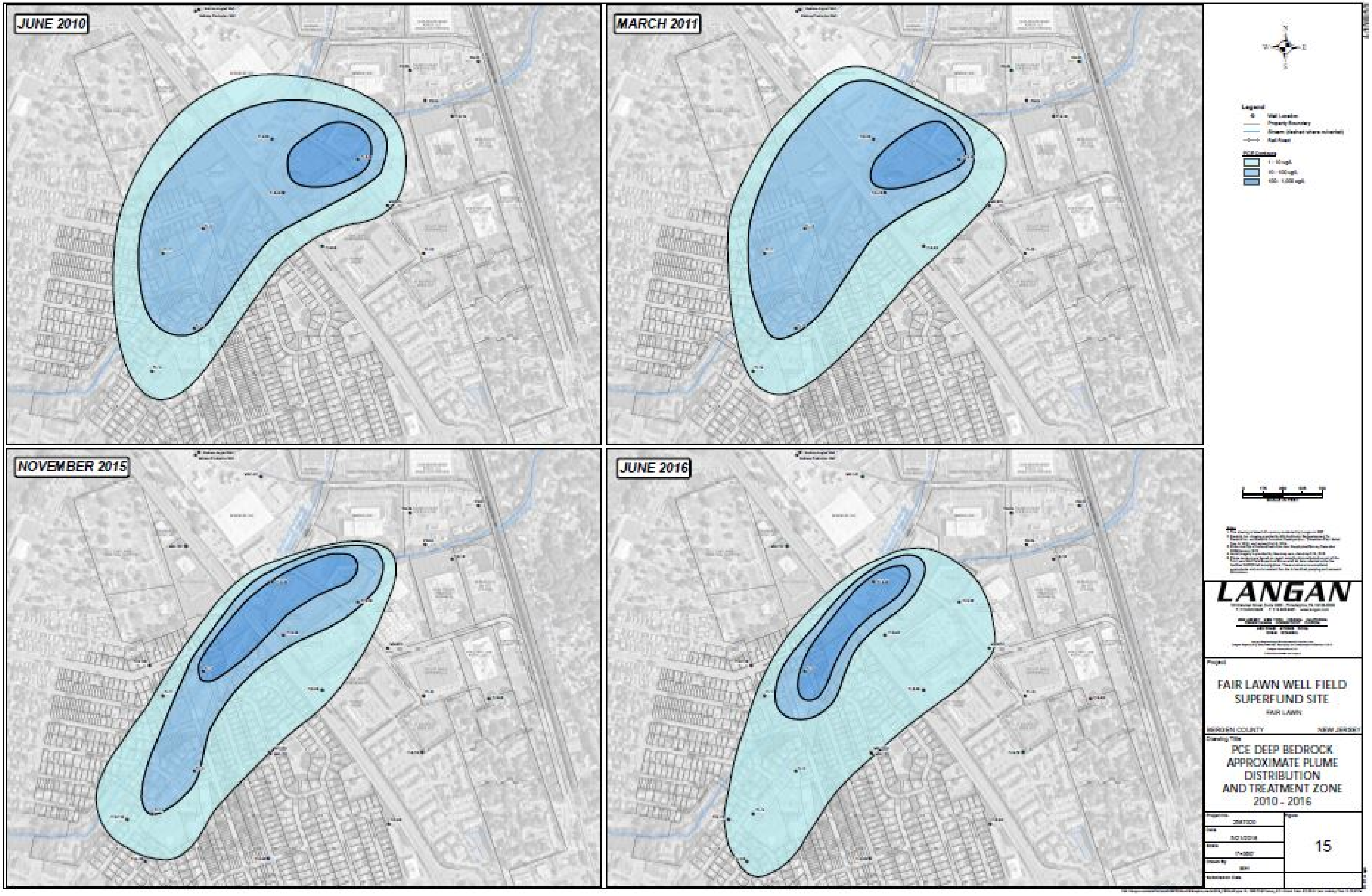


Figure 7
Groundwater Recovery Systems Locations

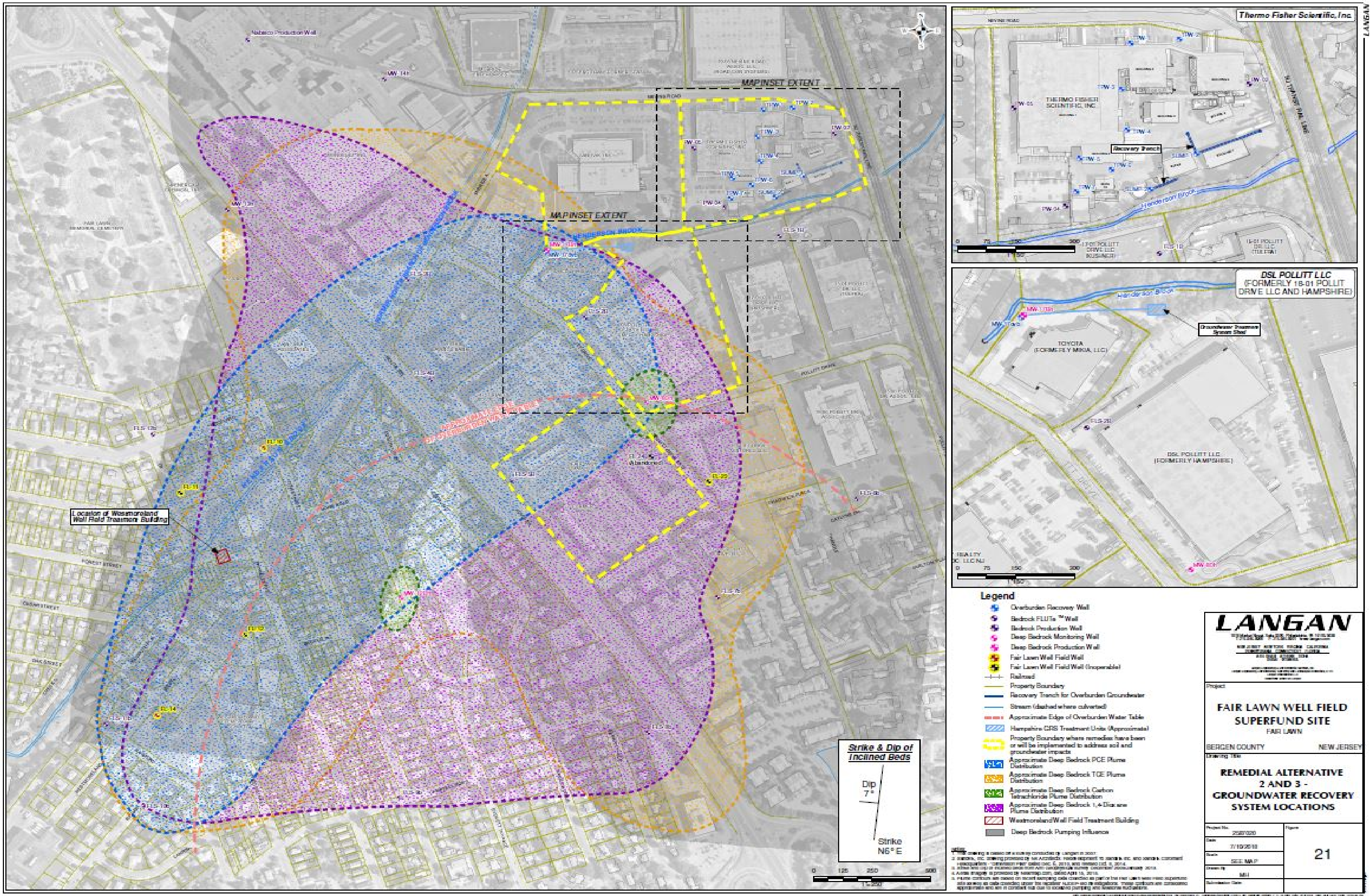


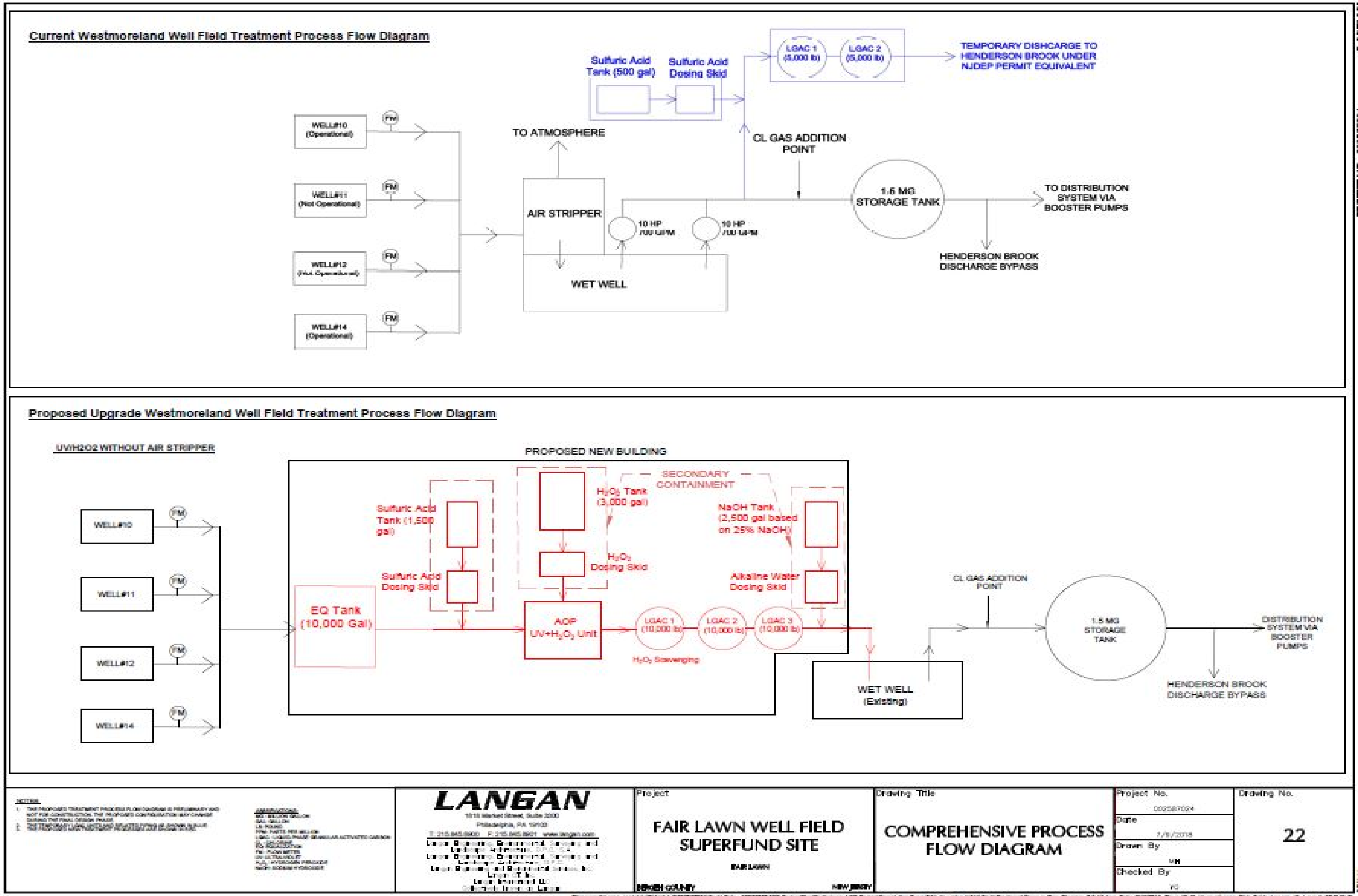
TABLE B
Preliminary Remediation Goals

Site Related Contaminants of Concern Groundwater	CAS Number	NJDEP Groundwater Quality Standards (ug/L)	New Jersey Primary Drinking Water MCLs (ug/L)	New Jersey Secondary Drinking Water MCLs (ug/L)	USEPA Primary Drinking Water MCLs (ug/L)	Preliminary Remediation Goals (ug/L)
Volatile Organic Compounds						
1,1,1-Trichloroethane	71-55-6	30	30	NA	200	30
1,1-Dichloroethane	75-34-3	50	50	NA	NA	50
1,2-Dichlorobenzene	95-50-1	600	600	NA	600	600
1,2-Dichloroethane	107-06-2	2	2	NA	5	2
Benzene	71-43-2	1	1	NA	5	1
Carbon Tetrachloride	56-23-5	1	2	NA	5	1
Chlorobenzene	108-90-7	50	50	NA	100	50
Chloroform	67-66-3	70	NA	NA	80	70
Cis-1,2-dichloroethylene	156-59-2	70	NA	NA	70	70
Ethylbenzene	100-41-4	700	NA	NA	700	700
n-Heptane	142-82-5	100*	NA	NA	NA	100*
Tert-Butyl-Methyl-Ether	1634-04-4	70	70	NA	NA	70
Tetrachloroethylene (PCE)	127-18-4	1	1	NA	5	1
Toluene	108-88-3	600	NA	NA	1000	600
Total Xylene	1330-20-7	1000	1000	NA	10000	1000
Trichloroethylene (TCE)	79-01-6	1	1	NA	5	1
Vinyl Chloride	75-01-4	1	NA	NA	2	1
Semi Volatile Organic Compounds						
1,4-Dioxane (P-Dioxane)	123-91-1	0.4	NA	NA	NA	0.4

Site Related Contaminants of Concern Surface Water	CAS Number	NJDEP Fresh Water Category 2 Non-Trout Bearing Surface Water Quality Standards (ug/L)	USEPA NRWQC for the Consumption of Water and Organisms (ug/L)	Preliminary Remediation Goals (ug/L)
Volatile Organic Compounds				
Benzene	71-43-2	0.15	2.1	0.15
Carbon Tetrachloride	56-23-5	0.33	0.4	0.33
Chloroform	67-66-3	68	60	60
Cis-1,2-dichloroethylene	156-59-2	NA	NA	NA
Tetrachloroethylene (PCE)	127-18-4	0.34	10	0.34
Total Xylene	1330-20-7	NA	NA	NA
Trichloroethylene (TCE)	79-01-6	1	0.6	0.6
Vinyl Chloride	75-01-4	0.082	0.022	0.022
Semi Volatile Organic Compounds				
1,4-Dioxane (P-Dioxane)	123-91-1	NA	NA	NA

Legend
NJDEP New Jersey Department of Environmental Protection
USEPA United States Environmental Protection Agency
NRCQA National Recommended Water Quality Criteria
NA Not Applicable
* - Value listed is an NJDEP interim generic groundwater quality of 100 for non-carcinogens and 5 for carcinogens

Figure 9
Treatment Enhancement Diagram



Attachment B

Public Notice

82 dead as powerful earthquake hits Indonesia

John Bacon
USA TODAY

The death toll rose to 82 after a magnitude 7.0 earthquake rocked the Indonesian island of Lombok and nearby Bali on Sunday, damaging buildings, sending terrified residents and tourists running into the streets, and triggering a brief tsunami warning.

Social media posts from the scene showed debris piled on streets and sidewalks. Hospital patients, many still in their beds, were rolled out onto streets as a safeguard against structural damage to the hospital buildings.

Lombok, about 50 miles east of Bali, was rocked by a magnitude 6.4 quake less than a week ago that killed 16 people. That quake injured more than 150 people, damaged thousands of homes and cut off power to many more.

The Meteorology, Climatology and Geophysics Agency for Indonesia had reported scores of aftershocks in the hours after last week's quake – and had warned that another major quake could be imminent.

The agency issued a tsunami warning after Sunday's temblor but withdrew it a short time later.

Iwan Asmara, an official from the local Disaster Mitigation Agency, said panicked residents and tourists ran from their homes and hotels to higher ground.

Model Chrissy Teigen, vacationing in Bali with husband John Legend and their children, tweeted that the quake "felt like a ride" for "15 solid seconds."

The quake struck at 6:46 p.m. local time Sunday with an epicenter 12 miles southwest of East Lombok. Lombok is known for its beaches, surfing, diving and snorkeling and is home to a sea turtle hatchery.

Indonesia, made up of thousands of islands, has a population of more than 260 million people. The archipelago is part of the Ring of Fire, an area in the Pacific known for volcanic activity and earthquakes.

Contributing: Associated Press

New 'sex talk' must address assault

An important conversation is not happening on college campuses

Kate Murphy and Meg Vogel Cincinnati Enquirer
USA TODAY NETWORK

Students at Northern Kentucky University protest the treatment of sexual assault survivors on campus.
CINCINNATI ENQUIRER

She was on the floor of a bathroom in the university student center, shoved there by a guy from her calculus class. A guy she barely knew. He sexually assaulted her, then insisted on walking her back to her dorm. It was Halloween of her freshman year.

On another campus, the year before, a guy went to a party, then to a girl's dorm room. They were both freshmen. In the spring of his sophomore year, the school found him responsible for sexually assaulting her in that dorm room, after that party. He was expelled from the college. He says he was falsely accused.

College students will enter school this fall during what experts call the "red zone." The days from August through November are a particularly dangerous time for the more than 20 million college students on campuses across the nation. More than half of college sexual assaults annually take place during those four months. We had seen the statistics. Perhaps 1 in 4 or 1 in 5 women. One in 14-16 men. That means about 3 million students on campus this fall will be sexually assaulted during their college years.

We knew it was more complicated than that.

We interviewed 24 people about what sexual assault looks like in college.

In a series of videos at thesextalk.cincinnati.com, you'll hear from the students who have been assaulted and accused, parents, a university president, police officers, Title IX experts, lawyers and others.

We began to understand it was about more than sexual assault. It was about how the culture might teach children about what sex is yet does a poor job of explaining the complex power of sexual dynamics and why consent matters.

"I see it as the No. 1 issue for student safety because, in a way, there's nothing else that comes close to it," said the Rev. Michael Graham, president of Xavier University in Cincinnati and a Jesuit priest.

We heard how colleges and universities investigate and adjudicate these crimes. And how that doesn't really work. We looked at the factors contributing to the campus sexual assault epidemic – consent, rape culture, alcohol, fear – and found they are confusing, devastating and ever-changing.

We discovered that the story of sexual assault varies, depending on who is talking about it, who gets hurt – and who investigates it.

We learned what the federal rules were and how they are changing as the Trump administration's Department of Education is working on a new set of rules that could change how campuses handle the issue.

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Attachment C

Public Meeting Transcript

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
- -x

FAIR LAWN WELL FIELD GROUNDWATER

CONTAMINATION SUPERFUND SITE

PUBLIC MEETING

- -x

Fair Lawn Borough Council Chambers
8-01 Fair Lawn Avenue - 2nd Floor
Fair Lawn, New Jersey

August 23, 2018
7:00 p.m.

P R E S E N T:

WANDA AYALA,
Community Involvement Coordinator

JEFF JOSEPHSON,
Superfund manager

DAVID KLUESNER,
Public Affairs Representative

JULIE McPHERSON,
Risk Assessor

SHARISSA SINGH,
Hydrogeologist

MICHAEL ZEOLLA,
Project Manager

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MS. AYALA: Good evening and thank you all for coming tonight. My name is Wanda Ayala and I am the Community Involvement Coordinator for the EPA for the Fair Lawn site.

Tonight, we are gathered to talk about the proposed remedial action plan for the Fair Lawn site. And at the meeting, we're going to be discussing the proposed remedies and our preferred remedy and the rationale for that.

Superfund law requires us to have a transcript of this meeting, so we have a stenographer here tonight, Linda Marino.

After Mike makes the presentation, we're going to ask people to come forward with their comments and their questions.

I like to start off acknowledging any elected officials or reps that are here tonight. If you could stand up and let people know that you're here.

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I'd like to ask people to please put your phones on vibrate so it doesn't disrupt the presentation. The restrooms, as most of you know because you're from here, are outside to the left.

When you get up to speak, you need to speak into the microphone and state your name so Linda can have it for the record.

I'd like to introduce to you our Mike Zeola is the remedial project manager for the site; Sharissa Singh, the hydrogeologist; Julie McPherson is our risk assessor; we have Superfund manager, sitting, Jeff Josephson; and we have David Kluesner from my office, the Public Affairs rep.

And without further ado, we're going to start the presentation.

MR. ZEOLLA: Good evening and welcome, everybody. As Wanda said, we're here to talk about the Fair Lawn Well Field Superfund Site and

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specifically the Proposed Plan that we have selected.

I'm going to go through the slides and give you kind of -- again, Wanda...

We are going to try to go through the slides as quickly as possible and get to the meat and bones of this, which is letting you know what the proposed remedy is.

As Wanda said, I'm the project manager and Wanda is the community relations person. We have Julie McPherson, our risk assessor; and Sharissa Singh, who is our hydrogeologist.

We're here tonight to discuss the preferred remedy and other cleanup options for the Fair Lawn Well Field ground contamination Superfund site.

The EPA will accept public comments until Wednesday, September 5, 2018. And EPA will assess those public comments in its Record of Decision

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Responsiveness summary.

The meeting agenda. We're going to talk about the Superfund as an overview of what we do; the site information, the history, the background; also, we'll discuss the investigation sampling results; then get into the risk assessment; then talk about the alternatives that were identified in the feasibility study; and then, lastly, we'll identify the preferred remedy. And then after I'm done with the presentation, we can open up for questions and comments.

CERCLA, Comprehensive Environmental Response Compensation and Liability Act: Toxic waste disposal disasters prompted law passage by Congress in 1980 and amended it in 1986; provides federal funds for cleanup of hazardous waste sites; and allows EPA to respond to emergencies involving hazardous substances; and empowers the EPA to compel potential responsibility

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parties to pay for or conduct necessary response actions.

The Superfund remedial process, just a quick overview: Site discovery is when EPA becomes aware of a potential release of hazardous substances into the environment; the next step, preliminary assessment site inspections, where EPA determines if that release is a threat to human health and the environment; and then determines whether the hazards need to be addressed immediately or if additional investigation work needs to be done, needs to be collected.

The first step is the site then to be listed -- well, it's proposed first on the National Priorities List, and then -- it's proposed first and then listed on the National Priorities List. And when that happens, once it gets listed, federal funds become available to do cleanup actions on that site.

Once that's done, we get into the process of actually doing the

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remedial investigation/feasibility study, where we have the funds, either through Government funds or we negotiate with the PRPs, responsible parties, to conduct the work. And the investigation starts. We do a -- I'm losing myself here.

The nature and extent of the contaminants have to be identified through sampling. And then at that point, once we get done with that, we move on to the proposed remedy. Once we have the information from the investigation, we get to -- we do a feasibility study once we have all the information.

We come up with a list of alternatives. From those alternatives, we select the proposed remedy that we issue to the public, which we did.

And then we ask the public to comment on that. We give 30 days to comment on that. Once that's been done, once we've received the comments from

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that, we take the comments and we decide what the final remedy will be and we document that into a record of decision.

That record of decision -- from the record of decision, we have the remedy that we want to implement. And then we either fund it through EPA or, again, we negotiate with the responsible parties to conduct the design and construction of that, of that remedy.

And at that point, the remedy will function and operate for a while. And once we've met the objectives that are outlined in the feasibility study, once those are met, then we can delete the site from the NPL, the National Priorities List.

The history and operation of the site, a quick overview.

The Fair Lawn site consists of four municipal wells, 10, 11, 12, and 14, and the surrounding contaminated aquifer, and Henderson Brook.

All four municipal wells are

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part of the Westmoreland Well Field, which began operating in 1948. Two of the four wells, FL-10 and -14, were used to supply drinking water to residents of Fair Lawn. FL-11 and -12 are used just for monitoring.

The treatment on the water supply system began in 1987. And at this stage, Wells 10 and 14, which were used to supply, are not supplying drinking water to the public since May of 2016.

Some more background and history.

Beginning in 1978, a volatile organic compound contamination were detected in municipal wells.

NJ DEP investigated all industrial/commercial facilities to conclude that the VOCs originated from the Fair Lawn Industrial Park.

At that point, NJ DEP issued an administrative order of consent to Fisher and Stanley, the potential

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responsibility parties, in March 1984 to conduct remedial activities on their properties, which those are considered the source areas.

Kodak and the owners of 18-01 Pollitt Drive have also conducted remedial activities on their property under NJ DEP authority.

EPA became the lead agency for the nonsource area contaminated groundwater in September of 1992.

And the PRPs agreed to conduct the site groundwater RI/FS in March of 2008.

Remedial investigation. The purpose of it is to determine the nature and extent of contamination in groundwater and surface water.

The RI data identifies: Sources of contamination; the contaminants of the potential concern; the pathways, mechanisms, and rates of contaminant migration through environmental media; and the concentration of contaminants at

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points of exposure to human and ecological receptors.

This gives you a broad look at the geology at the site. I'm going to kind of give you a quick little synopsis of what's happening here. Disregard the contour lines.

In general, the land surface goes from the northeast to the southwest, towards Henderson Brook. And what we have just below that is a layer of unconsolidated glacial sediments. That soil is typically heterogeneous. And the thickness of this layer is between 10 feet over in the northeast section to about 80 feet over by Henderson Brook.

Just below that is the actual bedrock aquifer, which is the Passaic formation. The aquifer was -- as you can see here, there's two different zones to it, an upper zone and a lower zone dissected by a confining unit.

But just a general idea of what

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it looks like from a conceptual model to look at how groundwater moves in the system.

The RI activities.

We installed eight -- we'll call them water table monitoring wells. They were installed and they were sampled. We also installed 12 bedrock monitoring wells and sampled them at 70 interval locations. Thirteen temporary overburden wells.

One of the water table wells was also used to identify permanent locations for those over the water table wells and, also, to assess whether vapor intrusion testing should be done in the area.

We also utilized 82 water table and bedrock monitoring wells as part of the sampling to be done on this site that were installed on the NJ DEP properties or source area.

We also sampled several of the Westmoreland well field municipal wells;

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10, 11, 12, 14 and 23 were sampled during our investigation.

And we actually sampled four different times, four different sampling events were conducted: March of 2010 -- actually June of 2010, March of 2011, November of 2015, and June of 2016.

In total, we sampled 70 locations of the surface water, we collected 70 samples from surface water. We collected 600 -- actually, the PRPs, the responsible parties, did all this work. They collected 600 samples from the groundwater. And water level measurements were collected from all of the monitoring wells at the site.

And we also did vapor intrusion sampling at nine commercial and 48 residential prompts, including the Westmoreland Elementary School.

We collected 12 samples. All the properties are currently not at risk for the contaminant vapors entering the space.

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This is a table I put together showing the range of concentration for the four identified contaminants of concern. The primary contaminants of concern are tetrachloroethylene, trichloroethylene, carbon tetrachloride, and 1,4-Dioxane.

What I'm showing here is the range of concentration within the plume for both the 2015 sampling event and the 2016 sampling event for the water table, the upper, bedrock and the lower bedrock; give you some sense of where we're finding -- how extensive the contamination is for, say, the most top layer aquifer to the bottom aquifer.

I will try and describe the stuff off this map, but it's going to be hard for you to see anything. But I have other figures out here that maybe later if folks wants to take a look around and take a look.

The general sense here is that the source areas are here, where the

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high contamination is. And as you move downgradient vertically and horizontally, the concentrations are reduced extensively.

So, just kind of giving you a sense of -- these lines here are concentration lines. So, you can't see the numbers, it's hard to tell, but here is where the major sources are, the hider concentrations. And down here by the well field, they're definitely not as high as they are here.

Surface water sampling results.

I'm going to quickly give you an idea of what the brook looks like. The brook is separated by 208, Route 208. There's a northern section of it in the industrial park area and a southern section below 208.

We found that the max PCE concentration and carbon tet concentration were in the northern portion of it, over by the industrial park area. The highest level of PCE we

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found up there was 13.4 parts per billion and exceeded the surface water quality standards. And for carbon tet, we found 3.6 parts per billion, again exceeding the surface water quality standards.

If you move to the south portion of the brook, below 208, you'll notice that the concentrations go from 9.6 down to .7. And we didn't find carbon tetrachloride anywhere in the southern portion of the brook.

Roles and responsibilities.

EPA, our job at this point forward will be to complete the ROD, which will be the final remedy, and to negotiate with the responsible parties to construct a design construction of the final remedy to remediate the contaminated groundwater outside the source areas.

DEP's role, they're going to continue to oversee the contaminated soil source material as well as the

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groundwater remediation within the source areas.

And the responsible parties, they're going to partner with EPA and NJ DEP to clean up the groundwater to meet federal and state standards.

The assessment of risk. Human health risk assessment, there are four steps to it.

Hazard identification, which is to identify the contaminants of concern, which at this one are PCE, TCE, 1,4-Dioxane, and carbon tetrachloride.

The exposure assessment. We will look at the potential human receptors. That would be on-site residents, children, adults, on-site construction workers, site workers, and transient visitors, most likely preadolescents and adolescents who are working -- just traveling through the town, so to speak.

The toxicity assessment. We're looking at the toxicity number for

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exposure to the contaminants of concern. And for the risk assessment, we're actually estimating risk based on toxicity and exposure to contaminants.

We also did a screening of the ecological risk assessment. What we did here was we want to note the existing habitats and ecologic receptors, and we evaluate the risk for those receptors in the surface water, and we determined there weren't any risk to the ecological receptors.

Human health risk assessment. The goal is to evaluate risk of the reasonably and maximum exposed individual. Exposures are evaluated in the absence of any well drilling restrictions and groundwater treatment systems.

The human health risk assessment risk characterization. We assumed the residential use of groundwater without treatment for Class 2-A drinking water source aquifer.

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The potential exposure routes evaluated for these receptors included inhalation, dermal contact, and ingestion.

The frequency of exposure for all receptors is similar under current and future scenarios.

We concluded that the groundwater from the aquifer and public water supply, if untreated, poses a risk that exceeds EPA's acceptable cancer or noncancer target levels for the child/adult resident and the construction/site worker.

Again, the contaminants of concern PCE, TCE, carbon tetrachloride, 1,4-Dioxane.

Feasibility study, the purpose of it is to identify the remedial alternatives based on the site-specific conditions and RI sampling results that will eliminate, reduce, or control unacceptable risk to human health and/or the environment.

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The remedial action objectives identified in the feasibility study.

One, prevent and minimize current and future exposure via ingestion, dermal contact, and inhalation of site-related contaminants in groundwater and surface water at concentrations greater than federal and state standards.

Two, restore the impacted aquifer to its most beneficial use -- as a source of drinking water -- by reducing site-related contaminant levels to the most stringent of federal and state standards.

Three, restore the impacted surface water to its most beneficial use by reducing site-related contaminant levels to the most stringent of federal and state standards.

And, four, minimize the potential for further migration of groundwater containing site-related contaminants at concentrations greater

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than federal and state standards.

Remedial alternatives. There were three that were identified in the FS.

Alternative 1 is no action. Not, to do anything.

Alternative 2, groundwater recovery and treatment, long-term monitoring, and institutional controls.

Alternative 3, we would do, again, groundwater recovery and treatment. In addition, we would do air sparging, soil vapor extraction, and aerobic cometabolic bioremediation, as well as long-term monitoring and institutional controls.

The groundwater recovery and treatment system.

We propose using up to four municipal wells to extract contaminated groundwater.

In addition, advanced oxidation with hydrogen peroxide for removing VOCs and 1,4-Dioxane.

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Also, liquid granular activated carbon for removing VOCs and PFOA/PFOS compounds from the groundwater.

And final step would be chlorination prior to entering the water supply.

This is a cost analysis of all three alternatives.

As you can see, Alternative 1, no action, would be no cost involved there.

Alternative 2, groundwater recovery and treatment, long-term monitoring and institutional controls, there's initial capital cost of 5.2 million and then an annual average operating maintenance and monitoring of about 440,000, for a final cost of 19.5 over a 30-year period. This number is calculated over a 30-year period.

Alternative 3, groundwater recovery and treatment with AS/SVE with in-well stripping and aerobic cometabolic bioremediation, long-term

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monitoring and institutional controls, having a 14 million capital cost. The operation and maintenance is similar to Alternative 2, about $430,000. But the total cost is 29 million.

EPA's nine evaluation criteria to determine -- we use these values of criteria to evaluate the alternatives that we have identified. It's something we have to address as part of CERCLA requirements. It's developed to ensure that all the important considerations are factored in to the remedy selection decision, and the comparison of options to determine the alternatives relative advantages and disadvantages between alternatives.

The nine criteria: One, overall protection of human health and the environment; two, compliance with applicable or relevant and appropriate requirements; three, long-term effectiveness and permanence; four, reduction in toxicity, mobility, and

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volume through treatment; five, short-term effectiveness; six, implementability; seven, cost; eight, the state concurrence or acceptance of the remedy; and, nine, the most important part, is the community accepting it.

This is the EPA's preferred remedy. It's Alternative 2. It's the groundwater recovery and treatment, where we're going to utilize upgraded systems to remove the VOCs, we're going to upgrade the water supply system to also treat for the 1,4-Dioxane and PFOS/PFOA contaminated groundwater, and if necessary -- and this would mean if we find out that the current wells are not capturing the groundwater plume -- then we would have to look at adding additional wells and treatment units. But that's if necessary and that would be determined during design, when we do another predesign investigation to determine that.

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The second part of it is to collect long-term monitoring of groundwater and surface water.

And the third part would be institutional controls, would be to implement the NJ DEP classification exception area/well restriction to reduce exposure to contaminated groundwater.

The basis for this preferred remedy.

One, groundwater recovery and treatment system provides mass reduction and hydraulic control of site-related COCs, contaminants of concern, to achieve federal and state standards.

Two, source control measures under New Jersey DEP will reduce the concentration of groundwater contamination.

Three, long-term monitoring and institutional controls ensure that human health and the environment are protected during operation of the groundwater

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recovery and treatment system.

And the fourth reason, NJ DEP concurs with the preferred remedy as well as EPA's looking at the community comments to see what their acceptance is for this particular remedy.

And that's it for the presentation. We're going to open now for questions.

MS. AYALA: We ask that you come to the front, speak into the mic, state your name.

MR. SALKA: Glenn Salka, Southern Drive, Fair Lawn. I have two questions.

One is after the implementation begins, how long does it take before you can say the water is cleaned up?

MR. ZEOLLA: Well, the next step would be for us to negotiate the enforcement document with the responsible parties.

MR. SALKA: But whenever that gets done, when does the process start?

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MR. ZEOLLA: That could take about six months to get that done, and then there's the whole process of getting the documents in place, the work plan for all the work to be done, for design.

Doing the design means collecting more additional information, like I was mentioning before, whether we need to put in additional wells or additional units. That would be part of determining that.

We also want to go out there and sample for the PFOA/PFOS compounds that we didn't sample -- that we're going to be treating for but didn't sample throughout the plume. We want to do that as well.

So those -- that, you know, getting to the work plan and then getting to into the actual field to do the work, you know, you're looking somewhere between 12 to 18 months.

MR. SALKA: My other question

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was -- my notes are kind of messy here, but apparently this has been identified since at least 2010. I have had another note, maybe decades.

MR. ZEOLLA: You mean the site?

MR. SALKA: Yes.

MR. ZEOLLA: The site was identified in 1978, when the wells were found contaminated.

MR. SALKA: We're 30 years and now talking another 18 months, based on what you just told me, before anything is really starting.

What takes so long?

MR. ZEOLLA: You know, it's Government, it takes a long time to go through all the steps.

You have to negotiate. When you have a responsible party --

MR. SALKA: I know that, yes.

MR. ZEOLLA: You get to the table, you have to negotiate all those documents --

MR. SALKA: 30 years? There's

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something wrong with a system that takes 30 years.

MR. ZEOLLA: I understand the concern.

MR. SALKA: It's more than a concern. I've been living here for 33 years.

MR. ZEOLLA: The site was discovered in '78. We know that the State was look being at it for quite a while. They determined where the sources were coming from.

So, the process there, it takes -- I know.

MR. SALKA: I just this is not a question, just a statement. It's absurd to me that at this point in time, we've identified the issues, we know who at least some of the PRPs are, and you're telling publically we're looking at another 18 months before we even begin remediation. That is, frankly, absurd.

MR. JOSEPHSON: Actually, I'd like to clarify.

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MS. AYALA: Jeff Josephson.

MR. JOSEPHSON: During all this time, the water has been collected and treated since air strippers were put on in 1987. There has been something ongoing since 1987 in terms of remediating the water.

MR. SALKA: Okay.

MR. JOSEPHSON: What we have been doing is investigating in more detail the nature and extent, and that is the full extent. At that time, it was recognized as a contaminant in public water supply but the actual distribution of the contaminants wasn't well understood.

If you look at the figures here, you'll see, for instance, the figure there with the blue coloring, it shows that it's a very complicated bedrock system there. And it does take a significant effort to put in the wells. The wells are 300 feet deep, they're in bedrock, they take a long time to put

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in.

What we're looking at is what is the final thing that we really need to do?

There has been pumping and treating going on for a really long time and it has prevented the contamination from going further towards the Passaic River and underneath the homes.

Another thing we understood is that, as Michael said, up by the source areas north of 208, the contamination is much higher; south of there, it has decreased and it continues to decrease in concentration.

MR. SALKA: Thank you.

MR. ZEOLLA: Thank you.

LISA: I'm Lisa. I'm here for my mother and father. They live on Chester Street, I guess south of the contamination spot.

I'm just curious, you keep saying "responsible parties." I've never heard them mentioned. I'd like it

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explained a little bit more in laymen terms.

I'd like to know what the differences are between the remedy option two and three, because, obviously, that's the middle ground for cost.

I want to ensure that the remedy cost is going to be borne by the responsible parties and the State and it's not going to be impacted by property taxes.

And I want to know what's going to happen to the value of the homes. My parents are trying to sell their house. They got notified of this and now buyers are going to be concerned that they have contaminated water with little kids.

MR. ZEOLLA: Well, the properties, the value of the homes -- your first question was the PRPs, the responsible parties. They're the ones responsible for the contamination.

LISA: Who are they? I've never

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heard them named.

I know you mentioned the Kodak place, and now you have the Promenade. I didn't read everything, so I apologize.

MR. ZEOLLA: Okay. I'll go back to the slide in the beginning. I know I went through history pretty quickly.

Fisher and Sander were the potentially responsible parties. They were identified in 1984 and they're the ones currently doing the work for the RI/FS that was done. They are the ones who paid for that to be done.

LISA: And for the future cost, who will bear that?

MR. ZEOLLA: Future cost, they will bear that as well.

LISA: Okay.

MR. ZEOLLA: Once the remedy is selected, we'll negotiate with them to do that, to do the design and construction for the remedy.

LISA: Okay.

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So, there is a difference between remedy two and remedy three, and you guys kind of picked two. Three seems to be a little bit more --

MR. ZEOLLA: Three is a little more costly because there's additional treatment units being installed to handle the mass of concentration in the plume...

(Pause in proceedings.)

MR. ZEOLLA: They're virtually the same alternatives except for the air sparging and soil vapor extraction would be implemented in the water table aquifer to handle the mass concentrations for VOCs. And the aerobic cometabolic bioremediation is handling the 1,4-Dioxane in the upper bedrock portion.

So, the difference in cost is those units being implemented, it's the capital cost, actually installing them, you know, as a unit. So, that's where the cost really is with that particular

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remedy. If you go back or go forward to the cost analysis, this is where the capital cost -- installing those units is where you're seeing the big difference because the operation and maintenance cost are similar.

LISA: I'm curious as far as safety. This has, again, been going on and it's going to take 18 months before they start work. And, you know, why not go for the full nut right now since they're on the hook for paying for it?

Safetywise, I'm just a little concerned about that.

MR. ZEOLLA: The actual system itself was being treated prior to it being, you know, turned offline or shut down. So, right now no one is drinking the water.

So, what we're attempting to do with Alternative 2 is we're attempting to upgrade the system so that we can handle the VOC, the 1,4-Dioxane, and the PFOA/PFOS, so when the system gets

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turned back on, you'll have clean water.

LISA: So, how long were the people drinking the contaminated water for?

MR. ZEOLLA: What I know about how long the system has been running, since '87 with treatment on it. Prior to that, when it was discovered in '78, so I can go by those numbers there.

LISA: I know you mentioned different wells and stuff, so geographically what area was drinking contaminated water since 1978?

MR. ZEOLLA: What I know about the system is it's only one portion of the entire water system. There are other well fields in Fair Lawn as well as there's water being sourced in from public utilities.

From what I understand is that about 10 percent of the Westmoreland well field gets put into the entire water system. So, I know from speaking with the borough manager, the water is

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blended, you know, when it gets into the system.

LISA: So, everybody in Fair Lawn since 1978?

MR. ZEOLLA: No, the water has been being treated since '87, so the water was clean. There were air strippers that were installed in '87, so no one was drinking contaminated water at that point.

LISA: But prior to that.

MR. ZEOLLA: But prior to that.

LISA: My family has been on Chester Street for over a hundred years. I assume they've been drink contaminated water.

And I guess even now if it's going to take 18 months -- the water is contaminated now or it isn't?

MR. ZEOLLA: We do know that it's contaminated groundwater underneath migrating to the well field.

LISA: Okay.

MR. ZEOLLA: The wells are

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currently running, but the wells are being treated and are discharged to the surface water. So, that water is not being put into the water system.

LISA: Okay.

MR. ZEOLLA: So, no one is drinking the water now.

LISA: Not coming out of the pipes at all?

MR. ZEOLLA: No.

LISA: Thank you very much.

MS. AYALA: You're welcome.

RICH: My name is Rich.

MR. ZEOLLA: Hi, Rich.

RICH: How did the contamination start? From where?

MR. ZEOLLA: It started in the industrial park.

RICH: Industrial park. Now, did it come from Echo (phonetic) and from Kodak having a sestine whereabouts they went and put their effluents into the ground?

MR. ZEOLLA: I don't know --

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RICH: You don't know.

MR. ZEOLLA: I just know that the sources --

RICH: Now, I'm going to explain to you back in the '60s, when they were starting to make the industrial park, it used to be farmland. As a kid, we used to block up the Henderson Brook and go swimming in there. We also had a wooden wine barrel where water would purge out of the ground. We used to drink it right there. I'm talking back in the '40s.

Turn around, in the '60s, when they were starting to build in there, it came to my attention that somebody went and put a sestine in two buildings over there: Echo and Kodak.

Nobody ever went and checked that out?

There are three wells in the Westmoreland track; am I correct?

MR. ZEOLLA: There are four, actually.

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RICH: Four of them? Okay. I knew it was three.

Now, there is a water tower in that field. At one time, back in '69, '70, the party that was in at the time, the people here, wanted to put a senior citizen housing in there. I got a little irate. I was much younger then.

Now I turn around, it comes to my attention that you cannot build a hundred feet on either side of a brook. They did have houses at the end of Central -- pardon me, at Forest Street, right near the brook. Never had a flood there.

I've lived in the area since '59. As a kid in the 40s, I used to leave Paterson to come over here and we would dam up the Henderson Brook and go swimming in there.

Now, nobody ever checked to see if there was a sestine in any of that property over there?

MR. ZEOLLA: That's not -- the

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investigation we've done here is -- you know, what was done -- I really can't answer your question because this seems like this is years and years and years ago. This wasn't discovered --

MS. AYALA: There was no EPA.

MR. ZEOLLA: Right, there was no EPA. So, the site wasn't known until '78.

RICH: Now, the water tower that's at the end of Forest Street, they went and put that up, oh, I think in the '70s. And it has ping-pong balls in it and it aerates the PCBs, from what I understand. It constantly runs. And it's also like a million- or million-and-a-half-gallon water tank on 11th Street.

Do you know what that's for?

MR. ZEOLLA: I believe that is the system that has been there since 1978 --

RICH: You're sure that's not in case Fair Lawn Industrial Park catches

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fire, they have extra water there for that?

MR. ZEOLLA: I'm not aware of that.

I can tell you from what you've described you're describing the air strippers along with the water tower where the water is being held.

RICH: That's right, that's right.

Now, have you made -- and you have all the yellow, pink and whatever it may be there. Have you made a -- gone to each house and find out if they have any cancer or any medical problems from this here trying to make a remediation of all this property?

Have you gone to anybody's houses to ask them?

MR. ZEOLLA: What we have done is if we see that there's a problem in the shallow aquifer --

Just putting numbers up on there and telling everybody about all kind of

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contaminants in the water, but you haven't gone around and asked people and run, find out. You haven't done that?

MR. ZEOLLA: What we have done is we've gone to people's homes that we've identified as a possibility that maybe vapors have entered their house, possibly --

RICH: In other words, you put pipes in their cellar?

MR. ZEOLLA: Let me finish what I'm saying. What I'm trying to say is we've sampled homes to determine if any vapors from the contaminated groundwater have entered the home and we found that none have.

RICH: Okay.

But I do know that down Fair Lawn Ave., where the dry cleaners used to be, that is really contaminated over there. That has nothing to do with us.

MR. ZEOLLA: Right.

RICH: Absolutely nothing.

MR. ZEOLLA: Correct.

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RICH: Anyway, when is this going to take place and what are you going to do it about?

MR. ZEOLLA: The groundwater contamination, we're going to deal with it. It's going to take a while. You know, we'll have to negotiate with the responsible parties, get them onboard, get a work plan in place, get the data we need, and then construct the remedy.

So, like I said to the previous gentlemen, it will take between 12 months to 18 months to get that done. That's what we're looking at you.

RICH: Now, in the 11th Street Forest Street, Cedar Street, are those houses going to be affected, right alongside the brook?

Cedar Street, Forest Street --

MR. ZEOLLA: Down in this area here, you're saying, on this side?

RICH: Yes.

MR. ZEOLLA: We have tested some of the homes in that area for vapors and

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we haven't found any of the homes to be of concern for the groundwater.

RICH: Okay.

MR. ZEOLLA: So, we've done that. We've done that type of work; not just in here, we've done it up here, we've done it in here.

So, we've gone to a lot of homes, some of the commercial properties have been tested. We tested the elementary school. As I mentioned earlier, we took 12 samples from the school and we didn't find anything.

RICH: I received a letter something about it was, like, two or three hundred feet underground with the contaminants.

Two or three hundred feet, how is that going to affect anybody?

MR. ZEOLLA: Where it's effecting is that down there --

RICH: It's the aquifer.

MR. ZEOLLA: When the wells are pumping, which they are now, they pull

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the contamination down into those wells.

The reason why there was treatment put on that system back in '87 -- what we're doing now is we're going to do the same thing, but we're just trying to upgrade the system to handle the 1,4-Dioxane and the PFOA/PFOS. That's what we're trying to do.

MS. AYALA: In an effort to give everybody an opportunity --

RICH: They can have it, I'll leave.

MS. AYALA: You can come back.

RICH: No, no, let them go, let them go.

MS. SPERLING: This handout is comparable to your presentation.

MR. ZEOLLA: I tried to make it --

MS. SPERLING: Yeah, I was going through it.

Usually, when they evaluate data, they compare it to what's in place

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with the specification in the testing unit. And the table here you have in your presentation shows, like, the limits, shows the amounts in the microgram per liter. Okay.

Where are the limits? Where are the limits to this?

MR. ZEOLLA: It wasn't included there.

I can tell you what the limits are for, say, PCE. I know for EPA, the MCL it's five parts per billion.

MS. SPERLING: Is there a way to compare to see how much -- like, you see this but you don't know.

MR. ZEOLLA: The MCL for drinking water per PCE is five parts per billion. For TCE, I believe it's the same five parts per billion. I'm not sure about carbon tetrachloride.

MS. SPERLING: They're all five parts per billion.

What I was getting at, usually the specifications, there's limits so

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you compare the contaminated water to
what the limits are and that you
evaluate the risk.
MR. ZEOLLA: What I was trying
to do there is give you an idea of what
we found.
MS. SPERLING: Yeah, I'm just
curious how much above the limit.
And, like, usually -- I'm a
toxicologist. Usually when things like
this happen, say -- this is something
going back to 1978. Usually case
studies are done, you know, because they
look at teratogenic effects or deferred
carcinogenic.
So, has anything been done like
that?
MR. ZEOLLA: You mean like a
risk study?
MS. SPERLING: Yes.
MR. ZEOLLA: Yes, we did that.
I mentioned that.
MS. SPERLING: Is it in here?
MR. ZEOLLA: It should be in

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that section after the data.

MS. MCPHERSON: They considered studies and that's -- the risk assessment includes a four-step process. So it includes hazard identification, the exposure assessment, toxicity assessment, and then risk characterization.

What that means is when they do a risk assessment, the hazard identification is they collect the samples and then they identify which concentrations exceed a risk level. And that's on a conservative side, those risk values are.

And when they do the exposure assessment, they assess or include data which suggests well, if we're going to evaluate a resident here, how long are they living here and how much are they drinking per day and so forth. So, that is involved in exposure assessment step.

And then the toxicity assessment, which is what you were

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talking about, is looking at data for the toxicity for all the chemicals that are posing or could potentially pose a risk at the site.

So, those steps combine evaluate what the risks are for each receptor, an individual. I'm talking about a resident or an industrial worker, construction worker, and so forth. So that's what that risk assessment does and that's how you consider the toxicity information you're referring to --

MS. SPERLING: Right. Usually it takes 20 years for something to show up, you know, accumulation. All right. I was just curious.

MS. AYALA: Can I have your name?

MS. SPERLING: I'm sorry, my name's Nancy Sperling. How are you?

MR. JOSEPHSON: Could I just add one thing?

If you look on Page 30 of your document, it does have all the standard

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in there.

MS. SPERLING: I saw that earlier, I just -- yeah. Thanks.

MR. JOSEPHSON: They are there.

MR. ZEOLLA: Thank you.

MS. FRIZZELL: My name is Robin Frizzell.

MR. ZEOLLA: Hi, Robin.

MS. FRIZZELL: I'm here on before of my mother, Sydelle Singer, living in Fair Lawn since 1961. And I grew up here as well. I have a few questions.

I'm curious, why did you choose choice number two over choice number three? Did it have to do with the cost?

MR. ZEOLLA: Not necessarily.

MS. FRIZZELL: Because if the people who did all the polluting are paying for it, all things being equal, why not go for the Cadillac plan?

MR. ZEOLLA: I think because the cost benefit of putting in the extra system to get the mass out wasn't going

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to shorten the lifespan of the pump-and-treat at the well field.

MS. FRIZZELL: Wasn't going to shorten the what?

MR. ZEOLLA: Shorten the lifespan of having to treat the groundwater. Say if it took 40 years to treat that groundwater, actually going in there to, you know, try to pull out the mass, it wasn't going to shorten that 40-year lifespan.

So, it didn't make sense to have to really go and tackle that when, first, there's a caveat being that the actual system itself or what we spoke of before, installing those systems to actually effectively remove the contaminants in those areas hasn't been -- it's a proven technology but it hasn't been implemented in a way that can be demonstrated that it actually works.

So, say if we looked at --

MS. FRIZZELL: Can you put

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number two and number three, that
screen?

MR. ZEOLLA: Yes.

MS. FRIZZELL: Are there any
advantages of number three over number
two?

Because we're not incurring the
cost, if the polluters are incurring the
cost --

MR. ZEOLLA: You want to know
the cost. The cost is what you're
looking at?

MS. FRIZZELL: If they were all
the same price, which one would you
choose?

MR. ZEOLLA: We would still
chose Alternative 2.

Alternative 2, you know, it's
going to remediate the groundwater at --
it's going to capture the plume, it's
going to remediate it at whatever --

MS. FRIZZELL: It's going to be
just as effective?

MR. ZEOLLA: It's just as

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effective, but I guess what I'm trying to say is they're both effective in the sense when it comes to groundwater recovery and treatment. I think what you're focussed on is the fact of the dollars, and the dollars really jump up when you include the other two systems. The other two systems are geared to reducing the mass in the plume.

What I'm trying to say, those two systems, when you look at them, even though they're proven technology, they are not proven in this particular area of this geology. So, we're looking to put in wells, but we have to demonstrate that it even works. And we don't know until we get there and they may not even work.

MR. JOSEPHSON: Let me just add something.

As Michael explained, there are nine criteria that each of the remedies is valued against. So, the results of that analysis led us to choose the

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preferred alternative that's number two.

Part of the reasoning was that if you look at the aerobic cometabolic bioremediation remediation for 1,4-Dioxane, for example, that has not really been demonstrated to be effective at the scale that we're looking at at this site. So, there would be a lot of work that would have to go into it and there's really no guarantee it would reduce the concentration. And if it could do it, it was determined there still wouldn't be any reduction in time for the overall remedy to be achieved.

So, with that kind of uncertainty, to engage in the project for many, many years and not even know with greater certainty, I think, that it would be successful, it just doesn't direct us to that remedy.

MS. FRIZZELL: What happens if you go over budget or find that you need to go back and do more work?

Can you then go back to Kodak

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and the other offenders and ask for more money?

MR. JOSEPHSON: What we will do is -- you know, Kodak declared bankruptcy, so we couldn't go back to them.

The other parties we would go through a similar process to what we are doing now. We would have to have, you know, a record that states why it's not working and we would amend this decision and say we have to do these additional things.

And, again, we would notice the people who we felt were responsible and we would negotiate with them and, if they're willing to do it, they would do it. If for some reason they weren't, the federal Government would pay for it.

MS. FRIZZELL: So, in no way would Fair Lawn residents have to incur the costs.

MR. JOSEPHSON: No, that's why there is a Superfund. It's a situation

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where if there are responsible parties and the enforcement process is effective at getting them to pay, they will pay, but, if for some reason -- for instance, if Kodak was the only party and went bankrupt, the federal government would step in. And being on the National Priorities List allows the federal government to expend the funds to complete the remedy.

MS. FRIZZELL: My other question is if this was discovered in 1978 -- I know Kodak did not close their location until -- they were open many more years after 1978.

Why weren't they forced to close in 1978 or stop doing whatever dumping they were doing?

MR. ZEOLLA: I can't answer that question since EPA wasn't involved at that time.

MS. FRIZZELL: Can somebody from Fair Lawn answer that question? A representative?

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MR. ZEOLLA: I'm not sure there's anybody here.

MS. FRIZZELL: Okay.

And just also, my mother lives on Kossuth Place. Her water was brown a couple of weeks ago. She didn't get any notice, nothing, no phone message. I don't believe she has e-mail. She's older, so maybe didn't get an e-mail.

Why would the water be brown?

MR. ZEOLLA: I couldn't answer that question. That would be a question for the people in Fair Lawn.

MS. FRIZZELL: Okay. Thank you very much.

MR. ZEOLLA: You're welcome.

COUNCILPERSON CUTRONE: HI. Cristina Cutrone, Greydanus Place in Fair Lawn, and I'm a councilwoman. I have a few questions.

Kind of just if I piggyback off of what the woman was asking about in front of me about option two and option three, it seems that option three or

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Alternative 3 has -- it says it would require a pilot test, and I think that was getting to what you were saying as to whether or not it would be effective.

MR. ZEOLLA: Right.

COUNCILPERSON CUTRONE: Was it considered that we have the responsible parties do the pilot test while also implementing Alternative 2 so that if the pilot shows that that would go above and beyond and make it even better then we could add that in?

MR. ZEOLLA: I think the way it's set up, the way we have it listed, it's either two or three. I think the beneficial thing here is obviously to go with two first, see how that works. If that doesn't materialize and work well and we need to go back and do something else, we'll obviously look at alternative three and see if that would be something we would need to do.

COUNCILPERSON CUTRONE: Okay.

And then there's been

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conversations about the residence and property taxes and who's going to pay for this and that the responsible parties are obviously responsible for covering the costs.

But this remediation is not guaranteed. So, if it doesn't -- if we don't get to a point where it's fully remediated in a timely enough fashion that we feel comfortable allowing our residents to drink the water, we need to, let's say, purchase water as a result of wanting to provide our residents with the safest drinking water, are the responsible parties going to pick up the cost of how much more it might cost the Borough to purchase water?

MR. ZEOLLA: I can't answer that question now because there's for a later time.

What I can tell you is that what we're planning to implement here, the treatment system that's going to go in

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is going clean the water. It's going to be really clean. We're not going to see the volatiles there, we're not going to see the 1,4-Dioxane, we're not going to see the PFOS/PFOA. So, they're going to get clean water that's implemented into the system.

COUNCILPERSON CUTRONE: And is there --

MR. ZEOLLA: How long that takes, it all depends.

COUNCILPERSON CUTRONE: Are we talking another 20 years?

I don't think it's acceptable to wait 20 years for clean drinking water.

MR. ZEOLLA: I'm not going to put a number on it. I know we've done some calculations on it. We're thinking 30, 40 years, but we don't know for sure.

COUNCILPERSON CUTRONE: Crazy, okay.

MR. ZEOLLA: There are things we will do during design, more

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investigative work that will help us out to better understand that, maybe putting another well or two to pull in the plume.

But that's not here. We don't have those answers right here tonight. We'll know that once we get the design completed.

COUNCILPERSON CUTRONE: So, after that 12- to 18-month period, we'll have a better idea of how much time it would take.

MR. ZEOLLA: Twelve to eighteen months means we'll get in the field to get the data.

COUNCILPERSON CUTRONE: Right.

MR. ZEOLLA: And at some point after that we'll have better answers.

COUNCILPERSON CUTRONE: Thank you.

MR. CAAN: Allan Caan, Chandler Drive. I've lived on Chandler Drive since 1975, so I've been there for a while.

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Just a question. I don't know necessarily all the contaminants you're talking about. The one I'm most familiar is the 1,4-Dioxane. From what you said earlier, it seems like that's been a problem going back to the '70s or maybe even earlier.

Is that correct?

MR. ZEOLLA: We don't know how far back it goes. What we do know is it was detected in the well field I believe in 2013, when the State sampled the well field as part of a program. We know it was then there. We then sampled for it in 2015, 2016, where we then found out it was throughout the plume.

So, this is why it was part of the rationale for trying to upgrade the system with the better treatment unit, to remove those compounds from the water.

MR. CAAN: Actually, I do know that number from 2013 because on the unregulated chemical part of the Fair

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Lawn water report, it showed that as a test in 2013. And the number was 3.24.

MR. ZEOLLA: Correct.

MR. CAAN: What is the standard for that particular unregulated chemical?

MR. ZEOLLA: I'm trying to think, what is the standard?

MR. JOSEPHSON: It's 0.4.

MR. CAAN: So, we're at 3.24 in 2013.

MR. JOSEPHSON: Can I clarify one thing?

That is not a drinking water standard. That is a standard developed by the State of New Jersey and is a groundwater quality standard.

MR. CAAN: Okay.

MR. JOSEPHSON: There's a little bit of difference there. Drinking water standards are regulated by the Clean Water Act, and that's what regulates --

MR. CAAN: So, what would be the drinking water standard for that

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particular --

MR. JOSEPHSON: There is not one.

MR. CAAN: There isn't one.

MR. JOSEPHSON: That's why it's in the unregulated contaminant.

MR. CAAN: Right.

MR. JOSEPHSON: What that is, is that's a program developed by EPA under the Clean Water Act. And what it does is, as time goes on, different chemicals are discovered throughout the United States, the law requires that only a certain number of chemicals be regulated under the Clean Water Act for municipals, and as time goes on, they can change which contaminants are regulated.

But there has to be assessment across the country to determine the toxicity of contaminants, what concentrations are a risk, and how many people exposed to a contaminant because they don't want to regulate something

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where nobody is ever exposed to it, they want the broadest coverage.

So, they have this program, they do the monitoring, and then they discuss with State support at the federal level what their drinking water standards --

MR. CAAN: Let me ask you this question: It's unregulated chemical and the standard that we know about is 0.4 and we have a reading in 2013 of 3.24, how high does it have to get before someone says maybe we need to look at this?

MR. JOSEPHSON: Actually, in 2013, the standard was not 0.4, it was 10. So, it was below the standard at that time.

MR. CAAN: Okay.

MR. JOSEPHSON: When the standard did change --

MR. CAAN: Which was when, approximately?

MR. ZEOLLA: November 2015 it was changed.

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You also have to understand no one knew about 1,4-Dioxane before then. 1,4-Dioxane became known to people probably four, five years ago.

MR. JOSEPHSON: People have known about it, but the standard did change at that time.

MR. CAAN: So, since 2015.

MR. JOSEPHSON: The town was informed and they did turn off the well field at that time.

MR. CAAN: In 2015?

MR. ZEOLLA: 2016.

MR. JOSEPHSON: But they didn't have to. There were other solutions. They could have just diluted it more, just so you know. But they did turn it off.

MR. CAAN: Okay, which leads me back to another question. For instance, in our water report that we get annually, starting with the 2013 reading, so the 2013 water report, 2014 water report, 2015 water report, 2016

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water report, and 2017 water report when it comes to unregulated chemicals within that water report, that page has been identical for all those years. Nothing has ever changed, they just reprint the same one.

So, we know in 2013 there was a reading of 3.24. But because they reprint the same page every single year, do we know what the readings have been since then?

MR. ZEOLLA: I couldn't answer that. That would be for the water department here.

MR. CAAN: Okay. So, you guys don't know about any more current readings than that number?

MR. JOSEPHSON: I think they will change the number probably with the sample in 2020. I think that's the next --

MR. CAAN: Does that make sense, that we have to wait until 2020 to get another reading?

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MR. JOSEPHSON: The federal government makes money available to states so that public water supplies can do analysis and understand the issue across the country. So, I believe the next round will be in 2020.

MR. CAAN: But we're now talking about being published in 2021 and we're in 2018 and the only reading we have is 2013.

MR. ZEOLLA: You can talk to your town and ask them to sample for it. If you'd like, you can do that to.

MR. CAAN: Okay. So, if the council members are here they will, I'm sure, get on that.

Last thing: When it comes to wells that we have and we -- obviously, there's contaminants, I'm just thinking maybe the long-term approach just be close the wells, don't worry about it, get water from Passaic Valley or Suez to make up the difference.

Does that seem reasonable?

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Unreasonable?

Is there a reason not to do that and go through all these steps where -- we have to clean it up, yes, but not beyond where we have to do it in a way where we have to reopen the wells and use them again.

MR. ZEOLLA: The wells aren't being utilized for drink water currently.

MR. CAAN: I'm talking about down the road.

MR. ZEOLLA: Down the road, once we have system built and treating for all the compounds that we're discussing tonight, that water will be clean. At that point it will be utilized again as part of our drinking water system.

MR. CAAN: So, if the process starts 12 to 18 months from now, when potentially could that occur?

MR. ZEOLLA: Off the top of my head, 2021. I couldn't give you a specific date, obviously. I'm giving

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you kind of an estimation.

MR. CAAN: Of course.

MR. ZEOLLA: We're saying 12 to 18 months if everything goes well, so you're looking at 2020, 2021.

MR. CAAN: Okay. Thanks.

ASSEMBLYPERSON SWAIN: Hi. Lisa Swain. Full disclosure, I am the former mayor of Fair Lawn, currently an assemblywoman. And I'm here with another state representative, Chris Tully, also an assemblyman for this district. So, obviously, we are care very much about this.

I'm going to just finish off where Allan left off. Let's say you do the testing, you clean up the water, and then you open the wells. The water that's now going to be flowing through the wells is coming from that groundwater.

Is that going to be as clean as the currently tested water or is it -- I mean, it's still go to have all those

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chemicals and it's still flowing underground.

MR. ZEOLLA: Right now, the wells that are pumping are being treated and with air strippers, the current air stripers, and discharged to the brook. It will stay that way until this system is built, the treatment system is built.

Once that is built, the groundwater from those wells will go through the system, get treated, as I mentioned before on one of the slides, the process of what it would look like.

The idea here is to use all four municipal wells. And the treatment system will be updated to advance oxidation with hydrogen peroxide and to deal with the VOC and 1,4-Dioxane. And then we're also adding in liquid granular activated carbon to deal with not just the VOCs but also the PFOA/PFOS. So, that will remove all the chemicals from there, and then there's a final step of chlorination before it

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gets actually put into the system.

Whatever water is in those wells, it's going to be cleaned through the system and on the other end it's going go to be clean water. I'm not sure...

ASSEMBLYPERSON SWAIN: Yes, you're somewhat answering it. But I've done some reading about this topic for many years. I understand that the carbon can help, but it doesn't completely remove those chemicals.

Where I'm getting at is about the wells because as Allan just mentioned about the cost of going through all of this and then we decide okay, now we're going to open up the wells and the water is going to flow, is it really going to be okay for everybody to drink even with this new system?

MR. ZEOLLA: Well, I think this system will go through a lot of testing and sampling before the well will be put into the entire system. We're not going

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to sit there and turn it on and hope the system works and then actually test to make sure that it does. That takes a little bit of a process.

Once the system is built, they'll run it, start testing it, kind of work through all the kinks of what's going on with the system, and at some point it will work efficiently that the water will be clean.

When it comes to the cost of all this, that's something that -- it's been cost out in our feasibility study, but as to who's going to pay for it that will be something discussed down the road.

ASSEMBLYPERSON SWAIN: Another question I have is you mentioned about the blended water. And that's something that we discussed several times, but we, as council people, were told that the water is not really blended.

Is that your understanding, that the water that comes from the wells goes

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to the houses that are in that area, that it doesn't just come into some central area, get blended, and then go out again; that it's coming from the wells, which is one of the reasons why the wells were shut down.

MR. ZEOLLA: The way I understand it is that for the Westmoreland, you know, the wells are pumping, they get treated, there's a final step of chlorination, and then it goes into a holding tank.

At some point, you know, when needed, that water is put into the system. So, it is a blend of the other sources, whether it's coming from other well fields or coming from Passaic Valley that's being utilized as a public utility, it's all going into the same system.

That's how I understand it. Since I'm not the water provider here, I'm not going to give you a full understanding of everything, just kind

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of the general sense of what I've gotten speaking to people.

ASSEMBLYPERSON SWAIN: Okay.

Last question. Sorry, I missed the first few minutes.

Was there something that triggered the EPA finally doing something?

I know it's been a Superfund site for a long time.

MR. ZEOLLA: It's been here since '78. The State was involved then. I know in '92 it transferred from the State to EPA. I know EPA issued notice letters to the PRP, responsible parties. I think it was in '84, I believe.

So, we were involved but we weren't directly involved, the State was directly involved. We became the direct lead in '92. So, at that point, we went and started doing a lot of investigative work, trying to find out who was responsible.

We hired the USGS to do a

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groundwater study. We did a lot of things between, say, '92 and when we finally got the PRP to sign on the dotted line to do the RI/FS.

ASSEMBLYPERSON SWAIN: So, I go back to the first man who questioned so it took you from '92 to now to decide, all right, we better do something?

MR. ZEOLLA: It's not -- like I said, there's a lot of work in between. We had the USGS involved, we did extensive search of PRPs, we then got the responsible parties to come onboard to do the RI/FS. And the RI/FS started in, I think, 2009.

And it took a while because we installed -- as I mentioned before in one of the slides, we installed bedrock wells, monitoring wells, rotator wells. We did a lot of work a lot, of data collected, reports prepared. We reviewed a lot of data and we then determined we had to go back out there and put more wells in.

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So, this was a kind of, you know, stepped process to get to this point. It does take time. You've got negotiations, you've got -- you know, reports are submitted, they're reviewed, comments. All this stuff happens, it does take time.

ASSEMBLYPERSON SWAIN: And you can see why we're all very frustrated.

MR. ZEOLLA: I understand, totally.

ASSEMBLYPERSON SWAIN: So, I want to bring up colleague here because we want to really know if there's anything we can do at the state level to help to speed things along. So, I want to give Chris a moment.

ASSEMBLYPERSON TULLY: Just to piggyback on a couple of things. Chris Tully with the State Assembly.

Take me through the first six months, when you mentioned the negotiating period.

Is there anything to be done to

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shorten that time span?

Because, as you said, this is 25 years with the EPA now. Is there a reason that will take so long?

MR. ZEOLLA: Maybe, Jeff, you want to speak on it?

MR. JOSEPHSON: Sure.

The process of negotiating a remedy with responsible parties is done in conjunction with the Department of Justice. And we follow the process and procedures of the law, which requires us to send out a certain amount of notice letters, to establish that the administrative record supports the information, to offer an opportunity for them to negotiate with the Government and give them time to consider negotiations with the Government. That will take a certain amount of time, it is a certain process.

And they have certain obligations under the notice provisions that we provide to them in terms of

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responding back to us. We have to look at what is called a good faith offer, it has to be evaluated by both the Environmental Protection Agency and the Department of Justice, and then we will enter into negotiations inside that period. There is an established time frame to negotiate. In the case it fails, we would then move on to look at federal funding for it.

So, there is an established deadline for that. It can be extended; for good circumstances, it would be extended. But there is a certain process that we have to lay out. It's not completely up to our control since we do it in conjunction with the Department of Justice.

ASSEMBLYPERSON TULLY: So, there's no guarantee it can only go six months. And, if it actually did --

MR. ZEOLLA: There's no guarantee that it can go that. That's why I said there is a certain amount of

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time established, and for good cause or good reason it can be extended.

ASSEMBLYPERSON TULLY: Second question to piggy back on what Councilwoman Cutrone had mentioned.

You mentioned Option 2 as a more viable option and that the results -- you won't know whether you need to continue with Option 3 as an option unless you see the results of Option 2?

MR. ZEOLLA: We've selected Alternative 2, so we're going to implement that. If we find that it's not doing what we expect it to do, then we'll look at Alternative 3 three or something else.

ASSEMBLYPERSON TULLY: Got it.

How long will it take between knowing if Option 2 had positive results and if you look at other options?

If option two didn't have positive results, how long would that take you to assess?

MR. ZEOLLA: I think once the

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system is built and once the system is running and we do the testing and sampling on it, we'll know probably within -- say from built, probably within a couple of months after it's built and it's running, we'll have the data in and we'll be able to know whether it's operating efficiently.

This is a pretty standard type of pump-and-treat system, so it should work. It's not something that we're expecting not to work. We're pretty much guarantying that it's going to work.

The question becomes do we want to be there 40, 50 years? Is there something else we can do to knock out some of the concentrations in the plume that maybe shorten the life span of the pump and treat system?

That's something we'll look at over the long term.

ASSEMBLYPERSON TULLY: Got it.

Third and final, the person -- I

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want to commend my colleagues and the mayor and council for what they've done here locally on this issue and trying to find solutions.

And while they have a wealth of knowledge here, I guess my one question is that you do have a good size room here tonight, but what is the EPA doing to make sure -- there's a wealth of knowledge here for residents of Fair Lawn. What is EPA doing to make sure that -- you know, you're collecting information and collecting comments. The deadline is September 5.

What are you doing to reach out to residents to make sure that they know this is the time to let EPA know what's going on, what they see, and what they know so you have as much information from the residents as possible going forward with this project?

MR. ZEOLLA: Wanda, we have --

MS. AYALA: We put together the Proposed Plan, we have a dedicated web

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page to it, and we've shared the information with the township so they can put it on their website.

Was anything shared through the contractor information?

MR. ZEOLLA: We have fact sheets back there.

MS. AYALA: Right.

MR. ZEOLLA: The Proposed Plan, with all my information and when the time frame is, with my e-mail address, my phone number. I don't think --

The web page...

MS. AYALA: The web page is updated and has the Proposed Plan on it and the fact sheet.

ASSEMBLYPERSON SWAIN: Can you submit comments right through the website?

MS. AYALA: Yes.

MR. ZEOLLA: I believe we also put it on the Borough website.

MS. AYALA: Yes, I shared this with Carol --

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ASSEMBLYPERSON TULLY: If there's anything that needs to be done to notify the public, whether it's a canvass or --

MS. AYALA: We also put a notice in the newspaper.

MR. ZEOLLA: Correct.

ASSEMBLYPERSON TULLY: Anything to make sure that people...

MS. AYALA: That's why we have -- the sheets in the back is not a sign-in sheet, it's a sheet so you can sign up to receive information, so we can have an ongoing list.

And at any time, if anybody needs for us to come back and talk to them, they're free to do that. We've done that in the past. We've met with people in the school, we've met with different people that just have questions and concerns, and we sit down and we have discussions with them.

MR. ZEOLLA: I have my information here, so you can take my

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information down. You can call me or
you can e-mail me.
ASSEMBLYPERSON TULLY: We'll
make sure you get our information. And
I echo the assemblywoman's comments:
Anything we can do at the state level to
be helpful, we want to do so.
MS. AYALA: We appreciate it.
ASSEMBLYPERSON TULLY: Thank you
so much. Appreciate your time.
MR. ZEOLLA: Thank you.
MS. BOUVIER: I'm Elizabeth
Bouvier and I've lived in Fair Lawn for
nearly ten years. I have two questions.
The first is do you have any
data on the anticipated removal
efficiencies for Alternatives 2 and 3?
MR. ZEOLLA: Any data on that
right now?
MS. BOUVIER: Yeah. I know you
mentioned they're pretty standard
treatment methods that have been used.
So, is there a typical removal
efficiency that you see with those

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compounds when they've been implemented elsewhere with these type of contaminants?

MR. ZEOLLA: I'm sure there's literature out there for general types of pump and treat system --

MS. BOUVIER: With these treatments.

MR. ZEOLLA: For this particular treatment, I'm sure there's some literature out there. I don't have it here tonight, but I'm sure online --

MS. BOUVIER: Is that something you reviewed as part of your comparison between Alternatives 2 and 3?

MR. ZEOLLA: It went through a process during the feasibility study. Again, the RI/FS was conducted by the responsible parties, so I'm sure they went through a reasonable search to look at whether these treatment options would work for those particular compounds.

MS. BOUVIER: Is that information that can be shared with the

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public?

MR. ZEOLLA: It's most likely in the feasibility study, which is attached to the remedial investigation. And that's probably -- I know it's on our website as a file.

MS. BOUVIER: Okay.

MR. ZEOLLA: I'm not sure if the Borough has it attached on their web page.

MS. AYALA: I don't know.

MR. ZEOLLA: There's a link to our web page. And from that web page, there's a link to all the documents that pertain to this preferred remedy. The link is called "administrative record" for this particular site. You can click on there and then there's a long list of documents.

As part of that, you'll see that there's the remedial investigation and a number of different appendices to that, as well as the feasibility study.

MS. AYALA: If you don't find

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it, just shoot me an e-mail. My name is
Wanda and I'll send you the link to it.

MS. BOUVIER: Great.

My other question, you mentioned a few times the operation and maintenance cost associated with the systems.

Is that something that the responsible parties would pay for; and, if so, would they be required to set up, like, a funding source to cover that over the 30 or 40 years or whatever it's going to have to run for?

MR. ZEOLLA: Just like we negotiated with them to do the RI/FS and they paid for the entire RI/FS, we're going to negotiate with them to conduct the design and construction of the treatment system for this project.

MS. BOUVIER: Okay. I was asking specific to operation and maintenance cost, because I know sometimes it's easy to get the construction covered --

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MR. ZEOLLA: As part of that, when we get to the O and M part of it, that's something that will have to be discussed between the Borough and the potentially responsible party. I know EPA will try to facilitate that.

What I can tell you is the PRPs have been cooperative since the beginning. So we don't see why they wouldn't want to participate in that and help the Borough.

MS. BOUVIER: Thank you.

MR. SAFAVI: Good afternoon. Thank you. My name is Fred Safavi. I have lived in Fair Lawn for 30 years. Thank you finally for coming meeting us and letting us know what's going on.

I have a very simple question. It's very easy to get lost within the details and the scientific data and all those things. As EPA presenter, do you consider Fair Lawn water safe?

MR. ZEOLLA: Like I said, the treatment that's on it is safe water.

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With the treatment on it, it's safe water.

MR. SAFAVI: With the information data that you see, is this something that you would you to your son or daughter to drink or your mother to drink?

MR. ZEOLLA: Like I was saying, the water is treated so the water is clean water. So, yes, I would give it to my son, my daughter.

MS. SINGH: No one is drinking the water.

MR. ZEOLLA: Currently, the water is not being utilized. But when it was utilized, there was air stripping --

MR. SAFAVI: Can you explain "not utilized," what you mean?

MR. ZEOLLA: What I'm saying is that right now, the system is operating and it's being treated, but the water is not being distributed to the water supply system.

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What's happening right now is it's being discharged to the surface water, which is Henderson Brook.

MR. SAFAVI: To where?

MR. ZEOLLA: Henderson Brook.

So, it's not being put into the system, the water supply system.

It's still being treated. It still has the air strippers, so the water is being treated. So, there isn't an issue there aside from the fact the 1,4-Dioxane is there, which is the reason the Borough decided --

MR. SAFAVI: "Dioxane," what does that mean? I'm not a scientist, I'm a financial guy.

MR. ZEOLLA: The 1,4-Dioxane is a compound that was discovered back in 2013. We sampled for it. It's in the water supply. We know it's there at concentrations above groundwater quality standards, as Jeff mentioned earlier.

It's not a drinking water standard, but --

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MR. SAFAVI: It's above the drinking water standard.

MR. ZEOLLA: No. That number is not a drinking water standard, it's groundwater quality standard.

MR. SAFAVI: Okay.

MR. ZEOLLA: So, it's something that we look at as a basis of -- go ahead.

MR. SAFAVI: That means it's not safe or it's safe?

MR. ZEOLLA: Well, it's a standard that's -- I wouldn't say --

MR. SAFAVI: Remember, I said let's not get lost in scientific things.

Simple answers for everybody who is sitting here.

MR. ZEOLLA: Correct.

MR. SAFAVI: Is that something which can cause danger to Fair Lawn residents if they drink it?

MR. ZEOLLA: But no one is drinking the water now.

MR. SAFAVI: No one's drinking

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the water?

MR. ZEOLLA: No one's drinking it.

MR. SAFAVI: That's being drained out?

MR. ZEOLLA: Correct.

MR. SAFAVI: That water which gets drained out through the drainage and there's one -- I don't know if it's rainwater or whatever, it comes and goes under my house towards the Passaic river.

Does the maintenance from it or the chemicals from concentration underneath my house can cause danger?

MR. ZEOLLA: No, because we have tested a number of houses in the area --

MR. SAFAVI: You didn't test my house. My house is right on it.

MR. ZEOLLA: I'm not sure where your house is.

MR. SAFAVI: By Memorial, that area.

MR. ZEOLLA: Memorial?

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MR. SAFAVI: Memorial Middle School.

MR. ZEOLLA: By the Westmoreland well --

UNIDENTIFIED SPEAKER: No, this is in a different area, closer to the river.

MR. SAFAVI: Different area.

MR. ZEOLLA: You're talking about Memorial -- the well field?

MR. SAFAVI: I'm not talking about a specific area. You said that it comes and goes and you said you tested and I said nobody has tested mine and this water comes and goes.

Is that concentration of that chemical can cause residents health hazards?

MR. ZEOLLA: You're saying the vapors from the --

MR. SAFAVI: The vapors and chemicals, yes.

MR. ZEOLLA: Vapors do migrate from the groundwater into the soils and

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possibly into someone's home. But we tested a number of homes around Henderson Brook within -- I'll show you here.

We tested a number of homes in here, all throughout the residential neighborhood. We tested the elementary school.

MR. SAFAVI: Which elementary school?

MR. ZEOLLA: Westmoreland.

MR. SAFAVI: All right.

MR. ZEOLLA: And we didn't find any vapors entering the buildings --

MR. SAFAVI: Anywhere else in Fair Lawn is in danger other than that area? Have you considered that?

MR. ZEOLLA: We've looked at the data to determine --

MR. SAFAVI: I'm not trying to be hard.

MR. ZEOLLA: I understand. I want to try to explain to you in a way you understand.

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So, we do look at the data and we try to determine which properties would be required for us to go --

MR. SAFAVI: From where data? How do you choose your data?

MR. ZEOLLA: It's the data we've collected from all the wells that we sampled throughout the last four, five years. That data is used to assess whether the vapors are an issue in, say, the residential neighborhoods here.

We did that over the years. We identified certain areas and we went there and sampled the homes and we didn't find that there was any vapors entering those homes, including Westmoreland Elementary School.

Now, obviously, things can change over time, and, so, we'll keep monitoring the groundwater for those changes. If we see those changes occur, we will look at going back out there and resampling some of these homes. That would be the next step.

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MR. SAFAVI: Going back to that first question that I asked, these wells, some of them closed, the water is not coming into the system, then as it's needed gets released to -- you mentioned gets released to the system.

Do you consider Fair Lawn water safe as EPA?

MR. ZEOLLA: Again, the water is not being utilized. What I'm saying by that is the system that's running, it's being treated --

UNIDENTIFIED SPEAKER: He means the drinking water.

MR. SAFAVI: Yes. Do you have a standard?

MR. JOSEPHSON: The Fair Lawn water supply always meets the state standards. They wouldn't be able to distribute it otherwise. So, it meets the regulated standards that have to be met.

MR. SAFAVI: Can EPA --

MR. JOSEPHSON: I'm EPA also.

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MR. SAFAVI: Do you agree with that?

MR. ZEOLLA: Yes.

MR. SAFAVI: You agree with that comment?

MR. ZEOLLA: Yes.

MR. SAFAVI: I don't know that gentlemen.

MS. AYALA: That's the supervisor.

MR. SAFAVI: You agree that Fair Lawn water is safe to drink?

MR. ZEOLLA: Yes.

MR. SAFAVI: Thank you very much.

DEPUTY MAYOR ROTTENSTRICH: My name's Gail Rottenstrich. I'm the Deputy Mayor here in Fair Lawn.

I have a question about the plumes because it's a little bit unclear from the picture what's going on with the plume.

And I know that looks like maybe it's the general plume and then in here

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we have pictures of the plume as it
refers to different chemicals.
Am I correct?
MR. ZEOLLA: Correct. Those
maps there show different contaminants
and the plume for each contaminant.
DEPUTY MAYOR ROTTENSTRICH: Okay
.
MR. ZEOLLA: I believe the pink
one there is the 1,4-Dioxane and the
orange or yellowish one there is carbon
tetrachloride, I believe.
MS. AYALA: This is 1,4.
MR. ZEOLLA: That's 1,4-Dioxane.
Those are individual maps of
specific compounds.
DEPUTY MAYOR ROTTENSTRICH: Are
they getting better?
It's hard to tell from, you
know, these pictures whether the plume
is improving.
Is it spreading? Is it
spreading into other Fair Lawn well
fields?

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MR. ZEOLLA: It is getting to the well field. That's why we're here.

DEPUTY MAYOR ROTTENSTRICH: I mean other than the Westmoreland well field, is it escaping into -- is it growing?

MR. ZEOLLA: What we're seeing here is a lot -- when you look at this, especially some of the data that we have from the different years, keep in mind that the first two years we had about five wells in and then the second two years, 2015 and 2016, we had another seven or eight wells put in. So, that makes the plume look bigger and larger because new wells were put in afterwards.

So, what you're seeing here is the general size of the plume has always been that way, we just now have more information that shows it. If we had all the wells in initially, you would see the same size plume the whole time.

DEPUTY MAYOR ROTTENSTRICH: So,

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it's not that the contaminants are
spreading out into other areas.

MR. ZEOLLA: Correct. But it is
migrating to the well field because when
the well field is pumping, it pulls it
in.

DEPUTY MAYOR ROTTENSTRICH: I
understand. It's pulling it into...

MR. ZEOLLA: Correct.

DEPUTY MAYOR ROTTENSTRICH: Do
you know the state of the chemicals that
are going into the plume?

Has that completely stopped?

Are there no more chemicals
going into that plume or is it still
being fed by the industries that are
there?

MR. ZEOLLA: What I do know is
that the industries are doing work on
their properties to, one, contain the
plumes on their property, and, two, to
remove the sources from the soil.

DEPUTY MAYOR ROTTENSTRICH: But
they're not adding any more chemicals.

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MR. ZEOLLA: From what I understand, no, they're not.

DEPUTY MAYOR ROTTENSTRICH: And then just to clarify the dates of when the water will be drinkable, because it was a little confusing to me because you're saying it's safe now, it will be safe in 2021 or it will be safe in 30, 40 years.

So, what are we talking about when we're looking about different --

MR. ZEOLLA: We have to understand that no one is being exposed to the water.

DEPUTY MAYOR ROTTENSTRICH: And that's because the wells --

MR. ZEOLLA: Because the wells are not being distributed into the water system.

DEPUTY MAYOR ROTTENSTRICH: Okay .

MR. ZEOLLA: It's being discharged to the brook.

DEPUTY MAYOR ROTTENSTRICH: And

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discharging to the brook doesn't make the water there unsafe?

MR. ZEOLLA: There's still treatment there. So, the numbers coming out say they're -- that's discharged to the brook are meeting MCLs because they're using the strippers. MCL is drinking water quality standards.

DEPUTY MAYOR ROTTENSTRICH: All right. Thank you very much.

MR. ZEOLLA: You're welcome.

MR. WOLPERT: Hi.

MR. ZEOLLA: Hi.

MR. WOLPERT: I'm Hans Wolpert. I've lived here almost 20 years. I never thought the water was really drinkable because of the swamp-type fumes that came off of it. So, I use a Brita filter, which is carbon, mostly, for drinking.

I have actually only couple of questions, mostly already asked.

One of the things that I think confuses many people is that you're

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treating the groundwater as it is pumped out to maybe yes, maybe no be used as drinking water. But most people are more concerned with what they actually drink --

MR. ZEOLLA: Correct.

MR. WOLPERT: -- and what the contaminations in the drinking water are.

So, I think you have to be a little bit more specific about what water you're talking about, the groundwater or the drinking water.

MR. ZEOLLA: I'm talking about the water that's coming from the well field. So, say if Well 10 and 14 are pumping, whatever contaminants are being pulled, groundwater contamination being pulled into those wells, that's the water I'm talking about. That water gets treated.

Whether it would --

MR. WOLPERT: It's discharged into the system, it's treated to the

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standards that are in effect at the
time.

MR. ZEOLLA: Correct.

MR. WOLPERT: Which changes from
20 years ago to 10 years from now,
right?

MR. ZEOLLA: Well, you're saying
the numbers change, and, obviously, with
science, better technology, you know,
those numbers do change.

MR. WOLPERT: Okay.

And then the other question is,
what Gail was already pointing at is,
what is being done, literally done, to
remove the source of this contamination?

Because you're talking about
what is coming out of the plume in the
groundwater. You just mentioned that,
indeed, the responsible parties are
trying to clean up what they are now
putting in willy-nilly.

How much more effort do you
think should be done to have these
responsible parties clean up what they

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put into the groundwater?

MR. ZEOLLA: Well, I think they're working with the State of New Jersey to clean up their source contamination, whether it's in the soil and in the groundwater.

So, I could rattle off there's a pump and treat on one responsible party, there's actually other treatment systems to actually attack the contaminants in the soil, so what they're doing is they're injecting solution to actually degrade the contaminants in the soil.

So, they are taking steps to reduce it and remove it; not just from the soil, but from the groundwater. So, there are steps being taken.

What we're doing here tonight is we want to make sure that the groundwater plume off the property is being handled and taken care of and contained.

MR. WOLPERT: Thank you.

MR. SHAMIS: I'm Serge Shamis.

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I've lived here for 15 years. I have a question to clarify something.

Given the way you things stand right now, with those two wells turned off and none of that water getting to the population, what is the current risk, in your assessment, to the population right now?

MR. ZEOLLA: There is no risk to the population.

MR. SHAMIS: So, we've been talking about the expensive options, numbers two and three. What about the first option, not to do anything, and keep those wells completely shut down?

That way, we're sure that no water -- even though the treatment is supposed to work, this way we can be completely sure no contaminated water gets into the drinking supply.

MR. ZEOLLA: I think that would be something for the Borough to speak about. I know they want to use the water as part of a supplement to the

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system.

I'm just saying that would be something to bring up.

MS. MCPHERSON: I just wanted to add, you brought up what if you were to use option one. The purpose of looking at these remedies, the goal is to return the groundwater to its most beneficial use. So, the most beneficial use for the community and in the future is to use it as a drinking water supply.

So with that goal in mind, option one would not be feasible and something that would be beneficial for the community and returning -- achieving that goal.

And that's part of the NCP, which is the National Contingency Plan. So, that's something that we have to consider.

MR. SHAMIS: Understood. It's a noble goal, but to me it carries more risk than not using that water at all. Because if there is zero risk today, you

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don't -- you keep not using the water, there's zero risks. I understand there may be some costs and that will need to be assessed.

I don't know if anyone from the town council can comment on downsides of not using these wells in the future. But being hundred percent sure that you don't even need the treatment and you don't need to worry about treatment being completely effective or not or ten years down the line another contaminant is discovered which we don't know much about today, just like 1,4-Dioxane was discovered five years ago, and then we find out this treatment, we need to add to the treatment because we didn't consider it and they're drinking contaminated water.

To me, zero risk solution is the best solution, even if it don't achieve the noble goal of using the beneficial supply of water, because contamination already happened.

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MR. ZEOLLA: It's understandable. For this particular -- we use no action as a basis to compare other alternatives to, similar to what Julie was saying before. That's why it's included in there.

If we do nothing and there's all this risk to the water, this is what you're exposed to. But if we do something, that eliminates the risk if the town is going to keep on using the water as part of supplementing the system.

Your question is why bother using it.

MR. SHAMIS: Right, why would we turn it on?

We know it's contaminated water. The best treatment, I'm not sure you can say it's a hundred percent effective for anything. It's an unknown at this time.

And if you want to proceed with the treatment, what would be the target for 1,4-Dioxane?

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MR. ZEOLLA: To meet the standard.

MR. SHAMIS: It seems like there is no standard for drinking water, so what would be the target for treatment?

MR. ZEOLLA: The standard, to me, would be what we mentioned before, the groundwater quality standard, which is .4. That would be the standard that they would have to meet for the treatment system.

MR. SHAMIS: I see.

Generally, drinking water standard would be higher standard, meaning a lower number of parts per billion than the groundwater because groundwater -- I'm not sure how that works.

The groundwater standard, is that considered not as rigorous because that water's not necessarily --

MR. JOSEPHSON: No. That standard is set by the State of New Jersey at what's called ten to the minus

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sixth level, which is considered an acceptable risk level. So, none of the water that's been measured in the water supply exceeds an unacceptable risk.

So, with EPA's Superfund jurisdiction, anything that's ten to the minus fourth to ten to the minus sixth, the risk is an acceptable risk range. We said zero risk, but there really isn't -- nothing is zero risk. All water is chlorinated; chlorination carries some risk for some people.

So the water that has been distributed with the dioxane doesn't exceed an unacceptable risk number to date, okay?

MR. SHAMIS: Yes. Thank you.

Who should we speak to regarding those wells?

Because it seems like the decision of whether to proceed with the treatment -- and the deadline is September 5, which is very close -- is a little bit tied with the decision of

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whether to turn the wells on in the
future. And nobody owns the whole thing
because EPA is responsible for the
treatment option, the town is
responsible for the wells.

So, who should we contact?

MR. ZEOLLA: For the wells, I
would say it would be the Borough
itself, to get in contact with them.

COUNCILPERSON CUTRONE: We have
a council meeting on September 4, a work
session. You can come during public
comments. Water is actually going to be
on the agenda, so come talk about it.

MR. SHAMIS: That doesn't leave
a lot of room. If the conclusion is not
reached then, then we're past the
deadline of the next day.

How firm is the September 5
deadline? Can it be moved to
accommodate the meeting on the 4th?

MR. ZEOLLA: Jeff?

MR. JOSEPHSON: We're not going
to ask the town to make a decision about

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whether they want the water or not by September 5. And our decision isn't going to say that a decision is made one way or another.

So, that's not going to matter if we extend it, with respect to your question, because we're not going to be -- we're not asking the town to make that decision.

For us, the operation of the well field also has -- what Julie had alluded to is to restore the water to its most beneficial use. So, we won't continue pumping and treating and discharging it to the brook if the town doesn't want it. And that's an acceptable solution.

We're not asking them to make a decision today or tomorrow. We'll work with the town. And Michael has worked extensively with your water people.

That's the way it's going to be. We'll probably make a decision about the well field and the benefits of restoring

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the aquifer at this point.

MR. SHAMIS: So, it seems like this is two separate decisions. Even if the town decides to never reopen the supply, EPA may still decide to proceed with the treatment.

MR. ZEOLLA: Exactly.

MR. JOSEPHSON: Yes.

MR. SHAMIS: Thank you.

MR. MILLER: Doug Miller. I've lived in Fair Lawn almost my entire life, so almost 40 years. I have a couple quick questions.

First, everyone keeps referring back to when the water was tested and they first found these contaminants back in 2013, I think they said.

MR. ZEOLLA: Initially, the wells were tested back in '78 --

MR. MILLER: I mean the more recent tests of the two other chemicals that we're talking about.

MR. ZEOLLA: Right. In 2014, the State went around sampling a number

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of different well fields in the state as part of a program.

MR. MILLER: I guess my question is the two main chemicals that you're showing the maps of, the levels that were originally found, because you're now saying they haven't been tested since 2013, how dangerous were those chemicals that were in our drinking water by today's standards then?

MR. ZEOLLA: At that time, the 1,4-Dioxane, the standard was ten.

MR. MILLER: That's what I'm saying about using today's standards.

MR. ZEOLLA: Using today's standards, what the effects are, you're saying?

MR. MILLER: Correct. How hazardous were the chemicals then based on the standards that are in effect now?

You're basically saying when the wells were shut down in 2016, that residents were drinking that water for about three years. So, how hazardous

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was that water being drinken for those three years?

That's the part I'm trying to wrap my head around.

MR. JOSEPHSON: That number was lowered. That was for 1,4-Dioxane. It was lowered from 10 to .4 by the State of New Jersey. The highest level that I'm aware of was between seven and eight that was detected in your well field.

Point four is what's called a ten to the minus sixth level. That's a cancer risk range number. And, so, within Superfund, ten to the minus fourth to ten to the minus sixth is acceptable risk range. This is the very, very least number of risk, at .4.

So, if you have seven -- in order to figure ten to the minus fifth, that would be four, the number four. At ten to the minus fourth, it would be 40. So, you were at seven, so you were ten to the minus fifth, which is an acceptable risk range.

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MR. MILLER: So, even at the worst, it was still within acceptable levels.

MR. JOSEPHSON: Yes.

MR. MILLER: That's really all I wanted to know.

MR. WOLPERT: As a scientist, I used to work with radioactivity and we had to count how much radioactivity we were using. One of the cocktails, as they are called, for measuring radioactivity contains dioxane.

I'm still here.

(Laughter.)

MR. GOTLIB: Good evening. David Gotlib, Westmoreland Avenue, Fair, Lawn New Jersey.

I believe it was around 2012 or 2013 --

MR. ZEOLLA: We sampled your home for --

MR. GOTLIB: Yes. You sampled my house for vapors and there were no vapors. Fantastic.

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But going through the booklet on the Page 26 of the PC overburden plume --

MR. ZEOLLA: This is in the proposed plan we sent out?

MR. GOTLIB: Yes.

-- the area was much smaller in, like, June 2010 and March 2011 compared to November 2015 and June 2016. And my house was checked back in 2013.

So, the question is with the plume being much larger in 2016, did you mention that the EPA was going to go around once again to check for vapors?

Is there going to be another round or not?

Because I see the plume is a lot larger now.

MR. ZEOLLA: Obviously, between 2010, 2011 to 2015, 2016, more wells were installed, so we now have a better idea where the plume is.

What I'm trying to understand -- as you see here, this is a water table,

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okay? So, we need to see exactly what the concentrations are at what depth to know whether vapors are actually moving into anybody's home or potentially moving into anybody's home.

This is a hard map to really gauge as to what's happening underneath.

So, I guess what you're asking is for us to relook at this and see if there's a necessity to go back out and retest your home.

MR. GOTLIB: Yes. It's been five years and I see that it's a dramatically larger area.

MR. ZEOLLA: I'm trying -- I know there were several water table monitoring wells we put down there, I know we looked at the data back when we collected the information, and we didn't see a need to go back out there.

But maybe I should go back and relook and see if there's something that we messed.

MR. GOTLIB: Not only my

Proceedings

house --

MR. ZEOLLA: Obviously, we'll look at the extent of the plume. And if it's under a different -- a number of homes, we'll look at all of them.

MR. GOTLIB: Thank you.

MS. AYALA: Any more comments? Questions?

Remember, the public comment period is open until September 5. You can e-mail them or send hard copy to Michael.

And if we don't have any comments or questions, I'd like to thank you for coming out to the meeting. Please feel free to reach out to any one of us. Our contact information is in the Proposed Plan.

Have a good night and get home safe.

MR. ZEOLLA: Thank you.

(Meeting concluded at 8:50 p.m.)

Proceedings

C E R T I F I C A T E

STATE OF NEW YORK)
) ss.
COUNTY OF NEW YORK)

I, LINDA A. MARINO, RPR, CCR, a Shorthand (Stenotype) Reporter and Notary Public of the State of New York, do hereby certify that the foregoing transcription of the public meeting held at the time and place aforesaid is a true and correct transcription of my shorthand notes.

I further certify that I am neither counsel for nor related to any party to said action, nor in any way interested in the result or outcome thereof.

IN WITNESS WHEREOF, I have hereunto set my hand this 14th day of September, 2018.

LINDA A. MARINO, RPR, CCR

Attachment D

Written Comments

Zeolla, Michael

From: Sharon Schaier U.S. FOIA (b)(6)
Sent: Sunday, August 19, 2018 1:58 PM
To: Zeolla, Michael
Subject: Fair Lawn, NJ Westmoreland clean up

I can't attend the boro council meeting so can you please answer my questions via email.

1) Does a Brita filter water pitcher remove 1,4-dioxane, PFOA, or PFOS from the water?

2) Does boiling remove these chemicals from the water or break them down into nonhazardous chemicals?

3) If the answer to both questions above is no, is there anything Fair Lawn residents can do to remove even low levels of these toxic chemicals from the water?

I'm looking forward to a quick response.

Thank you,

Sharon Schaier

Zeolla, Michael

From: Serge Shamis [redacted]
Sent: Monday, August 27, 2018 10:55 PM
To: Zeolla, Michael
Subject: question about Fair Lawn Superfund remediation plan

Hi, Michael.

Thank you for your presentation to the Fair Lawn community last week and for taking the time to answer all questions from residents!

I have now read through the full remediation proposal at the EPA web site and have an additional question. The proposal states the following in the section on Alternative 2 (page 14):

"The Borough would evaluate whether the treated water from the WMWF would be used as a water supply source. If the treated water from the WMWF is used as a water supply source, the new treatment equipment would become part of the water supply system. ***For purposes of estimating costs, it is assumed that the intended use of treated water is for drinking water.****"*

If the town decides *not* to use the treated water for the municipal drinking water supply, why would it have any impact on costs or anything else?

If I understand correctly, the 2 wells that are currently shut down would need to be brought online anyway for the most efficient extraction of the contaminated water in the aquifer, so the operational cost for them must already be included in the EPA estimates regardless of whether the treated water is discharged into Henderson Brook via the bypass or into the drinking water supply. Are there any other considerations?

Thank you!

Serge Shamis

Zeolla, Michael

From: Zeolla, Michael
Sent: Thursday, August 30, 2018 9:05 AM
To: 'Hemant Gore'
Cc: Jim Van Kruiningen; Council@fairlawn.org; KPeluso@fairlawn.org; Josephson, Jeff; Rossi, Tamara; Ayala, Wanda
Subject: RE: Fair Lawn Water quality concerns

Hi Hemant-

Your welcome.

Those are the maximum groundwater concentrations collected in “source areas” on the responsible parties properties within the Fair Lawn Industrial Park. The reason for the contaminant concentration increase in groundwater from 2015 to 2016 may be due to remaining subsurface soil contamination “source material” on these properties migrating into groundwater below. For example, during a rain event, water leaches through the contaminated soils picking up some of the contaminants and moving them into the groundwater. Another example would be the water table rises into the subsurface soil contaminated area and flushes out the contaminants into the groundwater. The good news is that the responsible parties are addressing the subsurface soil contamination through active remediation under NJDEP lead authority. Two of the source area properties are using bioremediation technologies to address the subsurface soils. The others are working with the NJDEP to address this issue. But while that is being addressed, the pump and treat systems on some of these properties are containing the contaminated plume from migrating further in groundwater.

Responsible parties under EPA-Lead have not collected any data since 2016. The plan is to collect additional data during the remedial design phase.

Let me know if you have any other questions.

Thank you
Michael

From: Hemant Gore U.S. FOIA (b)(6)
Sent: Tuesday, August 28, 2018 10:00 PM
To: Zeolla, Michael <zeolla.michael@epa.gov>
Cc: Jim Van Kruiningen <JVankruiningen@fairlawn.org>; Council@fairlawn.org; KPeluso@fairlawn.org; Josephson, Jeff <Josephson.Jeff@epa.gov>; Rossi, Tamara <Rossi.Tamara@epa.gov>; Ayala, Wanda <Ayala.Wanda@epa.gov>
Subject: Re: Fair Lawn Water quality concerns

Hello Michael:

Thank you for the information, it provided me with a history of the issue. I do have a question on your presentation, slide#13 shows an increase in the 3 of the 4 toxic chemicals between Nov2015 and Jun2016 Water tables. Is there an explanation for change? Do you have this data for 2018?

Regards,
Hemant

On Tue, Aug 28, 2018 at 9:33 AM Zeolla, Michael <zeolla.michael@epa.gov> wrote:

Hi Hemant-

I am the project manager for the Fair Lawn Well Field Superfund Site. I apologize that you were not made aware of the meeting last week. However, the link below will provide you information about the site including the proposed plan (EPA selected a preferred remedy for the Site) recently release to the community. There is also supporting documentation for the proposed plan under Administrative Record for review. I have also included the presentation slides. The public has until September 5 to comment on this Proposed Plan.

EPA's website for the Fair Lawn Well Field Site:

https://www.epa.gov/superfund/fair-lawn-wellfield

If you have any questions about the Superfund site, please feel free to contact me either by phone at (212) 637-4376 or email at zeolla.michael@epa.gov.

As Jim indicated below, questions about the water supply system should be directed to Ken Garrison, Borough Engineer/Deputy Manager.

Thank you

Michael

From: Jim Van Kruiningen [mailto:JVankruiningen@fairlawn.org]
Sent: Tuesday, August 28, 2018 8:41 AM
To: Hemant Gore U.S. FOIA (b)(6) Zeolla, Michael <zeolla.michael@epa.gov>; Council <Council@fairlawn.org>; Kurt Peluso <KPeluso@fairlawn.org>
Subject: RE: Fair Lawn Water quality concerns

Good Morning:

I am the Borough Manager and have been forwarded your below email for review and response. Please contact Borough Engineer/Deputy Manager Ken Garrison, who is also the operator of record for the Borough's water system and will be able to answer all your questions and concerns. Please feel free to call him directly at 201-794-5360 or email kgarrison@fairlawn.org.

Thank you.

Jim Van Kruiningen Jr., RPPO

Borough Manager
Deputy OEM Coordinator

Borough of Fair Lawn

8-01 Fair Lawn Avenue

Fair Lawn, New Jersey 07410

201-794-5310 – Phone

201-794-9859 – Fax

jvankruiningen@fairlawn.org

From: Hemant Gore U.S. FOIA (b)(6)
Sent: Tuesday, August 28, 2018 8:38 AM
To: zeolla.michael@epa.gov; Council <Council@fairlawn.org>; Kurt Peluso <KPeluso@fairlawn.org>
Subject: Fair Lawn Water quality concerns

Dear Mr. Peluso

I just became privy to an article about dangerous levels of chemicals found in FL water. As a father of 2 young children, I am gravely concerned about the water quality coming out of our taps. I was also not aware of EPA meeting to discuss this issue. Was this a closed door meeting?

I understand that EPA does not have concerns about the drinking water quality, but I would like to get some basic information that was used to draw this conclusion:

1> What are the present level of 1,4-dioxane and PFOA level in our tap water and what are EPA limits?

2> How frequently is the water tested? I would like to see the latest water quality report.

3> What disinfection methods are currently used to treat our tap water?

4> What is the proposed treatment suggested by EPA or the concerned engineers?

Does the city plan on holding a town hall meeting to address the water quality concerns? As someone who has worked within the water industry for over a decade, I have pretty high confidence in our water systems in general. However, we definitely would like to avoid a crisis of Michigan level by being proactive.

I appreciate your prompt response to this email, I am also copying Michael Zeolla for his input.

Thanks,

Hemant Gore

Hemant

--

Hemant Gore

--
Hemant Gore

Zeolla, Michael

From: Vladimir Itkin [redacted]
Sent: Monday, September 03, 2018 8:03 PM
To: Zeolla, Michael
Subject: question about water quality in Fair Lawn

Michael,

We live in Fair Lawn, and use tap water from municipal wells. As you know, the water is contaminated with volatile organic compounds (VOCs) and 1,4 dioxane. We have a reverse osmosis filter at home, which we use for all drinking water. It is a regular filter we got on Amazon. My question is: Does the filter clean the water from the contaminants?

Thank You

Vladimir Itkin
[redacted]
Fair Law, NJ 07410

Zeolla, Michael

From: T G [redacted]
Sent: Tuesday, September 04, 2018 1:08 PM
To: Zeolla, Michael
Subject: Fair Lawn wells superfund site

I want to address the well problem in Fair Lawn and ask since you knew about the questionable wells since 1978, why did you not close the wells at that time.   The wells were in use and have jeopardized the health of the whole town for many years. They way you did that was not very responsible.

Also, If you need to close those wells now, why don't you permanently close them and use the wells that are okay and have the town continue buying additional water that is needed. I don't think the town people trust those wells to be ever in use.

T. G. Ciavattone

Zeolla, Michael

From: jim.sheehan [redacted]
Sent: Wednesday, September 05, 2018 8:31 AM
To: Zeolla, Michael
Cc: 'Karen Sheehan'
Subject: Fair Lawn, NJ - Westmoreland Well Field

Mr. Zeolla,
Please accept this email as an indication of concern about Fair Lawn's Westmoreland Well Field. I have spoken with numerous neighbors, most who did not know about the comment period, and many who did not know about the contamination. I can tell you that there is widespread concern about this from those who know about it. As in most small towns, information, especially negative information, is not widely shared. Please note the importance of EPA's intervention and action in keeping thousand's safe and aware.

Jim Sheehan
[redacted]
Fair Lawn, NJ 07410
[redacted]

38th Legislative District

205 Robin Road, Suite 222
Paramus, New Jersey 07652
Tel. 201-576-9199 Fax. 201-576-9432

Joseph A. Lagana	Lisa Swain	Christopher Tully
Senator	Assemblywoman	Assemblyman
SenLagana@njleg.org	AswSwain@njleg.org	AsmTully@njleg.org

August 31, 2018

Michael Zeolla
Remedial Project Manager
U.S. EPA
290 Broadway 19th Floor
New York, NY 10007-1866

Re: **Proposed Plan for the Fair Lawn Well Field Site Response**

We would like to extend our appreciation to the Environmental Protection Agency (EPA), the New Jersey Department of Environmental Protection (NJDEP) and the Borough of Fair Lawn's Council for their actions in remediating the contaminated groundwater at the Westmoreland Well Field in Fair Lawn, New Jersey. This is an issue on which we have often received feedback from our constituents, and one we treat with the utmost seriousness. Clean water is vital to the well-being of District 38 residents and ecosystems, and we have been actively seeking support to solve this problem for some time.

Harmful contaminants, including carcinogens 1,4-dioxane, PFOA and PFOS, as well as PCE, benzene and chloroform, have been detected in the groundwater at and around the site for decades. This poses significant long-term risks to the health of Fair Lawn residents, who rely on the site for their drinking water. Likewise, this is extremely dangerous to the local ecosystems of Fair Lawn and along the Henderson Brook and the Passaic River. The "Proposed Plan for the Fair Lawn Well Field Site," put forward by the EPA in consultation with the NJDEP, takes an important step towards fully and permanently addressing the Westmoreland Well Field contamination.

While we support the final determinations of the EPA, NJDEP and the Fair Lawn Council, **we also strongly urge the full consideration of additional remedies that will increase the likelihood of success, as well as the speed and impact of remediation in restoring the site to an uncontaminated state**. Alternative 2, the plan currently recommended by the EPA and NJDEP, does not include in-situ air sparging (AS), soil vapor extraction (SVE) with in-well air stripping or aerobic cometabolic bioremediation systems, all prescribed remedies in Alternative 3. According to the EPA's proposed plan, AS/SVE techniques and aerobic cometabolic bioremediation systems, in combination with other remediation techniques/systems, would address specific issues plaguing the Fair Lawn site and could potentially remediate the site more quickly than Alternative 2. We ask the EPA and NJDEP to fully consider the health and other needs of Fair Lawn residents in deciding a final remediation plan and ask the EPA and NJDEP to reconsider Alternative 3 as the best course of action for the Westmoreland Well Field. Complete remediation of the site to a state that is safe for Fair Lawn's residents and ecosystems is our highest priority.

We also cannot state strongly enough our conviction that the full value of all remediation costs at the Westmoreland Well Field should be covered by the polluters who caused the contamination. The residents and taxpayers of Fair Lawn, District 38 and New Jersey have already faced too high a burden due to the actions of a few negative actors. Asking the taxpayers to further foot the bill for site remediation, as well as for Fair Lawn's potential need to bring drinking water in from other sources, would be extremely unjust and overly burdensome on the true victims of the contamination.

We encourage Fair Lawn residents, as well as other residents of District 38 or any other interested parties, to submit a comment to the EPA before the **public comment deadline of September 5, 2018**. Comments may be submitted to Michael Zeolla, Remedial Project Manager at the EPA, **via mail at Michael Zeolla, Remedial Project Manager, U.S. EPA, 290 Broadway 19th Floor, New York, NY 10007-1866** or **via email at zeolla.michael@epa.gov**.

Respectfully,

Joseph A. Lagana | Lisa Swain | Christopher Tully

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NEW JERSEY CHAPTER
145 West Hanover St., Trenton, NJ 08618
TEL: [609] 656-7612 FAX: [609] 656-7618
www.SierraClub.org/NJ

September 5, 2018

Michael Zeolla, Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 19th Floor
New York, NY 10007
zeolla.michael@epa.gov

Re: Westmoreland Well Field Contamination Comments

Dear Mr. Zeolla:

The New Jersey Sierra Club is concerned that the EPA's proposed clean-up plan for the Westmoreland Well Field Contamination site is not enough to protect the communities and environment of the region. The site has contaminated groundwater and some municipal wells with volatile compounds (VOCs), including 1,4 dioxane. Fair Lawn has some of the highest concentrations of 1,4 dioxane in New Jersey. Most of the contaminates have come for the Fair Lawn Industrial Park however the State of New Jersey is still addressing the source of contamination. The people of Fair Lawn's health is at risk because they are drinking contaminated water.

We believe that the current clean-up proposal in insufficient because would only expand the current pumping system that has not been successful to treat the water. Pumping will not get rid these toxic chemicals, such as 1,4 dioxane toxins in their groundwater. Focus should be on attacking these chemicals and more importantly finding the source of contamination. Dioxane is a serious threat to the town's public health and a threat to nearby water sources. It is important that the EPA's expanded cleanup will not only remove harmful contaminates in the Fair Lawn's water but find the main source of where those contaminates are coming from.

The Fair Lawn Well field site is comprised of three municipal wells that supply drinking water to the 32,000 residents of Fair Lawn, Bergen County, New Jersey. All three wells are part of the Westmoreland Well Field. In 1978 volatile organic compounds, such as 1,4-dioxane were found in these wells. Three companies in the park agreed to remove contaminated soil, monitor nearby groundwater however, sampling conducted as recently as 2011 found chemicals were still above acceptable levels in the soil and groundwater. The EPA found that 1,4-dioxane is more likely to cause cancer than previously thought: Cancer could occur in one person out of 1 million exposed to 0.35 milligrams per liter of the chemical over a lifetime.

The EPA's expanded clean up proposal also involves restarting two other municipal wells at the Westmoreland Well Field to further control the contamination plume. We urge the agency to be sure their plan includes effective long-term monitoring and measures to restrict the use of contaminated groundwater from the site. Throughout the cleanup, monitoring, testing, and further studies must be conducted to ensure the effectiveness of the cleanup. There's no safe

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standard set for 1,4 dioxane. It's a dangerous chemical that can lead to severe kidney and liver effects and possibly death. Breathing vapors of 1,4-dioxane also affects the nasal cavity.

The Fair Lawn Well Field Superfund site has some of the highest concentrations of 1,4- dioxane in their wells. This is a public health problem because 1,4-dioxane is a cancer-causing substance and can cause liver and kidney damage. The town has been waiting for 40 years for clean water and they deserve a thorough, effective clean-up and includes an investigation into all possible sources of contamination.

If you have any questions or would like to discuss this matter further, please feel free to call me at (609) 558-9100.

Sincerely,

Jeffrey H Tittel

Jeff Tittel
Director, New Jersey Sierra Club

COMMENTS OF SANDVIK, INC. AND FISHER SCIENTIFIC COMPANY L.L.C. IN RESPONSE TO THE PROPOSED PLAN ISSUED BY THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY ON AUGUST 6, 2018 FOR THE FAIR LAWN WELL FIELD SUPERFUND SITE

Sandvik, Inc. ("Sandvik") and Fisher Scientific Company L.L.C. ("Fisher") (collectively, the "Respondents"), respectfully submit the following comments in response to the Proposed Plan issued by the United States Environmental Protection Agency ("EPA") on August 6, 2018 for the Fair Lawn Well Field Superfund Site (the "Site"):

The Respondents have been working cooperatively with EPA, the New Jersey Department of Environmental Protection and Fair Lawn Borough officials to evaluate and address environmental conditions at the Site. The Respondents entered into an agreement with EPA to perform the Remedial Investigation and Feasibility Study that serves as the foundation for EPA's Proposed Plan. The Respondents support EPA's selection of Alternative 2 as the preferred remedial alternative for the Site, and will continue to work cooperatively with the agencies and the Borough of Fair Lawn to ensure that the remedy developed for the Site continues to be protective of public health and the environment and is technically sound.

Comment 1

In its description of the Preferred Alternative (Alternative 2) on pages 14-15 of the Proposed Plan, EPA states that "[d]uring the remedial design, modeling and capture zone analysis would be performed to estimate the hydraulic influence of the existing pump-and-treat systems to identify potential gaps in the capture zones. This new information would be used to determine the location of the recovery well(s), if necessary." (emphasis added). However, on page 1 of the Proposed Plan, EPA states that"[t]he remedy would also include installing an additional recovery well(s) with treatment unit(s) to provide further hydraulic control and contaminant removal of impacted groundwater." Similarly, in the description of Alternative 2 on page 14 of the Proposed Plan (the alternative chosen by EPA) EPA states that "[t]he remedy would also include installing an additional recovery well(s) with treatment unit(s) to capture any areas limited by hydraulic influence and contaminant removal of the 1,4-dioxane plume." In the description of the Preferred Alternative (Alternative 2) on page 19 of the Proposed Plan, EPA states that a component of the Preferred Alternative is "[a]dditional recovery well(s) with treatment unit(s) to capture any areas limited by hydraulic influence." The Record of Decision ("ROD") should be clear that additional recovery wells with treatment units will only be installed as part of the remedy if estimates of the hydraulic influence of the existing pump-and-treat systems indicate that additional recovery wells would be necessary to capture contaminated groundwater not already being captured by the existing systems.

Comment 2

The Preferred Alternative identified in the Proposed Plan includes the use of the existing Borough of Fair Lawn production wells and the treatment systems that exist on those wells (the "Borough Wells") as an important component of the remedy. The Preferred Alternative will treat the water from the Borough Wells so that the water will meet federal drinking water standards. The Preferred Alternative does not indicate whether the post-treatment water from the

Borough Wells will be distributed by the Borough as drinking water. As stated on page 1 of the Proposed Plan, "[t]he Borough would evaluate whether the treated water from the [Borough Wells] will be used as a water supply source…" The ROD should be clear that the Borough of Fair Lawn will decide whether to distribute post-treatment water from the Borough Wells to the residential water supply system based on the Borough's analysis of the post-treatment water and any other pertinent factors. The ROD should also be clear that any water from the Borough Wells not distributed by the Borough to the residential water supply system will be treated and discharged to Henderson Brook.

Comment 3

As stated on page 19 of the Proposed Plan, Alternative 3 "requires the construction on private properties and installation of numerous wells and related systems." Specifically, Alternative 3 would require the construction of an estimated 120 treatment wells, and related trenching and piping, over the six to twelve month estimated construction period. Road closures and detours, as well as mitigation measures for other short-terms hazards including fugitive dust and physical hazards, would be far more prevalent during construction of Alternative 3 than Alternative 2. Longer term, Alternative 3 would require significantly more aboveground equipment to be located and maintained on private commercial and residential properties in the area, causing additional dislocation and other nuisances (e.g., noise). Consequently, EPA appropriately concluded that "Alternative 2 would be significantly less disruptive than Alternative 3 to the residents." See page 20 of the Proposed Plan. Moreover, Alternative 3 requires the use of unproven technologies, does not significantly reduce the overall estimated duration of the remediation and is substantially higher in cost, without a measurable benefit over Alternative 2. Therefore, Alternative 2 is clearly a preferred alternative over Alternative 3 based on the nine evaluation criteria set out in the National Contingency Plan ("NCP"). Fisher and Sandvik support EPA's evaluation of the remedial alternatives in the Proposed Plan, and believe EPA has fully and appropriately considered the NCP criteria in this respect.

Comment 4

The Remedial Investigation included extensive vapor intrusion sampling at numerous residential and commercial properties, as well as the Westmoreland Elementary School. As stated on page 10 of the Proposed Plan, "the sample results from the EPA-led investigation found that all residential properties are currently not at risk for contaminated vapors entering their space, and no [vapor intrusion] sampling is scheduled." Therefore, unless there is evidence of a significant change in conditions warranting additional vapor intrusion investigation since the completion of the Remedial Investigation, no additional vapor intrusion sampling is warranted at the Site. The Respondents support EPA's statements in the Proposed Plan with respect to the status of the vapor intrusion investigation.

Comment 5

On page 2 of the Proposed Plan, EPA states "[t]wo of the four wells are used to provide treated drinking water to the residents of the Borough." This statement is not accurate because the Borough ceased using any wells in the Westmoreland Well Field for drinking water supply in

May 2016, and the Westmoreland Well Field has not been used for drinking water supply since May 2016.

Comment 6

On pages 13, 15 and 20 of the Proposed Plan, EPA describes long-term monitoring ("LTM") as a component of both active alternatives, and notes that the results of the LTM program "would be used to evaluate the migration and changes in site-related contaminants of concern over time." In addition, as described in the Feasibility Study Report dated June 2018, the LTM program will include sampling parameters that can be used to evaluate whether natural degradation of contaminants of concern is occurring in groundwater, or whether such degradation has the potential to occur in the future. The ROD should clarify that if LTM data indicate that natural degradation is an effective method of achieving the final remediation goals, monitored natural degradation may be incorporated into the remedy at some point in the future after the groundwater recovery and ex-situ treatment system has significantly reduced contaminant levels in groundwater.

Comment 7

In Table B of the Proposed Plan, EPA identifies preliminary remediation goals ("PRGs") for surface water. Based on the pathways identified in the approved March 2018 Baseline Human Health Risk Assessment ("BHHRA"), no unacceptable risk exists for exposure to surface water, and ingestion (of either water or fish) was not an identified pathway for exposure. As specified in the NCP, PRGs should be modified as more information becomes available through the Remedial Investigation/Feasibility Study process (which includes the BHHRA), and such additional evaluation should inform the identification of any remediation goals ultimately included in the remedy. Based on the information developed in the BHHRA, there is no unacceptable risk from surface water, and therefore surface water PRGs are not necessary. The ROD should not include any PRGs for surface water, or, in the alternative, utilize only the component of the EPA's National Recommended Water Quality Criteria derived from the ingestion of drinking water (not the ingestion of fish), as described more fully in the Respondents' July 25, 2018 Response to Comments letter to EPA.

Comment 8

On page 3 of the Proposed Plan, EPA describes the historic use of the Westmoreland Well Field wells. The ROD should clarify that, prior to May 2016 (when the Westmoreland Well Field wells ceased to be used as a drinking water source as noted in Comment 5 above), only wells FL-10 and FL-14 were operational. Well FL-11 was taken out of service in 1996, and has since been used only as an observation well.

Respectfully submitted,

Sandvik, Inc.
Fisher Scientific Company L.L.C.

Dated: September 5, 2018