RECORD OF DECISION

SAN GERMAN GROUNDWATER CONTAMINATION SUPERFUND SITE
SAN GERMAN, PUERTO RICO
OU-2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 2

September 2019

541230

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

San German Groundwater Contamination Superfund Site
OU-2 Site-wide Groundwater Contaminated Plume
San German, Puerto Rico
PRN000205957

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) documents the selected remedial action for site-wide groundwater at the San German Groundwater Contamination Superfund Site (Site), located at the Municipality of San German, Puerto Rico, which is selected by the United States Environmental Protection Agency (EPA) in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. § 9601-9675, as amended, 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 for at the Site. This decision is based on the Administrative Record file for this remedy. Refer to Appendix II of Part II – Decision Summary for copy of the Administrative Record Index. The Department of Natural and Environmental Resources (DNER) concurs with the selected remedy. Refer to Appendix X of Part II – Decision Summary for copy of the concurrence letter.

ASSESSMENT OF SITE

EPA, in consultation with DNER, has determined that actual or threatened releases of hazardous substances from the Site, if not addressed by the selected remedy, may present a current or potential threat to human health and the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy described in this document represents the second of two planned remedial actions, or operable units (OUs). EPA is addressing the conditions at the Site through two separate operable units, OU-1 and OU-2. OU-1 addresses contaminated soils and shallow, highly contaminated groundwater that acts as ongoing sources of groundwater contamination. The OU-1 remedy is currently being designed. OU-2 addresses broader site-wide groundwater.

The major components of the OU-2 remedy include:

- In situ treatment at the two identified source areas and of the plume core;
- Pre-design investigation;
- Remedial Design;
- Long-term groundwater and vapor monitoring in the plume fringe;
- Institutional controls;
- Five-year reviews.

The cost of the selected remedy is $17.3 million.

INSTITUTIONAL CONTROLS

Institutional controls are needed to restrict the use and exposure to contaminated groundwater until

the contaminant levels are reduced to the remediation goals (RGs) or no longer pose any risks to human health. The types of institutional controls employed to prevent exposure to contaminated groundwater could include restrictions on installation of drinking water wells and restrictions on groundwater use at locations within the contaminated areas. The effectiveness of selected institutional controls would depend on their continued implementation. The reliability of institutional controls depends on the ability to enforce them and availability of resources to monitor compliance with the restrictions.

EPA REGION 2 CLEAN AND GREEN POLICY

The environmental benefits of the preferred remedy may be enhanced by giving consideration, during the design, to technologies and practices that are sustainable in accordance with EPA Region 2 Clean and Green Energy Policy. This will include consideration of green remediation technologies and practices. Some examples of practices that would be applicable are those that reduce emissions of air pollutants, minimize fresh water consumption, incorporate native vegetation into revegetation plans, and evaluate beneficial reuse and/or recycling of materials, among others.

DECLARATION OF STATUTORY DETERMINATIONS

STATUTORY REQUIREMENTS

The selected remedy meets the requirements for remedial actions set forth in CERCLA Section 121, 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 of standard of control of the hazardous substances, pollutants, and contaminants that at least attains the legally applicable or relevant and appropriate requirements under the federal and State laws; (3) it is cost-effective; and (4) it utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

STATUTORY PREFERENCE FOR TREATMENT

The selected remedy meets the statutory preference for the use of remedies that involve treatment as a principal element.

FIVE-YEAR REVIEW REQUIREMENTS

Alternatives resulting in contaminants remaining above levels that would otherwise allow for unrestricted use and unlimited exposure require that the Site be reviewed at least once every five years. If justified by the review, additional remedial actions may be considered to remove, treat, or contain the contamination. For remedial actions where, unrestricted use and unlimited exposure is the remedial objective, it may require many years to reach that objective. It is EPA policy to conduct five-year policy reviews in such circumstances until remediation goals are achieved.

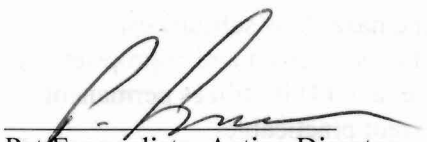
This remedy will not result in hazardous substances, pollutants, or contaminants remaining at the San German Superfund Site above levels that would otherwise allow for unlimited use and unrestricted exposure. However, because it may take more than five years to attain the remediation goals, consistent with CERCLA Section 121(c), policy reviews will be conducted no less often than once every five years after the completion of construction to ensure that the remedy is, or will be, protective of human health and environment. Because the OU-1 and OU-2 remedies are expected to be closely aligned, the five-year review for the two OUs will be comprehensively addressed.

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 located in the information repository.

- Contaminants of concern and their respective concentrations may be found in the "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 cleanup levels for chemicals of concern may be found in the "Remedial Action Objectives" section.
- A discussion of principal threat waste is contained in the "Principal Threat Waste" section.
- Current and reasonably-anticipated future land and groundwater use assumptions are discussed in the "Current and Potential Future Land and Groundwater Uses" section.
- Estimated capital, annual operation and maintenance, and total present worth costs are discussed in the "Description of 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 decisions) may be found in the "Comparative Analysis of Alternatives" and "Statutory Determinations" sections.

AUTHORIZING SIGNATURE



9/30/19

Pat Evangelista, Acting Director
Superfund & Emergency Management Division
EPA - Region 2

Date

DECISION SUMMARY

SAN GERMAN GROUNDWATER CONTAMINATION SUPERFUND SITE
OU-1 SOURCE CONTROL

SAN GERMAN, PUERTO RICO

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 2

SEPTEMBER 2019

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SITE NAME, LOCATION, AND DESCRIPTION

The San German Groundwater Contamination Superfund Site (Site) is located in San German, in southwestern Puerto Rico as shown in Figure 1 of Appendix VIII of this document. Volatile organic compounds (VOCs) have been detected above federal maximum contaminant levels (MCLs) in three public water supply wells, Retiro, Lola Rodriguez de Tio I (Lola I), and Lola Rodriguez de Tio II (Lola II), located south of Guanajibo River, between Routes 139 and 360 (Figure 2 of Appendix VIII). Prior to their closure, these wells were associated with the Puerto Rico Aqueduct and Sewer Authority (PRASA) San German Urbano Water Supply system, which includes a total of seven wells and two surface water intakes.

The Retiro, Lola I, and Lola II wells acted as an independent, interconnected supply system with approximately 800 service connections serving approximately 2,280 users in 2005. The Retiro well was located near the intersection of Route 122/Angel Castro Avenue and the Guanajibo River, along the east side of a narrow, unnamed dirt road that leads to the riverbank. The Retiro well was destroyed when a new bridge was constructed across the Guanajibo River. Lola I is located near an entrance to the Lola Rodriguez de Tio public school. Lola II is located approximately 550 feet west-northwest of the Retiro well, south of Guanajibo River, on the south side of an unnamed dirt road adjacent to the river. According to PRASA, the individual mean output for each well in 2005 was approximately 398,000 gallons per day (gpd) from Retiro, 185,000 gpd from Lola I, and 170,000 gpd from Lola II.

The Site includes an industrial park owned by the Puerto Rico Industrial Development Company known as the Retiro Industrial Park, located approximately one-half mile to the southeast of the affected supply wells. Two lots within the Retiro Industrial Park have been determined to be sources of the VOC contamination. Several of the buildings in the Retiro Industrial Park are occupied by active businesses that were investigated during the OU-1Remedial Investigation (RI).

The Site has been divided in two operable units (OUs). OU-1 addresses contaminated soils and shallow, highly contaminated groundwater that acts as ongoing sources of groundwater contamination. The OU-1 remedy was selected on December 11, 2015 and called for Soil Vapor Extraction (SVE) and Dual Phase Extraction (DPE)/In Situ Treatments at the property where Wallace Silversmiths de Puerto Rico, Ltd. (Wallace) currently operates and at a property formerly occupied by CCL Insertco de PR (CCL Label). The OU-1 remedy is currently in design. OU-2, which is the subject of this ROD, address the Site-wide groundwater contamination.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

From 2001 to 2005, groundwater samples collected quarterly from the Retiro, Lola I, and Lola II wells regularly exhibited detectable concentrations of tetrachloroethene (PCE) and c*is*-1,2-dichloroethene (*cis*-1,2-DCE). The maximum concentrations of PCE and *cis*-1,2-DCE detected in these wells during this period were 6.4 micrograms per liter (µg/L) and 1.2 µg/L, respectively.

The Puerto Rico Department of Health (PRDOH) ordered PRASA to close the Retiro public drinking water supply well in January 2006 because of the presence of VOC contamination in the

groundwater at unacceptable levels. PCE concentrations exceeded the federal MCL of 5 µg/L. PCE was also detected in samples collected from tap water from within the water distribution system. PRASA responded to this order by taking the Retiro well out of service on January 19, 2006. The Lola I and Lola II wells were taken out of service in about the same time period because of exceedances in levels in those wells, too.

EPA added the Site to the National Priorities List (NPL) on March 19, 2008. The OU-1 Remedial Investigation (RI) and Feasibility Study (FS) for the Site was funded by EPA. The RI/FS for OU-1 was completed in 2015, and the ROD for OU-1 was signed on December 11, 2015. The RI results for OU-1 identified two sources of the groundwater VOC contamination and surface water and sediment contamination. The OU-1 remedy addresses soil contamination that acts as a continuing source of groundwater contamination, including soil in the vadose zone (above the water table) and soil and highly contaminated groundwater below the water table in the shallow saprolite zone (soils and highly weathered rock). Currently EPA is conducting the remedial design (RD) for OU-1.

EPA POTENTIAL SOURCE AREA INVESTIGATION

In June 2006, EPA collected groundwater samples from operational wells and analyzed the samples for target compound list and target analyte list contaminants, confirming the presence of PCE (1.6 µg/L), *cis*-1,2- DCE (1.5 µg/L), and trichloroethene (TCE) (0.54 µg/L). In addition, PCE was detected at an estimated concentration (below the sample quantitation limit) in the Lola II well. EPA was unable to collect a sample from the Retiro well because the pump was removed in February 2006 in response to PRDOH's shutdown order. Background groundwater samples, collected upgradient of the Retiro Industrial Park, revealed no detections for PCE, *cis*-1,2-DCE, and TCE.

In July 2006, EPA conducted reconnaissance activities at 44 industrial properties in the San German area as part of a site discovery initiative to identify hazardous waste sites that could be sources of contamination. This led to the identification of several locations in San German that were investigated further as part of the OU-1 RI.

Potential source area investigations were performed at five facilities within the Retiro Industrial Park in February and May 2012. Soil samples were collected at 0 to 2 feet, 5 to 7 feet, 10 to 12 feet, 20 to 22 feet and 30 to 32 feet (if accessible). Soil samples were analyzed for VOCs, semi-volatile organic compounds, pesticides, polychlorinated biphenyls, and inorganics, including mercury and cyanide. A total of 41 borings were completed at five such areas; 159 soil samples were collected.

Two out of the five facilities investigated were identified as sources of soil contamination that reached the groundwater and formed separate PCE and TCE plumes which then combine in a single plume. It was determined that these plumes resulted in the contamination observed in the three former supply wells. One of the properties is currently occupied by Wallace. The other property was formerly occupied by CCL Label. Solely for descriptive purposes, these properties are referred to in this ROD as the Wallace property and the CCL property. Wallace currently occupies two buildings at its property, but previously, a predecessor to Wallace occupied a nearby

third building that was investigated as part of the RI. High levels of PCE were present in a majority of soil samples collected in the vicinity of the two buildings at the Wallace property. TCE and *cis*-1,2-DCE were also frequently detected, but at lower levels. At the third building on the Wallace property, PCE was detected in some soil samples, and TCE and *cis*-1,2-DCE were detected much less frequently and at low levels.

The CCL property is located to the east of the Wallace property. In soil samples collected in the building at the CCL property, concentrations of TCE were detected at higher levels than PCE. In addition, *cis*-1,2-DCE was frequently detected, generally at lower levels than TCE. PCE was rarely detected. The RI results for OU-1 identified two source areas of the groundwater contamination at the properties referred to herein as the Wallace property and CCL property.

The former Baytex facility is not currently considered as a source of contamination since soil contamination was not detected above the water table (approximately five feet bgs). For example, the soil sample result from FB-05 was detected at 180 ppb for PCE in comparison to sources at Wallace (i.e., >10,000 ppb for PCE). The groundwater screening sample result from FB-05 was detected at 2,690 ppb. A concentration of soil of 180 ppb would not yield a groundwater concentration of 2,690 ppb at FB-05. Since the former Baytex facility is directly downgradient of Wallace, the source of contamination found at former Baytex is likely from the migration of the plume from the upgradient source areas.

EPA OU-2 REMEDIAL INVESTIGATION/FEASIBILITY STUDY

After the OU-1 remedy was selected, EPA commenced the OU-2 RI to refine the hydrogeologic framework of the Site, evaluate the nature and extent of site-wide groundwater contamination, update surface water conditions in the Guanajibo River, and refine a conceptual site model (CSM). The major OU-2 field activities included a hydrological investigation, groundwater sampling, and surface water sampling. As part of the OU-2 RI, two rounds of groundwater and surface water sampling events were completed. In addition, after Hurricane María in September 2017, an additional round of sampling was conducted to observe whether the contaminant plumes had changed. Selected monitoring wells and irrigation wells were sampled in March 2018 to determine if the hurricane resulted in changes to the presence or location of groundwater contamination.

OU-2 field investigations included installation of five saprolite monitoring wells and four unstable bedrock wells, collection of three rounds of monitoring well samples, collection of surface water and pore water samples, and hydraulic conductivity testing at selected monitoring wells. The nature and extent of contamination in Site media was assessed during the RI by collecting and analyzing samples and then comparing analytical results to federal, Commonwealth, and Site-specific screening criteria. Contaminants identified as representative of Site contamination in OU-2 are consistent with those from OU-1: PCE, TCE, cis-1,2-DCE, 1,1-dichloroethene (1,1-DCE), and vinyl chloride. These five VOCs were detected the most frequently, and at the highest levels, in source area soil samples and other affected media, including groundwater, surface water, and sediment. These chemicals include chlorinated solvents and degradation products of those solvents.

An OU-2 RI Report was prepared by EPA to document the nature and extent of the contamination

at the Site. EPA also issued a Baseline Human Health Risk Assessment (HHRA) Report to document the current and future effects of Site contaminants on human health and the environment associated with the contamination found at the Site. EPA also conducted a Screening-level Ecological Risk Assessment (SLERA) to evaluate any potential for ecological risks from the presence of Site contaminants in surface water and sediment. A detailed description of the HHRA and SLERA for this Site is provided in the Summary of Risk Section of this ROD.

An FS Report was prepared to present and analyze cleanup alternatives suitable for OU-2 at the Site. The purpose of the OU-2 FS Report was to identify, develop, screen, and evaluate a range of remedial alternatives that protect human health and the environment from potential risks at OU-2 and enable EPA to select a remedy for OU-2. A detailed description of the cleanup alternatives evaluated for OU-2 is provided in the Description of Alternatives Section of this ROD.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the RI, a Community Involvement Plan (CIP) was developed to assess any community concerns about the Site and encourage public participation. As part of the CIP and as required by Superfund regulations, EPA prepared an OU-2 Proposed Plan for the Site (Appendix I). The Proposed Plan summarized the remedial alternatives and identified EPA's preferred alternative and the rationale for the preferred remedy. On July 12, 2019, EPA made available to the public the Proposed Plan, the RI Report, the HHRA and SLERA Reports, and the FS Report for OU-2. All of these documents, along with other relevant documents included in the Administrative Record for the OU-2 remedy for the Site were made available to the public at the following locations:

- EPA's Docket Room in New York, New York;
- San German City Hall;
- DNER's Superfund File Room in San Juan, Puerto Rico; and
- EPA's Caribbean Environmental Protection Division Office in Guaynabo, Puerto Rico.

A copy of the Administrative Record Index for the remedy is provided in Appendix II of this ROD. Additionally, digital copies of the documents contained in the Administrative Record Index for the remedy can be found at EPA's website for the San German Ground Water Contamination Site at: https://www.epa.gov/superfund/san-german-groundwater.

A notice of the availability of the Proposed Plan and supporting documentation was published in the "Primera Hora" newspaper on July 12, 2019 (see Appendix III). In order to facilitate communication with the community, a Fact Sheet (in Spanish) was prepared and distributed throughout the community (see Appendix IV). A public comment period was held from July 12, 2019, to August 11, 2019. In addition, a public meeting was held at the Santa Marta Basketball Court in San German on July 30, 2019, from 5:00 pm to 7:00 pm. The purpose of the public meeting was to present the Proposed Plan to the community and provide an opportunity for the public to ask questions or provide comments on the proposed remedial alternatives described in the Proposed Plan and EPA's preferred alternative. At this meeting, representatives from EPA and DNER answered questions and received comments about the remedial investigation activities conducted at the Site and the proposed remedial alternative for OU-2 at the Site. A copy of the attendance sheet for this meeting can be found in Appendix V of this ROD. Appendix VI of this

ROD contains the official transcripts of the public meeting. In addition, EPA's response to written comments received during the public comment period is included in the Responsiveness Summary (Appendix VII).

In response to multiple requests for a 30-day extension of the public comment period regarding EPA's preferred remedy, EPA granted a 30-day extension of the public comment period, extending the public comment period until September 10, 2019. A Public Notice of the 30-day extension was published in the "Primera Hora" newspaper on August 9, 2019 (Appendix III).

SCOPE AND ROLE OF RESPONSE ACTION

EPA is addressing the cleanup of this Site through two remedies, OU-1 and OU-2. This remedy is the second of the two remedial actions anticipated for the Site, with OU-1 addressing contaminated soils and shallow, highly contaminated groundwater that acts as ongoing sources of groundwater contamination. OU-2, the second planned remedial action for the Site address the site-wide groundwater contaminated plume not addressed in the OU-1 remedy. OU-2 is comprised of the core of the plume, where concentrations of VOCs are greater than 100 micrograms per liter (µg/L) of either PCE or TCE and the fringe of the plume where concentrations of these contaminants are between 100 and 5 µg/L.

SITE CHARACTERISTICS

CONCEPTUAL SITE MODEL

The CSM is based on data collected during previous investigations, namely the OU-1 RI, and the OU-2 RI. It integrates information on geology, hydrogeology, source areas, and receptors. Data generated as part of the OU-2 RI support the prior CSM developed for OU-1. A CSM had been developed as part of the OU-1 investigation for the Site to integrate the different types of information collected during the RI, including geology, hydrogeology, background, setting, and the fate and transport of contaminants. Based on the Site-specific geology, hydrogeology, physical and chemical properties of the Site-related contaminants, and the fate and transport of the contaminants, a CSM was developed for OU-2, which is summarized below and illustrated in Figure 3 and Figure 4 of Appendix VIII.

The OU-1 RI identified two properties as sources of soil contamination that resulted in separate PCE and TCE plumes that comingle in an area downgradient of the two sources. These plumes resulted in the contamination observed in the three closed PRASA public water supply wells: Lola I, Lola II, and the destroyed Retiro well. Contaminated soil and highly contaminated groundwater below the water table in the shallow saprolite zone (soils and highly weathered rock) are being addressed under the OU-1 remedy. These contaminants have migrated into the groundwater causing the formation of separate PCE and TCE plumes and a comingled plume.

Saprolite zone monitoring wells located at the source areas (MW-2S, MW-3S, MW-4S, and MW-5S) have consistently revealed high concentrations of PCE and TCE. The predominant groundwater flow direction in the Guanajibo River alluvial valley is preferentially toward the river, as the tributary streams to the Guanajibo River likely act as aquifer drains. The groundwater

potentiometric surface measured with the additional OU-2 monitoring wells confirmed that the groundwater flow direction remains to the northwest but shifts toward a more northerly direction within the Retiro Industrial Park during large storm events.

Based on the OU-1 and OU-2 RI data, the saprolite/unstable bedrock zone aquifer is under confined to semi-confined conditions since groundwater was observed to be higher in monitoring wells than in the actual water table that was encountered during drilling. This also suggests that the unsaturated zone is thicker than indicated by water level measurements in wells. The majority of PCE and TCE contamination in groundwater occurs in the saprolite zone and in the upper portion of the unstable bedrock zone. The highest levels occur near the two source areas and decrease as the plumes move downgradient and become more diluted.

The two plumes differ in distribution and extent. The PCE plume, which is more extensive and at higher concentrations, is oriented toward the northwest, whereas the TCE plume is oriented toward the north/northwest. The PCE plume is approximately 4,250 feet long and 1,450 feet wide at its widest point, and the TCE plume is approximately 2,400 feet long and 930 feet wide.

In the competent bedrock zone monitored by seven multiport wells, very low concentrations of site-related contaminants were identified at the CCL property source area where pumping from a nearby well (the Wallace well) may have pulled contamination into the deeper zone that would otherwise have been protected by the small upward gradient between the competent bedrock and the saprolite/unstable bedrock. In the downgradient plume area at MPW-10, low concentrations of site-related contaminants (below screening criteria) in all the ports were likely to have been drawn into the competent bedrock by the high capacity pumping when the three former public supply wells were active.

During both the OU-1 and OU-2 RIs, PCE and TCE were detected in surface water samples collected in drainage features in the vicinity of the source areas. The surface water results indicate that rainwater percolates through contaminated soil or that contaminated groundwater discharges into surface water near the former CCL Label and Former Baytex buildings. Water levels measured in two staff gauges installed in the small drainage ditch, when compared to water levels in the nearby saprolite monitoring well, indicate that groundwater discharges to the drainage ditch. Sediment samples collected during OU-1 from the small drainage ditch on the northeastern side of the former CCL Label and Baytex buildings were generally not contaminated. Low levels (below the OU-1 screening criteria) of cis-1,2-DCE and/or vinyl chloride were detected in three samples in the Retiro Industrial Park drainage adjacent to the Former Baytex building.

SITE OVERVIEW

Topography and Drainage

San German is located in the eastern part of the Guanajibo River floodplain. Within the municipality, the river drops from an elevation of approximately 155 feet above mean sea level in the east to approximately 115 feet in the west. The river valley is flanked to the north and south by uplands; the highest point in the area is 735 feet, at a hilltop 0.75 mile south of the public supply

wells. Uplands north of the river are as high as approximately 280 feet. The three former public supply wells are located adjacent to the river on the south side, at an approximate elevation of 138 feet.

The Guanajibo River flows west through the town of San German and is the major surface water body in the area. The Guanajibo River drainage basin encompasses an area of approximately 35 square miles. A tributary to the Guanajibo River originates in the highlands southeast of the Site and flows west, then north, toward the river, discharging near the northwest corner of the Santa Marta neighborhood between Route 102 and the river.

Geology

The highlands to the north and south of the river valley are predominantly igneous rocks and serpentinite. Serpentinite bedrock is overlain by alluvial deposits in the river valley.

The main geologic units encountered during the OU-1 and OU-2 hydrogeological investigations include alluvium, saprolite, and serpentinite, as summarized below. The zones between the alluvium and competent bedrock are transitional zones that represent chemical weathering of bedrock typical of tropical climates.

- Alluvium Soils (Quaternary) – Alluvial deposits occur in the river valley and along tributaries; within the study area, these deposits were observed to be stiff silty clay to clay and clayey sand.
- Saprolite – Saprolite, which occurs below the alluvium, consists of chemically weathered serpentinite that retains the structure of the bedrock. The upper portion of the saprolite, which is soft and friable enough to be penetrated with hollow-stem augers, is where the shallow monitoring wells are screened. Bedrock fragments were increasingly present with depth, with the deepest fragments composed largely of olive-brown to olive serpentinite. The saprolite zone gradually transitions to highly fractured and unstable bedrock at depths ranging from approximately 68 to 82 feet below ground surface (bgs).
- Serpentinite or Serpentinized Peridotite (late Jurassic and early Cretaceous age or older) - Serpentinite is highly folded, faulted, and fractured. Serpentinite or rock fragments were first encountered from 20 to 30 feet bgs in the majority of drilling locations. A zone of highly unstable bedrock was encountered above competent rock, ranging from 32 to 70 feet thick.

Hydrogeology

The aquifer within the study area is part of the Guanajibo River alluvial valley; it is contained predominantly within the poorly to moderately consolidated deposits of sand and gravel of alluvial origin (adjacent to the Guanajibo River) and in weathered saprolite between the alluvium and bedrock. The groundwater-bearing potential of the serpentinite bedrock is minimal, except where it is highly fractured.

Regional groundwater flow occurs under varying conditions, from confined, semi-confined to unconfined conditions. Unconfined conditions predominantly occur in local areas where the

alluvium is relatively thin and the thickness of clays and silt is limited. Semiconfined conditions generally increase west of the town of San German where the thickness of clay and silt strata increase.

In general, groundwater depths in Site monitoring wells range from river level at the Guanajibo River to approximately 15 to 20 feet bgs at higher land-surface elevations.

Cultural Resources

A Cultural Resource Survey (CRS) was performed during the OU-1 RI for the Site to assess the archaeological sensitivity in the area of potential effects (APE). The APE for the Site consists of an approximately 440-acre Cultural Resource Study Area in the Municipality of San German in the Guanajibo Valley section of Puerto Rico.

A Stage 1A CRS was conducted within the APE for the Site. The primary goal of the Stage 1A CRS was to assess the archaeological sensitivity of the APE. Portions of the APE were identified as possessing high and moderate sensitivity for archaeological resources as shown in Appendix H of the RI Report based on cartographic evidence and field reconnaissance. The Stage 1A CRS included a recommendation that a Stage 1B CRS be performed in areas where subsurface disturbance for remediation is planned within zones of high or moderate archaeological sensitivity. Because the two source areas in the Retiro Industrial Park are within the APE area of low sensitivity, no additional CRS activities are necessary for implementing the OU-1 nor the OU-2 remedy. The CRS for OU1 covered the whole site and surrounding area including the plume area within OU2

Sampling Strategy

The nature and extent of contamination in Site media was assessed during the OU-1 and OU-2 RIs by collecting and analyzing samples and then comparing analytical results to federal, Commonwealth, and site-specific screening criteria. The major OU-2 field activities included a hydrological investigation, groundwater sampling, and surface water sampling. As part of the OU-2 RI, two rounds of groundwater and surface water sampling events were completed. After Hurricane María selected monitoring wells and irrigation wells were sampled again in March 2018 to determine if the September 2017 hurricane resulted in changes to the presence or location of groundwater contamination.

Summary of Groundwater Contamination

As part of the OU-2 groundwater investigation, five monitoring wells in the saprolite zone and four monitoring wells in the unstable bedrock zone were installed to assess groundwater contamination. The OU-2 Round 1 and Round 2 sampling events included the following sampling points from all wells and ports: 14 shallow wells screened in the saprolite zone; 4 wells screened in the unstable bedrock zone; 1 single screen bedrock well; 7 multiport bedrock wells, each with 2 to 5 ports (total of 25 ports); and irrigation well MW-C, which was only used for monitoring purposes and not for potable water (Figure 5). Wells completed in the saprolite zone contained the highest PCE and TCE levels, as well as the majority of the screening criteria exceedances. The

sampling results can be summarized as follows:

- PCE and TCE were detected in 13 saprolite monitoring wells, and the results exceeded the screening criteria in 11 and 6 wells, respectively.
- The highest PCE concentrations in the saprolite zone were located at, and just downgradient of, the Wallace property source area, at 16,000 µg/L (MW-2S), 2,400 µg/L (MW-4S), and 1,300 µg/L (MW-6S).
- PCE was detected in three of the four monitoring wells completed in the unstable bedrock zone, with the results exceeding the screening criterion in only MW-4UR (2,400 µg/L), located near the Wallace property source area.
- In the bedrock aquifer, PCE was detected only in the top four ports in MPW-10, the furthest downgradient bedrock well; all concentrations were below the screening criterion, ranging from 0.65 µg/L to 2.8 µg/L.
- The highest TCE concentrations in the saprolite zone were at, and just downgradient of, the CCL property source area, at 680 µg/L (MW-3S) and 580 µg/L (MW-12).
- TCE was detected in all unstable bedrock wells, with the results exceeding the screening criterion in three wells. The highest TCE concentration of 21 µg/L was in MW-14UR, located downgradient of the source areas but on the northern side of the Site where TCE is the more dominant contaminant. The remaining TCE exceedances were in MW-3UR (6.2 µg/L) and MW-4UR (13 µg/L). MW-3UR is located close to the CCL property source area and MW-4UR is close to the Wallace property source area.
- TCE was detected at levels well below the screening criterion in five bedrock wells: MPW-3 (ports 2 and 3); MPW-5 (port 2); MPW-6 (ports 1, 2, and 3); MPW-7 (ports 3, 4, and 5); and MPW-10 (ports 3, 4, and 5). TCE concentrations ranged from 0.12J µg/L to 0.42J µg/L.
- Cis-1,2-DCE was detected in 13 saprolite wells, with the results exceeding the screening criterion in 4 wells. The highest cis-1,2-DCE concentration was detected in MW-12 (310 µg/L), located downgradient of the CCL and Wallace property source areas.
- Cis-1,2-DCE was detected in three unstable bedrock wells; concentrations in two of these wells exceeded the screening criterion. The levels detected were 80 µg/L in MW-3UR and 96 µg/L in MW-14UR.
- Remaining cis-1,2-DCE exceedances were detected in MW-3S (100 µg/L) at the CCL property source area and in MW-4S (120 µg/L) and MW-5S (94 µg/L), downgradient of the two identified source areas.
- Cis-1,2-DCE was detected at levels well below the screening criterion in five bedrock wells: MPW-3 (all 5 ports), MPW-4 (1 of 3 ports), MPW-6 (2 of 3 ports), MPW-7 (all 5 ports), and MPW-10 (all 5 ports). cis-1,2-DCE concentrations ranged from 0.14J µg/L to 2.8 µg/L.
- Vinyl chloride was detected in seven saprolite wells with the results exceeding the screening criterion in four wells. The maximum vinyl chloride concentration of 12 µg/L was detected in MW-3S at the CCL property source area.
- Vinyl chloride was detected in two unstable bedrock wells with the results exceeding the screening criterion in one unstable bedrock well. That concentration was 2 µg/L in MW-3UR.
- Vinyl chloride was the only site-related contaminant to exceed its screening criterion in the bedrock aquifer; exceedances were detected only in MPW-3 (all ports, ranging from 1.2

µg/L to 26 µg/L).

- 1,1-DCE was detected in seven saprolite wells with the results exceeding the screening criterion in four wells; the highest concentration was in MW-4S, near the Wallace property source area, at 41 µg/L.
- 1,1-DCE was detected in two unstable bedrock wells below the screening criterion.
- Similar to Round 1, the highest levels and the majority of exceedances of PCE and TCE in Round 2 were found in wells completed in the saprolite zone. Round 2 results were generally slightly higher than Round 1 result in the majority of wells.
- The irrigation well MW-C contained PCE (0.58 µg/L), TCE (1 µg/L), cis-1,2-DCE (5.3 µg/L), and vinyl chloride (0.024J µg/L); all detections were well below the screening criteria.

The majority of PCE and TCE contamination in groundwater occurs in the saprolite zone and in the upper portion of the unstable bedrock zone. The highest contaminant levels occur near the two identified source areas, and the levels decrease as the plumes move downgradient, comingle and become more diluted. However, the two plumes differ in distribution and extent.

Selected monitoring wells and newly discovered irrigation wells were sampled in March 2018 to determine if the September 2017 Hurricane María resulted in changes to groundwater contamination (Figure 6). Post-Hurricane María sample results generally indicate that this unusually strong storm had little impact on the overall contaminant plumes. Concentrations of PCE and TCE generally were similar to all other rounds of sampling, except at the Wallace property source area where results for MW-2S showed an increase in PCE. Overall, concentrations of site-related contaminants are gradually decreasing although the areas of the plumes immediately downgradient of the two identified source areas remain well above the screening criteria. The PCE plume, which is more extensive and at higher concentrations, is oriented toward the northwest, whereas the TCE plume is oriented toward the north/northwest. (Figure 7).

Summary of Surface Water/Sediment Contamination

- No site-related contaminants were detected in any surface water samples collected from the Guanajibo River during OU-1 and OU-2 RI investigations.
- During OU-1 piezometer pore water sampling, PCE (at 0.77 µg/L) was detected in one sample at a concentration well below the screening criterion. This very low concentration of PCE detected during OU-1 sampling indicates that groundwater discharges to the Guanajibo River.
- PCE was not detected in piezometer pore water samples collected during the OU-2 RI investigation.
- Site-related contaminants were detected in surface water samples collected in a small drainage ditch on the northeastern side of the former CCL Label building at the CCL property in the Retiro Industrial Park. PCE levels in these drainage ditch samples ranged from non-detect to 25 µg/L, with two exceedances, and TCE levels ranged from 4.6 to 58 µg/L, with three exceedances.
- Vinyl chloride levels, in these drainage ditch samples which ranged from 1.1 to 2.9 µg/L, exceeded the screening criterion in all samples.
- The maximum detections in these drainage ditch samples of cis-1,2-DCE and 1,1-DCE

were 57 µg/L and 0.64 µg/L, respectively. These results are similar to those detected during OU-1.

Types of Contaminants and Migration

The primary Site-related contaminants include five chlorinated VOCs, namely TCE, PCE, *cis*-1,2-DCE, 1,1-DCE, and vinyl chloride. The fate of a chemical in the environment is a function of its physical and chemical properties and conditions at a site. The potential for environmental transport is a function of site conditions, including the geological and hydrogeological characteristics. The primary fate and transport aspects at the Site are summarized below.

- PCE, TCE, and their degradation daughter products have migrated from the ground surface through the overburden zone and into groundwater. Some of the PCE and TCE mass is retained by capillary forces in the soil pores. The concentrations of PCE and TCE identified in the saturated zone indicate the potential for the presence of dense, non-aqueous phase liquid, although it was not observed during sample collection.
- The greatest potential for the transport of the chlorinated VOCs is through continuous dissolution of contaminants in soil and vertical migration to groundwater, and then groundwater migration, and then eventual volatilization.
- Dissolved contaminants move with the groundwater flow in the saprolite zone to the north-northwest toward the former supply wells and the Guanajibo River. Dissolved contaminants in the saprolite zone may enter the bedrock groundwater through bedrock bedding planes and fractures. It is currently unknown whether contamination is present in the highly fractured and unstable upper bedrock.
- Chlorinated VOCs in soil and groundwater have also migrated as vapor. Vapor intrusion sample results confirm the presence of vapor beneath buildings and structures in the vicinity of the groundwater plume. VOC vapors detected within the interior of buildings were below risk-based screening criteria.
- Based on an evaluation of natural attenuation, discussed below, there is limited evidence that anaerobic biodegradation of chlorinated VOCs is occurring at the Site. However, the frequent detections of *cis*-1,2-DCE and less frequent detections of trans-1,2-DCE, vinyl chloride, and 1,1-DCE are indicative of active (if incomplete) biodegradation in the aquifer.

The primary fate and transport in groundwater was discussed in OU-1 and was confirmed by the additional data collection for the OU-2 RI. The primary fate and transport aspects are summarized below.

- The saprolite and the unstable bedrock zones are the main water bearing zones, and they act as a confined to semi-confined aquifer. The transition from the saprolite to the unstable bedrock zone is gradational, transitioning from a mixture of soft clay, sand, and rock fragments in the saprolite to highly weathered bedrock in the unstable bedrock zone. The slug test results indicate that the hydraulic conductivities in the saprolite and the unstable bedrock zones vary by two orders of magnitude. Each zone is discussed below.
    - Saprolite and Upper Unstable Bedrock Zones
        - Regarding advection, groundwater in the saprolite would be expected to move more slowly than in the unstable bedrock zone as a result of the

presence of silt and clay; however, slug test data indicate that groundwater flow in the lower saprolite zone (MW-2S) and in the upper unstable bedrock zone (MW-4UR) is similar.

- Contaminants in the saprolite and upper unstable bedrock would be transported through advection and dispersion. Furthermore, dilution as a result of infiltration of precipitation through the vadose zone would decrease contaminant concentrations in the saprolite and the upper unstable bedrock zones as the plumes migrate downgradient.

- Lower Unstable Bedrock Zone
  - Based on OU-2 Round 1 sampling results, contaminants have migrated into the lower unstable bedrock zone at the CCL property source area, as observed in MW-3UR (screened from 70-80 feet bgs) with TCE at 6.2 µg/L. In MW-3S (screened from 32-42 feet bgs), TCE was detected at 680 µg/L, indicating that contaminant migration into the deeper portions of the unstable bedrock zone is likely limited.
  - Near the Wallace property source area, a deep monitoring well could not be installed adjacent to MW-2S because of space limitations in accommodating a large drill rig. However, PCE from MW-4UR in the Wallace property source area (screened from 45-55 feet bgs) was 2,400 µg/L, indicating that contaminants have migrated into the upper unstable bedrock zone at this source area. Contaminants in the lower unstable bedrock zone are expected to migrate through advection, dispersion, and dilution.
  - The lower unstable bedrock zone is expected to have more flow path variations and to be more transmissive, and, therefore, to have higher degrees of dispersion and dilution than the shallower unstable bedrock zone and the saprolite.
- Bedrock Zone
  - Based on OU-2 Round 1 sampling results, at the CCL property TCE source area, very low concentrations of site-related contaminants cis-1,2-DCE and vinyl chloride were detected as deep as 190 feet bgs at MPW-3, Port 5 in the fractured bedrock, although there is an upward vertical hydraulic gradient between the competent fractured bedrock and the unstable bedrock zone.

Assessment of Natural Attenuation at the Site

Natural attenuation refers to the naturally occurring processes in soil and groundwater, including biodegradation, that can occur by subsurface microorganisms, reactions with naturally occurring minerals, and sorption on geologic media. These processes can achieve a reduction in the total mass, toxicity, mobility, volume, or concentration of contaminants.

The groundwater geochemistry and the contaminant distribution in the PCE plume indicate that very limited naturally occurring reductive dechlorination is occurring. However, there is evidence of naturally occurring reductive dechlorination in the TCE plume and in a portion of the commingled PCE and TCE plumes. Analytical data from MW-3S, MW-3UR, MPW-3, MW-12,

MW-14, and MW-14UR demonstrate that the occurrence of anaerobic biodegradation of TCE is ongoing at the two identified source areas, in the PCE and TCE commingled plumes, and in the bedrock portion of the aquifer. These wells reveal elevated concentrations of the degradation products cis-1,2-DCE and vinyl chloride as well as detections of the degradation product ethene. The dissolved oxygen, nitrate, and oxidation-reduction potential also indicate favorable geochemical conditions for degradation at these wells. MW-3S in the source area has relatively high levels of ferrous iron and manganese, and MW-14 has high ferrous iron, also indicating reducing conditions. Reductive dechlorination, along with dilution and dispersion, are expected to reduce concentrations in the future.

CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The San German municipality is comprised of 54.51 square miles with a population of 35,527 and a population density of 651.8 people per square mile (U.S. Census 2010). The primary land use in the vicinity of the Site is agricultural with some residential, commercial, and light industrial development. The population currently served by the seven PRASA supply wells that remain open is 14,000 people. The Retiro Industrial Park, the focus of the OU-1 RI/FS, is a mixture of commercial and light industrial enterprises. These land uses are not anticipated to change in the future.

Several private residential wells were installed in the residential area northwest of the Retiro Industrial Park. None of these wells are believed to be currently used for drinking water purposes since all the homes in the area have been connected to the PRASA public water supply system. Currently, some of these wells are used for irrigation purposes. Public awareness sessions to educate the community on the risks of using contaminated groundwater have been conducted and are ongoing.

SUMMARY OF SITE RISKS

As part of the OU-2 investigation, EPA conducted a baseline risk assessment to estimate the current and future effects of contaminants on human health and the environment. 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 includes a human health risk assessment and an ecological risk assessment. If an unacceptable risk is identified, 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. The remedial alternative that is being chosen for the Site addresses contamination at the Site. The risks and hazards posed by the Site are presented in the baseline risk assessment and are summarized in this section.

HUMAN HEALTH RISK ASSESSMENT

The following four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario:

- Hazard Identification – in this step, EPA uses the analytical data collected to identify the contaminants of potential concern at a site for each medium, with consideration of a

number of factors explained below;

- Exposure Assessment - in this step, EPA estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingesting contaminated well-water) by which humans are potentially exposed;
- Toxicity Assessment - in this step, EPA determines the types of adverse health effects associated with the identified chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response); and
- Risk Characterization - in this step, EPA summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks.

The risk characterization also identifies contamination with concentrations that exceed acceptable levels, as defined by the NCP and discussed below, as posing either an excess lifetime cancer risk greater than the range from 1×10^{-6} to 1×10^{-4} or a hazard index greater than 1 (both discussed in greater detail below). Contaminants at these concentrations are considered chemicals of concern (COCs) and are typically those that will be required to be addressed through remediation at a site. Also included in this section is a discussion of the uncertainties associated with such risks.

HAZARD IDENTIFICATION

In this step, the chemicals of potential concern (COPCs) in each medium were identified based on such factors as toxicity, frequency of occurrence, fate and transport of the contaminants in the environment, concentrations, mobility, persistence, and bioaccumulation. The risk assessment focused on groundwater and surface water contaminants related to the Site that may pose significant risk to human health and the environment. Analytical information that was collected to determine the nature and extent of contamination revealed the presence of VOCs in the groundwater at concentrations of potential concern.

A comprehensive list of all COPCs can be found in the baseline human health risk assessment (BHHRA), entitled "Final Human Health Risk Assessment - San German Groundwater Contamination Site," dated June 20, 2018. This document is available in the Administrative Record file for this remedy. This ROD focuses on a site-wide groundwater evaluation, which includes the Guanajibo River and the drainage ditch. The contaminated media, concentrations detected, and concentrations utilized to estimate potential risks and hazards associated with the COCs at the Site are presented in Table 1 of Appendix IX. Groundwater and surface water were the media that are impacted by COCs.

EXPOSURE ASSESSMENT

Consistent with Superfund policy and guidance, the BHHRA is a baseline human health risk assessment and assesses conditions under the assumption that no remediation or institutional controls will be implemented to mitigate or remove hazardous substance releases. Cancer risks and noncancer hazard indices were calculated based on an estimate of the reasonable maximum exposure expected to occur under current and future use conditions at the Site. That exposure is defined as the highest exposure that is reasonably expected to occur at a site.

The industrial sites in the Retiro Industrial Park are currently zoned for industrial use, however,

there are residential areas in the vicinity of those industrial facilities and situated overlying the areas of the groundwater plumes, and the Guanajibo River may be used for recreational activities. The BHHRA evaluated potential risks to populations associated with both current and potential future land uses.

Exposure pathways were identified for each potentially exposed population and each potential exposure scenario, namely groundwater and surface water. Exposure pathways assessed in the BHHRA are presented in Table 2 and include future exposure to residents and workers through ingestion, inhalation, and dermal contact from contaminated groundwater, and current/future recreational users of Guanajibo River through the incidental ingestion and dermal contact of surface water. Although residents in the area are not currently using groundwater in the contaminated plume for their drinking water, because the aquifer is designated as a drinking water source, it is possible they may do so in the future. Typically, exposures are evaluated using a statistical estimate of the exposure point concentration, which is usually an upper-bound estimate of the average concentration for each contaminant, but in some cases, it may be the maximum detected concentration. A summary of the exposure point concentrations for the COCs in groundwater can be found in Table 1 of Appendix IX to this ROD, while a comprehensive list of the exposure point concentrations for all COPCs can be found in the BHHRA.

TOXICITY ASSESSMENT

Under current EPA guidelines, the likelihood of carcinogenic risks and noncancer hazards as a result of exposure to site chemicals are considered separately. Consistent with current EPA policy, it was assumed that the toxic effects of 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 noncarcinogens, respectively.

The Integrated Risk Information System (IRIS) database is relied upon for toxicity data for the human health risk assessment. This information for the COCs is presented in Table 3 (noncancer toxicity data summary) and Table 4 of Appendix IX (cancer toxicity data summary). Additional toxicity information for all COPCs is presented in the BHHRA.

RISK CHARACTERIZATION

Noncarcinogenic risks were assessed using a hazard index (HI) approach, based on a comparison between expected contaminant intakes at the Site 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 at the Site (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 hazard quotients for all compounds within a particular medium that may impact a particular receptor population.

The HQ for oral and dermal exposures is calculated 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 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 then calculated for those chemicals which 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 noncancer health effects on a specific target organ. The HI provides 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 these chemicals for each exposure pathway is contained in Table 5 of Appendix IX.

Table 5 presents a summary of the HIs for the future adult/child resident and the future worker. The total HI for both the future adult/child resident and future worker are above EPA's threshold of 1. The exceedance of the total HI for the future residential adult/child is primarily because of TCE, PCE, and cis-1,2-DCE in groundwater. The exceedance of the total HI for the future adult worker is primarily as a result of TCE and PCE in groundwater. Surface water exposure did not result in an HI above 1.

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 assessment. Again, as stated in the NCP, the point of departure is 10^{-6} and the acceptable risk range for site-

related exposure is 1 x 10^{-6} to 1 x $10^{-4.}$

A summary of the estimated cancer risks are presented in Table 6 of Appendix IX. Risks and hazards were evaluated for the potential future exposure to groundwater and surface water. The populations of interest included adult site workers and residential adults and children. The cancer risks exceeded EPA's acceptable ranges for the future residential adult/child (4 x 10^{-3}) and future worker (3 x 10^{-4}) for exposure to groundwater. These cancer risks are primarily associated with PCE, TCE and Vinyl chloride. Surface water exposure resulted in cancer risks that were below or within the EPA acceptable ranges.

Vapor Intrusion

The potential for vapors to volatilize from contaminated groundwater into buildings that are situated over the groundwater plume was evaluated as a removal action during the OU1 RI. Elevated soil gas concentrations of TCE and PCE were detected under several buildings (three commercial buildings and two residential properties). One of the residential properties also had a slight exceedance of the indoor air screening value for TCE. Vapor intrusion in the source area was addressed in the OU-1 remedy. The vapor intrusion pathway in the residential area is considered part of OU-2 and will be monitored.

UNCERTAINTIES

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 the following:

- environmental data
- environmental parameter estimation
- toxicity values
- risk characterization

Two of the primary sources of uncertainty identified in the HHRA were associated with exposure parameters and toxicological data. Uncertainty in exposure parameters was related to the calculation of EPCs and the parameter values used to estimate chemical intake.

Another important source of uncertainty was toxicological data. The toxicity factors used in the quantitative evaluation of potential risks and hazards were primarily selected from IRIS. For many chemicals, there is a lack of appropriate information on effects in humans (i.e., epidemiologic studies). Therefore, animal studies are generally used to develop toxicity values in human health risk assessments, which may under- or over-estimate potential risks and hazards.

More specific information concerning uncertainty in the health risks is presented in the baseline human health risk assessment report.

ECOLOGICAL RISK ASSESSMENT

A screening-level ecological risk assessment was conducted to evaluate the potential for ecological

risks from the presence of contaminants in surface soil. That SLERA focused on evaluating the potential for impacts to sensitive ecological receptors to Site-related constituents of concern through exposure to surface water, sediment, and pore water from Guanajibo River. Surface soil, surface water, sediment, and pore water concentrations were compared to ecological screening values as an indicator of the potential for adverse effects to ecological receptors. A complete summary of all exposure scenarios can be found in the SLERA.

SURFACE WATER

There is a potential for adverse effects to ecological receptors (invertebrates, reptiles, amphibians, birds, and mammals) from exposure to surface water in the Guanajibo River. The surface water screening criteria were exceeded for metals (aluminum, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel, silver, vanadium, and zinc) and three volatile organic compounds (chloroform, toluene, and TCE), which resulted in HIs greater than the acceptable threshold value of 1. The metals were not considered to be Site-related and were not selected as COCs. The elevated concentration of TCE in surface water was located near a drainage area adjacent to Retiro Industrial Park, in an area with limited viable habitat. Therefore, no adverse effects on survival, growth, and/or reproduction of aquatic organisms is expected to occur, and no COCs were identified for surface water.

SEDIMENT

There is a potential for adverse effects to ecological receptors (invertebrates, reptiles, amphibians, birds, and mammals) from exposure to sediment in the Guanajibo River. The surface soil screening criteria were exceeded for metals (antimony, cadmium, chromium, cobalt, copper, cyanide, iron, lead, manganese, nickel, silver, and zinc), which resulted in HIs greater than the acceptable threshold value of 1. However, none of the metals were considered to be Site-related, therefore there were no COCs selected for sediment from the Guanajibo River.

PORE WATER

There is a potential for adverse effects to ecological receptors (invertebrates, reptiles, amphibians, birds, and mammals) from exposure to pore water in the Guanajibo River. The surface soil screening criteria were exceeded for metals (aluminum, barium, chromium, cobalt, copper, iron, lead, manganese, nickel, and vanadium), which resulted in HIs greater than the acceptable threshold value of 1. However, none of the metals were considered to be Site-related, therefore there were no COCs selected for pore water from the Guanajibo River.

Based on the results of the ecological risk assessment, no remedial action is necessary to protect ecological receptors.

BASIS FOR TAKING AN ACTION

In summary, volatile organic compounds, specifically TCE, PCE, cis-1,2-DCE, and vinyl chloride in groundwater at the Site contributed to unacceptable risks and hazards to future residents. Based on the results of the human health assessments, the response action selected for OU-1 in this ROD

is necessary to protect the public health or welfare of the environment from actual or threatened releases of hazardous substances into the environment.

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), to-be-considered (TBC) guidance, and site-specific risk-based levels. The Site-related contaminants are the following chlorinated ethenes and their degradation products: PCE, TCE, cis-1,2-DCE, 1,1-DCE, and vinyl chloride. These five VOCs were detected the most frequently and at the highest concentrations in groundwater during the OU-1 and OU-2 RIs.

The contaminated media identified at this Site include soil, groundwater, and soil vapor. The soil contamination at the Wallace and CCL property source areas and the highly contaminated groundwater in the shallow saprolite zone in the vicinity of the two identified source areas are addressed under the OU-1 remedy selected in December 2015.

This OU-2 remedy addresses the Site-wide groundwater contaminant plume, including contaminated groundwater below the saprolite zone within the source area footprint. Site-related contaminants were also detected in surface water samples collected in a small drainage channel on the northeastern side of the former CCL Label and former Baytex buildings. This surface water contamination is expected to be addressed through the remediation of soil and shallow saprolite zone groundwater as part of the OU-1 remedy. No site-related contaminants were detected in any surface or pore water samples located in Guanajibo River during OU-2. Therefore, surface water will not be targeted for active remediation.

To protect human health and the environment, the following OU-2 RAOs have been identified.

The RAOs for OU-2 groundwater are:

- Prevent or minimize unacceptable risk from future exposure (via direct contact, ingestion, or inhalation) to contaminated groundwater attributable to the Site
- Restore groundwater to drinking water quality
- Reduce or eliminate the potential for migration of contamination above drinking water standards.

REMEDIATION GOALS

To meet the RAOs, remediation goals (RGs) were developed to aid in defining the extent of contamination requiring remedial action. Remediation goals are typically chemical-specific measures for each media and/or exposure route that, if attained, are expected to be protective of human health and the environment. In this case, groundwater remediation goals were developed to aid in defining the extent of contaminated groundwater that would require remedial action under OU-2. They are derived based on comparison to ARARs, risk-based levels, and background

concentrations, with consideration also given to other requirements such as analytical detection limits, guidance values, and other pertinent information.

Groundwater at the Site is classified as SG (which includes all groundwater as defined in Puerto Rico's Water Quality Standards Regulation [May 2016]), suitable for drinking water use, and it is used as a potable water supply source in areas outside of the contaminated plume. Since Puerto Rico does not have promulgated drinking water standards, the federal drinking water standards are relevant and appropriate requirements. Table 7 presents the RGs for groundwater at this Site.

Table 7
Remediation Goals for Groundwater

Site Contaminants	Remediation Goals (µg/L)
Tetrachloroethene (PCE)	5
Trichloroethene (TCE)	5
cis-1,2-Dichloroethene	70
Vinyl Chloride	2
1,1-Dichloroethene	7

Based on the currently available data, vapor intrusion into downgradient structures has not been observed. However, vapor accumulation underneath buildings is occuring. Vapor mitigation systems in the two identified source areas were part of the OU-1 remedy. Periodic sampling of any downgradient structures will be conducted and concentrations beneath the slab and in the indoor air will be compared to the appropriate vapor intrusion screening levels (VISLs). The suitable sub-slab contaminant-screening criteria and indoor air concentration threshold requiring mitigation will be based on EPA VISL guidance for residential properties and will be used to monitor sub-slab and indoor air quality over time.

EPA anticipates the implementation of the remedy will overlap with the already selected OU-1 remedy.

DESCRIPTION OF THE ALTERNATIVES

Remedial alternatives were assembled by combining the retained remedial technologies and process options for the contaminated media in OU-2. The time frames presented below for each alternative reflect only the time required to construct or implement the remedy and do not include the time required to design the remedy, negotiate the performance of the remedy with any potentially responsible parties, if applicable, or procure contracts for a federally funded design and construction. The precise timeframe to achieve RAOs in the groundwater is dependent on remediation of the source areas and plume core. Therefore, long-term groundwater monitoring is necessary to ensure that RAOs are achieved at the Site

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.

Common Elements

There are several common elements that are included in all the remedial alternatives, except the no action alternative (Alternative 1). These common elements are described here in more detail and referred to, generally, in Alternatives 2 and 3, below.

Pre-Design Work

A pre-design investigation (PDI) would be conducted as part of the remedial design of either Alternative 2 or 3. A PDI would be conducted to delineate the vertical extents of the treatment zone in the saprolite and unstable bedrock zone. Additional monitoring wells would be installed at the Wallace property source area, the CCL property source area, nd selected downgradient areas where the treatment system would be installed.

Institutional Controls

Institutional controls are required with Alternative 2 and 3 to restrict the use and exposure to contaminated groundwater until the contaminant levels are reduced to the RGs or no longer pose any risks to human health. The types of institutional controls employed to prevent exposure to contaminated groundwater could include restrictions on installation of drinking water wells and restrictions on groundwater use at locations within the contaminated areas. The effectiveness of selected institutional controls would depend on their continued implementation. The reliability of institutional controls depends on the ability to enforce them and the availability of resources to monitor compliance with the restrictions.

More information about Institutional Controls can be found at:
http://www.epa.gov/fedfac/pdf/ic_ctzns_guide.pdf.

Long-term Groundwater and Vapor Monitoring of the Plume Fringe

Long-term monitoring would be conducted at the leading edge of the plume, referred to as the plume fringe, which includes monitoring contamination in the fractured bedrock aquifer and the deep unstable bedrock zone below the active treatment area. The monitoring program would involve periodic collection of groundwater samples for the evaluation of contaminant migration, MNA and continued protection of human health and the environment.

Once the active treatment in the plume core (where concentrations of either PCE or TCE exceed 100 µg/L) is complete, any remaining low contamination in the plume fringe (where concentrations of these contaminants are between 5 µg/L and 100 µg/L) and in the overall plume would also be included under the long-term monitoring and MNA program.

Groundwater monitoring data would also be used for the evaluation of possible areas of vapor accumulation underneath structures. Sub-slab and indoor air samples would be collected periodically for vapor VOC analysis. Vapor mitigation systems would be installed as necessary.

Supplemental Considerations

Five-Year Reviews

Section 121(c) of CERCLA requires that any remedy resulting in contaminants remaining above levels that would otherwise allow for unrestricted use and unlimited exposure must be reviewed at least once every five years. While this requirement is statutorily required and not part of a selected remedy, if as a result of such a review, additional remedial actions are determined to be necessary to remove, treat, or contain the contamination, they can be required. For remedial actions where unrestricted use and unlimited exposure is the remedial objective, it may be many years before the activities achieve that objective. It is EPA policy, in those circumstances, to conduct five-year reviews until remediation goals are achieved.

EPA expects that the OU-2 remedy selected for this Site will require more than five-years for the it to attain the RGs; however, because the OU-1 and OU-2 remedies are expected to be closely aligned, five-year review for the two Ous will be comprehensively addressed. EPA would conduct five-year reviews for OU-1 until RAOs are achieved within the source area and for OU-2 until RAOs are achieved in groundwater.

EPA Region 2 Clean and Green Policy

The environmental benefits of any selected remedy may be enhanced by giving consideration, during the design, to technologies and practices that are sustainable in accordance with EPA Region 2 Clean and Green Energy Policy. This will include consideration of green remediation technologies and practices. Some examples of practices that would be applicable are those that reduce emissions of air pollutants, minimize fresh water consumption, incorporate native vegetation into re-vegetation plans, and consider beneficial reuse and/or recycling of materials, among others.

Remedial Alternatives

The three alternatives that were developed as part of the OU-2 FS for the Site-wide groundwater are described below.

Alternative 1 – No Action

The Superfund regulations require that a "no-action" alternative be considered for comparison with the other alternatives. This serves as a baseline for comparison to active remedial alternatives. As indicated, under this alternative, no remedial action would be taken to address conditions found to be present at OU-2. Alternative 1 costs and time frames are presented in Table 8.

Table 8
Alternative 1 Cost Summary

Capital Cost	$0
Present Worth Operation and Maintenance Cost	$0
Total Present Worth Cost	$0
Timeframe to meet RAOs	Will not meet RAOs

Alternative 2 – Groundwater Extraction, Ex Situ Treatment, and MNA

Under this alternative, groundwater extraction wells would be installed at the Retiro Industrial Park and at the downgradient portion of the plume core to intercept the contaminant plume and minimize further plume migration. The major components of this alternative are as follows:

- PDI
- RD
- Installation of groundwater extraction wells in the plume core
- Construction of pipeline and groundwater treatment system.
- Operation and maintenance (O&M) of the groundwater extraction and ex situ treatment system (air stripping, vapor-phase GAC, and liquid-phase GAC)
- Monitoring of the plume fringe to evaluate migration and natural attenuation
- Institutional controls
- For cost estimating purposes, it is assumed the treatment zone is from ground surface to 20 feet bgs.

Under this alternative, groundwater extraction wells would be installed in the plume core to remove contaminated groundwater to minimize the downgradient migration of contaminants and facilitate the cleanup of the contaminant plume over the long term. For the FS, an analytical groundwater flow calculation was conducted to estimate the required number of extraction wells and the necessary extraction rates. This would be updated through the performance of a PDI and be used to simulate groundwater extraction and determine the locations and number of necessary extraction wells, the extraction well screen intervals, and the groundwater extraction rates.

Groundwater that is reinjected back into the aquifer would be required to meet Puerto Rico Water Quality Standards, which are developed to prevent the degredation of surface and groundwater from discharges, and they are a potential action-specific ARAR to the extent that a remedial alternative (such as this Alternative 2) includes treatment and discharge of groundwater into the environment.

Groundwater extraction wells would also be installed in the downgradient portion of the plume core to intercept the contaminant plume and minimize further plume migration. It is assumed that vertical extraction wells would be installed in two areas of the plume core. It is expected that an extraction well fence would be installed at the northern portion of the Wallace property, immediately downgradient of the Wallace property source areas, and at the CCL property source area (Line #1). Another extraction well fence would be installed along Calle 2 and Calle B (Line #2).

Wells at Line #1 would consist of well clusters screened in the saprolite and unstable bedrock zone. Wells at Line #2 would be screened across the lower saprolite and the upper unstable bedrock zone. For cost-estimating purpose, 29 extraction wells are assumed for this alternative. It is also assumed that these wells would be 6-inches in diameter and installed using a mud rotary drilling method. All the wells would be installed flush mounted, with a traffic-rated vault. While the plume core and an area downgradient of that core would be actively remediated under this alternative, the plume fringe would be monitored for protection of human health and the environment.

Groundwater extraction effluent lines would be combined into a common header and then routed to a groundwater treatment system. There are several vacant buildings at the Site. For this FS, it is assumed that the vacant former Baytex building would be modified and rented to house the groundwater treatment system. The treatment train would typically include bag filters, air stripper, and vapor-phase activated carbon. The treated water could be re-injected into the aquifer, discharged to a surface drainage channel, if sufficient capacity is available, or discharged to the local POTW if the POTW is willing to accept the flow. In the FS, it was assumed that the treated water would be discharged to the local POTW.

Routine O&M of the groundwater extraction wells and ex situ treatment system may include periodic redevelopment or cleaning of groundwater extraction wells, change of bag filters, cleaning of air stripper and change of vapor-phase GAC media. Water and vapor samples would be collected in accordance with O&M requirements and permit requirements.

Costs associated with alternative 2 are presented in Table 9.

Table 9
Alternative 2 Cost Summary

Capital Cost	$ 7,800,000
Present Worth O&M Cost	$13,900,000
Total Present Worth Cost	$21,700,000
Construction Time Frame	2.5 -3 years
Timeframe to meet RAOs	Greater than 30 years

Alternative 3 – In Situ Treatment and MNA

Under this alternative, in situ treatment would be conducted at the Wallace and CCL properties and in the downgradient portion of the plume core. The conceptual approach for this alternative involves recirculating bioremediation amendment at the Wallace and CCL properties and installing two biobarriers in the plume core. Other approaches may be developed during the RD. The major components of this alternative include the following:

- PDI
- RD
- In situ treatment in the plume core

- Monitoring of the plume fringe to evaluate migration and natural attenuation
- Institutional controls

In situ bioremediation is assumed to be the in situ treatment technology. In situ treatment consists of the following:

- Enhance Anaerobic Bioremediation (EAB) recirculation system at the Wallace and CCL properties source areas.
- Two in situ treatment barriers downgradient of the source area.

For cost estimating purposes, the FS assumed that the EAB treatment would be carried out using groundwater recirculation systems at the Wallace and former CCL Label areas. The systems would consist of a mix of vertical and horizontal wells based on accessibility. The vertical groundwater extraction wells would be installed on the downgradient side of the Wallace building and the former CCL Label areas to extract groundwater; the extracted groundwater would be amended with organics and nutrients, then injected into injection wells on the upgradient side. Up to three horizontal wells upgradient of MW-2S and five vertical injection wells to the east of Wallace are assumed to be installed to treat groundwater contamination at Wallace.

For cost estimating purposes, the FS assumed that two treatment barriers would be installed using either horizontal or vertical injection wells to intercept the contaminant plume and minimize contaminant migration (see figures 8 and 9). Both horizontal and vertical injection wells were considered for cost estimating in this area. While installation of horizontal wells would require a large staging area and enough distance for the lead pipe to be drilled to the target depth, vertical injection wells need to be spaced approximately 30 feet apart; thus, if the vertical wells approach is chosen, a large number of vertical wells would be required. It is estimated that 60 vertical injection wells would be necessary to cover the same area as two horizontal wells in the plume core. The installation of 60 vertical injection wells would likely cause disruption to the local community for an extended period. Figure 8 presents the conceptual approach using two horizontal injection wells; Figure 9 presents the conceptual approach using vertical injection wells. The orientation of the injection wells will be evaluated in a PDI.

During the RD, additional evaluation of the feasibility of mobilizing a rig for vertical well installation south of Wallace and the availability of space for staging horizontal well drilling equipment would be further evaluated. A wide range of amendments are commercially available, such as EVO, whey, LactOil™, or Plume Stop™, that would remain effective for 2 years or longer. A pilot study would be conducted at a location feasible for the installation of a full-scale treatment barrier to collect site-specific design parameters such as injection rate, radius of influence, longevity of the amendment, and the number of expected injections.

The plume core would be actively remediated under this alternative, and the plume fringe would be monitored for groundwater contamination and SVI for the protection of human health and the environment.

Costs associated with alternative 3 are presented in Table 10.

Table 10
Alternative 3 Cost Summary

Capital Cost	$13,300,000
Present Worth O&M Cost	$4,000,000
Total Present Worth Cost	$17,300,000
Construction Time Frame	4 years
Timeframe to meet RAOs	30 years or longer

EVALUATION OF REMEDIAL ALTERNATIVES

In selecting a remedy, EPA considers the factors set out in CERCLA Section 121, 42 U.S.C. § 9621, by conducting a detailed analysis of the viable remedial alternatives in accordance with the NCP, NCP Section 300.430(e)(9)(iii), and the EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-01. The detailed analysis consists of an assessment of each alternative against each of nine evaluation criteria and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

The following "threshold" criteria are the most important and must be satisfied by any alternative in order for the alternative to be eligible for selection:

1. *Overall protection of human health and the environment* addresses whether a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. *Compliance with ARARs* addresses whether a remedy would meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and regulations or provide grounds for invoking a waiver. Other federal or state advisories, criteria, or guidance are to be considered. The NCP recognizes that a TBC may be used to determine what is protective of a site or how to carry out certain actions or requirements.

The following five "primary balancing" criteria are used to make comparisons and to identify the major tradeoffs between alternatives:

3. *Long-term effectiveness and permanence* refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

4. *Reduction of toxicity, mobility, or volume through treatment* is the anticipated performance of the treatment technologies, with respect to these parameters, that a remedy may employ.

5. *Short-term effectiveness* addresses the period needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup levels are achieved.

6. *Implementability* is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. *Cost* includes estimated capital, O&M, and present worth costs.

The following "modifying" criteria are used in the final evaluation of the remedial alternatives after the formal comment period, and they may prompt modification of the proposed remedy that was presented in the Proposed Plan:

8. *State acceptance* indicates whether, based on its review of the RI/FS report, Human Health and Ecological Risk Assessment, and Proposed Plan, the State concurs with, opposes, or has no comment on the proposed remedy.

9. *Community acceptance* refers to the public's general response to the alternatives and the proposed remedy based on the RI/FS Reports, the Human Health and Ecological Risk Assessments, and their descriptions in the Proposed Plan.

A comparative analysis of the alternatives considered in this ROD, based upon the evaluation criteria noted above, follows.

COMPARATIVE ANALYSIS OF ALTERNATIVES

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 because no action would be taken. Without the implementation of institutional controls, human exposure to site contamination would not be prevented. Even though the soil and highly contaminated groundwater at the two identified source areas serving as sources for groundwater contamination would be treated under OU-1, contaminants at levels as high as thousands of µg/L have migrated downgradient, and natural attenuation is limited, especially in the larger PCE plume. Under Alternative 1, no mechanisms would be implemented to reduce the toxicity, mobility, and volume (T/M/V) of the contamination except through natural processes that would not be monitored to assess the effectiveness or predict the duration of this alternative.

Alternatives 2 and 3 would be effective in protecting human health and environment. Institutional controls would prevent future human exposure to groundwater contamination. Alternative 2 would remove contaminants through groundwater extraction and ex situ treatment; Alternative 3 would destroy contaminants in the subsurface. Overtime, the entire contaminant plume would be remediated. Both Alternatives 2 and 3 would achieve the groundwater RAOs. However, the rate of contaminant removal by the groundwater extraction and ex situ treatment system of Alternative 2 would likely take longer to reach an asymptotic level than Alternative 3 because the rate of contaminant removal by groundwater extraction in Alternative 2 would be limited by diffusion-controlled processes. Alternative 3 is expected to achieve the RGs at a faster rate than Alternative 2.

Compliance with ARARs

Alternative 1 would not achieve chemical-specific ARARs or RGs. Location- and action-specific ARARs would not apply with Alternative 1 because no remedial action would be conducted. Because Alternative 1 does not meet this threshold criteria, it is not evaluated further in this analysis. Alternatives 2 and 3 are anticipated to satisfy the chemical-specific ARARs by achieving the RGs in the future and would be designed and implemented to comply with location- and action specific ARARs. Location-specific-ARARs will be met by using floodplain management during the design and implementation of the selected remedy, as both alternatives propose subsurface disturbance within the 0.2-and 1%-annual chance flood hazard zones. Wetlands and archeological zones in the area will not be impacted with the proposed subsurface disturbance.

Long-Term Effectiveness and Permanence

Alternatives 2 and 3 would provide long-term effectiveness because they combine treatment, long-term monitoring, MNA, and institutional controls to protect human health and the environment. For Alternative 2, contaminants would be extracted and treated ex situ. The rate of contaminant removal is expected to be slower than Alternative 3 because groundwater extraction and treatment could not be as focused in the source areas where the original releases of contaminants appear to have occurred because of space and logistical constraints. The technology proposed in Alternative 3 would be easier to target areas with the highest contamination, and it is expected to result in a lower volume of residual concentrations of contaminants than Alternative 2.

Even though the sources of groundwater contamination in the vadose zone and shallow saprolite would be treated under OU-1, there are most likely residual, high levels of contamination in the unstable bedrock zone, especially at the Wallace property, which would require a long time to be flushed out by natural groundwater flow.

Alternative 3 is expected to provide additional long-term effectiveness because it would target the area where the original contaminant releases have had the greatest adverse impact—the saprolite and unstable bedrock zone below the OU-1 source areas—and would destroy the contaminants in situ. As mentioned above, the residual contaminant concentrations are expected to be lower under Alternative 3 than Alternative 2.

Alternative 2 uses proven technology to remove contaminated groundwater from the subsurface, and it is reliable. However, the residual contaminant concentrations could be higher than the RGs for a long time because this technology tends to have reduced efficacy on contaminant removal in the long-term. Alternative 3 uses innovative technologies that have been tested in full-scale field application (i.e., implemented at other remediation sites). In situ bioremediation technology has been demonstrated to be effective at many sites and reliable in reducing contaminant mass in the source areas and in the contaminant plume.

Vertical injection wells have been successfully implemented at many sites and using horizontal wells for amendment injection has also been proved to be effective. The reliability of institutional controls under Alternatives 2 and 3 would rely on local government enforcement and the

understanding and willingness of residents to comply with intuitional controls.

The effectiveness of the aspects of these alternatives would be assessed through routine groundwater monitoring under the remedy and statutorily required five-year reviews.

Reduction of Toxicity, Mobility, and Volume Through Treatment

Both Alternatives 2 and 3 would reduce toxicity, mobility, and volume through treatment. Alternative 2 would remove contaminated groundwater and treat it ex situ, whereas Alternative 3 would biologically or chemically treat and destroy contamination in situ.

The extent and effectiveness of toxicity, mobility, and volume reduction would need to be verified with monitoring results. It is expected that Alternative 3 would have higher toxicity, mobility, and volume reduction than Alternative 2 because Alterative 3 would target the area and vertical zones directly below the contamination sources being addressed under the OU-1 remedy, and in situ treatment is generally more effective than groundwater extraction in reducing contamination.

Short-Term Effectiveness

There would be short-term impacts to the local community and Site workers for Alternatives 2 and 3 because of the active remedial actions undertaken and associated construction, operation, and maintenance activities. Alternative 2 would require the installation of a large number of vertical groundwater extraction wells and a transmission pipeline through a densely populated residential community, which would impact residents' daily life.

Alternative 3 is assumed to use horizontal wells for amendment injection, which would have much less impact to the local community. However, if vertical injection wells are used under Alternative 3, it would involve the installation of a larger number of wells than Alternative 2, which could have a greater impact on the local community. Alternative 3 also involves the presence of an amendment injection crew and equipment, potentially in the residential community. Under Alternatives 2 and 3, careful planning and public communication would be required for implementation to minimize negative impacts to the local community.

Impact from collecting groundwater samples from Site-wide monitoring wells for the long-term monitoring and MNA program would be minimal. For Alternatives 2 and 3, air monitoring, engineering controls and appropriate personal protective equipment would be used to protect the community and workers from any exposure to contamination.

The construction period for Alternative 2 is estimated to be 2.5 to 3 years, including an initial 1 year for system startup, testing, and optimization operation. O&M of the groundwater extraction wells and the groundwater treatment system is expected to be much longer than the 30-year-period usually projected in an FS.

The construction period for Alternative 3 is estimated to be 4 years, assuming the in situ treatment at the Retiro Industrial Park would be conducted first, prior to at the downgradient plume area. It is also assumed that one round of replenishment of amendment for the treatment zones would be

required after the initial amendment injection, after which the entire contaminant plume would be under a long-term monitoring program, which may be required for 30 years or longer.

Implementability

Alternatives 2 and 3 would be constructible and operable because services, materials, and experienced vendors would be available. Alternative 2 would require installation of a large number of wells and interconnecting piping through a residential neighborhood, which would require acceptance and coordination with the community. Drilling and installation of a large number of extraction wells in the unstable bedrock zone would be challenging as a result of potential borehole collapse; however, mud rotary or sonic drilling methods may mitigate this concern. Alternative 2 also requires space for a treatment plant, which could use existing vacant buildings and should not be a significant implementability issue.

Construction of Alternative 2 would require a thorough survey of utilities, and the implementation needs to be designed so as to avoid interruption or damage to utilities. Ex situ treatment equipment, such as the air stripper, might need to be manufactured and shipped from off the island. Currently, the local publicly owned treatment works (POTW) is operating under the designed capacity. With the appropriate permits and approvals, the treated water may be able to be discharged to the local POTW.

For implementing Alternative 3, horizontal injection wells are assumed in this FS for cost estimating purposes. Experienced vendors are available for the installation of horizontal wells for amendment injection. However, the equipment and crews for horizontal well installation and amendment injection would likely need to be transported from off the island. Under Alternative 3, potential disruption to existing utilities by horizontal well drilling and installation is minimal because the horizontal wells would be installed at a deep depth at which utilities would be unlikely to be present. Horizontal well installation would require one or two large staging areas. Currently, there are large open spaces available to serve as the staging areas; permission to use those areas would likely be obtainable. During the remedial design, an evaluation of whether to use vertical injection wells or horizontal injection wells would be performed to determine a cost-effective approach. If vertical injection wells are used, a larger number of vertical wells would be required for Alternative 3 than for Alternative 2, and careful well installation would be required so as to not impact utilities.

For both Alternatives 2 and 3, health and safety measures would be implemented to protect the local community and the construction workers. Equipment and working hours that would minimize the impact of construction noise would be utilized. The time for construction activities would also be scheduled to minimize impact to the local community to the extent practical.

Cost

The cost estimates for all alternatives are provided using a seven percent discount rate. The cost estimates for all three alternatives are provided in Table 11.

Table 11
Alternatives Costs

Alternative	Capital Cost	Present Worth O&M Cost	Total Present Worth Cost
1	$ 0	$0	$0
2	$7,800,000	$ 13,900,000	$21,700,000
3	$13,300,000	$4,000,000	$17,300,000

State/Support Agency Acceptance

The Commonwealth of Puerto Rico concurs with the selected remedy. A copy of the concurrence letter is included in Appendix X.

Community Acceptance

All the alternatives were made available for the community to review and comment. The preferred alternative was presented to the community in the Proposed Plan. A public comment period (July 12, 2019, to August 11, 2019) was established to allow the community to review and comment on all the alternatives and the preferred alternative. In addition, a public meeting was held on July 30, 2019. EPA's response to public comments received during the comment period is presented in the Responsiveness Summary of this ROD, included as Attachment VII. In response to a request for a public period comment extension, EPA extended the public comment period to September 10, 2019.

PRINCIPAL THREAT WASTES

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a Site whenever practicable (NCP Section 300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. Source material includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for the migration of contamination to groundwater, surface water, or air, or act as a source for direct exposure. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present significant risk to human health or the environment should exposure occur. The principal threat concept is applied to the characterization of source materials at a Superfund site.

In the OU-1 remedy, it was determined that at both the Wallace and CCL properties, PCE and TCE concentrations have been detected in groundwater samples, indicating contaminants have migrated into the shallow saprolite zone and the deeper fractured bedrock zone below. Soil source areas found in the vadose zone and extending below the water table into the saturated soil in the shallow saprolite zone contain large contaminant mass. Therefore, PCE and TCE contamination in these source areas fits the definition of principal threat waste and would require remediation through treatment, where practicable. The selected soil alternative for the OU1 remedy for the vadose zone and the shallow saprolite at the Wallace and CCL properties rely on treatment to address the principal threats.

Contaminated groundwater generally is not considered to be a source material. The OU-2 contamination in the core and fringes of the plume is not considered principal threat waste.

SELECTED REMEDY

SUMMARY OF THE RATIONALE FOR THE SELECTED REMEDY

Based upon the requirements of CERCLA, the results of the Site investigations, detailed analysis of the alternatives, and public comments, EPA has determined that Alternative 3 satisfies the requirements of CERCLA Section 121, 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, set forth at 40 CFR §300.430(e)(9), as described below. The principal components of the selected remedy are described below:

Alternative 3 – In Situ Treatment and MNA. The remedy includes the following components:

- PDI
- RD
- In situ treatment at the two identified source areas and in the plume core
- Monitoring of the plume fringe to evaluate migration and natural attenuation
- Institutional controls

DETAILED DESCRIPTION OF THE SELECTED REMEDY

Under this alternative, in situ treatment would be conducted at the Wallace and CCL properties and in the downgradient portion of the plume core. The conceptual approach for this alternative involves recirculating a bioremediation amendment at Wallace and CCL properties and installing two biobarriers in the plume core.

The plume core would be actively remediated under this alternative, and the plume fringe would be monitored for groundwater contamination and SVI to assess natural attenuation and for the protection of human health and the environment. The selected alternative would be coordinated with the OU-1 source zone remedy to provide efficient remediation overall at the Site.

PDI

A PDI would be conducted to delineate the vertical extents of the treatment zone in the unstable bedrock zone at the Wallace property and the vertical and lateral extents of the treatment zone in saprolite and in the unstable bedrock downgradient.

Because the cost of the PDI would be incurred during the RD phase, the cost for the PDI will not be included as part of the RA cost.

A pilot study would be conducted at a location feasible for the installation of a full-scale treatment barrier to collect information to gauge Site-specific design parameters such as injection rate, radius

of influence, longevity of the amendment, and the number of expected injections.

Remedial Design

Data obtained during the RI, PDI, and pilot study would be used to develop the detailed approach for Site remediation during the design to meet the requirements set in the OU-2 ROD. All aspects necessary for implementing the remedial action would be considered, including selection of locations for the in situ treatment, the configuration of in situ treatment system, the construction sequence, the regulatory requirements, and an estimate of the RA cost.

The cost for the RD will not be included as part of the RA cost.

In Situ Treatment at the Plume Core

During the RD, in situ treatment technologies and treatment configurations will be evaluated and/or refined to provide the most cost-effective remedy.

In situ bioremediation is assumed to be the in situ treatment technology. In situ treatment consists of the following:

- Enhance Anaerobic Bioremediation (EAB) recirculation system at the Wallace and CCL properties source areas.
- Two in situ treatment barriers downgradient of the source area.

EAB Recirculation System at the Wallace Property and the CCL Property Source Areas

For cost estimating purposes, it is assumed that the EAB treatment would be carried out using groundwater recirculation systems at the Wallace property and CCL property source areas. The systems would consist of a mix of vertical and horizontal wells based on accessibility. The vertical groundwater extraction wells would be installed on the downgradient side of the Wallace facility building and the CCL property source areas to extract groundwater; the extracted groundwater would be amended with organics and nutrients, then injected into injection wells on the upgradient side. Up to three horizontal wells upgradient of MW-2S and five vertical injection wells to the east of the Wallace facility building are assumed to be installed to treat groundwater contamination at the Wallace property. Vertical injection wells upgradient of MW-2S were considered; however, because of active overhead powerlines and the difficulty in accessing the area south of the Wallace property, installation of vertical wells in this area would require further evaluation. Instead, horizontal injection wells were proposed in the FS as the most feasible option for amendment delivery upgradient of MW-2S at the south side of the Wallace property. Further evaluation of installing vertical wells to the south of the Wallace property a using low-profile mini-sonic rig could be conducted during the RD. Six vertical injection wells and four vertical extraction wells are assumed for the CCL property source area. Groundwater extraction wells and injection wells would be screened in the saprolite and unstable bedrock zones.

Treatment in the saprolite would be conducted in coordination with OU-1 remedy. Monitoring wells between the extraction wells and injection wells as well side gradient would be installed as

part of OU-2 to monitor amendment distribution and treatment progress. Depending on the delineated
extents of the target treatment zone, the recirculation operation may take place for months or a year. Samples from the extraction wells would be collected periodically to test for total organic carbon (TOC). Furthermore, the addition of organics in the injection solution might be intermittent to minimize clogging of the injection wells. For the FS, it was assumed that a soluble organic amendment would be used to facilitate its distribution across the treatment zone, especially below the Wallace building. During the RD, available amendment would be fully evaluated to select the most suitable amendments.

In Situ Treatment Barriers

For cost estimating purposes, it was assumed that two treatment barriers would be installed using either horizontal or vertical injection wells to intercept the contaminant plume and minimize contaminant migration. Both horizontal and vertical injection wells were considered for cost estimating in this area. While installation of horizontal wells would require a large staging area and enough distance for the lead pipe to be drilled to the target depth, vertical injection wells would need to be spaced approximately 30 feet apart; thus, if the vertical well approach is utilized, a large number of vertical wells would be required. It is estimated that 60 vertical injection wells would be necessary to cover the same area as two horizontal wells in the plume core. The installation of 60 vertical injection wells would likely cause disruption to the local community for an extended period.

A wide range of amendments are commercially available, such as EVO, whey, LactOil™, or Plume Stop, that would remain effective for 2 years or longer. A pilot study would be conducted at a location feasible for the installation of a full-scale treatment barrier to collect information to gauge Site-specific design parameters such as injection rate, radius of influence, and longevity of the amendment. The pilot study using a horizontal well at a downgradient location would also be performed during the RD. Design parameters obtained from the pilot study to be conducted for the in situ treatment component of the OU-1 remedy may also be used if vertical injection wells are designed. Monitoring wells would be installed upgradient and downgradient of the treatment barriers for performance evaluation.

In Situ Treatment Performance Evaluation

Groundwater samples would be collected periodically to evaluate the effectiveness of in situ treatment. Groundwater samples would be analyzed for VOCs, TOC, and MNA parameters such as nitrate/nitrite, ferrous iron, sulfate, methane, ethene, and ethane. Additionally, groundwater purging parameters, such as dissolve oxygen, oxidation-reduction potential, pH, temperature, and conductivity would be recorded. The biological community stimulated by the injected amendment would be analyzed. The results of in situ treatment performance monitoring and a long-term monitoring and MNA evaluation program for the plume fringe would be reviewed together to determine if additional amendment delivery would be necessary.

RATIONALE FOR THE SELECTED REMEDY

EPA has determined that Alternative 3 provides the best balance of tradeoffs among the alternatives considered based on the information available to EPA at this time. EPA has determined that the selected remedy will treat principal threats, be protective of human health and the environment, comply with ARARs, be cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. DNER, on behalf of the Commonwealth, concurs with that determination. The selected remedy also would meet the statutory preference for the use of treatment as a principal element.

While the two active alternatives can achieve similar levels of protectiveness, the short-term occupant disruptions and implementability challenges of Alternative 2 are substantially greater than for Alternative 3. Alternative 3 is also expected to achieve the PRGs at a faster rate than Alternative 2. Alternative 3 is expected to provide additional long-term effectiveness because it would target the area where the original contaminant releases have had the greatest adverse impact—the saprolite and unstable bedrock zone below the OU-1 source areas—and would destroy the contaminants in situ. The residual contaminant concentrations are expected to be lower under Alternative 3 than Alternative 2.

It is expected that Alternative 3 would have a higher toxicity, mobility, and volume reduction than Alternative 2 because Alterative 3 would target the area and vertical zones directly below the contamination sources under OU-1, and in situ treatment is generally more effective than groundwater extraction in reducing contamination.

The environmental benefits of the selected remedy may be enhanced by consideration, during the design, of technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green Energy Policy. This would include consideration of green remediation technologies and practices.

SUMMARY OF THE ESTIMATED SELECTED REMEDY COSTS

The estimated capital, O&M, and present worth costs of the components of the selected remedy is discussed in detail in the 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.

The capital, O&M, and present worth costs for the selected remedy are presented in Table 12 of Appendix IX. The estimated cost of Alternative 3 is $4.4 million less than that of Alternative 2.

EXPECTED OUTCOMES OF SELECTED REMEDY

The selected remedy for OU2 actively addresses PCE, TCE, vinyl chloride, cis-1,2-DCE and 1,1-DCE in the Site-wide groundwater. The results of the risk assessment indicate that these contaminants pose an unacceptable human health risk and/or exceed drinking water standards. The

response action selected in this ROD will address contaminated groundwater exceeding the RGs and, thereby, will eliminate the unacceptable risks associated with these exposure pathways, and will restore groundwater to its designated use.

STATUTORY DETERMINATIONS

CERCLA Section 121(b)(1) mandates that a remedial action must be protective to human health and the environment, be cost-effective, and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions that employ treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, or contaminants at the Site. CERCLA 121(d) further specifies that a remedial action must attain a degree of cleanup that satisfies ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA 121(d)(4). For the reasons discussed below, EPA has determined that the selected remedy meets the requirements of CERCLA Section 121.

Protection of Human Health and the Environment

The selected remedy will protect human health and the environment because it will address the Site-wide groundwater contaminated plumes. In addition, the selected remedy is expected to provide additional long-term effectiveness because it would target the area where the original contaminant releases have had the greatest adverse impact—the saprolite and unstable bedrock zone below the two source areas identified in the OU-1 RI-- and would destroy the contaminants in situ.

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

Compliance with ARARs

The selected remedy is anticipated to satisfy the chemical-specific ARARs by achieving the RGs in the future and would be designed and implemented to comply with location- and action-specific ARARs. Location-specific-ARARs will be met by using floodplain management during the design and implementation of the selected alternative, as the alternative will result in subsurface disturbance within the 0.2-and 1%-annual chance flood hazard zones. Wetlands and archeological zones in the area will not be impacted by the proposed subsurface disturbance.

The remedy will meet the RGs and will be protective of the environment by addressing site-wide groundwater contaminated plume. (Tables 13-15 of Appendix IX).

Cost Effectiveness

A cost-effective remedy is one which has costs that are proportional to its overall effectiveness (NCP Section 300.430(f)(1)(ii)(D)). Overall effectiveness is based on the evaluations of long-term effectiveness and permanence, reduction in toxicity, mobility, and volume through treatment, and short-term effectiveness. EPA evaluated the “overall effectiveness” of the alternatives that

satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination, namely long-term effectiveness and permanence; reduction in toxicity, mobility, and volume though treatment; and short-term effectiveness. Overall effectiveness was then compared to the cost of each alternative to determine cost-effectiveness.

Each of the alternatives underwent a detailed cost analysis. In that analysis, capital and O&M costs were estimated and used to develop present-worth costs. In the present-worth cost analysis, O&M costs were calculated for the estimated life of each alternative. The total estimated present-worth cost for implementing the selected remedy is $17,300.000.

Based on the comparison of overall effectiveness to cost, the selected remedy meets the statutory requirement that Superfund remedies be cost-effective (NCP Section 300.430(f)(1)(ii)(D)) in that it is the least-costly alternative that comprehensively addresses the site-wide groundwater contaminated plume and achieves the remediation goals within a reasonable time frame.

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

The selected remedy provides the best balance of tradeoffs among the alternatives with respect to the balancing criteria set forth in the NCP, at Section 300.430(f)(1)(i)(B), because it 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 removing contaminant mass with elevated levels of VOC concentrations in the source areas and in the contaminated plume. It is anticipated that the selected remedy will have the highest reduction of toxicity, mobility, and volume because it would target the area and the vertical zones directly below the contamination sources under OU-1.

Preference for Treatment as a Principal Element

In the selected remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied through the use of biological or chemical treatment to address the vertical zones directly below the contamination sources under the two source areas identified in the OU-1 RI, which will improve the groundwater conditions Site-wide.

Five Year Review Requirements

Alternatives resulting in contaminants remaining above levels that would otherwise allow for unrestricted use and unlimited exposure require that the Site be reviewed at least once every five years. If justified by the review, additional remedial actions may be considered to remove, treat, or contain the contamination. For remedial actions where unrestricted use and unlimited exposure is the remedial objective but the remedy may require many years to reach that objective, it is EPA's policy to conduct five-year reviews until remediation goals are achieved.

EPA expects that this Site will require more than five-years to remediate; however, because the OU-1 and OU-2 remedies are expected to be closely aligned, the five-year review for the two OUs will be comprehensively addressed. EPA will conduct five-year reviews for OU-1 until RAOs are achieved

within the source area in the soil and highly contaminated shallow groundwater and for OU-2 until RAOs are achieved in the sitewide groundwater.

DOCUMENTATION OF SIGNIFICANT CHANGES FROM PREFERRED ALTERNATIVE OF PROPOSED PLAN

The Proposed Plan for the Site was released for public comment on July 12, 2019, and the public comment period ran from that date through September 10, 2019. The Proposed Plan identified Alternative 3, the selected remedy, as the preferred alternative for the Site.

All written and verbal comments submitted during the public comment period were reviewed by EPA. See the Responsiveness Summary set forth in Attachment VII. Upon review of these comments, EPA has determined that no significant changes to the proposed remedy, as it was originally identified in the Proposed Plan, is necessary.

APPENDIX I

PROPOSED PLAN
San German Groundwater Contamination Superfund Site

OU-2

San German Groundwater Contamination Superfund Site (OU-2)

San German, Puerto Rico
July 2019

EPA Region 2

EPA ANNOUNCES PROPOSED CLEANUP PLAN

This Proposed Plan describes the remedial alternative developed for the San German Groundwater Contamination Superfund Site (the Site) OU-2 in San German, Puerto Rico, and identifies the preferred remedy for the Site with the rationale for this preference. This document was developed by the U.S. Environmental Protection Agency (EPA), the lead agency for Site activities, in consultation with the Puerto Rico Environmental Quality Board (PREQB), 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, 42 U.S.C. § 9617(a) (CERCLA, commonly known as Superfund) and Sections 300.430(f) and 300.435(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

The nature and extent of the contamination at the Site and the remedial alternatives summarized in this document are described in detail in the OU-2 Remedial Investigation (RI) and Feasibility Study (FS) reports. EPA is addressing the Site in two operable units (OUs). OU-1 addresses soil contamination that acts as a continuing source of groundwater contamination, including soil in the vadose zone (above the water table), and soil and highly contaminated groundwater below the water table in the shallow saprolite zone (soils and highly weathered rock). The OU-1 ROD was signed in December 11, 2015 and called for Soil Vapor Extraction (SVE) and Dual Phase Extraction (DPE)/In Situ Treatments at the properties currently operated by Wallace and formerly occupied by CCL. OU-2 addresses the

MARK YOUR CALENDAR

PUBLIC MEETING
July 30, 2019 at 5:00 pm
Santa Marta Basketball Court, San German

PUBLIC COMMENT PERIOD
July 12, 2019 - August 11, 2019

INFORMATION REPOSITORY
The administrative record file, which contains copies of the Proposed Plan and supporting documentation, is available at the following locations:
San German City Hall
Hours: Monday – Friday 9:00 am to 3:00 pm

U.S. Environmental Protection Agency
City View Plaza II- Suite 7000
#48 PR-165 Km. 1.2
Guaynabo, PR 00968-8069
(787) 977-5865
Hours: Monday – Friday 9:00 am to 5:00 pm
By appointment.

Puerto Rico Environmental Quality Board
Emergency Response and Superfund Program
Edificio de Agencias Ambientales Cruz A. Matos
Urbanización San José Industrial Park
1375 Avenida Ponce de León
San Juan, PR 00926-2604
(787) 767-8181 ext 3207
Hours: Monday – Friday 9:00 am to 3:00 pm
By appointment.

U.S. EPA Records Center, Region 2
290 Broadway, 18th Floor
New York, New York 10007-1866
(212) 637-4308
Hours: Monday-Friday – 9:00 am to 5:00 pm
By appointment.
EPA's website for the San German Ground Water Contamination site:
https://www.epa.gov/superfund/san-german-groundwater

site-wide groundwater contaminated plume and is the subject of this action.

Two locations in the Retiro Industrial Park, which is owned by the Puerto Rico Industrial Development Company, were identified as source areas for the groundwater contamination. They are currently occupied by Wallace International de P.R., Inc. (Wallace), and a vacant lot formerly occupied by CCL Insertco de PR (CCL). These lots will be referred to as the Wallace and former CCL lots in this document.

EPA's preferred remedy for the Site OU-2 is Alternative 3 – In Situ Treatment and Monitored Natural Attenuation.

This remedy also includes long-term monitoring for vapor intrusion and institutional controls that would restrict the use and exposure to contaminated groundwater until the contaminant levels are reduced to the Preliminary Remedial Goals (PRGs) or no longer pose any risks to human health and ecological receptors.

COMMUNITY ROLE IN SELECTION PROCESS

EPA relies on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, this OU-2 Proposed Plan has been made available to the public for a 30-day public comment period, which begins with the issuance of this Proposed Plan and concludes on August 11, 2019.

EPA is providing information regarding the investigation and cleanup of the Site to the public through a public meeting and the public repositories, which contain the administrative record file. EPA encourages the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted there.

The public meeting to be held during the comment period is to provide information regarding the Site investigations, the alternatives considered and the preferred remedy, as well as to receive public comments. Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary Section of the OU-2 Record of Decision (ROD), the document that formalizes the selection of the remedy.

Written comments on this Proposed Plan should be addressed to:

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SCOPE AND ROLE OF ACTION

EPA is addressing the cleanup of this Site in two phases, OU-1 and OU-2. This is the second (OU-2) planned remedial action for the Site, addressing the site-wide groundwater contaminated plume not included in the OU-1 remedy. OU-2 is comprised of the core of the plume, which is where concentrations of VOCs are greater than 100 micrograms per liter (µg/L) of either PCE or TCE and the fringe of the plume where concentrations of these contaminants are between 100 and 5 µg/L.

SITE BACKGROUND

Site Description

The Site is located in San German, in southwestern Puerto Rico (Figure 1). Volatile organic compounds (VOCs) were detected above federal drinking water standards, called Maximum Contaminant Levels (MCLs), in three public water supply wells, Retiro, Lola Rodriguez de Tio I (Lola I), and Lola Rodriguez de Tio II (Lola II), located south of the Guanajibo River, between Routes 139 and 360 (Figure 2). These wells were part of the Puerto Rico Aqueduct and Sewer Authority (PRASA) San German Urbano Water system, which includes a

total of seven wells and two surface water intakes.

The Retiro, Lola I, and Lola II wells acted as an independent interconnected supply system with approximately 800 service connections serving approximately 2,280 users in 2005 when VOCs were detected. The Site includes Retiro Industrial Park approximately one-half mile to the southeast of the affected supply wells that has been shown to be the source of the VOCs (Figure 2). Several of the buildings in the industrial park are occupied by active businesses that were investigated during the RI. Only Wallace and former CCL are considered sources of groundwater contamination.

Site History

From 2001 to 2005, groundwater samples collected by PRASA from the Retiro, Lola I, and Lola II wells regularly exhibited detectable concentrations of tetrachloroethene (PCE) and *cis*-1,2-dichloroethene (cis-1,2-DCE). The maximum concentrations of PCE and cis-1,2-DCE detected in these wells during this period were 6.4 µg/L and 1.2 µg/L, respectively.

On January 17, 2006 the Puerto Rico Department of Health (PRDOH) ordered the closure of the Retiro well due to PCE concentrations exceeding the federal MCL of 5 µg/L. PCE was also detected in tap water samples collected from the water distribution system. The Lola I and Lola II wells were taken out of service at about the same time.

EPA added the San German Groundwater Contamination Site to the National Priorities List (NPL) on March 19, 2008, because chlorinated solvents were found in groundwater that supplies drinking water for local residents.

On December 11, 2015 EPA issued the OU-1 ROD. The OU-1 ROD addresses soil contamination that acts as a continuing source of groundwater contamination, including soil in the vadose zone (above the water table), and soil and highly contaminated groundwater below the water table in the shallow saprolite zone (soils and highly weathered rock). Currently EPA is conducting the remedial design (RD) for OU-1.

Topography and Drainage

The municipality of San German is located in the eastern part of the Guanajibo River floodplain. The three closed public supply wells are located adjacent to the river on the south side, at an approximate elevation of 138 feet above mean sea level. The Guanajibo River flows west through the municipality of San German and is the major surface water body in the area.

Geology

The study area lies within the eastern part of the Guanajibo River floodplain, which is bounded to the north and south by highlands of predominantly igneous rocks and serpentinite. Bedrock is overlain by alluvial deposits in the Guanajibo River valley and is generally encountered at the surface in the highlands, and at depths up to 100 feet below the ground surface (bgs) in the river valley.

Within the well field, the serpentinite is encountered at 30 feet bgs. The geologic units exposed or underlying the study area are described below, from youngest to oldest.

- Alluvium Soils (Quaternary) – Alluvial deposits, also known as the overburden, occur in the Guanajibo River valley and along tributaries, and are made up of sand, clay, and gravel. Deposits are generally less than 100 feet thick.
- Saprolite – This unit is composed of saturated sands, silts, clays, and highly weathered rock with an increasing percentage of rock fragments with depth.
- Unstable Zone – A highly fractured and unstable layer, possibly composed of the underlying serpentinite, is found below the saprolite.
- Serpentinite or Serpentinized Peridotite (late Jurassic and early Cretaceous age or older) - highly fractured and faulted.

Hydrogeology

The aquifer within the study area is part of the Guanajibo River alluvial valley. Groundwater is first encountered in the saprolite (sands, silts, clays and weathered rock) and the depth to water ranges from river level at the Río Guanajibo to about 15 to 25 feet bgs. Groundwater occurs under confined to semi-confined conditions within the saprolite and the unstable bedrock zone.

Flow in the saprolite and bedrock is toward the northwest from the two main source areas in the industrial park. Groundwater flow measured after Hurricane María (in September 2017) exhibited a slightly more northerly trend in upgradient portions of the study area, and water elevations increased by as much as 4.59 feet in MW-14, near the center of the study area. Water level elevations between saprolite and bedrock zone well clusters generally show a slight upward hydraulic gradient.

Land Use

The San German municipality is comprised of 54.51 square miles with a population of 35,527 and a population density of 651.8 people per square mile (United States Census 2010). The primary land use in the vicinity of the San German Site is agricultural with some residential, commercial, and light industrial development. The area directly downgradient of the source areas is densely populated with residential and commercial development. The land use is expected to remain unchanged in the future. There are currently seven water supply wells serving the public connected to the San German Urbano water system. The Retiro, Lola I, and Lola II wells previously functioned as an independent, interconnected supply system, with approximately 800 service connections serving approximately 2,280 users until they were removed from service in 2006.

Ecology

As the Site is comprised of residential, agricultural, commercial, and industrial developments, most undeveloped land parcels are situated along the Guanajibo River, the major surface water body in the area. The river valley is flanked to the north and south by uplands. The Guanajibo River flows from east to west through San German and is joined by smaller unnamed tributaries within the study area. One of these tributaries originates in the highlands southeast of the Site, and flows west, then north, toward the river. Little viable habitat is present within upland portions of the Site due to development. In general, the river banks are heavily vegetated and moderately to steeply sloped, depending on the reach. The majority of both the north and south banks of the river within the area of the Site have been subjected to disturbance activities associated with development. Ecological studies associated with the Site focused primarily on areas adjacent to the River. No known occurrences of listed rare, threatened, and/or endangered species or critical habitats have been identified.

EARLY SITE INVESTIGATIONS

2006 to 2008 - EPA Activities

In June 2006 EPA collected groundwater samples from operational wells and analyzed for a wide range of chemicals, including pesticides, metals, VOCs and semivolatile organic compounds. This sampling reflected the presence of PCE (1.6 µg/L), cis-1,2-DCE (1.5 µg/L), and trichloroethene (TCE) (0.54 µg/L). In addition, PCE was detected at an estimated concentration (below the sample quantitation limit) in the Lola II well. EPA was unable to collect a sample from the Retiro well because the pump was removed in February 2006 as part of the response to PRDOH's closure order.

In July 2006, EPA conducted reconnaissance activities at 44 industrial sites in the San German area as part of a Site Discovery Initiative to identify hazardous waste sites that could be potential sources of contamination. This led to the identification of several locations in San German that were investigated further as part of EPA's Site studies.

NATURE AND EXTENT OF CONTAMINATION

The nature and extent of contamination in Site media was assessed during the OU-1 and OU-2 RI by collecting and analyzing samples and then comparing analytical results to federal, commonwealth, and site-specific screening criteria. Groundwater PCE and TCE plumes were identified during OU-1 evaluations in the saprolite zone originating in two source areas in Retiro Industrial Park; the contamination extended to the former supply wells approximately 3,300 feet to the northwest. Limited contamination was identified in the bedrock zone.

Separate plumes of PCE and TCE originated at the Wallace and former CCL Label source areas, respectively, and then co-mingled as the contaminated groundwater moved downgradient toward the northwest (Figure 3, Figure 4). The plumes and groundwater movement may have been influenced by pumping at the former supply wells when they were in operation (prior to 2006). Although the PCE and TCE plumes were co-mingled, TCE was more dominant on the northern side of the plumes. The TCE observed at and downgradient of the Wallace source area may be a result of biodegradation of the PCE, or TCE may have also been used in the Wallace buildings as part of the industrial processes.

Contaminants selected to represent Site contamination in OU-2 are consistent with those from OU-1: PCE, TCE, cis-1,2-DCE, 1,1-dichloroethene (1,1-DCE), and vinyl chloride. These five VOCs were detected the most frequently, and at the highest levels, in source area soil samples and other affected media including groundwater. These chemicals include chlorinated solvents and degradation products of those solvents. The RI also investigated the Site for the presence of Site contaminants in the form of nonaqueous phase liquids. Site contaminants are chlorinated VOCs that are denser than water, so are also referred to as dense nonaqueous phase liquids (DNAPLs) at certain concentrations. DNAPL has not been observed at the Site.

The major OU-2 field activities included a Hydrological Investigation, Groundwater Sampling and Surface Water sampling. As part of the OU-2 RI, two rounds of groundwater and surface water sampling event were completed. In addition, after the passage of Hurricane Maria a sampling was conducted to observe whether the contaminant plumes had changed. Selected monitoring wells and irrigation wells were sampled in March 2018 to determine if the September 2017 hurricane resulted in changes to groundwater contamination.

The purpose of the OU-2 Remedial Investigation (RI) report was to refine the hydrogeologic framework, evaluate the nature and extent of site-wide groundwater contamination, update surface water conditions in the Río Guanajibo, and refine the conceptual site model (CSM) developed during the investigation of OU-1.

The results of the sampling events are discussed below.

Summary of Groundwater Contamination

As part of the OU-2 groundwater investigation, five monitoring wells in the saprolite zone and four monitoring wells in the unstable bedrock zone were installed to assesses groundwater contamination. The OU-2 Round 1 and Round 2 sampling event included all wells and ports: 14 shallow wells screened in the saprolite zone; 4 wells screened in the unstable bedrock zone; 1 single-screen bedrock well, 7 multiport bedrock wells, each with 2 to 5 ports (total of 25 ports) and irrigation well MW-C, which is only used for monitoring purposes and not for potable water (Figure 5). Wells completed in the saprolite zone contained the highest PCE and TCE levels, as well as the majority of the screening criteria exceedances.

- PCE and TCE were detected in 13 saprolite monitoring wells and the results exceeded the screening criteria in 11 and 6 wells, respectively.
- The highest PCE concentrations in the saprolite zone were located at, and just downgradient of, the Wallace source

area, at 16,000 µg/L (MW-2S), 2,400 µg/L (MW-4S), and 1,300 µg/L (MW-6S).

- PCE was detected in three of the four monitoring wells completed in the unstable bedrock zone, but the results exceeded the screening criterion in only MW-4UR (2,400 µg/L), located near the Wallace source area.
- In the bedrock aquifer, PCE was detected only in the top four ports in MPW-10, the furthest downgradient bedrock well; all concentrations were below the screening criterion, ranging from 0.65 µg/L to 2.8 µg/L.
- The highest TCE concentrations in the saprolite zone were at, and just downgradient of, the former CCL Label source area, at 680 µg/L (MW-3S) and 580 µg/L (MW-12).
- TCE was detected in all unstable bedrock wells and the results exceeded the screening criterion in three wells. The highest TCE concentration of 21 µg/L was in MW-14UR, located downgradient of the source areas but on the northern side where TCE is the more dominant contaminant. The remaining TCE exceedances were in MW-3UR (6.2 µg/L) and MW-4UR (13 µg/L). MW-3UR is located close to the former CCL Label source area and MW-4UR is close to the Wallace source area.
- TCE was detected at levels well below the screening criterion in five bedrock wells: MPW-3 (ports 2 and 3); MPW-5 (port 2); MPW-6 (ports 1, 2, and 3); MPW-7 (ports 3, 4, and 5); and MPW-10 (ports 3, 4, and 5). TCE concentrations ranged from 0.12J µg/L to 0.42J µg/L.
- Cis-1,2-DCE was detected in 13 saprolite wells, and the results exceeded the screening criterion in 4 wells. The highest cis-1,2-DCE concentration was detected in MW-12 (310 µg/L), located downgradient of the former CCL Label and Wallace source areas.
- Cis-1,2-DCE was detected in three unstable bedrock wells; concentrations in two of these wells exceeded the screening criterion (80 µg/L in MW-3UR and 96 µg/L in MW-14UR).
- Remaining cis-1,2-DCE exceedances were detected in MW-3S (100 µg/L) at the former CCL Label source area and in MW-4S (120 µg/L) and MW-5S (94 µg/L), downgradient of the two source areas.
- Cis-1,2-DCE was detected at levels well below the screening criterion in five bedrock wells: MPW-3 (all 5 ports), MPW-4 (1 of 3 ports), MPW-6 (2 of 3 ports), MPW-7 (all 5 ports), and MPW-10 (all 5 ports). cis-1,2-DCE concentrations ranged from 0.14J µg/L to 2.8 µg/L.
- Vinyl chloride was detected in seven saprolite wells and the results exceeded the screening criterion in four wells. The maximum vinyl chloride concentration of 12 µg/L was detected in MW-3S at the former CCL Label source area.
- Vinyl chloride was detected in two unstable bedrock wells and the results exceeded the screening criterion in one unstable bedrock well (2 µg/L in MW-3UR).
- Vinyl chloride was the only site-related contaminant to exceed its screening criterion in the bedrock aquifer; exceedances were detected only in MPW-3 (all ports, ranging from 1.2 µg/L to 26 µg/L).
- 1,1-DCE was detected in seven saprolite wells and the results exceeded the screening criterion in four wells; the highest concentration was in MW-4S, near the Wallace source area, at 41 µg/L.
- 1,1-DCE was detected in two unstable bedrock wells below the screening criterion.
- Similar to Round 1, the highest levels and the majority of exceedances of PCE and TCE in Round 2 were found in wells completed in the saprolite zone. Round 2 results were generally slightly higher than Round 1 results in the majority of wells.

- The irrigation well MW-C contained PCE (0.58 µg/L), TCE (1 µg/L), cis-1,2-DCE (5.3 µg/L), and vinyl chloride (0.024 J µg/L); all detections were well below the screening criteria.

The majority of PCE and TCE contamination in groundwater occurs in the saprolite zone and in the upper portion of the unstable bedrock zone. The highest contaminant levels occur near the two source areas, and the levels decrease as the plumes move downgradient and become more diluted. However, the two plumes differ in distribution and extent. The PCE plume, which is more extensive and at higher concentrations, is oriented toward the northwest, whereas the TCE plume is oriented toward the north/northwest. (Figure 7).

Several private residential wells were installed illegally in the residential area northwest of the Retiro Industrial Park. None of these wells are currently used for drinking water purposes since all the homes in the area have been connected to the PRASA public water supply system. Currently, some of these wells are used for irrigation purposes. Public awareness sessions to educate the community on the risks of using contaminated groundwater have been conducted and are ongoing.

Selected monitoring wells and newly discovered irrigation wells were sampled in March 2018 to determine if the September 2017 Hurricane Maria resulted in changes to groundwater contamination (Figure 6). Post-Hurricane María samples results generally indicated that this unusually strong storm had little impact on the overall contaminant plumes. Concentrations of PCE and TCE generally were similar to all other rounds of sampling, except at the Wallace source area where results for MW-2S showed an increase in PCE. Overall, concentrations of site-related contaminants are gradually decreasing although the areas of the plumes immediately downgradient of the two source areas remain well above screening criteria.

Monitored Natural Attenuation

Natural attenuation is the process by which contaminant concentrations are reduced by various naturally occurring physical, chemical, and biological processes. The main processes include biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological stabilization, transformation, or destruction of contaminants. These processes occur naturally, in-situ, and act to decrease the mass or concentration of contaminants in the subsurface. The groundwater geochemistry and the contaminant distribution in the PCE plume in the saprolite indicate that very limited naturally occurring reductive dechlorination is occurring. However, there is clear evidence of naturally occurring reductive dechlorination in the TCE plume and the portion of the commingled PCE and TCE plumes. Analytical data from MW-3S, MW-3UR, MPW-3, MW-12, MW-14, and MW-14UR demonstrate that the occurrence of anaerobic biodegradation of TCE is ongoing at the source areas, in the PCE and TCE commingled plumes, and in the bedrock portion of the aquifer. These wells show elevated concentrations of degradation products cis-1,2-DCE and vinyl chloride and detections of the degradation product ethene. The dissolved oxygen, nitrate, and ORP indicate favorable geochemical conditions for degradation at these wells. MW-3S in the source area has relatively high levels of ferrous iron and manganese and MW-14 has high ferrous iron, also indicating reducing conditions. Additionally, several years (2013 – 2018) of groundwater monitoring data indicate that the plume fringe is stable. Natural processes of reductive dechlorination, along with dilution and dispersion, are on-going and expected to continue to reduce concentrations in the future.

Summary of Surface Water/Sediment Contamination

- No site-related contaminants were detected in any surface water samples collected from the Río Guanajibo during OU-1 and OU-2 RI investigations.
- During OU-1 piezometer pore water sampling, PCE (at 0.77 µg/L) was detected in one sample at a concentration well below the screening criterion. This very low concentration of PCE detected during OU-1 sampling indicates that groundwater discharges to the Río Guanajibo.
- PCE was not detected in piezometer pore water samples collected during the OU-2 RI investigation.
- Site-related contaminants were detected in surface water samples collected in a small drainage ditch on the northeastern side of the former CCL Label building in the industrial park.
- PCE levels in these samples ranged from nondetect to 25 µg/L, with two exceedances, and TCE levels ranged from 4.6 to 58 µg/L, with three exceedances.
- Vinyl chloride levels, which ranged from 1.1 to 2.9 µg/L, exceeded the screening criterion in all samples.
- The maximum detections of cis-1,2-DCE and 1,1-DCE were 57 µg/L and 0.64 µg/L, respectively. These results are similar to those detected during OU-1.

EPA has a statutory preference to use treatment to address any principal threats posed by a site. Principal threat wastes are those source materials considered to be highly toxic or mobile that generally cannot be reliably contained or would present a significant risk to human health Contaminated ground water generally is not considered to be a source material. The contamination in the core and fringes of the plume is not considered principal threat waste.

SUMMARY OF SITE RISKS

The purpose of the risk assessment is to identify potential cancer risks and noncancer health hazards at the Site assuming that no further remedial action is taken. A risk assessment was performed to evaluate current and future cancer risks and noncancer health hazards based on the results of the RI. A screening-level ecological risk assessment was also conducted to assess the risk posed to ecological receptors due to Site-related contamination

Human Health Risk Assessment

As part of the RI/FS, a baseline human health risk assessment was conducted to estimate the risks and hazards associated with the current and future effects of contaminants on human health and the environment. A baseline human health risk assessment 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 under current and future land 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 is comprised of: Hazard Identification of Chemicals of Potential Concern (COPCs), Exposure Assessment, Toxicity Assessment, and Risk Characterization (see adjoining box “What is Risk and How is it Calculated”).

The baseline human health risk assessment began with selecting COPCs in the various media (i.e., groundwater, and surface water) that could potentially cause adverse health effects in exposed populations. The current and future land use scenarios included the following exposure pathways and populations:

- Residents (child/adult): future ingestion, dermal contact and inhalation of groundwater.
- Recreational (adolescent 12-18): current/future ingestion and dermal contact for surface water from the Rio Guanajibo.

Only future exposure to groundwater was considered since all residents are currently connected to public water. In this assessment, exposure point concentrations were estimated using either the maximum detected concentration of a contaminant or the 95% upper-confidence limit (UCL) of the average concentration. Chronic daily intakes were calculated based on the reasonable maximum exposure (RME), which is the highest exposure reasonably anticipated to occur at the Site. The RME is intended to estimate a conservative exposure scenario that is still within the range of possible exposures. A complete summary of all exposure scenarios can be found in the baseline human health risk assessment.

Groundwater

Risks and hazards were evaluated for the potential future exposure to groundwater. The populations of interest included adult workers and residential adults and children. The cancer risks were above the EPA acceptable ranges. The noncancer hazards were above the EPA threshold of 1. The COCs identified in the groundwater were TCE, PCE, vinyl chloride and cis – 1,2-DCE.

Table 1. Summary of hazards and risks associated with exposure to groundwater via ingestion, dermal contact and inhalation while bathing.

Receptor	Hazard Index	Cancer Risk
Worker – future	34	$3x10^{-4}$
Resident adult – future	317	$4.0x10^{-3}$
Resident child - future	289	
The COCs identified in the groundwater were PCE, TCE, vinyl chloride and cis-1,2-DCE.		

WHAT IS RISK AND HOW IS IT CALCULATED?

Human Health Risk Assessment:
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 in air, water, soil, etc. 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 and are referred to as Chemicals of Concern or COCs in the final remedial decision or Record of Decision.

Surface Water & Sediment

Risks and hazards were evaluated for the potential future exposure to surface water in the Rio Guanajibo. The population of interest included adolescent recreators. The cancer risks were below or within the EPA acceptable ranges. The noncancer hazards were below or slightly above the value of 1. Although the sum of the hazard quotients slightly exceeds 1 for the sediment pathway, no individual chemical or chemicals that act on the same target organ were above a value of 1. Therefore, there were no COCs identified in the surface water or sediment.

Vapor Intrusion

The potential for vapors to volatilize from contaminated groundwater into buildings that are over the groundwater plume was evaluated as a removal action during the OU1 investigation. Elevated soil gas concentrations of TCE and PCE were detected under several buildings (three commercial buildings and two residential properties). One of the residential properties also had a slight exceedance of the indoor air screening value for TCE. Vapor intrusion in the source area was addressed in the OU-1 ROD. The vapor intrusion pathway in the residential area is considered part of OU-2 and will continue to be monitored.

Ecological Risk Assessment

A screening-level ecological risk assessment (SLERA) was conducted to evaluate the potential for ecological risks from the presence contaminants in contaminated media. The SLERA focused on evaluating the potential for impacts to sensitive ecological receptors to site-related constituents of concern through exposure to surface soil on the properties and surface water, sediment, and pore water from Rio Guanajibo. Surface water, sediment and pore water concentrations were compared to ecological screening values as an indicator of the potential for adverse effects to ecological receptors. A complete summary of all exposure scenarios can be found in the SLERA.

Surface Water: There is a potential for adverse effects to ecological receptors (invertebrates, reptiles, amphibians, birds, and mammals) from exposure to surface water in the Rio Guanajibo. The surface water screening criteria were exceeded for metals (aluminum, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel, silver, vanadium and zinc) and three volatile organic compounds (chloroform, toluene and TCE), which resulted in HIs greater than the acceptable value of 1. Based on a review of the historic chemical usage at the Site (i.e., VOCs), the metals were not considered to be site-related and therefore metals were not selected as COCs. The elevated concentration of TCE in surface water was located near a drainage area adjacent to Retiro Industrial Park, in an area with limited viable habitat. Therefore, no adverse effects on survival, growth and/or reproduction of aquatic organisms are expected to occur and no COCs were identified for surface water.

Sediment: There is a potential for adverse effects to ecological receptors (invertebrates, reptiles, amphibians, birds, and mammals) from exposure to sediment in the Rio Guanajibo. The surface soil screening criteria were exceeded for metals (antimony, cadmium, chromium, cobalt, copper, cyanide, iron, lead, manganese, nickel, silver and zinc), which resulted in HIs greater than the acceptable value of 1. However, based on a review of the historical chemical usage at the Site (i.e., VOCs), the metals were not considered to be site-related and therefore there were no COCs selected for sediment from the Rio Guanajibo.

Pore Water: There is a potential for adverse effects to ecological receptors (invertebrates, reptiles, amphibians, birds, and mammals) from exposure to pore water in the Rio Guanajibo. The surface soil screening criteria were exceeded for metals (aluminum, barium, chromium, cobalt, copper, iron, lead, manganese, nickel and vanadium), which resulted in HIs greater than the acceptable value of 1. Based on a review of the historic chemical usage at the Site (i.e., VOCs), the metals were not considered to be site-related and therefore metals were not selected as COCs,

therefore there were no COCs selected for pore water from the Rio Guanajibo.

Based on the results of the ecological risk assessment no remedial action is necessary to protect the environment from actual or threatened releases of hazardous substances.

Risk Assessment Summary

Based on the results of the human health risk assessment, it is the lead agency'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 public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

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), to-be-considered (TBC) guidance and site-specific risk-based levels. The site-related contaminants are chlorinated ethenes and their degradation products, including PCE, TCE, cis-1,2-DCE, 1,1-DCE, and vinyl chloride. These five VOCs were detected the most frequently and at the highest concentrations in groundwater during the OU-1 and OU-2 RIs.

The contaminated media identified at this site include soil, groundwater and soil vapor. The soil contamination at the Wallace and former CCL Label source areas and the highly contaminated soil and shallow saprolite zone groundwater in the source areas are addressed under the ROD for OU-1 issued in December 2015.

This OU-2 action addresses the sitewide groundwater contaminant plume, including contaminated groundwater below the saprolite zone within the source area footprint.

Site-related contaminants were also detected in surface water samples collected in a small drainage channel on the northeastern side of the former CCL Label and former Baytex buildings. This surface water contamination is expected to be addressed through the remediation of soil and shallow saprolite zone groundwater as part of OU-1. No site-related contaminants were detected in any surface or pore water samples located in Río Guanajibo during OU-2. Therefore, surface water will not be targeted for active remediation.

Based on the currently available data, vapor intrusion into downgradient structures has not been observed. However, vapor accumulation underneath buildings is occuring. Vapor mitigation systems in the source area were part of the OU-1 remedy. Periodic sampling of any downgradient structures will continue and concentrations beneath the slab and in the indoor air will be compared to the appropriate vapor intrusion screening levels (VISLs). The suitable sub-slab contaminant-screening criteria and indoor air concentration requiring mitigation will be based on EPA VISLs guidance for residential properties and will be used to monitor sub-slab and indoor air quality over time.

To protect human health and the environment, the following OU-2 RAOs have been identified.

The RAOs for OU-2 groundwater are:

- Prevent or minimize unacceptable risk from exposure (via direct contact, ingestion, or inhalation) to contaminated groundwater attributable to the site
- Restore groundwater to drinking water quality
- Reduce or eliminate the potential for migration of contamination above drinking water standards

PRELIMINARY REMEDIATION GOALS

To meet the RAOs, Preliminary Remediation Goals (PRGs) were developed to aid in defining

the extent of contaminated groundwater that would require remedial action under OU-2. PRGs are chemical-specific remediation goals for each media and/or exposure route that are expected to be protective of human health and the environment. They have been derived based on comparison to ARARs and risk-based levels (human health and ecological), with consideration also given to other requirements such as analytical detection limits, guidance values and other pertinent information.

Groundwater at the Site is classified as SG (which includes all groundwater as defined in Puerto Rico's Water Quality Standards Regulation [May 2016]), suitable for drinking water use, and is used as a potable water supply source in areas outside of the contaminated plume. Therefore, federal drinking water standards are relevant and appropriate requirements. Puerto Rico Water Quality Standards are promulgated and applicable standards for this Site. Table 3 at the end of this Proposed Plan presents the PRGs for groundwater at this Site.

EPA expects the remedial alternatives considered in this Proposed Plan to comprehensively address groundwater contamination and achieve the remediation goals. EPA also expects the implementation of this action will overlap with the already selected OU-1 remedy.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA § 121(b)(1), 42 U.S.C. § 9621(b)(1), mandates that remedial actions must be protective of human health and the environment, be 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. CERCLA § 121(d), 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, which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA § 121(d)(4), 42 U.S.C. § 9621(d)(4).

The time frames presented below for each alternative reflect only the time required to construct or implement the remedy and do 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. The precise timeframe to achieve RAOs in the groundwater is dependent on remediation of the source areas and plume core. Therefore, long-term groundwater monitoring would ensure that RAOs are achieved at the Site

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.

Common Elements

There are several common elements that are included in all active remedial alternatives. The common elements listed below do not apply to the No Action alternatives.

Pre-Design Work

A pre-design investigation (PDI) would be conducted as part of the remedial design. A PDI would be conducted to delineate the vertical extents of the treatment zone in the saprolite and unstable bedrock zone. Additional monitoring wells would be drilled at the Wallace source area, the former CCL Label source area, and selected downgradient areas where the treatment system would be installed.

Institutional Controls

Institutional controls would be needed to restrict the use and exposure to contaminated groundwater until the contaminant levels are reduced to the PRGs or no longer pose any risks

to human health. The types of institutional controls employed to prevent exposure to contaminated groundwater could include restrictions on installation of drinking water wells and restrictions on groundwater use at locations within the contaminated areas. The effectiveness of selected institutional controls would depend on their continued implementation. The reliability of institutional controls depends on the ability to enforce them, availability of resources for inspections, and compliance with the restrictions.

More information about Institutional Controls can be found at: http://www.epa.gov/fedfac/pdf/ic_ctzns_guide.pdf

Long-term Groundwater and Vapor Monitoring of the Plume Fringe

Long-term monitoring would be conducted in the plume fringe, which includes monitoring contamination in the fractured bedrock aquifer and the deep unstable bedrock zone below the active treatment area. The monitoring program would involve periodic collection of groundwater samples for the evaluation of contaminant migration, MNA and continued protection of human health and the environment.

Once the active treatment in the plume core (where concentrations of either PCE or TCE exceed 100 µg/L) is terminated, any remaining low contamination in the plume fringe (where concentrations of these contaminants are between 5 µg/L and 100 µg/L) and in the overall plume would also be included under the long-term monitoring and MNA program. Based on multiple lines of evidence, monitored natural attenuation is expected to continue to reduce concentrations over time. The contaminant plume is located in a densely populated residential/commercial area and available locations for implementing treatment areas outside the plume core are limited. Additionally, targeting higher concentrations (i.e., 100 µg/L and higher) will address the highest contaminant mass.

Groundwater monitoring data would also be used for the evaluation of possible areas of vapor accumulation underneath structures. Sub-slab and indoor air samples would be collected periodically for vapor VOC analysis. Vapor mitigation systems would be installed as necessary.

Five-Year Reviews

Alternatives resulting in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, require that the Site be reviewed at least once every five years. If justified by the review, additional remedial actions may be considered to remove, treat, or contain the contamination. For remedial actions where, unrestricted use and unlimited exposure is the remedial objective, it may require many years to reach that objective. It is EPA policy to conduct five-year reviews until remediation goals are achieved.

EPA expects that this Site will require more than five-years to remediate; however, because the OU-1 and OU-2 remedies are expected to be closely aligned, the need for a five-year review will be comprehensively addressed. EPA would conduct five-year reviews for OU-1 until RAOs are achieved within the source area and for OU-2 until RAOs are achieved in groundwater.

EPA Region 2 Clean and Green Policy

The environmental benefits of the preferred remedy may be enhanced by giving consideration, during the design, to technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green Energy Policy.[1] This will include consideration of green remediation technologies and practices. Some examples of practices that would be applicable are those that reduce emissions of air pollutants, minimize fresh water consumption, incorporate

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

native vegetation into revegetation plans, and consider beneficial reuse and/or recycling of materials, among others.

Remedial Alternatives

The alternatives developed for the plume are described below. The selected alternative would be coordinated with the OU-1 source zone remedy to provide remediation of the overall site.

Remedial Alternatives

Alternative 1 – No Action

Capital Cost	$0
Present Worth O&M Cost	$0
Total Present Worth Cost	$0
Timeframe to meet RAOs	Will not meet RAOs

The No Action alternative is required by the NCP to be carried through the screening process. The No Action alternative would include no action being taken and serves as a baseline for comparison of remedial alternatives.

Alternative 2 – Groundwater Extraction, Ex Situ Treatment and MNA

Capital Cost	$ 7,800,000
Present Worth O&M Cost	$13,900,000
Total Present Worth Cost	$21,700,000
Construction Time Frame	2.5 -3 years
Timeframe to meet RAOs	Greater than 30 years

Under this alternative, groundwater extraction wells would be installed at the Retiro Industrial Park and downgradient portion of the plume core to intercept the contaminant plume and minimize further plume migration. The major components of this alternative are:

- PDI
- Remedial design (RD)
- Installation of groundwater extraction wells at the plume core
- Construction of pipeline and groundwater treatment system.
- O&M of the groundwater extraction and ex situ treatment system (air stripping, vapor-phase GAC and liquid-phase GAC)
- Monitoring of the plume fringe to evaluate migration and natural attenuation
- Institutional controls
- Five-year review
- For cost estimating purposes, it is assumed the treatment zone is from ground surface to 20 feet bgs.

Under this alternative, groundwater extraction wells would be installed in the plume core to remove contaminated groundwater to minimize contaminant downgradient migration and facilitate the cleanup of the contaminant plume over the long-term. The groundwater model developed during the RD would be updated as necessary and used to simulate groundwater extraction and determine the locations and numbers of extraction wells, the extraction well screen intervals, and the groundwater extraction rates. For the FS, an analytical groundwater flow calculation was conducted to estimate the number of extraction wells and the extraction rates.

It is assumed that vertical extraction wells would be installed in two areas of the plume core. It is expected that an extraction well fence would be installed at the north of Wallace, immediately downgradient of the Wallace source areas, and at the former CCL Label source area (Line #1). Another extraction well fence would be installed along Calle 2 and Calle B (Line #2).

Wells at Line #1 would consist of well clusters screened in the saprolite and unstable bedrock zone. Wells at Line #2 would be screened across the lower saprolite and the upper unstable bedrock zone. For cost-estimating purpose, 29 extraction wells are assumed for this alternative. It is also assumed that these wells would be 6-inch and installed using mud rotary drilling method. All the wells would be completed flush mount, with a traffic-rated vault.

The plume core would be actively remediated under this alternative, whereas the plume fringe would be monitored for continued protection of human health and the environment.

Alternative 3 – In Situ Treatment and MNA

Under this alternative, in situ treatment would be conducted at the Wallace and former CCL Label properties and in the downgradient portion of the plume core. The conceptual approach for this alternative involves recirculating bioremediation amendment at Wallace and former CCL Label facilitates and installing two biobarriers in the plume core. Other approaches may be developed during the RD. The major components of this alternative include:

- PDI
- RD
- In situ treatment at the plume core
- Monitoring of the plume fringe to evaluate migration and natural attenuation
- Institutional controls
- Five-year review

For cost estimating purposes, it was assumed that two treatment barriers would be installed using either horizontal or vertical injection wells to intercept the contaminant plume and minimize contaminant migration (see figures 8 and 9). Both horizontal and vertical injection wells were considered for cost estimating in this area. While installation of horizontal wells would require a large staging area and enough distance for the lead pipe to be drilled to the target depth, vertical injection wells would need to be spaced approximately 30 feet apart; thus, a large number of vertical wells would be required. It is estimated that 60 vertical injection wells would be necessary to cover the same area as two horizontal wells in the plume core. The installation of 60 vertical injection wells would likely cause disruption to the local community for an extended period of time. Figure 8 presents the conceptual approach using two horizontal injection wells; Figure 9 presents the conceptual approach using vertical injection wells. The orientation of the injection wells will be evaluated in the PDI.

A wide range of amendments are commercially available, such as EVO, whey, LactOil™, or

Capital Cost	$13,300,000
Present Worth O&M Cost	$4,000,000
Total Present Worth Cost	$17,300,000
Construction Time Frame	4 years
Timeframe to meet RAOs	30 years or longer

Plume Stop, that would last 2 years or longer. A pilot study would be conducted at a location feasible for the installation of a full-scale treatment barrier to collect site-specific design parameters such as injection rate, radius of influence, and longevity of the amendment.

The plume core would be actively remediated under this alternative, whereas the plume fringe would be monitored for continued protection of human health and the environment.

EVALUATION OF REMEDIAL ALTERNATIVES

The NCP lists nine criteria for evaluation and comparison of remedial alternatives. This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, and how each of the alternatives compares to the other options under consideration. Seven of the nine evaluation criteria are discussed below. The final two criteria, “State Acceptance” and “Community Acceptance” are discussed at the end of the document. A more detailed analysis of each of the alternatives is presented in the FS report.

Comparative Analysis of Alternatives

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 because no action would be taken. Without the implementation of

institutional controls, human exposure to site contamination would not be prevented. Even though the soil and highly contaminated groundwater at the source areas serving as sources for groundwater contamination would be treated under OU-1, contaminants concentrations downgradient of the source areas are still significantly elevated and would go untreated. Under Alternative 1, no mechanisms would be implemented to reduce the toxicity, mobility and volume of the contamination except through natural processes that would not be monitored to assess the effectiveness or predict the duration of this alternative.

Alternatives 2 and 3 would be effective in protecting human health and environment. Institutional controls would prevent future human exposure to groundwater contamination. Alternative 2 would remove contaminants through groundwater extraction and ex situ treatment; Alternative 3 would destroy contaminants in the subsurface. Over time, the entire contaminant plume would be remediated. Both alternatives would achieve the groundwater RAOs. However, the rate of contaminant removal by the groundwater extraction and ex situ treatment system would likely reach an asymptotic level in the long-term because the rate of contaminant removal by groundwater extraction would be limited by the complex geology at the site. Alternative 3 is expected to achieve the PRGs faster than Alternative 2.

Compliance with ARARs

Alternative 1 would not achieve chemical-specific ARARs or PRGs. Location- and action-specific ARARs would not apply with Alternative 1 because no remedial action would be conducted. Alternatives 2 and 3 are anticipated to satisfy the chemical-specific ARARs by achieving the PRGs in the future and would be designed and implemented to comply with location- and action-specific ARARs. Location-specific-ARARs will be met by using floodplain management during the design and implementation of the selected alternative, as both alternatives propose subsurface disturbance within the 0.2% and 1% annual chance flood hazard zones. Wetlands and archeological zones in the area will not be impacted with the proposed subsurface disturbance.

Long-Term Effectiveness and Permanence

Alternative 1, No Action, would not provide long-term effectiveness and permanence because no action would be implemented to reduce the level of contamination or the potential for exposure to contaminated groundwater to site receptors.

Alternatives 2 and 3 would provide long-term effectiveness because they combine treatment, long-term monitoring, MNA and institutional controls to protect human health and the environment. For Alternative 2, contaminants would be extracted and treated ex situ. The rate of contaminant removal is expected to be slower than Alternative 3 because groundwater extraction and treatment could not be as focused in the source areas where the original releases of contaminants occurred due to space and logistical constraints. The technology proposed in Alternative 3 would be easier to target areas with the highest contamination and is expected to result in lower residual concentrations of contaminants than Alternative 2.

Even though the sources of groundwater contamination in the vadose zone and shallow saprolite would be treated under OU-1, there are most likely residual high levels of contamination in the unstable bedrock zone, especially at Wallace, which would require a long time to be flushed out by natural groundwater flow.

Alternative 3 is expected to provide additional long-term effectiveness because it would target the area where original contaminant releases occurred—the saprolite and unstable bedrock zone below the OU-1 source areas—and would destroy the contaminants in situ. The residual contaminant concentrations are expected to be lower under Alternative 3 than Alternative 2.

Alternative 2 uses proven technology to remove contaminated groundwater from the subsurface

and is reliable. However, the residual contaminant concentrations could be higher than the PRGs for a long time because this technology tends to have reduced efficacy on contaminant removal in the long-term. Alternative 3 uses innovative technologies that have been tested in full scale field application (i.e. implemented at other remediation sites). In situ bioremediation technology has been demonstrated at many sites to be effective and reliable in reducing contaminant mass in the source areas and in the contaminant plume.

Using vertical injection wells has been implemented at many sites; using horizontal wells for amendment injection has also been tested at sites with effective results. The reliability of institutional controls under Alternatives 2 and 3 would rely on the enforcement of local government and the understanding and willingness of residents to comply with intuitional controls. The effectiveness of these alternatives would be assessed through routine groundwater monitoring and five-year reviews.

Reduction of Toxicity, Mobility, or Volume (T/M/V) Through Treatment

Alternative 1, No Action, would not reduce contaminant T/M/V because no remedial action would be conducted. Contaminant concentrations are expected to decrease over time due to remediation under OU-1 and natural attenuation, however.

Both Alternatives 2 and 3 would reduce T/M/V through treatment. Alternative 2 would remove contaminated groundwater and treat it ex situ, whereas Alternative 3 would biologically or chemically treat and destroy contamination in situ. The extent and effectiveness of T/M/V reduction would need to be verified with monitoring results. It is expected that Alternative 3 would have higher T/M/V reduction than Alternative 2 because Alterative 3 would target the area and vertical zones directly below the contamination sources under OU-1.

Short-Term Effectiveness

Under Alternative 1, the No Action alternative, there would be no short-term impact to the community, environment, and site workers as no remedial action would occur. There would be short-term impacts to the local community and site workers for Alternatives 2 and 3 due to the active remedial actions undertaken and associated construction, operation, and maintenance activities. Alternative 2 would require the installation of a large number of vertical groundwater extraction wells and a pipeline through a densely populated residential community, which would impact residents' daily life.

Alternative 3 is assumed to use horizontal wells for amendment injection, which would have much less impact to the local community. However, if vertical injection wells are used under Alternative 3, it would involve the installation of a larger number of wells than Alternative 2, which could have a greater impact on the local community. Alternative 3 also involves the presence of an amendment injection crew and equipment, potentially in the residential community, for amendment injection at least twice. Under Alternatives 2 and 3, careful planning and public communication would be required for implementation to minimize negative impacts to the local community.

Impact from collecting groundwater samples from sitewide monitoring wells for the long-term monitoring and MNA program would be minimal. For Alternatives 2 and 3, air monitoring, engineering controls, and appropriate personal protective equipment would be used to protect the community and workers from any exposure to contamination.

The construction period for Alternative 2 is estimated to be 2.5 to 3 years, including an initial 1 year for system startup, testing, and optimization operation. O&M of the groundwater extraction wells and the groundwater treatment system is expected to be much longer than the 30-year-period usually evaluated for an FS.

The construction period for Alternative 3 is estimated to be 4 years, assuming the in-situ treatment at the Retiro Industrial Park would be conducted first, then at the downgradient plume area. It is also assumed that one round of replenishment of amendment for the treatment zones would be required after 3 to 4 years of the initial amendment injection after which the entire contaminant plume would be under a long-term monitoring program, which may be required for 30 years or longer.

Implementability

Alternative 1, the No Action alternative, would be easiest to implement both technically and administratively as no additional work would be performed at the Site.

Alternatives 2 and 3 would be constructible and operable because services, materials, and experienced vendors would be available. Alternative 2 would require installation of a large number of wells and interconnecting piping through a residential neighborhood, which would require acceptance and coordination with the community. Drilling and installation of a large number of extraction wells in the unstable bedrock zone would be challenging due to potential borehole collapse; however, mud rotary or sonic drilling methods may mitigate this concern. Alternative 2 also requires space for a treatment plant, which could use existing vacant buildings and should not be an implementability issue.

Construction of Alternative 2 would require a thorough survey of utilities and the implementation needs to be designed to avoid interruption or damage to utilities. Ex situ treatment equipment, such as the air stripper, might need to be manufactured and shipped from the off the island. Currently, the local publicly owned treatment works (POTW) is operating under the designed capacity. With the appropriate permits and approvals, the treated water may be discharged to the local POTW.

For implementing Alternative 3, horizontal injection wells are assumed in this FS for cost estimating purposes. Experienced vendors are available for the installation of horizontal wells for chemical injection. However, the equipment and crews for horizontal well installation and amendment injection would need to be transported from off the island. Under Alternative 3, potential disruption to existing utilities by horizontal well drilling and installation is minimal because the horizontal wells would be installed at a deep depth at which most utilities would not be present. Horizontal well installation would require one or two large staging areas. Currently, there are large open spaces available to serve as the staging areas; permission to use those areas would likely be obtainable. During the remedial design, the use of vertical injection wells and horizontal injection wells would be evaluated to determine a cost-effective approach. If vertical injection wells are used, a larger number of vertical wells would be required for Alternative 3 than for Alternative 2, and careful well installation would be required so as to not impact utilities.

For both Alternatives 2 and 3, health and safety measures would be implemented to protect the local community and the construction workers. Equipment and working hours that would minimize impact of noise would be utilized. The time for construction would also be scheduled to minimize impact to local community to the extent practical.

Cost

The cost estimates for all alternatives are provided using a seven percent discount rate.

Alternative	Capital Cost	Present Worth O&M Cost	Total Present Worth Cost
1	$ 0	$0	$0
2	$7,800,000	$ 13,900,000	$21,700,000
3	$13,300,000	$4,000,000	$17,300,000

Commonwealth/Support Agency Acceptance

The PREQB concurs with the preferred remedy in this Proposed Plan.

Community Acceptance

Community acceptance of the preferred remedy will be evaluated after the public comment period ends and will be described in the Responsiveness Summary section of the ROD for this Site. The ROD is the document that formalizes the selection of the remedy for a site.

PREFERRED REMEDY

Alternative 3 (In Situ Treatment and MNA) is the preferred alternative for the OU-2. Under this alternative, in situ treatment would be conducted at the Wallace and former CCL Label properties and in the downgradient portion of the plume core. The conceptual approach for this alternative involved recirculating bioremediation amendment at Wallace and former CCL Label facilitates and installing two biobarriers at the plume core. The approach may be refined during the RD.

The plume core would be actively remediated under this alternative, whereas the plume fringe would be monitored for the continued protection of human health and the environment.

BASIS FOR REMEDY PREFERENCE

The Preferred Alternative is believed to provide the best balance of tradeoffs among the alternatives based on the information available to EPA at this time. EPA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA Section 121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element. The preferred alternative can change in response to public comment or new information.

The environmental benefits of the preferred remedy may be enhanced by consideration, during the design, of technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green Energy Policy. This would include consideration of green remediation technologies and practices.

Table 3
Preliminary Remediation Goals for Groundwater
San German Groundwater Contamination Site OU-2
San German, Puerto Rico

Site Contaminants	Puerto Rico Water Quality Standards (PRWQS)[1] (µg/L)	National Primary Drinking Water Standards (EPA MCLs)[2] (µg/L)	PRGs[3] (µg/L)	Maximum Detected Concentrations[4] (µg/L)	Well ID with Maximum Concentration[5]
Volatile Organic Compounds					
Tetrachloroethene	5	5	5	11,000	MW-2S
Trichloroethene	5	5	5	890	MW-3S
cis-1,2-Dichloroethene	NL	70	70	310	MW-12
Vinyl Chloride	0.25	2	0.25	29	MPW-3-P1
1,1-Dichloroethene	7	7	7	73	MW-4UR

Notes:

1. Puerto Rico Water Quality Standards (PRWQS) Regulation, Environmental Quality Board, Commonwealth of Puerto Rico, May 2016.
2. EPA National Primary Drinking Water Standards (web page), EPA 816-F-09-004, May 2009.
3. Based on the lower value between PRWQS and EPA MCLs.
4. The maximum concentrations detected at the Site during OU-2 remedial investigation.
5. Well ID associated with the maximum concentration detected at the Site during OU-2 remedial investigation.

Acronyms:

EPA - United States Environmental Protection Agency
MCLs - Maximum Contaminant Levels
NL - not listed
PRGs - Preliminary Remediation Goals
µg/L - microgram per liter

CDM Smith

Page 1 of 1

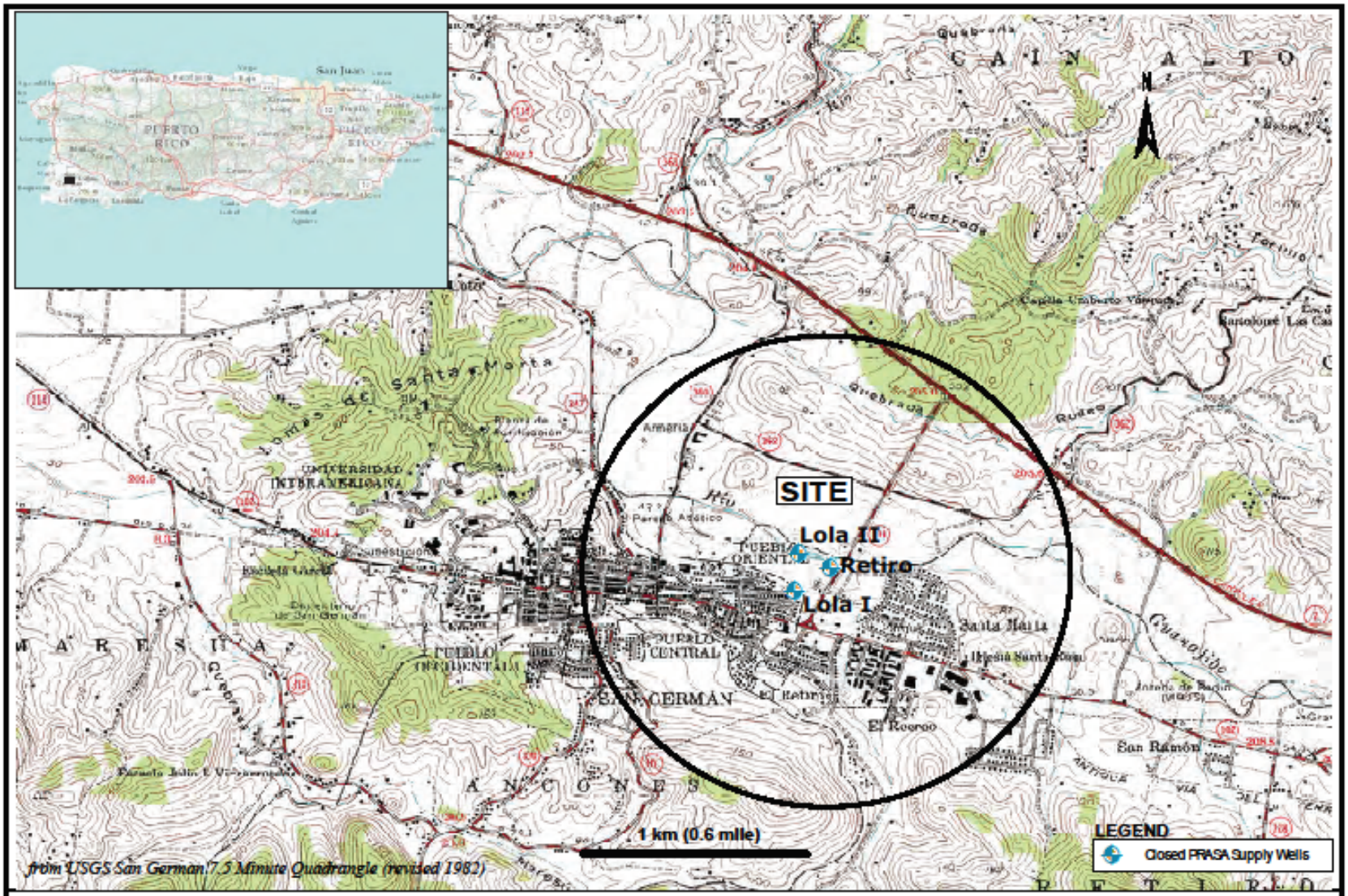
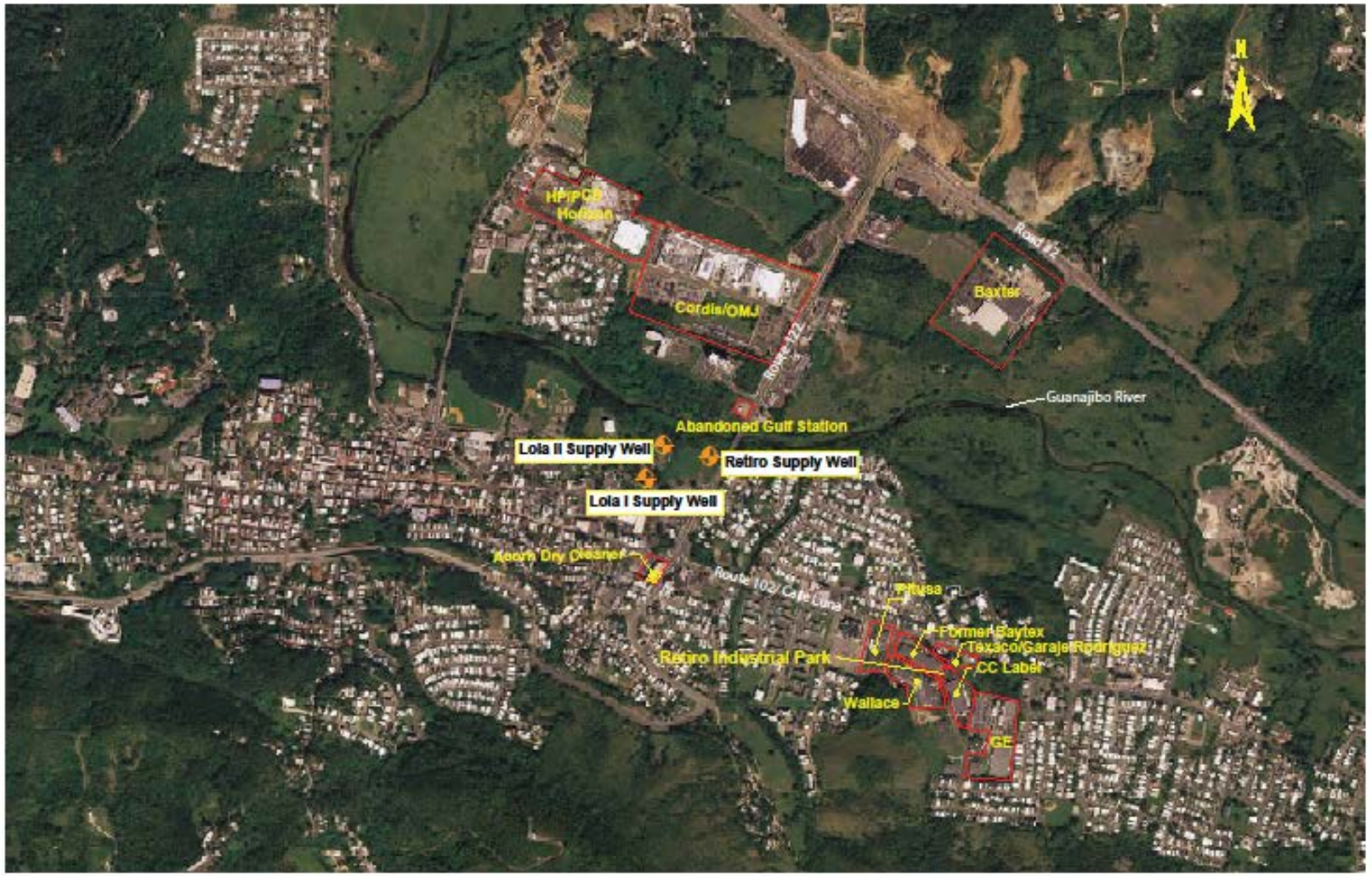


Figure 1
Site Location Map
San German Groundwater Contamination Site
San German, Puerto Rico

CDM Smith



1,000 0 500 1,000

Approximate Scale (in feet)

Figure 2
Site Map
San German Groundwater Contamination Site
San German, Puerto Rico

CDM Smith

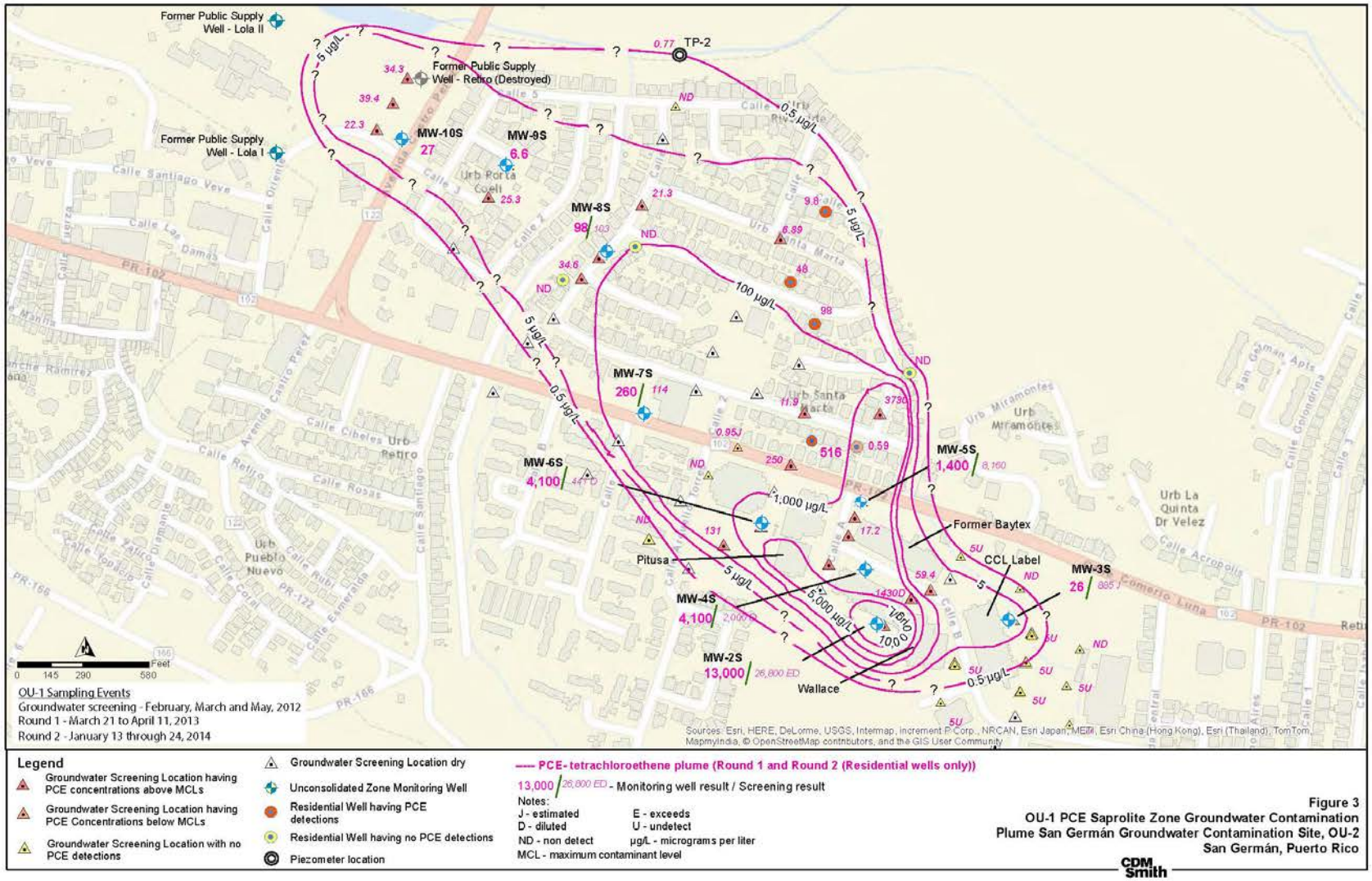


Figure 3
OU-1 PCE Saprolite Zone Groundwater Contamination
Plume San Germán Groundwater Contamination Site, OU-2
San Germán, Puerto Rico

CDM Smith

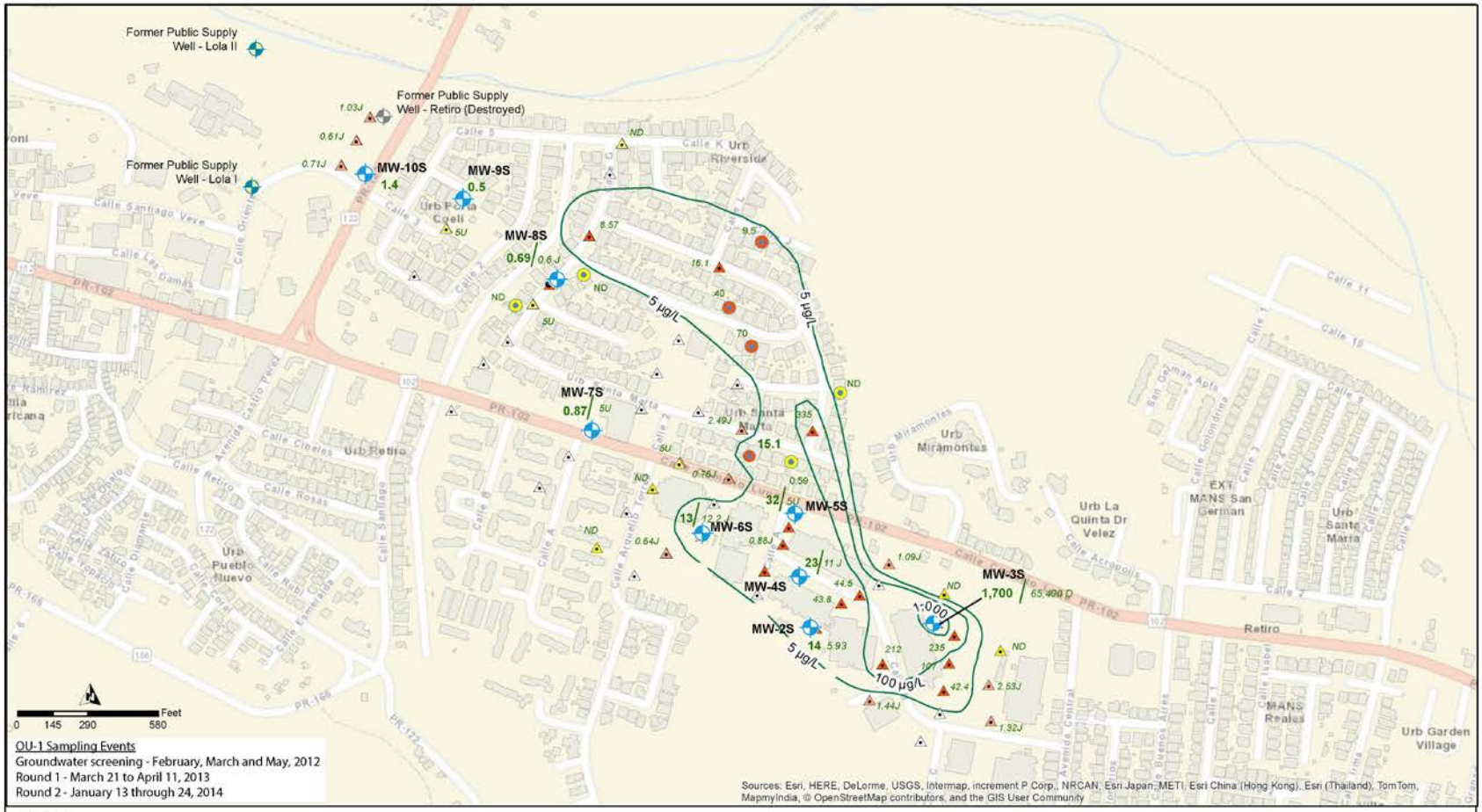


Figure 4
OU-1 TCE Saprolite Zone Groundwater Contamination Plume
San Germán Groundwater Contamination Site, OU-2
San Germán, Puerto Rico

CDM Smith

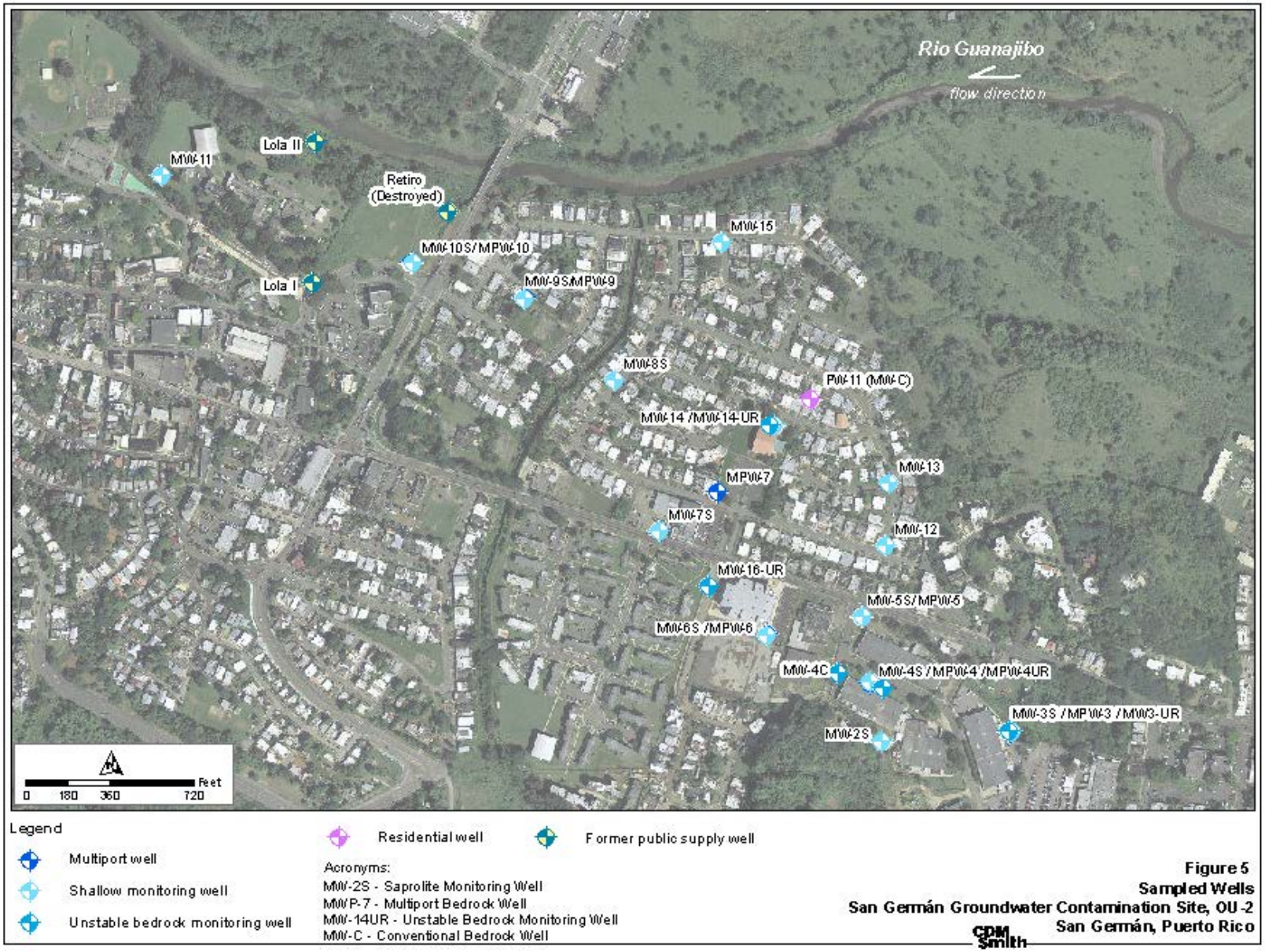
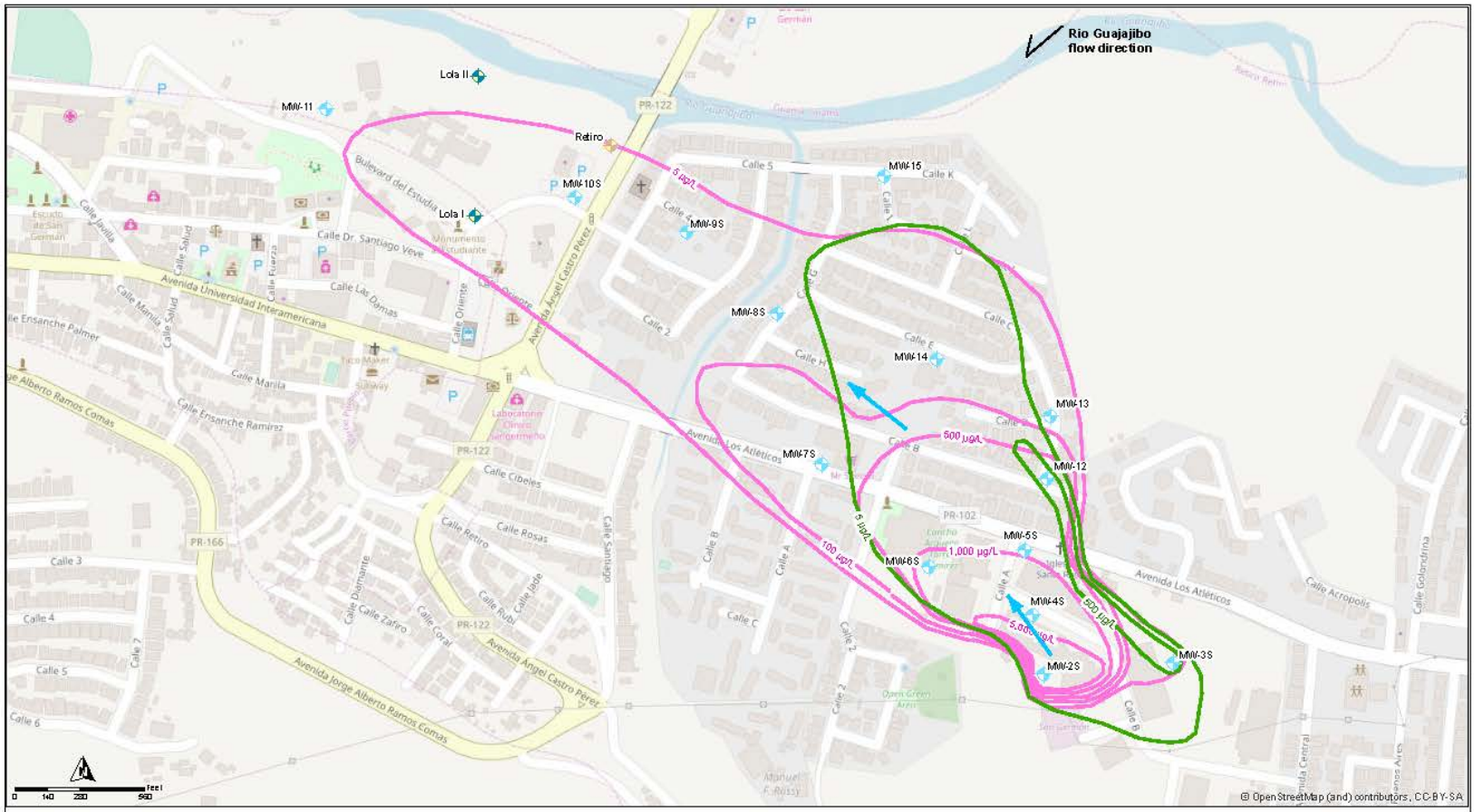


Figure 5
Sampled Wells
San Germán Groundwater Contamination Site, OU-2
San Germán, Puerto Rico

CDM Smith

Figure 6
Post-Hurricane María Sampled Monitoring and Residential Well Location Map
San Germán Groundwater Contamination Site, OU-2
San Germán, Puerto Rico

CDM Smith



Legend

- Former public supply well
- Saprolite monitoring well
- TCE isocontour in µg/L
- PCE isocontour in µg/L
- Destroyed former public supply well
- Groundwater flow direction

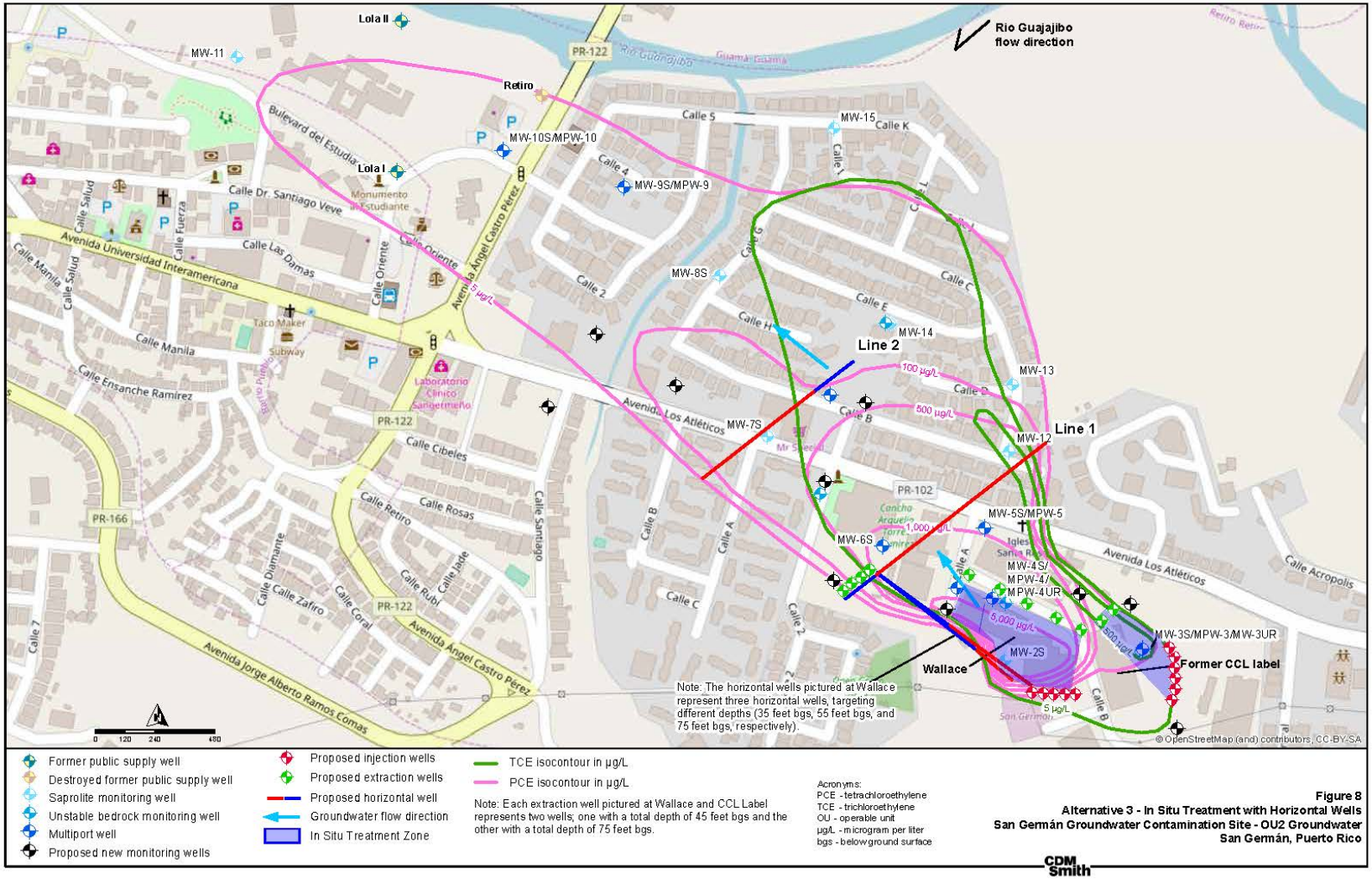
Acronyms:
PCE - tretrachloroethylene
TCE - trichloroethylene
OU - Operable Unit

Notes:
1 - Given the elevated PCE detection and elevated TCE detection limit,TCE is expected to be present at MW-2S at concentrations above 5 micrograms per liter (µg/L) and therefore is included in the contour line.

2 - Monitoring well PCE and TCE detections are included on Figures 4-5 and 4-7.

Figure 7
PCE and TCE Saprolite Zone Round 1 Plumes Map
San Germán Groundwater Contamination Site, OU-2
San Germán, Puerto Rico

CDM Smith


Lola II
MW-11
Retiro
MW-10S/MPW-10
Lola I
MW-9S/MPW-9
MW-15
Rio Guajajibo
flow direction
PR-122
Río Guajataibo
Calle 5
Calle K
Calle 4
Bulevard del Estudiante
Monumento al Estudiante
Calle Dr. Santiago Veve
Calle Salud
Calle Fuerza
Avenida Universidad Interamericana
Calle Las Damas
Calle Oriente
Avenida Ángel Castro Pérez
Calle Manila
Taco Maker
Subway
Laboratorio Clínico Sangermeño
Calle Ensanche Ramírez
MW-8S
Calle 2
Calle G
Calle C
Calle E
Calle H
MW-14
Line 2
100 µg/L
MW-13
Calle D
500 µg/L
Line 1
MW-12
Avenida Los Atléticos
MW-7S
Calle B
PR-102
Calle Cibeles
Calle Retiro
Calle Rosas
Calle Santiago
PR-166
Calle Diamante
Calle Zafiro
Calle Coral
Calle Rubí
Calle Jade
Calle A
MW-5S/MPW-5
MW-6S
1,000 µg/L
MW-4S/MPW-4/MPW-4UR
5,000 µg/L
500 µg/L
MW-3S/MPW-3/MW-3UR
Former CCL label
MW-2S
Wallace
Calle Acrópolis
Calle 7
Avenida Jorge Alberto Ramos Comas
5 µg/L
Note: The horizontal wells pictured at Wallace represent three horizontal wells, targeting different depths (35 feet bgs, 55 feet bgs, and 75 feet bgs, respectively).
© OpenStreetMap (and) contributors, CC-BY-SA
Former public supply well
Destroyed former public supply well
Saprolite monitoring well
Unstable bedrock monitoring well
Multiport well
Proposed new monitoring wells
Proposed injection wells
Proposed extraction wells
Proposed horizontal well
Groundwater flow direction
In Situ Treatment Zone
TCE isocontour in µg/L
PCE isocontour in µg/L
Note: Each extraction well pictured at Wallace and CCL Label represents two wells; one with a total depth of 45 feet bgs and the other with a total depth of 75 feet bgs.
Acronyms:
PCE - tetrachloroethylene
TCE - trichloroethylene
OU - operable unit
µg/L - microgram per liter
bgs - below ground surface
Figure 8
Alternative 3 - In Situ Treatment with Horizontal Wells
San Germán Groundwater Contamination Site - OU2 Groundwater
San Germán, Puerto Rico
CDM Smith

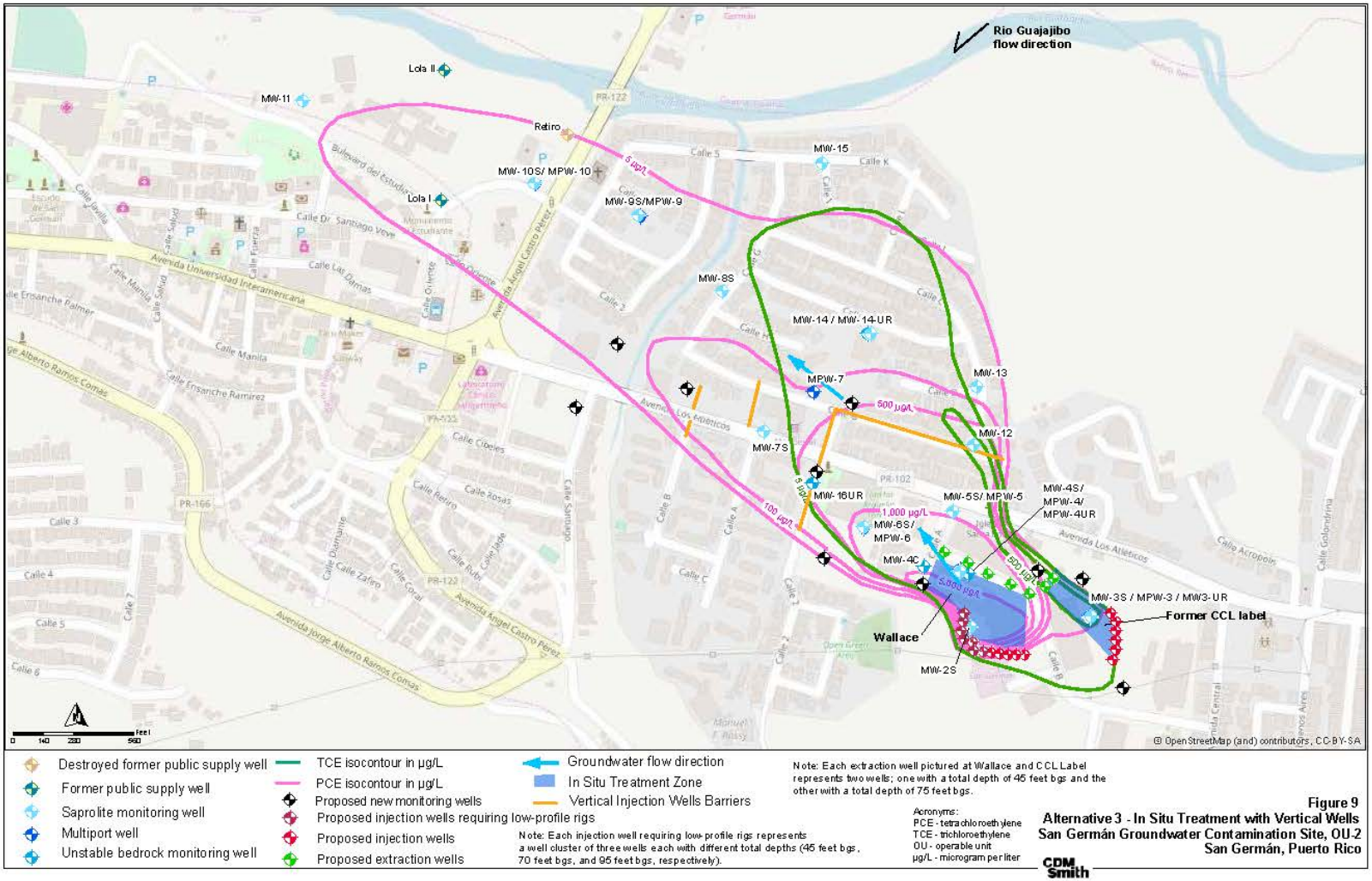


Figure 9
Alternative 3 - In Situ Treatment with Vertical Wells
San Germán Groundwater Contamination Site, OU-2
San Germán, Puerto Rico

APPENDIX II
ADMINISTRATIVE RECORD INDEX
San German Groundwater Contamination Superfund Site
OU-2

ADMINISTRATIVE RECORD INDEX OF DOCUMENTS

FINAL

07/11/2019

REGION ID: 02

Site Name: SAN GERMAN GROUND WATER CONTAMINATION SITE
CERCLIS ID: PRN000205957
OUID: 02
SSID: 02YP
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
565384	07/11/2019	ADMINISTRATIVE RECORD INDEX FOR OU2 FOR THE SAN GERMAN GROUND WATER CONTAMINATION SITE	1	Administrative Record Index		(US ENVIRONMENTAL PROTECTION AGENCY)
573602	05/04/2016	DRAFT WORK PLAN VOLUME 1 FOR OU2 FOR THE SAN GERMAN GROUND WATER CONTAMINATION SITE	73	Work Plan		(CDM SMITH)
565382	12/21/2016	FINAL QUALITY ASSURANCE PROJECT PLAN ADDENDUM NO. 1 FOR OU2 FOR THE SAN GERMAN GROUND WATER CONTAMINATION SITE	312	Work Plan	BOSQUE,ADALBERTO (US ENVIRONMENTAL PROTECTION AGENCY)	(CDM SMITH)
573606	06/20/2018	FINAL REMEDIAL INVESTIGATION REPORT FOR OU2 FOR THE SAN GERMAN GROUND WATER CONTAMINATION SITE	461	Report		(CDM SMITH)
573604	06/20/2018	FINAL HUMAN HEALTH RISK ASSESSMENT FOR OU2 FOR THE SAN GERMAN GROUND WATER CONTAMINATION SITE	148	Report		(CDM SMITH)
573608	07/30/2018	FINAL FEASIBILITY STUDY REPORT FOR OU2 FOR THE SAN GERMAN GROUND WATER CONTAMINATION SITE	161	Report		(CDM SMITH)
565381	06/17/2019	PUERTO RICO ENVIRONMENTAL QUALITY BOARD'S CONCURRENCE ON THE DRAFT PROPOSED PLAN FOR OU2 FOR THE SAN GERMAN GROUND WATER CONTAMINATION SITE	1	Letter	BOSQUE,ADALBERTO (US ENVIRONMENTAL PROTECTION AGENCY)|Rodriguez,Teresita (US ENVIRONMENTAL PROTECTION AGENCY)	(PUERTO RICO ENVIRONMENTAL QUALITY BOARD)
550158	07/09/2019	PROPOSED PLAN FOR OU2 FOR THE SAN GERMAN GROUND WATER CONTAMINATION SITE	29	Publication		(US ENVIRONMENTAL PROTECTION AGENCY)

541230

APPENDIX III
PUBLIC NOTICE

San German Groundwater Contamination Superfund Site
OU-2

La Agencia Federal de Protección Ambiental
Anuncia el Plan Propuesto y Periodo de Comentarios
Para el Lugar de Superfondo Contaminación del Agua Subterránea de San Germán
Unidad Operacional 2
San Germán, Puerto Rico

La Agencia Federal de Protección Ambiental (EPA, por sus siglas en inglés) en colaboración con la Junta de Calidad Ambiental (JCA), anuncia el comienzo de un período de treinta (30) días de comentario público sobre el Plan Propuesto para la remediación del lugar conocido como Contaminación del Agua Subterránea de San Germán, localizado en el municipio de San Germán, Puerto Rico. El Plan Propuesto describe las alternativas recomendadas y las razones para estas recomendaciones. La alternativa preferida por la EPA es la Alternativa 3 que corresponde a tratamiento en el lugar (in situ) y monitoreo de la atenuación natural. Pero antes de seleccionar un remedio final, la EPA va a considerar los comentarios escritos y verbales recibidos durante este período de comentario público. Todos los comentarios (verbales y/o escritos) deberán ser recibidos en o antes del 11 de agosto de 2019. La EPA proveerá un resumen de todos los comentarios y sus respuestas en el Récord de Decisión para este lugar.

A tales fines, la EPA llevará a cabo una reunión pública el martes 30 de julio de 2019, de 5:00 pm a 7:00 pm en la Cancha de la Urbanización Santa Marta en San Germán, Puerto Rico. El propósito de esta reunión es informarle a la comunidad sobre los hallazgos, conclusiones y recomendaciones de la investigación para la remediación del agua subterránea realizada en el lugar, bajo la unidad operacional 2 (OU-2, por sus siglas en inglés). Además, se discutirá la alternativa de remediación recomendada. Durante esta reunión pública, la EPA contestará preguntas o comentarios que los participantes tengan con relación a la investigación realizada y a la alternativa preferida.

Las copias del Plan Propuesto y otros documentos relacionados al lugar están disponibles en los siguientes repositorios de información:

Nueva Alcaldía de San Germán
Calle Luna San Germán, Puerto Rico 00683
(787) 892-3500
Horario: Lunes – Viernes 8:00am a 4:00 pm

Junta de Calidad Ambiental de Puerto Rico
Programa de Respuestas de Emergencias y Superfondo
Edificio de Agencias Ambientales Cruz A. Matos
Urbanización San José Industrial Park
1375 Avenida Ponce de León San Juan, PR 00926-2604
(787)767-8181 ext 3207
Horario: Lunes – Viernes 9:00am a 3:00 pm
Por cita

Agencia Federal de Protección Ambiental, Región 2
División de Protección Ambiental del Caribe
City View Plaza II- Suite 7000
48 RD, 165 Km. 1.2 Guaynabo, PR 00968-8069
Fax: (787) 289-7104 (787) 977-5869
Horario: Lunes - Viernes, 9:00 a.m. a 4:30 p.m.
Por cita

U.S. Environmental Protection Agency, Region 2
290 Broadway, 18th floor New York, New York 10007-1866
(212) 637-4308
Horario: Lunes.-Viernes, 9:00 a.m. a 3:30 p.m.
Por cita

Para más información, favor llamar a Adalberto Bosque PhD, MBA al (787) 977-5825. Comentarios escritos al Plan Propuesto deben ser enviados a:

Adalberto Bosque PhD, MBA
Gerente de Proyectos
Agencia Federal de Protección Ambiental, Región 2
División de Protección Ambiental del Caribe
City View Plaza II- Suite 7000 48 RD, 165 Km. 1.2 Guaynabo, PR 00968-8069
Fax: (787) 289-7104
Internet: bosque.adalberto@epa.gov

La Agencia Federal de Protección Ambiental
Anuncia el Plan Propuesto y Periodo de Comentarios
Para el Lugar de Superfondo Almacén de Pesticidas III
Unidad Operacional 2 - Agua Subterránea
Manatí, Puerto Rico

La Agencia Federal de Protección Ambiental (EPA por sus siglas en inglés) en colaboración con la Junta de Calidad Ambiental (JCA), anuncia el comienzo de un período de treinta (30) días de comentario público sobre el Plan Propuesto para la remediación del lugar conocido como Almacén de Pesticidas III, localizado en el municipio de Manatí, Puerto Rico. El Plan Propuesto describe las alternativas recomendadas y las razones para estas recomendaciones. La alternativa preferida por la EPA es la Alternativa G2 que corresponde a monitoreo y mantenimiento de los pozos existentes en la zona industrial aguas abajo del almacén, y controles institucionales. Pero antes de seleccionar un remedio final, la EPA va a considerar los comentarios escritos y verbales recibidos durante este período de comentario público. Todos los comentarios (verbales y/o escritos) deberán ser recibidos en o antes del 11 de agosto de 2019. La EPA proveerá un resumen de todos los comentarios y sus respuestas en el Récord de Decisión para este lugar.

A tales fines, la EPA llevará a cabo una reunión pública el jueves 1 de Agosto de 2019, de 5:00 pm a 7:00 pm en el salón de conferencias de la Biblioteca Municipal en Manatí, Puerto Rico. El propósito de esta reunión es informarle a la comunidad sobre los hallazgos, conclusiones y recomendaciones de la investigación realizada en el lugar para la remediación del agua subterránea, bajo la unidad operacional 2 (OU-2, por sus siglas en inglés). Además, se discutirá la alternativa de remediación recomendada. Durante esta reunión pública, la EPA contestará preguntas o comentarios que los participantes tengan con relación a la investigación realizada y a la alternativa preferida.

Las copias del Plan Propuesto y otros documentos relacionados al lugar están disponibles en los siguientes repositorios de información:

Biblioteca Municipal
Paseo de las Atenas y calle McKinley
Manatí, Puerto Rico 00739
(787) 884-5494
Horario: Lunes – Viernes 7:00am a 11:00 pm

Junta de Calidad Ambiental de Puerto Rico
Programa de Respuestas de Emergencias y Superfondo
Edificio de Agencias Ambientales Cruz A. Matos
Urbanización San José Industrial Park
1375 Avenida Ponce de León
San Juan, PR 00926-2604
(787)767-8181 ext 3207
Horario: Lunes – Viernes 9:00 am a 3:00 pm
Por cita

Agencia Federal de Protección Ambiental, Región 2
División de Protección Ambiental del Caribe
City View Plaza II- Suite 7000
48 RD, 165 Km. 1.2
Guaynabo, PR 00968-8069
Fax: (787) 289-7104 (787) 977-5869
Horario: Lunes - Viernes, 9:00 a.m. a 4:30 p.m.
Por cita

U.S. Environmental Protection Agency, Region 2
290 Broadway, 18th floor
New York, New York 10007-1866
(212) 637-4308
Horario: Lunes.-Viernes, 9:00 a.m. a 3:30 p.m.
Por cita

Para más información, favor llamar al señor Luis Santos al (787) 977-5865. Comentarios escritos al Plan Propuesto deben ser enviados a:

Luis Santos
Gerente de Proyectos
Agencia Federal de Protección Ambiental, Región 2
División de Protección Ambiental del Caribe
City View Plaza II- Suite 7000
48 RD, 165 Km. 1.2
Guaynabo, PR 00968-8069
Fax: (787) 289-7104
Email: santos.luis@epa.gov

Universidad de Puerto Rico

UPR Universidad de Puerto Rico

Recinto de Ciencias Médicas

AVISO SUBASTA FORMAL RCM-19-20-02

MODERNIZACIÓN DE LOS ASCENSORES DEL EDIFICIO DECANATO DE ESTUDIANTES DEL RECINTO DE CIENCIAS MÉDICAS – DECANATO DE ADMINISTRACIÓN

Recogido de Pliegos: Disponibles en los siguientes días laborables: **13 al 15 de agosto de 2019** en horario de **8:00 a.m. a 12:00 p.m.** y de **1:00 a 2:00 p.m.** y el **16 de agosto de 2019** en horario de **8:00 a.m. a 10:00 a.m.**, en el Decanato de la Escuela de Medicina, ***Oficina A-880, Piso 8 del Edificio Principal Dr. Guillermo Arbona Irizarry*** del Recinto de Ciencias Médicas. Los pliegos tendrán un costo **no reembolsable** de cincuenta dólares ($50.00), pagadero a favor de la Universidad de Puerto Rico, mediante cheque certificado, giro postal o bancario, efectivo, ATH, tarjetas de crédito.

Reunión Pre-Subasta: Visita (ambas son Compulsorias)
Fecha: 16 de agosto de 2019
Hora: 10:30 a.m.
Lugar: ***Oficina A-880, Piso 8 del Edificio Principal del RCM Dr. Guillermo Arbona Irizarry***

Apertura de Ofertas:
Fecha: 23 de agosto de 2019
Hora: 10:30 am
Lugar: ***Oficina A-880, Piso 8 del Edificio Principal del RCM Dr. Guillermo Arbona Irizarry***

El alcance de este proyecto es la modernización completa de los ascensores de pasajeros, los trabajos abarcan el reemplazo de todos los componentes de los ascensores que se han visto afectados por el desgaste y el uso por periodos prolongados (trabajos mecánicos).

Las ofertas se radicarán en o antes de las 9:45 am del 23 de agosto de 2019 en la *Oficina A-880, Piso 8 del Edificio Principal Dr. Guillermo Arbona Irizarry.* Todo licitador deberá entregar y acompañar con su oferta una **garantía de oferta BID Bond** a favor de la UPR, **Recinto de Ciencias Médicas equivalente al 5% del total de su oferta, válida por noventa (90) días**, mediante **cheque certificado o de una fianza**, emitida por una compañía autorizada por el Comisionado de Seguros de Puerto Rico para hacer negocios en Puerto Rico. El Recinto de Ciencias Médicas se reserva el derecho a rechazar cualesquiera o todas las propuestas y de adjudicar la subasta bajo las condiciones más convenientes a los intereses de la UPR, independientemente del monto de las ofertas o de cancelar la adjudicación de subasta en cualquier momento antes de la firma del contrato.

Aplica Orden Ejecutiva 2018-033 del Gobernador de Puerto Rico y Carta Circular 2018-01 del Secretario del Departamento del Trabajo y Recursos Humanos del Gobierno de Puerto Rico.

Segundo Rodríguez, MD, FACS, FASCRS
Rector

Magda Rodríguez Vega, MHSA, MPA
Presidenta-Junta de Subastas

PO Box 365067 San Juan PR 00936-5067 • Tel. (787)758-2525 Ext. 1800 • Email: subastas.rcm@upr.edu

Patrono con Igualdad de Oportunidad en el Empleo M/M/V/I

Estado Libre Asociado de Puerto Rico
Municipio de Río Grande
Ciudad de El Yunque

AVISO DE SUBASTA

SUBASTA NÚM. 2020-02 **SERIE: 2019-2020**

La Junta de Subastas del Municipio de Río Grande, Puerto Rico, recibirá propuestas en original sobres sellados para la Subasta Núm. 2020-02 Adquisición e Instalación de los Servidores de Sistema de Información del Municipio de Río Grande.

FECHA: 20 de agosto de 2019
HORA: 11:00 a.m. Apertura de Propuestas
LUGAR: Salón de Actividades, Primer Piso Casa Alcaldía

Cada propuesta o cotización deberá estar acompañada de una fianza de licitación (Bid Bond) de $200.00. La misma puede pagarse en efectivo, cheque certificado, giro postal o fianza de una compañía aseguradora de Puerto Rico, a favor del Municipio de Río Grande.

Los pliegos, especificaciones y condiciones de la subasta pueden obtenerse en la Oficina del Secretario Municipal en el primer piso de la antigua Casa Alcaldía, a partir del lunes, 12 de agosto de 2019. El costo de las mismas es de $50.00 por renglón, los cuales se pagarán en efectivo, cheque certificado o giro postal a nombre del Municipio de Río Grande (No reembolsable). Los solicitadores deberán entregar sus propuestas en sobre sellados no más tarde del **20 de agosto de 2019 a las 11:00 a.m.** en la Oficina de Secretaría Municipal.

La Junta de Subastas se reserva el derecho de rechazar cualquiera o todas las propuestas y adjudicar la subasta bajo las condiciones más favorables al Municipio de Río Grande. Igualmente, se reserva el derecho de cancelar la adjudicación de la subasta, en el momento o antes de la firma del contrato, o la orden de servicio sin que medie responsabilidad alguna para el Municipio de Río Grande.

Yolanda Lebrón López
Presidenta Interina Junta de Subastas

Rafael Ramos Matos
Secretario Junta de Subastas

Apartado 847, Río Grande, Puerto Rico 00745 • (787) 887-2370 / (787) 321-7782

United States Environmental Protection Agency

Anuncio de Extensión del Periodo de Comentarios para el Lugar de Superfondo Contaminación del Agua Subterránea de San Germán - Unidad Operacional 2

La Agencia Federal de Protección Ambiental (EPA, por sus siglas en inglés) ha extendido el periodo de comentario público para el Plan Propuesto del Lugar de Superfondo Contaminación del Agua Subterránea ubicado en San Germán, Puerto Rico. La Agencia ha extendido el periodo de comentario que terminaba el 11 de agosto del 2019. La extensión del periodo de comentarios comenzará el lunes 12 de agosto de1 2019 y terminará el martes 10 de septiembre del 2019.

La EPA llevó a cabo una reunión con la comunidad el 30 de julio del 2019 para explicar el Plan Propuesto. La EPA está proponiendo tratamiento en el lugar y monitoreo de atenuación natural (alternativa #3) como la alternativa preferida por ser la que lograría efectivamente los objetivos de la acción correctiva. Puede ver el Plan Propuesto en la dirección electrónica http://www.epa.gov/region02/superfund/npl/sangerman. También los documentos relacionados a la investigación del lugar pueden ser encontrados en la oficina del alcalde en la Alcaldía de San Germán.

Los comentarios sobre este Plan Propuesto deben ser enviados a:

Adalberto Bosque, PhD, MBA
Gerente de Proyecto
#48 Carr 165
City View Plaza II Suite 7000
Guaynabo, PR 00968
(787) 977-5825
Bosque.adalberto@epa.gov

Estado Libre Asociado de Puerto Rico
Municipio de Río Grande
Ciudad de El Yunque

AVISO DE SUBASTA

SUBASTA NÚM. 2020-01 **SERIE: 2019-2020**

La Junta de Subastas del Municipio de Río Grande, Puerto Rico, recibirá propuestas en original sobres sellados para la Subasta Núm. 2020-01

FECHA: 20 de agosto de 2019
HORA: 9:00 a.m. Apertura de Propuestas
LUGAR: Salón de Actividades, Primer Piso Casa Alcaldía

RENGLONES:
1. Suministro de Comestibles para el Centro Jardín de El Yunque
2. Suministro de comestibles para Yunquelandia Child Care
3. Suministro de Alimentos en general
4. Alquiler de equipo pesado
5. Mantenimiento y reparación de equipo acondicionador de aire en instalaciones municipales

Cada propuesta o cotización deberá estar acompañada de una fianza de licitación (Bid Bond) de $200.00. La misma puede pagarse en efectivo, cheque certificado, giro postal o fianza de una compañía aseguradora de Puerto Rico, a favor del Municipio de Río Grande.

Los pliegos, especificaciones y condiciones de la subasta pueden obtenerse en la Oficina del Secretario Municipal en el primer piso de la antigua Casa Alcaldía, a partir del lunes, 12 de agosto de 2019. El costo de las mismas es de $50.00 por renglón, los cuales se pagarán en efectivo, cheque certificado o giro postal a nombre del Municipio de Río Grande (No reembolsable). Los solicitadores deberán entregar sus propuestas en sobre sellados no más tarde del 20 de agosto de 2019 a las 9:00 a.m. en la Oficina de Secretaría Municipal.

La Junta de Subastas se reserva el derecho de rechazar cualquiera o todas las propuestas y adjudicar la subasta bajo las condiciones más favorables al Municipio de Río Grande. Igualmente, se reserva el derecho de cancelar la adjudicación de la subasta, en el momento o antes de la firma del contrato, o la orden de servicio sin que medie responsabilidad alguna para el Municipio de Río Grande.

Yolanda Lebrón López
Presidenta Interina Junta de Subastas

Rafael Ramos Matos
Secretario Junta de Subastas

Apartado 847, Río Grande, Puerto Rico 00745 • (787) 887-2370 / (787) 321-7782

APPENDIX IV
FACT SHEET (IN SPANISH
San German Groundwater Contamination Superfund Site
OU-2

Contaminación del Agua Subterránea de San Germán
Unidad Operacional 2 – Agua Subterránea

San Germán, Puerto Rico
Julio 2019

United States Environmental Protection Agency

PARA OBTENER MÁS INFORMACIÓN

Reunión Pública
Cancha de la Urbanización Santa Marta
San Germán, Puerto Rico 00683
Fecha: 30 de julio de 2019
Hora: 5:00 a 7:00 PM

Periodo de Comentarios Públicos
Julio 12, 2019 a Agosto 11, 2019

Participación de la Comunidad
Participación del público es esencial para el éxito del Programa de Superfondo de la EPA. Si usted tiene alguna pregunta acerca de las actividades del Lugar, póngase en contacto con:

Dr. Adalberto Bosque Gerente de Proyectos de Remediación de la EPA al (787) 977-5825, bosque.adalberto@EPA.gov , o con la Sra. Brenda Reyes, Coordinadora de Participación de la Comunidad de la EPA al (787) 977-5869, reyes.brenda@epa.gov .

Superfondo
Para obtener información sobre el proceso de Superfondo, visite el sitio web de la EPA en www.epa.gov/superfund.

Repositorio de información
El repositorio de información contiene documentos relacionados con el Lugar, disponibles para la revisión del público en las siguientes ubicaciones:

Nueva Alcaldía de San Germán
Calle Luna
San Germán, Puerto Rico 00683
(787) 892-3500
Horario: Lunes – Viernes 8:00am a 4:00 pm

USEPA Región II
Centro de Expedientes del Superfondo
290 Broadway, piso 18
Nueva York, NY 10007-1866
Lunes a viernes de 9:00 AM a 5:00 PM
(212) 637-4308

Agencia Federal de Protección Ambiental, Región 2
División de Protección Ambiental del Caribe
City View Plaza II, Suite 7000
#48 PR-165 km 1.2
Guaynabo, Puerto Rico 00968-8069
Lunes a viernes de 9:00 AM a 4:30 PM
Brenda Reyes, (787) 977-5869

Hoja Informativa
PROGRAMA DE SUPERFONDO

Esta hoja informativa explica la acción preferida para el Lugar de Superfondo Contaminación del Agua Subterránea de San Germán (el Lugar) en San Germán, Puerto Rico. Este documento fue desarrollado por la Agencia de Protección Ambiental (EPA, por sus siglas en inglés), el organismo coordinador de las actividades del Lugar, en consulta con la Junta de Calidad Ambiental de Puerto Rico (JCA), la agencia de apoyo. La EPA publica este Plan Propuesto como parte de sus responsabilidades de participación pública bajo la Sección 117 (a) de Respuesta Ambiental Comprensiva, Ley de Compensación y Responsabilidad, 42 USC § 9617 (a) (CERCLA, comúnmente conocido como el programa de Superfondo) y las Secciones 300.430 (f) y 300.435 (c) del Plan de Contingencia Nacional por la Contaminación de Petróleo y las Sustancias Peligrosas (National Contingency Plan, NCP, por sus siglas en inglés).

La naturaleza y el alcance de la contaminación en el Lugar y las alternativas de remediación resumidas en este documento se describen detalladamente en los informes de la Investigación de Remediación (RI, por sus siglas en inglés) y el Estudio de Viabilidad (FS, por sus siglas en inglés) OU-2. La EPA está abordando el Lugar en dos unidades operacionales (OU, por sus siglas en inglés). La OU-1 aborda la contaminación del suelo que actúa como una fuente continua de contaminación al agua subterránea, incluido el suelo en la zona vadosa (sobre el nivel freático), y el suelo y el agua subterránea altamente contaminada debajo del nivel freático en la zona de la saprolita poco profunda (suelos y roca altamente meteorizada). El ROD para el OU-1 se firmó el 11 de diciembre de 2015 y establece como medida la Extracción de vapor de suelo (SVE) y Extracción de fase dual (DPE)/Tratamiento in situ en las propiedades actualmente operadas por Wallace International de P.R. (Wallace) y anteriormente ocupada por CCL Insertico de P.R. (CCL Label). El OU-2 aborda el plumacho de contaminación del agua subterránea en todo el Lugar y es el objeto de esta acción.

Dos lotes en el Parque Industrial el Retiro, propiedad de la Compañía de Fomento Industrial de Puerto Rico (Departamento de Desarrollo Económico), fueron

identificadas como áreas de origen de la contaminación del agua subterránea. Las dos áreas consisten en un lote actualmente ocupado por Wallace, y de una facilidad anteriormente ocupada por CCL Label. En este documento, se hará referencia a estos lotes como los lotes de Wallace y de CCL Label anteriores.

El remedio preferido de la EPA para el Lugar bajo la OU-2 es la Alternativa 3: tratamiento in situ y monitoreo de la atenuación natural.

Este remedio también incluye controles institucionales que restringirían el uso de las propiedades y la exposición al agua subterránea contaminada hasta que los niveles de contaminantes se reduzcan a los Objetivos Preliminares de Remediación (PRG, por sus siglas en inglés) o ya no presenten ningún riesgo para la salud humana o los receptores ecológicos.

ROL DE LA COMUNIDAD EN EL PROCESO DE SELECCIÓN

La EPA solicita el insumo del público para asegurar que las preocupaciones de la comunidad sean consideradas en la selección de un remedio efectivo para cada Lugar de Superfondo. Para ello, el Plan Propuesto para esta OU-2 ha sido puesto a la disposición del público por un período de comentarios de 30 días que comienza con la emisión del Plan Propuesto y concluye el 11 de agosto del 2019.

La EPA estará proporcionando información sobre la investigación y limpieza del Lugar al público a través de una reunión pública y estableciendo depósitos de información, que contienen el expediente administrativo. La EPA exhorta al público en general a obtener información sobre el Lugar, las actividades de Superfondo que se han realizado en el mismo y la explicación sobre la selección de la alternativa preferida.

La reunión pública a celebrarse durante el periodo de comentarios proporcionará información sobre las investigaciones completadas en el Lugar, las alternativas evaluadas, explicación de la alternativa preferida, así como para recibir comentarios del público. Todos los comentarios recibidos durante el período de comentarios públicos de 30 días se documentarán en la sección “Resumen de Respuestas” del Registro de Decisión (ROD, por sus siglas en inglés), el documento que formaliza la selección del remedio para el Lugar.

Los comentarios escritos sobre este Plan Propuesto deberán dirigirse a:

Adalberto Bosque, PhD, MBA
Remedial Project Manager
U.S. Environmental Protection Agency
City View Plaza II - Suite 7000
48 RD, 165 Km. 1.2
Guaynabo, Puerto Rico 00968-8069
Telephone: (787) 977-5825
E-mail: bosque.adalberto@epa.gov

ALCANCE Y ROL DE LA ACCIÓN A TOMAR

La EPA está atendiendo la remediación de este Lugar en dos fases o unidades operacionales, OU-1 y OU-2. Esta es la segunda (OU-2) acción de remedio planificada para el Lugar, en la que se trata el plumacho de agua contaminada en el agua subterránea en todo el Lugar y que no incluye el remedio de la OU-1. La acción de remediación en la OU-2 se concentra en el núcleo del plumacho, que es donde las concentraciones de VOCs (PCE o TCE) son mayores que 100 µg/L y la franja del plumacho donde las concentraciones de estos contaminantes están entre 100 y 5 µg/L.

ANTECEDENTES DEL LUGAR

Descripción Del Lugar e Historial

El Lugar está ubicado en San German, al suroeste de Puerto Rico (Figura 1). Los compuestos volátiles orgánicos (VOCs) se detectaron por encima de los estándares federales de agua potable, llamados niveles máximos por contaminantes (MCLs), en tres pozos públicos de suministro de agua; Retiro, Lola Rodríguez de Tío I (Lola I) y Lola Rodríguez de Tío II (Lola II), ubicados al sur del río Guanajibo, entre las carreteras 139 y 360 (Figura 2). Estos pozos formaban parte del sistema de Agua Urbano de San Germán de la Autoridad de Acueductos y Alcantarillados de Puerto Rico (PRASA, por sus siglas en inglés), que incluye un total de siete pozos y dos tomas de agua de superficie.

Los pozos el Retiro, Lola I y Lola II actuaron como un sistema de suministro independiente con aproximadamente 800 conexiones de servicio que brindaban agua a aproximadamente 2,280 usuarios en 2005 cuando se detectaron los VOCs. El Lugar incluye el Parque Industrial el Retiro, que se ha demostrado que es la fuente de los VOCs, este está localizado a aproximadamente a media milla al sureste de los pozos de suministro afectados (Figura 2). Varios de los edificios en el parque industrial están ocupados por negocios activos que fueron investigados durante el RI. Solo las propiedades de Wallace y la antigua facilidad ocupada por CCL Label se consideran fuentes de contaminación del agua subterránea.

NATURALEZA Y ALCANCE DE LA CONTAMINACIÓN

La naturaleza y el alcance de la contaminación en el Lugar se evaluaron durante la RI de la OU-1 y OU-2 mediante el muestreo y el análisis de muestras (varios medios) y luego comparando los resultados analíticos con los criterios de detección federales, estatales y específicos para el Lugar. Los plumachos de PCE y TCE en el agua subterránea se identificaron durante las investigaciones de la OU-1 en la zona de saprolítica en dos áreas de origen en el Parque Industrial el Retiro; la contaminación se extendió a los antiguos pozos de suministro localizados aproximadamente a 3,300 pies al noroeste. La contaminación encontrada en la roca madre es limitada.

Los plumachos de PCE y TCE, en su comienzo, se originaron en las áreas de Wallace y de la antigua facilidad de CCL Label, respectivamente, y luego se mezclaron a medida que el agua subterránea contaminada descendía hacia el noroeste (Figura 3-4). Los plumachos y el movimiento del agua subterránea pueden haber sido influenciados por el bombeo en los pozos de suministro cuando estos estaban en operación (antes del 2006). Aunque los plumachos de PCE y TCE se mezclaron, el TCE fue más dominante en el lado norte de los penachos. El TCE observado en el área de la fuente de Wallace y puede ser el resultado de la biodegradación del PCE, o el TCE también se puede haber utilizado en los edificios de Wallace como parte de los procesos industriales.

Los contaminantes seleccionados para representar la contaminación del Lugar en la OU-2 son consistentes con los de OU-1: PCE, TCE, cis-1,2-DCE, 1,1-dicloroeteno (1,1-DCE) y cloruro de vinilo. Estos cinco VOCs se detectaron con mayor frecuencia, y en los niveles más altos, en las muestras de suelo del área fuente y otros medios afectados, incluida el agua subterránea. Estos productos químicos incluyen solventes clorados y productos de degradación de esos solventes. El RI también investigó el Lugar por la presencia de contaminantes en el sitio en forma de líquidos en fase no acuosa. Los contaminantes del Lugar son VOCs clorados que son más densos que el agua, por lo que también se les conoce como líquidos densos en fase no acuosa (DNAPL) en ciertas concentraciones. DNAPL no ha sido observado en el Lugar.

Las principales actividades de campo de la OU-2 incluyeron una investigación hidrológica, muestreo de agua subterránea y muestreo de agua de superficie. Como parte del RI para la OU-2, se completaron dos rondas de muestreo de agua subterránea y agua superficial. Además, después del paso del huracán María, se realizó un muestreo para observar si el plumacho había cambiado. En marzo de 2018 se tomaron muestras de los pozos de monitoreo seleccionados y de los pozos de riego para determinar si el huracán de septiembre del 2017 provocó cambios en la contaminación del agua subterránea.

El propósito del informe del RI para la OU-2 fue refinar el marco hidrogeológico, evaluar la naturaleza y el alcance de la contaminación del agua subterránea en todo el Lugar, actualizar las condiciones del agua superficial en el Río Guanajibo y refinar el modelo conceptual del Lugar (CSM, por sus siglas en inglés).

Los resultados de los eventos de muestreo se discuten a continuación.

Resumen de la Contaminación del Agua Subterránea

Como parte de la investigación del agua subterránea en la OU-2, se instalaron cinco pozos de monitoreo en la zona de saprolita y cuatro pozos de monitoreo en la zona de roca fracturada e inestable debajo de la saprolita para evaluar la contaminación del agua subterránea. El evento de muestreo de la Ronda 1 y Ronda 2 incluyó todos los pozos y puertos: 14 pozos poco profundos abiertos en la zona de la saprolita; 4 pozos abiertos en la zona de roca fracturada e inestable; 1 pozo de lecho de roca de una sola rejilla, 7 pozos de lecho de roca multipuertos, cada uno con 2 a 5 puertos (un total de 25 puertos) y un pozo de irrigación MW-C, que solo se usa para el monitoreo de agua y no para agua potable (Figura 5). Los pozos completados en la zona de saprolita contenían los niveles más altos de PCE y TCE, así como la mayoría de los criterios de detección.

La mayor parte de la contaminación por PCE y TCE en el agua subterránea se produce en la zona saprolítica y en la parte superior de la zona inestable del lecho de roca. Los niveles más altos de contaminantes ocurren cerca de las dos áreas de origen (Wallace y la antigua facilidad de CCL Label), y los niveles disminuyen a medida que los plumachos descienden y se diluyen más. Sin embargo, los dos plumachos difieren en extensión y distribución. El plumacho de PCE, que es más extenso y en concentraciones más altas, está orientado hacia el noroeste, mientras que el plumacho de TCE está orientado hacia el norte/noroeste. (Figura 7).

Varios pozos residenciales (privados) se instalaron ilegalmente en el área residencial al noroeste del Parque Industrial el Retiro. Ninguno de estos pozos se utiliza actualmente para fines de agua potable, ya que todas las casas en el área siempre han estado conectadas al sistema público de suministro de agua de PRASA. Actualmente, algunos de estos pozos se

utilizan para fines de riego. Se han realizado sesiones de concientización ciudadana para educar a la comunidad sobre los riesgos del uso del agua subterránea contaminada y están en curso.

En marzo del 2018 se tomaron muestras de los pozos de monitoreo seleccionados y de los pozos de irrigación recién descubiertos para determinar si el huracán María (septiembre de 2017) provocó cambios en la contaminación del agua subterránea (Figura 6). Los resultados de las muestras posteriores al huracán María generalmente indicaron que esta tormenta inusualmente fuerte tuvo poco impacto en los plumachos. Las concentraciones de PCE y TCE en general fueron similares a todas las otras rondas de muestreo, excepto en el área de la fuente en Wallace, donde los resultados para MW-2S mostraron un aumento en PCE. En general, las concentraciones de contaminantes relacionados con el Lugar están disminuyendo gradualmente, aunque las áreas inmediatamente aguas abajo de las dos fuentes de origen permanecen muy por encima de los criterios de detección.

Monitoreo de la Atenuación Natural

En general, en función de la presencia prominente de productos de la degradación de PCE y/o TCE, como cis-1,2-DCE y cloruro de vinilo, en concentraciones traza en MW-6S y MW-7S, la geoquímica del agua subterránea y la distribución de contaminantes en el plumacho de PCE en la zona saprolítica indica que se está produciendo de una manera natural la descloración reductiva, aunque de una manera muy limitada. Sin embargo, existe una clara evidencia de la decloración reductiva que se produce naturalmente en el plumacho de TCE y en la porción donde los plumachos de PCE y TCE se cruzan. Las detecciones de cis-1,2-DCE y cloruro de vinilo en MW-3S y MW-12, y cis-1,2-DCE o concentraciones de cloruro de vinilo mayores que las concentraciones de TCE en MW-3UR, MPW-3, MW-14 y MW-14UR demuestra que está ocurriendo la biodegradación anaeróbica de TCE en las áreas de origen, en los plumachos combinados de PCE y TCE, y en la porción de lecho de roca del acuífero.

Resumen de la Contaminación del Agua de Superficie y del Sedimento

Contrario a la OU-1 dónde hubo una detección de PCE en una muestra de agua de poro a una concentración muy por debajo del criterio de detección, durante la OU-2 no se detectaron ninguno de los contaminantes relacionados al lugar en el Rio Guanajibo en muestras de superficie o poro. Dicha detección permitió concluir que el agua subterránea descarga al Rio Guanajibo.

Se detectaron contaminantes relacionados con el Lugar en concentraciones que exceden los niveles de detección en muestras de agua superficial colectadas en una pequeña zanja de drenaje en el lado noreste de la antigua facilidad de CCL Label en el parque industrial. Estos resultados son similares a los detectados durante OU-1.

La EPA tiene una preferencia legal de usar el tratamiento para atender las principales amenazas planteadas por un lugar. Los principales residuos de amenaza principal son aquellos materiales de origen considerados altamente tóxicos o móviles que generalmente no se pueden contener de manera confiable o presentarían un riesgo significativo para la salud humana. El agua subterránea contaminada generalmente no se considera un material de origen. La contaminación en el centro y las franjas del plumacho no se considera un residuo de amenaza principal.

Resumen de Riesgos

El propósito de la evaluación del riesgo es determinar los posibles riesgos de cáncer y riesgos para la salud no cancerígenos del Lugar suponiendo que no se tomen medidas de remediación. Una evaluación inicial de riesgo para la salud humana se realizó para evaluar los riesgos de cáncer actuales y futuros y los riesgos para la salud no cancerígenos en base a los resultados de la investigación de remediación.

Una Evaluación de Riesgo Ecológico a nivel de detección (SLERA, por sus siglas en inglés) también se llevó a cabo durante la OU-1 para evaluar el riesgo que supone para los receptores ecológicos como resultado de la contaminación relacionada al Lugar.

Evaluación de Riesgos a la Salud Humana

Como parte del RI y el estudio de viabilidad (RI/FS, por sus siglas en inglés), se llevó a cabo una evaluación inicial de riesgos a la salud humana (HHRA, por sus siglas en inglés) para estimar los riesgos y peligros asociados con los efectos actuales y futuros de los contaminantes a la salud humana y el medio ambiente. La evaluación inicial HHRA es un análisis de los posibles efectos adversos a la salud causados por la exposición de sustancias peligrosas en ausencia de cualquier acción para controlar o mitigar estas exposiciones en virtud de los usos actuales y futuros del terreno.

Una evaluación de cuatro pasos de riesgos a la salud humana fue usada para evaluar los riesgos de cáncer y peligros a la salud no cancerígenos. El proceso de cuatro pasos está compuesto por: Identificación de Peligrosidad de los Químicos de Potencial Preocupación (COPCs, por sus siglas en inglés),

Evaluación de Exposición, Evaluación de Toxicidad y Caracterización de Riesgo.

La evaluación de referencia de los riesgos a la salud humana comenzó seleccionando los COPCs en los medios (por ejemplo, agua de superficie, sedimento y agua subterránea) que pudieran causar efectos adversos a la salud en poblaciones expuestas. Los escenarios actuales y futuros de uso de terreno en el Lugar incluyeron los siguientes medios de exposición y poblaciones:

- Residentes (niños/adultos): ingestión futura, contacto dérmico e inhalación del agua subterránea.
- Los usuarios recreativos (adolescentes 12-18): ingestión actual y futura, y contacto dérmico por exposición recreativa al agua de superficie y del Rio Guanajibo.

En esta evaluación de riesgo a la salud humana, las concentraciones de los puntos de exposición fueron estimadas usando ya sea el máximo de concentración detectado de un contaminante o el 95% del límite de seguridad de la concentración promedio. Las ingestas diarias crónicas se calcularon basadas en la exposición máxima razonable (RME, por sus siglas en inglés), la cual es la mayor exposición razonablemente anticipada que se espera que ocurra en el Lugar. El RME está diseñado para estimar un escenario conservador de exposición que esté aun en el rango de posibles exposiciones. Se desarrollaron además suposiciones de exposición de tendencia central. Un resumen completo de todos los escenarios de exposición puede ser encontrado en el reporte de la evaluación de riesgos a salud del Lugar.

Agua Subterránea

Los riesgos y peligros fueron evaluados para determinar el potencial de una futura exposición al agua subterránea. La población de interés incluía adultos y niños residentes. El riesgo de cáncer estaba por encima del rango aceptable de la EPA. El riesgo no canceroso estaba por encima del valor aceptable de EPA de 1. Los COCs identificados en el agua subterránea fueron TCE, PCE, cloruro de vinilo y cis-1,2-DCE.

Tabla 1. Resumen de riesgos asociados al agua subterránea.

Receptor	Indice de Riesgo	Riesgo de Cancer
Trabajador - adulto (futuro)	34	$3x10^{-4}$
Residente adulto (futuro)	317	$4x10^{-3}$
Residente niño (futuro)	289	
Los COCs identificados en el agua subterránea son PCE, TCE, cloruro de vinilo y cis-1,2-DCE.		

Agua de Superficie y Sedimento

Los riesgos y peligros fueron evaluados para determinar el potencial de una futura exposición al agua de superficie y sedimento del Rio Guanajibo. Las poblaciones de interés incluyeron a los adolescentes usuarios recreacionales. Los riesgos de cáncer estuvieron por debajo o dentro del rango aceptable de la EPA. Los no cancerígenos estaban por debajo o justo por encima del valor aceptable de la EPA del índice de riesgo (HI) de 1. Aunque la suma de los cocientes de riesgo apenas excede el valor de 1 para suelo, ningún químico individual o químicos que actúen sobre el mismo órgano estuvieron por encima de 1. Por lo tanto, ningún COCs fue identificado el agua de superficie o sedimento.

Intrusión de Vapores

Se evaluó la posibilidad de que los vapores en el agua subterránea contaminada se volatilicen y lleguen a los edificios localizados sobre el plumacho evaluado. Las concentraciones elevadas de gases del suelo de TCE y PCE se detectaron en varios edificios (tres edificios comerciales y dos propiedades residenciales). Una de las propiedades residenciales también tuvo una ligera superación del valor de detección de aire interior para TCE. La ruta de intrusión de vapor continuará siendo evaluada y se tomarán las medidas correctivas apropiadas en función de los resultados del muestreo.

Evaluación de Riesgo Ecológico

Un SLERA se llevó a cabo para evaluar el potencial de riesgos ecológicos por la presencia de contaminantes en el Lugar. El enfoque del SLERA fue evaluar el potencial de impactos a receptores ecológicos sensibles de constituyentes de riesgo relacionados al lugar por medio de la exposición al suelo, sedimento, agua de superficie y de poro del Rio Guanajibo. Las concentraciones en el agua de superficie y poro, y suelo fueron comparadas a los valores de revisión como un indicador del potencial a efectos adversos a receptores ecológicos. Un resumen completo de todos los escenarios de exposición puede encontrarse en el SLERA.

***Agua de superficie**:* Existe un potencial de efectos adversos para los receptores ecológicos (invertebrados, reptiles, anfibios, aves y mamíferos) por la exposición al agua superficial en el Río Guanajibo. Los criterios de detección del agua

superficial se excedieron para metales (aluminio, bario, cadmio, cromo, cobalto, cobre, hierro, plomo, manganeso, níquel, plata, vanadio y zinc) y tres compuestos orgánicos volátiles (cloroformo, tolueno y TCE), que dio como resultado un HI mayor que el valor aceptable de 1. Los metales no se consideraron relacionados con el Lugar y no se seleccionaron como COCs. La concentración elevada de TCE en el agua superficial se localizó cerca de un área de drenaje adyacente al Parque Industrial el Retiro, en un área con un hábitat viable limitado. Por lo tanto, no se esperan efectos adversos en la supervivencia, el crecimiento y/o la reproducción de organismos acuáticos y no se identificaron COCs para el agua superficial.

Sedimento: Existe un potencial de efectos adversos para los receptores ecológicos (invertebrados, reptiles, anfibios, aves y mamíferos) por la exposición a sedimentos en el Río Guanajibo. Los criterios de detección en la superficie del suelo se excedieron para metales (antimonio, cadmio, cromo, cobalto, cobre, cianuro, hierro, plomo, manganeso, níquel, plata y zinc), lo que dio como resultado valores de HI superiores al valor aceptable de 1. Sin embargo, ninguno de los metales detectados se consideró como relacionados al Lugar, por lo tanto, no se seleccionaron COCs para los sedimentos del Río Guanajibo.

Resumen de la Evaluación de Riesgo

En base a los resultados de la evaluación de riesgos para la salud humana, es la opinión actual de la agencia líder de que la Alternativa Preferida identificada en este Plan Propuesto, o cualquiera de las otras medidas de remediación consideradas en el Plan Propuesto, es necesaria para proteger la salud pública o el bienestar, o el medio ambiente a partir de descargas actuales o potenciales de sustancias peligrosas al medio ambiente.

OBJETIVOS DE ACCIÓN REMEDIAL

Los Objetivos de Acción Remedial (RAOs, por sus siglas en inglés) son metas específicas para proteger la salud humana y el medio ambiente. Estos objetivos están basados en información disponible y estándares, tales como requisitos aplicables o relevantes y apropiados (ARARs, por sus siglas en inglés), guías a ser consideradas (TBC) y niveles basados en el lugar específico. Los contaminantes relacionados con el Lugar son los etenos clorados y sus productos de degradación, que incluyen PCE, TCE, cis-1,2-DCE, 1,1-DCE y cloruro de vinilo. Estos cinco VOCs se detectaron con mayor frecuencia y en las concentraciones más altas en el agua subterránea durante el RI de la OU-1 y OU-2.

Los medios contaminados identificados en este Lugar incluyen suelo, agua subterránea y vapor de suelo. La contaminación del suelo en las áreas de origen de Wallace y de la antigua facilidad de CCL Label, el suelo altamente contaminado y el agua subterránea de las zonas poco profundas de la saprolita en las áreas de origen se atenderán en el ROD emitido en diciembre de 2015 para la OU-1.

Esta acción, en la OU-2, se aborda la columna de contaminantes en el agua subterránea de todo el Lugar, incluidas el agua subterránea contaminada debajo de la zona de saprolita dentro de la huella del área de origen.

También se detectaron contaminantes relacionados con el Lugar en muestras de agua superficial colectadas en un pequeño canal de drenaje en el lado noreste de la antigua facilidad de CCL Label y dónde antiguamente operó Baytex. Se espera que esta contaminación del agua superficial se aborde mediante la remediación del suelo y el agua subterránea de la zona poco profunda de la saprolita como parte de la OU-1. No se detectaron contaminantes relacionados con el Lugar en ninguna muestra de agua de superficie o de poro tomadas en el Río Guanajibo durante la OU-2. Por lo tanto, el agua de la superficie no será objeto de remediación activa.

En base a los datos actualmente disponibles, no se ha observado la intrusión de vapor en estructuras localizadas aguas abajo. Sin embargo, está ocurriendo acumulación de vapor debajo de los edificios. Los sistemas de mitigación de vapor en el área de la fuente fueron parte del remedio para la OU-1. El muestreo periódico de cualquier estructura aguas abajo continuará; las concentraciones debajo de la losa y en el aire interior se compararán con los niveles apropiados de detección para intrusión de vapor (VISL, por sus siglas en inglés). Los criterios adecuados de detección de contaminantes en la sub-losa y la concentración del aire interior que requieren mitigación se basarán en la guía de la EPA VISL para propiedades residenciales y se utilizarán para monitorear la calidad del aire interior y de la losa.

Para proteger la salud humana y el medio ambiente, se han identificado los siguientes RAO para la OU-2. Los RAOs para Agua Subterránea (OU-2) son:

• Prevenir/minimizar riesgos a través de la exposición (via contacto directo, ingestión o inhalación) a el agua subterránea contaminada del Lugar.

- Restablecer el agua subterránea a los estándares de agua potable.

- Reducir o prevenir la potencial emigración de contaminantes por encima de los estándares de agua potable.

METAS PRELIMINARES DE REMEDIACIÓN

Para satisfacer los RAO, se desarrollaron los PRGs para ayudar a definir la extensión de la contaminación que requiere medidas correctivas. Los PRGs son medidas químico- específicas para cada uno de los medios y / o vía de exposición que se espera que sean de protección a la salud humana y al medio ambiente. Se derivan basado en la comparación con los ARARs, niveles basados en el riesgo, y las concentraciones de trasfondo, teniendo en cuenta también dado a otros requisitos como límites analíticos de detección, los valores de orientación, y otra información pertinente.

El agua subterránea en el Lugar está clasificada como SG (que incluye toda el agua subterránea según se define en el Reglamento de normas de calidad del agua de Puerto Rico [mayo de 2016]), adecuada para el uso de agua potable, y se utiliza como fuente de suministro de agua potable en áreas fuera del plumacho de agua subterránea contaminada. Por lo tanto, los estándares federales de agua potable son requisitos relevantes y apropiados. Los estándares de calidad del agua de Puerto Rico están promulgados y los estándares aplicables para este Lugar. La Tabla 3 al final de este Plan Propuesto presenta los PRG para el agua subterránea en este Lugar.

La EPA espera que las alternativas de remediación consideradas en este Plan Propuesto atiendan de manera integral la contaminación del agua subterránea y alcancen los objetivos de la remediación. La EPA también espera que la implementación de esta acción se superponga con el remedio ya seleccionado de la OU-1.

RESUMEN DE LAS ALTERNATIVAS REMEDIALES

La ley de CERCLA § 121 (b) (1), 42 U.S.C. § 9621 (b) (1), exige que las medidas correctivas sean de protección a la salud humana y el medio ambiente, sean costo efectivas, y utilicen soluciones permanentes y tecnologías alternativas de tratamiento y alternativas de recuperación de recursos en la mayor medida posible. La Sección 121 (b) (1) también establece una preferencia por las medidas remediales que emplean, como elemento principal, el tratamiento para reducir de forma permanente y significativamente el volumen, toxicidad, o la movilidad de las sustancias peligrosas, y contaminantes en un Lugar. CERCLA § 121 (d), 42 USC § 9621 (d), especifica además que una acción remedial debe alcanzar un nivel o un estándar de control en las sustancias peligrosas y contaminantes, que al menos alcance los ARARs bajo las leyes federales y estatales, a menos que una dimisión puede justificarse en virtud de CERCLA § 121 (d) (4), 42 USC § 9621 (d) (4).

Los plazos que se presentan a continuación para cada alternativa sólo reflejan el tiempo necesario para construir o implementar el remedio y no incluyen el tiempo requerido para diseñar el remedio, negociar de haber partes potencialmente responsables, o procurar contratos para el diseño y construcción. El período de tiempo preciso para lograr los RAO en el agua subterránea depende de la remediación de las áreas de origen y del núcleo del plumacho. Por lo tanto, el monitoreo del agua subterránea a largo plazo aseguraría que los RAO se logren en el Lugar.

Los estimados de gastos, que se basan en la información disponible, son estimaciones de orden de magnitud de costos de ingeniería que se espera que estén dentro de +50 a -30 por ciento del costo real del proyecto.

Elementos comunes

Se supone que varios elementos comunes se incluyen como parte de cada alternativa de remediación. Los elementos comunes enumerados a continuación no aplican a la alternativa de No Acción.

Investigación de Pre-Diseño

Se realizará una investigación pre-diseño (PDI, por sus siglas en inglés) como parte del diseño para la remediación. Se llevaría a cabo un PDI para delinear las extensiones verticales de la zona de tratamiento en la zona de la saprolita y de la roca inestable. Se perforarían pozos de monitoreo adicionales en el área de origen en Wallace, el área de origen de la antigua facilidad de CCL Label, y en áreas seleccionadas aguas abajo de donde se instalaría el sistema de tratamiento.

Controles institucionales

Se necesitarían controles institucionales para restringir el uso y la exposición al agua subterránea contaminada hasta que los niveles de contaminantes se reduzcan a los PRG o ya no presenten ningún riesgo para la salud humana. Los tipos de controles institucionales empleados para prevenir la exposición al agua subterránea contaminada podrían incluir restricciones en la instalación de pozos de agua potable y restricciones en el uso del agua subterránea en lugares dentro de las áreas contaminadas. La efectividad de los controles institucionales seleccionados dependería de su implementación continua. La confiabilidad de los controles institucionales depende de la capacidad de hacerlos cumplir, la disponibilidad de recursos para las inspecciones y el cumplimiento de las restricciones.

Para más información sobre controles institucionales ir a: http://www.epa.gov/fedfac/pdf/ic_ctzns_guide.pdf

Monitoreo a Largo Plazo del Agua Subterránea Contaminada y del Vapor dentro del Plumacho

El monitoreo a largo plazo se llevaría a cabo en la franja del plumacho, que incluye el monitoreo de la contaminación en el acuífero de la zona fracturada del lecho de roca y la zona profunda e inestable del lecho de roca debajo del área de tratamiento activo. El programa de monitoreo incluiría la toma periódica de muestras de agua subterránea para la evaluación de la migración de contaminantes, MNA y la protección continua de la salud humana y el medio ambiente.
Una vez que finaliza el tratamiento activo en el núcleo del plumacho (donde las concentraciones de PCE o TCE superan los 100 µg/L), cualquier contaminación restante con una concentración considerada baja en la franja de la columna (donde las concentraciones de estos contaminantes están entre 5 y 100 µg/L) y en la columna también se incluirían en el programa de monitoreo a largo plazo y MNA. En base a las múltiples líneas de evidencia, se espera que la atenuación natural monitoreada continúe reduciendo las concentraciones a lo largo del tiempo. El plumacho de contaminación está ubicado en un área residencial/comercial densamente poblada y las localizaciones disponibles para implementar el tratamiento fuera del núcleo del plumacho son limitadas. Además, enfocarse en las concentraciones más altas (es decir, iguales o mayores de 100 µg/L) remediaría la masa más alta del contaminante.

Los datos del monitoreo del agua subterránea también se utilizarían para evaluar posibles áreas de acumulación de vapor debajo de las estructuras. Las muestras de la sub-losa y del aire interior se tomarían periódicamente para el análisis de VOCs en el vapor. Los sistemas de mitigación de vapor se instalarán según sea necesario.

Evaluación de cada Cinco Años

Las alternativas que hacen que los contaminantes permanezcan por encima de los niveles que permiten el uso sin restricciones y la exposición ilimitada, requieren que el Lugar se revise al menos una vez cada cinco años. Si la revisión lo justifica, se pueden considerar medidas correctivas adicionales para eliminar, tratar o contener la contaminación. Para acciones de remediación en las que, el uso no restringido y la exposición ilimitada es el objetivo del remedio, puede requerir muchos años para alcanzar ese objetivo. Es política de la EPA llevar a cabo revisiones cada cinco años hasta que se alcancen los objetivos de remediación.

La EPA entiende que este Lugar requerirá más de cinco años para remediarlo; sin embargo, debido a que se espera que los recursos de la OU-1 y la OU-2 estén estrechamente alineados, la necesidad de una revisión de cinco años se abordará de manera integral. La EPA llevaría a cabo revisiones cada cinco años para OU-1 hasta que los RAO se logren dentro del área de origen y para la OU-2 hasta que se alcancen los RAO del agua subterránea.

EPA Región 2 - Política de Eficiencia Energética (Clean and Green Policy)

Los beneficios ambientales del remedio preferido pueden mejorarse tomando en consideración, durante el diseño, las tecnologías y prácticas que sean sostenibles, de acuerdo con la Política Energética de la EPA en la Región 2. Esto incluirá la consideración de tecnologías y prácticas de remediación verdes. Algunos ejemplos de prácticas que serían aplicables son las que reducen las emisiones de contaminantes al aire, minimizar el consumo de agua potable, incorporar vegetación nativa en los planes de revegetación, y considerar la reutilización y / o reciclaje de materiales beneficiosos, entre otros.

Alternativas de Remediación

Las alternativas de remediación que atenderán la contaminación del agua subterránea están resumidas a continuación. La alternativa seleccionada se coordinaría con el remedio de la zona de origen de la OU-1 para proporcionar la remediación del Lugar.

Alternativa 1: No Acción

Costo Capital Total	$ 0
Costo de O y M	$ 0
Total del Valor Neto Presente	$ 0
Tiempo Estimado para lograr RAOs	No los logrará

El NPC exige que se evalue una alternativa de "No acción" como base para comparar con las otras alternativas de remediación. Bajo esta alternativa, la EPA no tomaría ninguna acción y solo se utilizaría para comparación.

Alternativa 2: Extracción del Agua Subterránea, Tratamiento fuera del lugar (Ex Situ) y MNA

Costo Capital Total	$ 7.8 millones
Costo de Operación y Mantenimiento	$ 13.9 millones
Total del Valor Neto Presente	$ 21.7 millones

Tiempo Estimado de Construcción	2.5 – 3 years
Tiempo Estimado para lograr RAOs	Más de 30 años

Bajo esta alternativa, los pozos de extracción de agua subterránea se instalarían en el Parque Industrial el Retiro y en la parte aguas abajo del núcleo del plumacho para interceptar el plumacho del contaminante y minimizar la migración de la contaminación. Los componentes principales de esta alternativa son:

• PDI
• Diseño para remediación (RD, por sus siglas en inglés)
• Instalación de pozos de extracción de agua subterránea en el núcleo del plumacho
• Construcción de tubería y sistema de tratamiento para el agua subterránea
• O&M del sistema de extracción de agua subterránea y tratamiento ex situ (extracción de aire, GAC en fase vapor y GAC en fase líquida)
• Monitoreo de la franja del plumacho para evaluar la migración y la atenuación natural
• Controles institucionales
• Revisión cada cinco años
• Para fines de estimación de costos, se supone que la zona de tratamiento es desde la superficie del terreno hasta 20 pies de profundidad

Bajo esta alternativa, los pozos de extracción de agua subterránea se instalarían en el núcleo del plumacho para eliminar el agua subterránea contaminada, para minimizar la migración del contaminante aguas abajo y facilitar la limpieza del plumacho de contaminación a largo plazo. El modelo de agua subterránea desarrollado durante el RD se actualizará según sea necesario y se usará para simular la extracción de agua subterránea y determinar las localizaciones y número de pozos de extracción, los intervalos de monitoreo de los pozos de extracción y las tasas de extracción de agua subterránea. Para el FS, se realizó un cálculo analítico del flujo de agua subterránea para estimar el número de pozos de extracción y las tasas de extracción.

Se supone que los pozos de extracción vertical se instalarían en dos áreas del núcleo del plumacho. Se espera que se instale una cerca del pozo de extracción al norte de Wallace, inmediatamente aguas abajo de las áreas de origen de Wallace, y en el área de origen en la antigua facilidad de CCL Label (Línea #1). Otra cerca del pozo de extracción que se instalaría a lo largo de la Calle 2 y la Calle B (Línea #2).

Los pozos en la Línea #1 consistirían en grupos de pozos abiertos en la zona de roca saprolítica y a la roca inestable. Los pozos en la Línea #2 se distribuirían entre la parte inferior de la saprolita y en la zona superior de la roca inestable. Para fines de estimado de costos, se asumen 29 pozos de extracción para esta alternativa. También se supone que estos pozos serían de 6 pulgadas y se instalarían utilizando el método de perforación rotatoria con lodo. Todos los pozos se completarían al ras con la superficie, en una bóveda clasificada para tráfico.

El núcleo del penacho sería remediado activamente bajo esta alternativa, mientras que la franja del penacho sería monitoreada para la protección continua de la salud humana y el medio ambiente.

Alternativa 3: Tratamiento In Situ y MNA

Bajo esta alternativa, el tratamiento in situ se llevaría a cabo en Wallace y en la antigua facilidad de CCL Label, y aguas abajo del núcleo del plumacho. El enfoque conceptual para esta alternativa implica recircular la enmienda de biorremediación en Wallace y en la antigua facilidad de CCL Label e instala dos barreras biológicas (biobarriers) en el núcleo del plumacho. Se podrían desarrollar otras estrategias durante el RD. Los componentes principales de esta alternativa incluyen:

• PDI
• RD
• Tratamiento in situ en el núcleo del plumacho
• Monitoreo de la franja alrededor del núcleo del plumacho para evaluar la migración y la atenuación natural.
• Controles institucionales.
• Revisión cada cinco años

Para propósitos de estimación de costos, se asumió que se instalarían dos barreras de tratamiento utilizando pozos de inyección horizontales o verticales para interceptar el plumacho y minimizar la migración de contaminantes (ver figuras 8 y 9). Se consideraron los pozos de inyección tanto horizontales como verticales para la estimación de costos en esta área. Si bien la instalación de pozos horizontales requeriría un área de almacenamiento grande y una distancia suficiente para perforar la tubería de plomo hasta la profundidad deseada, los pozos de inyección verticales deberían estar separados aproximadamente 30 pies; por lo tanto, se requeriría un gran número de pozos verticales. Se estima que serían necesarios 60 pozos de inyección vertical para cubrir la misma área que dos pozos horizontales cubrirían en el núcleo del plumacho. La instalación de 60 pozos de inyección vertical probablemente causaría una interrupción en la comunidad local durante un período prolongado de tiempo. La Figura 8 presenta el enfoque conceptual utilizando dos pozos de inyección horizontales; La Figura 9 presenta el enfoque conceptual utilizando pozos de inyección

vertical. La orientación de los pozos de inyección será evaluada en el PDI.

Una amplia gama de enmiendas está disponible comercialmente, como EVO, suero de leche, LactOil™ o Plume Stop™, que duraría 2 años o más. Se llevaría a cabo un estudio piloto en un lugar factible para la instalación de una barrera de tratamiento a gran escala para recopilar los parámetros de diseño específicos del Lugar, como la tasa de inyección, el radio de influencia, la longevidad de la enmienda y el número de pozos requeridos.

Costo Capital Total	$ 13.3 millones
Costo de O y M	$ 4.0 millones
Total del Valor Neto Presente	$ 17.3 millones
Tiempo Estimado de Construcción	4 años
Tiempo Estimado para lograr RAOs	30 años o más

El núcleo del penacho sería remediado activamente bajo esta alternativa, mientras que la franja del penacho sería monitoreada para asegurar la protección continua a la salud humana y al medio ambiente.

EVALUACIÓN DE ALTERNATIVAS DE REMEDIACIÓN

El NCP enumera nueve criterios para la evaluación y comparación para las alternativas de remediación. Esta sección del Plan Propuesto describe el desempeño relativo a cada alternativa en relación con los nueve criterios, y cómo cada una de las alternativas se compara con las otras opciones en consideración. Siete de los nueve criterios de evaluación se discuten a continuación. Los últimos dos criterios, "Aceptación del Estado" y "Aceptación de la Comunidad" se discuten al final del documento. En el informe del FS se presenta un análisis más detallado de cada una de las alternativas.

Análisis Comparativo de las Alternativas

Protección General a la Salud Humana y el Medio Ambiente

La Alternativa 1, Ninguna acción, no cumpliría con los RAO y no protegería la salud humana ni el medio ambiente porque no se tomaría ninguna medida. Sin la implementación de controles institucionales, la exposición humana a la contaminación del Lugar no se evitaría. A pesar de que el suelo y el agua subterránea altamente contaminada en las áreas de origen que sirven como fuentes para la contaminación del agua subterránea se tratarían bajo la OU-1, las concentraciones de contaminantes de las áreas de origen aún están significativamente elevadas y no se tratarán. Bajo la Alternativa 1, no se implementarían mecanismos para reducir la toxicidad, la movilidad y el volumen de la contaminación, excepto a través de procesos naturales que no serían monitoreados para evaluar la efectividad o predecir la duración de esta alternativa.

Las alternativas 2 y 3 serían eficaces para proteger la salud humana y el medio ambiente. Los controles institucionales evitarían la futura exposición humana a la contaminación del agua subterránea. La Alternativa 2 eliminaría los contaminantes mediante la extracción del agua subterránea y el tratamiento ex situ; La alternativa 3 destruiría los contaminantes en el subsuelo. Con el tiempo, todo el plumacho de contaminación sería remediado. Ambas alternativas lograrían los RAO para el agua subterránea. Sin embargo, la tasa de remoción de contaminantes por la extracción de agua subterránea y el sistema de tratamiento ex situ probablemente alcanzará un nivel asintótico a largo plazo porque la tasa de remoción de contaminantes por extracción del agua subterránea estaría limitada por la compleja geología del Lugar. Se espera que la Alternativa 3 alcance los PRG más rápido que la Alternativa 2.

Cumplimiento de los Requisitos Aplicables o Relevantes y Apropiados (ARARs)

La Alternativa 1 no lograría los ARARs o PRGs químico-específicos para el Lugar. Los ARARs de localización-y acción específicos no aplicarían con la Alternativa 1 porque no se realizarían acciones correctivas. Se anticipa que las alternativas 2 y 3 satisfacen los ARARs químico-específicos al lograr los PRGs en el futuro y se diseñarán e implementarán para cumplir con los ARARs localización-y acción específicos. Los ARARs localización-específicos se cumplirán utilizando el manejo de la planicie de inundación durante el diseño y la implementación de la alternativa seleccionada, ya que ambas alternativas proponen una perturbación subsuperficial dentro de las zonas con probabilidad de inundación con probabilidad anual del 0.2% y 1%. Los humedales y las zonas arqueológicas en el área no se verán afectadas por la perturbación subsuperficial propuesta.

Efectividad y Permanencia a Largo Plazo

La Alternativa 1, Ninguna acción, no proporcionaría efectividad y permanencia a largo plazo porque no se implementaría ninguna acción para reducir el nivel de contaminación o la posibilidad de exposición al agua subterránea contaminada a los receptores del Lugar.

Las alternativas 2 y 3 proporcionarían efectividad a largo plazo porque combinan tratamiento, monitoreo a largo plazo, MNA y controles institucionales para proteger la salud humana y el medio ambiente. Para la Alternativa 2, los contaminantes serían extraídos y tratados ex situ. Se espera que la tasa de remoción de contaminantes sea más lenta que la Alternativa 3 debido a que la extracción y el tratamiento del agua subterránea no podrían estar tan enfocados en las áreas de origen donde se produjeron las descargas de contaminantes originales debido al espacio y a limitaciones de logísticas. La tecnología propuesta en la Alternativa 3 sería más fácil de enfocar en áreas con la mayor contaminación y se espera que resulte en concentraciones residuales más bajas que la Alternativa 2.

A pesar de que las fuentes de contaminación del agua subterránea en la zona vadosa y la saprolita se tratarían bajo la OU-1, lo más probable es que existan altos niveles residuales de contaminación en la zona inestable del lecho de roca, especialmente en Wallace, lo que requeriría mucho tiempo para ser lavado por el flujo natural del agua subterránea.

Se espera que la Alternativa 3 brinde efectividad adicional a largo plazo porque se enfocaría en el área donde ocurrieron las descargas originales de contaminantes (la saprolita y la zona de lecho de roca inestable debajo de las áreas de origen identificadas en la OU-1) y destruiría los contaminantes en el lugar. Se espera que las concentraciones de contaminantes residuales sean menores en la Alternativa 3 que en la Alternativa 2.

La Alternativa 2 utiliza tecnología probada para eliminar el agua subterránea contaminada del subsuelo y es confiable. Sin embargo, las concentraciones de contaminantes residuales podrían ser más altas que las PRG durante mucho tiempo debido a que esta tecnología tiende a tener una eficacia reducida en la eliminación de contaminantes a largo plazo. La Alternativa 3 utiliza tecnologías innovadoras que se han probado en aplicaciones de campo a gran escala (es decir, implementadas en otros sitios de remediación). Se ha demostrado que la tecnología de biorremediación in situ en muchos sitios es eficaz y confiable para reducir la masa del contaminante en las áreas de origen y en la plumacho.

El uso de pozos de inyección vertical se ha implementado en muchos lugares; el uso de pozos horizontales para inyección de enmiendas también se ha probado en sitios con resultados efectivos. La confiabilidad de los controles institucionales bajo las Alternativas 2 y 3 dependería de la aplicación del gobierno local y de la comprensión y disposición de los residentes para cumplir con los mismos. La efectividad de estas alternativas se evaluaría a través del monitoreo rutinario del agua subterránea y las revisiones cada cinco años.

Reducción de la Toxicidad, Movilidad o Volumen (T/M/V) por Medio de Tratamiento

La Alternativa 1, Ninguna acción, no reduciría el contaminante T/M/V porque no se llevaría a cabo ninguna acción correctiva. Sin embargo, se espera que las concentraciones de contaminantes disminuyan con el tiempo debido a la remediación bajo OU-1 y la atenuación natural.
Ambas alternativas 2 y 3 reducirían la T/M/V a través del tratamiento. La Alternativa 2 eliminaría el agua subterránea contaminada y la trataría ex situ, mientras que la Alternativa 3 trataría y destruiría biológica o químicamente la contaminación in situ. El alcance y la eficacia de la reducción de T/M/V deberían verificarse con los resultados del monitoreo. Se espera que la Alternativa 3 tenga una mayor reducción de T/M/V que la Alternativa 2 porque la Alterativa 3 se enfocaría en el área y las zonas verticales directamente debajo de las fuentes de contaminación bajo OU-1.

Efectividad a Corto Plazo

Bajo la Alternativa 1, la alternativa de Ninguna acción, no habría ningún impacto a corto plazo para la comunidad, el medio ambiente y los trabajadores del sitio, ya que no se establecerían acciones correctivas. Habría impactos a corto plazo para la comunidad local y los trabajadores del Lugar para las Alternativas 2 y 3 debido a las medidas correctivas activas iniciadas y las actividades de construcción, operación y mantenimiento asociadas. La Alternativa 2 requeriría la instalación de una gran cantidad de pozos verticales de extracción de agua subterránea y una tubería a través de una comunidad residencial densamente poblada, lo que impactaría la vida diaria de los residentes.

Se supone que la Alternativa 3 utiliza pozos horizontales para la inyección de enmiendas, lo que tendría un impacto mucho menor para la comunidad local. Sin embargo, si los pozos de inyección vertical se usan bajo la Alternativa 3, implicaría la instalación de un número mayor de pozos que la Alternativa 2, lo que podría tener un mayor impacto en la comunidad local. La Alternativa 3 también implica la presencia de una brigada y equipo de inyección de enmienda, potencialmente en la comunidad residencial. Bajo las Alternativas 2 y 3, se requerirá una cuidadosa planificación y comunicación pública para la implementación a fin de minimizar los impactos negativos en la comunidad local.

El impacto de la toma de muestras de agua subterránea en los pozos de monitoreo en todo el

Lugar para el monitoreo a largo plazo y el programa MNA sería mínimo. Para las Alternativas 2 y 3, el monitoreo de aire, los controles de ingeniería y el equipo de protección personal apropiado se usarían para proteger a la comunidad y los trabajadores de cualquier exposición a la contaminación.

Se estima que el período de construcción de la Alternativa 2 es de 2.5 a 3 años, incluido un año inicial para la operación de inicio, prueba y optimización del sistema. Se espera que la O&M de los pozos de extracción de agua subterránea y el sistema de tratamiento de agua subterránea sea mucho más largo que el período de 30 años generalmente evaluado para un FS.

El período de construcción de la Alternativa 3 se estima en 4 años, asumiendo que el tratamiento in situ en el Parque Industrial el Retiro se llevaría a cabo primero, luego en el área del plumacho aguas abajo. También se supone que se requerirá una ronda de reposición de la enmienda para las zonas de tratamiento después de la inyección de la enmienda inicial, después de lo cual todo el plumacho del contaminante estaría bajo un programa de monitoreo a largo plazo, que puede ser necesario para 30 años o más.

Implementación

La alternativa 1, la alternativa de No acción, sería más fácil de implementar tanto técnica como administrativamente, ya que no se realizaría ningún trabajo adicional en el Lugar.

Las alternativas 2 y 3 serían construibles y operables porque los servicios, materiales y proveedores con experiencia estarían disponibles. La Alternativa 2 requeriría la instalación de una gran cantidad de pozos y tuberías de interconexión a través de un vecindario residencial, lo que requeriría la aceptación y la coordinación con la comunidad. La perforación y la instalación de un gran número de pozos de extracción en la zona de roca inestable sería un desafío debido al posible colapso del barreno; sin embargo, los métodos de perforación sonora o rotativos de lodo pueden mitigar esta preocupación. La Alternativa 2 también requiere espacio para una planta de tratamiento, que podría instalar en los edificios vacantes existentes y no debería ser un problema de implementación.

La construcción de la Alternativa 2 requeriría un estudio exhaustivo de los servicios públicos y la implementación debe diseñarse para evitar la interrupción o el daño a utilidades. El equipo de tratamiento ex situ, como el extractor de aire, puede necesitar ser fabricado y enviado para la isla. Actualmente, la planta de tratamiento de aguas usadas (POTW, por sus siglas en inglés) están operando bajo la capacidad diseñada. Con los permisos y las aprobaciones correspondientes, el agua tratada del Lugar podría descargarse al POTW local.

Para implementar la Alternativa 3, para propósitos de estimación de costos los pozos de inyección horizontal se asumieron en el FS. Hay vendedores experimentados disponibles para la instalación de pozos horizontales para la inyección de químicos. Sin embargo, el equipo y las cuadrillas para la instalación de pozos horizontales y la inyección de enmiendas deberían ser transportados a la isla. Bajo la Alternativa 3, la interrupción potencial de las utilidades existentes por la perforación e instalación de pozos horizontales es mínima porque los pozos horizontales se instalarían a una profundidad a la cual no habría utilidades presentes. La instalación horizontal del pozo requeriría una o dos áreas grandes de almacenamiento. Actualmente, hay espacios grandes y abiertos disponibles que sirven como áreas de preparación; permiso para usar esas áreas probablemente sería obtenible. Durante el diseño para la remediación, se evaluaría el uso de pozos de inyección vertical y pozos de inyección horizontal para determinar un enfoque rentable. Si se usan pozos de inyección vertical, se requerirá un número mayor de pozos verticales para la Alternativa 3 que para la Alternativa 2, y se requerirá una instalación cuidadosa del pozo para no afectar utilidades públicas.

Para las Alternativas 2 y 3, se implementarán medidas de seguridad y salud para proteger a la comunidad local y a los trabajadores de la construcción. Se utilizarían equipos y horas de trabajo que minimizarían el impacto del ruido. El tiempo de construcción también se programaría para minimizar, en la medida posible, el impacto en la comunidad local.

Costo

El costo para todas las alternativas provisto contiene una tasa de descuento de un siete por ciento.

Alternativa para Suelo	Costo Capital	Costo Presente O&M	Total del Valor Neto Presente
1	0	0	0
2	$7,800,000	$13,900,000	$21,700,000
3	$13,300,000	$4,000,000	$17,300,000

Estado Libre Asociado de Puerto Rico / Agencia de Apoyo

La JCA está de acuerdo con la acción preferida incluida en el Plan Propuesto.

Aceptación de la Comunidad

La aceptación de la comunidad del remedio preferido será evaluada después de que termine el periodo público de comentarios y se describa en la sección Resumen de Respuesta del ROD para este Lugar. El ROD es el documento que formaliza la selección de un remedio para un Lugar.

Remedio Preferido

La alternativa 3 (tratamiento in situ y MNA) es la alternativa preferida para la OU-2. Bajo esta alternativa, el tratamiento in situ se llevaría a cabo en Wallace y en la antigua facilidad de CCL Label, y aguas abajo del núcleo del plumacho. El enfoque conceptual para esta alternativa requiere recircular la enmienda de biorremediación en Wallace y la antigua facilidad de CCL Label e instalar dos biobarriers en el núcleo del plumacho. El enfoque puede ser refinado durante el RD.

El núcleo del penacho sería remediado activamente bajo esta alternativa, mientras que el borde del penacho sería monitoreado para la protección continua a la salud humana y el medio ambiente.

Bases Para Preferencia del Remedio

Basándose en la información actualmente disponible, la EPA cree que la alternativa preferida cumple los criterios de umbral y proporciona el mejor balance de compensaciones entre las otras alternativas con respecto a los criterios de equilibrio. La EPA y la PREQB esperan que la alternativa preferida pueda satisfacer los siguientes requisitos estatutarios de la Sección 121 (b) de CERCLA: 1) proteja la salud humana y el medio ambiente; 2) cumpla con los ARARs; 3) sea rentable; 4) utilice soluciones permanentes y tecnologías alternativas de tratamiento o tecnologías de recuperación de recursos en la medida posible; y 5) satisfaga la preferencia por el tratamiento como elemento principal. La alternativa preferida puede cambiar en respuesta a comentarios públicos o al recibo de nueva información.

Los beneficios ambientales del remedio preferido pueden ser mejorados al considerar, durante el diseño, tecnologías y prácticas que sean sostenibles de acuerdo con la Política de Energía Limpia y Verde de la Región 2 de la EPA. Esto incluiría la consideración de tecnologías y prácticas de remediación ecológica.

APPENDIX V
ATTENDANCE SHEET

San German Groundwater Contamination Superfund Site
OU-2

San Germán Groundwater Contamination Superfund Site
Public Meeting - July 30, 2019 5 to 7 p.m.

Name	Address	Phone	Email
Brendan MacDonald	14 Wall St New York NY 10025	(917)209-4907	macdonaldbc@cdmsmith.com
Jose H. Pagan	Mun. San Germán	787-264 7386	—
Maria Quiroy	Urb Dorla Marta - C-D21 -		
Omar Santiago	DNER (form PREQB)	787-767-8181	omarsantiago@jca.pr.gov
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Jessenda Emmanuelli	VVB	787-413-8880	jemmanuelli@vvblegal.com
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José López Guiñones	Urb. Riverside J-4	787-892-2588	joslopez1962@gmail.com
Santos Marrero Rodríguez	Urb. Sta. Monica Calle C-F-7	787-379-6956	—
Jorge J. Garcia	CCL (Counsel)	787-562-6918	jjg@mcvpr.com
Zahiryn Y. Vélez Hernández	5508 Ave. Agustín Ramos Calero	787-414-8133	zahiryn.velez@gmail.com
Moraida Malugin Soto	Smile Again Learning Center	787-906-9459	moraida.malugin@gmail.com
Anna Grace	150 M St. NE Washington DC	—	anna.e.grace@usdoj.gov
Adalberto Bosque	City View Plaza Suite 2000 - Guaynabo PR	(787)977-5825	bosque.adalberto@epa.gov
Henry Guzman	USEPA 290 Broadway, NY NY 10007	(212)637 3166	guzman.henry@epa.gov

APPENDIX VI

TRANSCRIPT OF THE PUBLIC MEETING
San German Groundwater Contamination Superfund Site
OU-2

PUBLIC MEETING
SAN GERMÁN GROUNDWATER CONTAMINATION
SAN GERMÁN, PUERTO RICO
JULY 30, 2019

Transcription notes:
Scheduled meeting time: 5:00 p.m.
Location: Basketball Court at Santa Marta Residential Area

Record opened at 5:15 p.m.

Brenda Reyes: Good afternoon. My name is Brenda Reyes Tomassini, Public Affairs Officer of the Environmental Protection Agency, the EPA. We are meeting here this afternoon to explain the preferred action for the San Germán Superfund Site, known as Pozos de San Germán. This afternoon, the folks from EPA, my agency, and CDM, the contractors and us will be making a presentation to show you, the public, the alternative selected for the groundwater Operable Unit. So, I´m going to provide you with a little background. We have been working with this community, actively, for approximately 7 years. For those of you who do not know, we have been working with the community for seven years, right, under the Superfund Program. We also have with us tonight some folks from the [Puerto Rico] Environmental Quality Board. We want to give the deepest thanks to the mayor. The mayor facilitated our use of the basketball court and also helped us announce the meeting. At the entrance you will find this sheet, which is a fact sheet about the Superfund Program that provides the details of the selected alternative. It includes a risk evaluation, a summary and what we expect to achieve with this remedial action. I´m going to ask you to save your questions until the end; we will have a brief presentation. When you begin asking questions, I ask you to state your name because we have a transcription service. It´s always important to have a transcription in all

Superfund cases. So, without further ado, let's begin. Here is my coworker, Project Manager Dr. Adalberto Bosque.

Adalberto Bosque: Great, good afternoon. Good afternoon. I like to walk around, get out of here. Good, it´s a pleasure for the U.S. Environmental Protection Agency, for me, and for the team, at the Agency as well as the Environmental Quality Board, to be here this afternoon giving a presentation specifically related to the investigation performed by the U.S. Environmental Protection Agency here in the San Germán case, known as the San Germán Contaminated Groundwater Site.

(Transcriber's Note – Begins discussing the presentation)

So, what will we be discussing this afternoon? This afternoon's presentation is going to be brief and to the point.

(Transcriber's Note – turns to Slide 2)

We´ll be talking, defining, in the first place, talking about the extent and magnitude of the contamination as defined by the studies performed here in the San Germán case. It´s important to mention that, when the U.S. Environmental Protection Agency began with the San Germán case, it divided or organized, the investigation in two phases, two phases. The first phase is known as Operable Unit Number 1 (*referred to in this presentation as OU-1*). The investigation that was performed in order to determine the source of contamination. The source was found to originate from, or originates from, El Retiro Industrial Park, and we´ll be looking at some figures soon in order to get an idea where this contamination begins, the origin of this contamination. Specifically, two of the main contaminants. The first contaminant is called tetrachloroethene, and the second main contaminant is called trichloroethene. So we´ll

be talking about the extent and magnitude of the contamination as determined by the remedial investigation performed by the U.S. Environmental Protection Agency, for which many residents, well, were able to see the team, the U.S. Environmental Protection Agency consultants, installing wells by drilling boreholes, collecting soil samples, taking surface water samples and groundwater samples; also, taking surface water samples both from a drainage ditch located in El Retiro Industrial Park, as well as surface water samples from the Guanajibo River. The second phase of the investigation consisted of a risk assessment, a study performed by the U.S. Environmental Protection Agency to determine if the concentrations detected in the area, both in the soil and the groundwater, if these concentrations, the contaminant concentrations of these chemicals present in the soil or in the water, could present an unacceptable health risk for people and for the environment; and I should point something out here. When we talk about risk, we have to say that any type of activity entails risk. When we talk about a negative effect of some contaminants on people's health, on people's health, we need to say if the risk is acceptable or unacceptable, because even when a person gets out of bed in the morning, there is a risk. There is a risk of getting tangled up in the blanket and falling; when you get on a plane, there is risk, there is a risk that the plane may crash. When you drive a motor vehicle on the streets, the highways, there is a risk, but this risk is accepted. This means that if you travel in a plane or you drive a motor vehicle, it means that a study is performed to identify who will be potentially exposed to the contaminants of concern, to the different media—soil, groundwater, surface water. If there are vapors being generated by the contaminants as they evaporate as they vaporize, if there is an acceptable risk or if it's an unacceptable risk. Subsequently, a report known as a Feasibility Study was drafted or prepared, where various possible alternatives were evaluated, or presented, that could be

implemented at the site, which eventually, the U.S. Environmental Protection Agency, with the consent of the Government of Puerto Rico through the Department of Natural and Environmental Resources Environmental Quality Board, the Agency then proposes an alternative, which is the base and reason behind this public meeting, and there will be a period for comments, as Brenda specified, and we will probably provide you more information at the end of the presentation. Finally, the Agency presents alternatives that were evaluated, alternatives to address the contamination. The Agency recommends an alternative and the public, the community, the relevant agencies, well, they have a chance to submit comments that the Agency will be answering in a document titled Responsiveness Summary in response to the questions and comments being submitted. That's basically the process; those are different phases performed, the different phases performed... Hand me the pointer, please, my pointer, that one (*asks for the presentation pointer*).

(Transcriber's Note – turns to Slide 3: Superfund Process)

These are the different phases conducted in the evaluation process from the time a site is discovered or when the U.S. Environmental Protection Agency learns there is contamination at a site. In this case, the U.S. Environmental Protection Agency, through the Department of Health, through the Aqueduct and Sewer Authority, detected contamination in the Retiro, Lola I, and Lola II wells. We'll be looking at the timeline later on to have an idea of the years in which these events took place. The U.S. Environmental Protection Agency learned that it was, that there was contamination in these wells; that they were exceeding the acceptable levels established by the Safe Drinking Water Act, and the Agency intervened. We should mention that, earlier, the Department of Health intervened and ordered, in this case, the closure of the wells. That's what we're talking about initially. Later, the Agency performed a preliminary

investigation where it evaluated, obtained information to determine if the case merited a more thorough investigation. The site was later included in the National Priorities List. The site was included in the National Priorities List in March 2008. On that list, it's a U.S. Environmental Protection Agency list in which all sites where there is a contamination issue are assessed, and a scoring system is applied to the sites, if they exceed a certain score, 28.5... If a site exceeds a certain score based on the assessment performed, then the site is nominated for inclusion in the U.S. Environmental Protection Agency's national list, a list that establishes and authorizes the U.S. Environmental Protection Agency to invest federal money in the investigation and, if necessary, the remediation of this site. Afterwards, the investigation begins, wells are installed, samples are collected from groundwater, surface water, soil. Areas that could be ecologically sensitive, that could be impacted, who could be affected, the population that could be impacted and how, where the contamination could have originated, what are the contaminants in question, what are the concentrations present in the area, the type of contaminant. Eventually, the type of effect the contaminant could have on human health and on the ecosystem is studied and determined, and, later, a risk assessment is performed to determine if the risk is acceptable or unacceptable. The feasibility study, which determines possible alternatives that could be implemented. What does the Agency do afterwards? The Agency then drafts what is known as the Proposed Plan. This is what we are presenting. It was made public on July 12th, Friday, July 12th. The U.S. Environmental Protection Agency has made the document public; some of you already have hard copies, provided to you at this meeting, so that people could submit comments regarding the investigation and the alternative or alternatives the Agency is proposing. After this comment period, the Agency will be signing what is known as a Record of Decision. The Record of

Decision is the document in which the U.S. Environmental Protection Agency, once it has received and evaluated the comments submitted by the community and the relevant agencies or entities, the U.S. Environmental Protection Agency, after receiving an acceptance letter from the Government of Puerto Rico through the Environmental Quality Board, the Agency signs what is known as the Record of Decision. This is the document where the Agency finally selects the alternative that will be implemented in the area. In this particular case, the record was signed in 2015, September 2015, the Record of Decision of the first phase of the investigation of the San Germán case, was signed in the year 2015. At that time, in the year 2015, we mentioned before that the first phase had been conducted specifically to identify the source of the contamination; in this case the source of contamination was identified as coming from El Retiro Industrial Park, specifically from two lots located in this Industrial Park, and we'll be looking at figures related to that. Operable Unit Number 1, Operable Unit Number 1, whose Record of Decision was signed in the year 2015, it is now in design stages of the remediation alternative. This means that the U.S. Environmental Protection Agency's consultants, or the Agency's contractor, have been conducting additional samplings during the last months to define with greater precision the extent and magnitude of the contamination and, later, design the system that will be treating or remediating the contamination found in the first phase. That's why we are presenting this flowchart (*refers to the presentation*). Here we have Operable Unit Number 1, and in this phase we can see Operable Unit Number 2, (*referred to in the presentation as OU-2*), which is what we'll be talking about this afternoon. This means that the first phase is at a more advanced state than the second one, but the purpose or the plan is to try to eventually join both phases so that together they can maximize the remediation being implemented to address, not only the source of the contamination, but to try to remediate the

contaminated soil and prevent that soil, those contaminants from continuing to reach the groundwater and spread. I should point out that El Retiro Industrial Park, El Retiro Industrial Park is located approximately 1,300 feet from the wells that were impacted. Those wells have already been closed. OK, next slide please.

(Transcriber's Note – turns to Slide 4: Site Map)

OK. In this figure, this figure appears in the Proposed Plan, in the proposed plan. It basically shows the location. All of us know where we are right now in the municipality of San Germán and where we are right now or where the site is located, one of the sites on the National Priorities List, as is the case of San Germán, of the contaminated wells in San Germán. Next.

(Transcriber's Note – turns to Slide 5: Satellite Image of the Location of the Wells)

In this figure what we are seeing is the location of the wells, Lola I, Lola II, El Retiro, as well as the location of El Retiro Industrial Park. El Retiro Industrial Park. When we began investigating this Superfund site, the U.S. Environmental Protection Agency performed an assessment, an identification of possible places that may have been the cause of the contamination or sources of contamination, and approximately forty-some sites were identified as possible sources of contamination. The investigation was performed and the U.S. Environmental Protection Agency eventually determined in its investigation that the source of contamination of the Lola I, Lola II, and El Retiro wells came from El Retiro Industrial Park. There are two industrial parks here in the town of San Germán: one located north of the Guanajibo River, the Guanajibo River, and the other located south of the Guanajibo River. When the investigation was performed, well we were able to see the location of the Industrial Park, we can see where the contamination originated... how that contamination eventually moved towards the northwest, or

north-northwest, as we'll see later on, until it impacted El Retiro, Lola I, and Lola II wells. It is understood and believed that when these wells, the Lola I, Lola II, and El Retiro, were in operation they created a cone of depression, which means that by creating that cone of depression, they pulled the contaminant in that direction, or speeded up the process of moving the contaminants towards those three wells. I should point out that the information we have indicates that around the time these wells were impacted, there were seven Aqueduct and Sewer Authority wells in operation. Besides, these communities were also served by two surface water sources from the Aqueduct and Sewer Authority; since these three wells were affected, Aqueduct and Sewer Authority supplied, continued to supply water to the communities from an area that is not impacted. This is extremely important, the Aqueduct and Sewer Authority has to comply with Department of Health, meaning that the water supplied must comply with drinking water standards and if the concentration of the contaminants is exceeded in the water, present in the water is exceeded, it means the Department of Health orders the closing of what? Of the wells. This means that the Department of Health must be monitoring the water we drink, must be monitoring that it complies with water, drinking water quality standards, because, as we can see on the way from the Industrial Park to the wells, there are a series of communities, including Santa Marta. This residential area, Porta Coeli, is in the direction of the impacted wells. Next.

(Transcriber's Note – turns to Slide 6: Site Description)

Ok, so we have the location with relation to the site. We spoke about the area of investigation, which was the photo or figure I showed previously, and included, as we also mentioned, El Retiro Industrial Park, identified as the place where the contaminants that impacted these three wells originated, and adjacent areas were also studied. Specifically in one direction,

northwest, north-northwest. Remember, when an investigation is performed, the Agency installs a series of wells to collect groundwater samples to determine and study the groundwater flow direction, that's why the study is pretty thorough, pretty thorough. Wells are installed at 20, 25 feet deep, 70, 55, 60, 70, 80, 90 feet. At this site wells were installed to approximately 170, 180, 190 feet deep, and when these wells are installed, groundwater samples and soil samples are collected at different depths in order to vertically and horizontally define the area where these contaminants are found.

(Transcriber's Note – turns to Slide 7: Historic Background)

This is basically the historic background: In 2001-2005, the presence of contamination is detected in the Aqueduct Authority's wells. In 2006, the Department of Health ordered the closing of the wells; in 2006 the U.S. Environmental Protection Agency and the Puerto Rico Environmental Quality Board intervened. They began to perform investigations to try to identify and subsequently recommend the inclusion of the site in the National Priorities List, which was done in 2008. From 2010 to 2015 this Operable Unit Number 1 investigation was completed. When this investigation was performed wells were installed from the Industrial Park towards el Retiro Park. Soil investigations were performed, and vapor samples were also collected of vapors that could be accumulating under the buildings. Remember, we're talking about volatile organic substances, which means that a volatile organic substance volatilizes, produces vapors and those vapors could move up and could accumulate in buildings. It means that as part of Operable Unit Number 1, studies were made from the previous study and in approximately forty-some residences in this residential area and the adjacent one, two ports were drilled, some "small holes" were opened to determine if vapors were accumulating beneath the buildings and if there was a concentration of these contaminants within the

buildings exceeding levels that would raise flags, for the Agency to say it had to take action. At that time, or when the investigation was completed, it was determined there were no contaminants inside the residences where the study was performed, and we'll be talking about the next step the Environmental Protection Agency will be taking in that direction, according to the recommendations in the proposed alternative. Similarly, investigations were performed at the Industrial Park to determine if vapors were accumulating under buildings, facilities, at El Retiro Industrial Park, and that information was also obtained and documented. From 2015 to 2018, well that is the investigation we will be presenting this afternoon, and eventually the alternative that we are proposing. Next.

(Transcriber's Note – turns to Slide 8: Remedial Investigation)

When we talk about an investigation, as we have already mentioned, the nature of the contamination has to be determined, how the contamination originated, determine exactly when it originated, the amount of contaminants, and, although it's not easy sometimes, you can delimit the source or possible source of contamination, or the reason why the groundwater, surface water, or soil were impacted. The contaminants of concern found in this site, determined by Operable Unit Number 2, the investigation that was just completed in 2018 or early 2019, indicated they were the same contaminants found in Operable Unit Number 1, those present when the public meeting was held here in September 2015, they are the same contaminants. Specifically, these contaminants are mainly solvents, used as solvents, they are volatile organic compounds. The first one, which says PCE, is tetrachloroethene, then trichloroethene, Cis 1-2, dichloroethene, and so on up to vinyl chloride. Those are the contaminants of concern. The contaminant with the highest concentration when the Operable Unit Number 1 investigation was performed was trichloroethene, detected at a concentration of

up to sixty-five thousand parts per billion, sixty-five thousand. The drinking water standard is five parts per billion. Up to sixty-five thousand had been detected at one time. That was the highest concentration at one time. Lower concentrations have been found after that, but above the standard of five parts per billion that is the level for drinking water, and the other contaminant with the highest concentration found when the Operable Unit Number 1 investigation was performed was tetrachloroethene, with a concentration of twenty-six, twenty-six thousand parts per billion, twenty-six parts per billion; the standard for drinking water is five. The investigation showed twenty-six thousand parts per billion, the first study done specifically at the source. Subsequently, in this study the highest concentration of this contaminant, tetrachloroethene, was sixteen thousand parts per billion and we'll be looking at the figure to get a physical idea, ok. Some of these contaminants, I should mention, originate directly, they are direct products, or some are products generated as a result of the biodegradation of other contaminants. For example, tetrachloroethene, trichloroethene, etc., etc., and then comes vinyl chloride, they continue to biodegrade, but they still have an adverse effect, which is why the agency says "all of them have to be remedied."

(Transcriber's Note – turns to Slide 9: Remedial Investigation Figure)

Here are the figures. This figure is from the same investigation. This figure is, well, figure 1-3 of the report, the remedial investigation performed around 2015, completed in 2015. This figure presents from industrial Park, from industrial park towards Lola I, Lola II, and El Retiro wells. This means that when the investigation was performed, it was determined that the source of contamination was the Industrial Park. Specifically, when the investigation was performed, two lots were identified, two lots, where they originated, or where it is understood, based on the investigation, that the contaminants originated. The lot where it originates, I'm talking about the

lot where the contamination originates, where Wallace is now located, where it currently operates, and the source of contamination as... next.

(Transcriber's Note – turns to Slide 10: Remedial Investigation Figure)

...as identified in the first phase, Operable Unit Number 1, and confirmed in this second phase, for trichloroethene, the lot where CCL was previously operating was identified, as the main source of trichloroethene. That's why we can see in this case, in this figure, this little line, these outlines that originate in the facility where CCL previously operated. OK, good. Next.

(Transcriber's Note – turns to Slide 11: Remedial Investigation, Nature and Extent of the Contamination)

In the investigation we just completed, two samplings rounds were done. This means the wells were sampled twice. [In] the wells, or a certain number of wells, two sampling rounds were done. In addition, in the aftermath of Hurricane María, which brought a lot of rain, the U.S. Environmental Protection Agency found it appropriate to perform another investigation, another round of sampling in order to determine if the torrential rains had caused any type of effect. Remember that rainfall eventually infiltrates down the soil, and this could have some kind of effect. An additional round of sampling was done after María from a total of twenty-seven wells in the area. We'll be looking at the figures, twenty-seven wells in the area, three rounds of sampling, and basically, after María, the investigation revealed that the effect had been minor or practically inexistent. We are talking about the movement, the extent, the extent or the concentrations that had been detected in the wells that were previously sampled, but that was the information obtained.

(Transcriber's Note – turns to Slide 12: Location of the Wells Used for Sampling)

Here we can see the location of the wells, the location of the wells where groundwater samples were collected. Some of these wells will have three numbers, right, three numbers, which means there's more than one well, right, they were taken there, there's more than one well there. So when we say twenty-seven, we're talking about twenty-seven, if you count the little circles there may be less than twenty-seven, but when you count within each one, in some of them, you will see we have three here, right, and we have three here (*points to the wells in the photo*), here we have three and so on, and in some of them we have more than one sampling point. This means that twenty-seven wells were sampled during the second phase of the investigation at this site.

(Transcriber's Note – turns to Slide 13: Location of Sampled Wells)

Here we can see the wells that were sampled in the aftermath of Hurricane María in order to verify if the storm had had some kind of effect that could have changed what had already been determined or identified in previous investigations. Next.

(Transcriber's Note – turns to Slide 14: Remedial Investigation; Results of the Groundwater Study)

What was determined in this second phase of the investigation? Eh, specifically in relation to the contaminant tetrachloroethene, tetrachloroethene, well, the maximum concentration detected during this phase was found to be sixteen thousand parts per billion, sixteen

thousand parts per billion. The drinking water standard is five thousand, remember, I'm talking about a water monitoring well. I'm not talking about one well because since El Retiro wells were disconnected, the Aqueduct and Sewer Authority is not using them anymore. It's using, supplying water from other wells that have not been impacted, at least they're complying with the order, the Department of Health mandate, the drinking water standard, right, the drinking water standard. Sixteen thousand parts per billion, the well known as 2S, we'll be looking at it, two thousand four hundred in one well that will be four times, and a thousand three hundred in other wells. Those were the highest concentrations detected. We should point out that the highest concentration of tetrachloroethene detected in this investigation, well, it was found in the Industrial Park in the lot we mentioned earlier as an identified source of tetrachloroethene. Ok, so deeper, possibly seventy, eighty, ninety feet deep, seventy to eighty feet deep, we detected two-thousand four... a maximum concentration of two thousand four hundred parts per billion. That's the highest concentration at a depth of approximately seventy or eighty feet. Next.

(Transcriber's Note – turns to Slide 15: Remedial Investigation; Results of the Groundwater Investigation)

With respect to trichloroethene, ok, we had talked about the identified source of trichloroethene earlier. We said that in the lot where CCL Label was located or operated previously, a maximum concentration of six hundred and eighty parts per billion was found and also five-hundred and eighty parts per billion; and, at a depth of seventy or eighty feet in other wells installed in the area, we found a concentration of twenty-one parts per billion. This was specifically in the 14UR well. Next.

(Transcriber's Note – Turns to Slide 16: Figure)

Here we can basically see the location of the wells, right? This figure is included in the document you all have. In the document you all have, you will see, specifically here we can see the 2S well, right? Well 2S is located at this point, ok, at this point, we're talking about the Industrial Park, ok; the area where the Industrial Park is located. The 4S and the 6S is, I believe it is this one around here (*points to the figure in the slide*), 6S. This means that when we talk about sixteen thousand parts per billion we're referring to this here (*points to a spot in the figure on the slide*), when we talk about approximately two thousand, three hundred we're referring to this point (*points to a spot in the figure on the slide*), when we talk about one thousand three hundred parts per billion we're talking about this point here (*points to a spot in the figure on the slide*). These are the contours for tetrachloroethene, ok, good. Next. Let's go back, sorry (*continues with slide 16*); the green contours, the green contours. These green lines, ok, these green contours, represent or show the trichloroethene concentration, and you can see there are like two different contours. One of them shows tetrachloroethene as the main contaminant. We're not saying this tetrachloroethene area does not contain trichloroethene, we're saying the main contaminant is tetrachloroethene. The other main contour is the trichloroethene one; we talked earlier about the maximum concentration in this investigation as six hundred and eighty parts per billion. Six hundred something, five hundred eighty something, the highest concentration of trichloroethene, and well, we're seeing the highest concentration. This is where the CCL facility used to operate. Ok. This means we confirmed what had previously been discovered. Eventually, both contaminants or both groundwater contaminated areas, well, they eventually joined together. Ok. Next.

(Transcriber's Note – Turns to Slide 17: Remedial Investigation; Results of the Surface Water/ Sediment Study)

Regarding the surface water, surface water, when the first Operable Unit investigation was performed, samples were collected from the Guanajibo River, surface water and sediment samples. Samples were also collected from a drainage ditch located in the Industrial Park. A drainage ditch located in the Industrial Park. The first Operable Unit had detected surface water concentrations that at the time were exceeding drinking water standards. It had [sic] in Operable Unit Number 1, when Operable Unit Number 2 was completed; at that time none of the contaminants were found to exceed five parts per billion, neither in the Guanajibo River nor in the sediments were there levels in excess of the amounts that would make the U.S. Environmental Protection Agency raise a flag. Remember, the contaminant moves and, as the contaminant moves, it tries to reach the river, right, continues to try to reach the river. There's a northwest or north-northwest direction. We understand that possibly the river's abatement, the river's abatement, the hydrological features in the area could make this contaminant, well, instead of moving directly toward the north, towards the river, it's moving in a northwest or north-northwest direction, depending on the contaminant, the movement of trichloroethene. This was not the case when samples were collected from the surface water in the drainage ditch located in the Industrial Park. When the analysis were performed, samples were collected from the water in this ditch, tetrachloroethene was detected at concentrations of up to twenty-five parts per billion. Twenty-five parts per billion for tetrachloroethene, and trichloroethene concentrations of up to fifty-eight parts per billion. We're clear up to there. Remember, when this type of investigation is performed, samples are collected, but samples continue being collected downgradient, downstream; downstream to be able to determine how far that

concentration reaches, how far it reaches. These contaminants are volatile organic, which means that at high temperatures they tend to what? Evaporate. They tend to evaporate, I'm talking about surface water now. Next.

(Transcriber's Note – Turns to Slide 18: Summary of Site Risks)

Based on the information gathered by the U.S. Environmental Protection Agency, it made what is known, as I mentioned earlier, as a risk assessment. A risk assessment is made to determine if the concentrations present, umm, if people could be exposed to those contaminants in any way. Remember, when we talk about exposure to a contaminant, we're talking about different routes of exposure. One of the exposure routes is what? Ingestion. If I drink contaminated water, what happens? Well, I'm being exposed, it means that I'm being exposed and this could have an adverse effect. If I inhale the contaminant, inhale it, inhale, that's another exposure route. If I have dermal contact with that contaminant, through the skin, right, dermal contact, it means that I'm being exposed to that contaminant. There's a fourth exposure route, injection, but it doesn't apply to this case, right? Which exposure routes we are evaluating? Ingestion, inhalation, and dermal contact. For example, if there's contaminated water and I drink it, I'm ingesting that contaminant at the concentration that contaminant may be present, right? It could be present. If I inhale or boil that water and that contaminant goes into the air and I breathe it in, I inhale it, it means that I'm inhaling that contaminant. I'm being exposed to that contaminant, and dermal contact could be that I'm taking a shower or using that water that could be contaminated. The Agency identifies who could be exposed and how, who are the ones who could be exposed. Remember, when we talk about exposure and adverse effects, there are different types of people that could be more sensitive than others. Remember, a pregnant woman is more sensitive than a young person who is not pregnant. A

person with a compromised immune system may be more susceptible to an adverse effect, a response to the exposure of that contaminant. There could be an acute, short-term effect, or there could be a long-term effect from the exposure. Remember, when these wells were found to be contaminated, the Department of Health ordered their closure. That means these wells are not being used. When the Agency identifies who could be exposed, it identifies the residents, both children and adults, who could be exposed to these contaminants in any way. It's important, regardless, regardless of whether the contaminated water is not being used, it's not being used for utilization purposes, drinking water, or is not being used; no contact with that water. The U.S. Environmental Protection Agency identifies and indicates what might be the worst case scenario; and the worst case that could happen is that even if the water is not being used, what would happen if a person were to use that water, were to ingest that water at the highest concentration detected for a period of seventy years, seventy years, and, based on this, makes some calculations to determine if the risk is acceptable or unacceptable. Are we clear so far? In other words, some studies are made to determine if the risk is acceptable or unacceptable. If it's unacceptable, it means the U.S. Environmental Protection Agency has to take action to remedy the contamination problem. In addition, we also identify individuals who could possibly be in contact with the contaminants during recreational use. People who in one way or another could be in contact with surface water, who go to the river, who bathe, who bathe in the river, who bathe, who walk in the drainage ditch, in the ditch I mentioned before, the surface water in that ditch that runs through the Industrial Park. What would happen if someone is exposed to that concentration for ex amount of time, would that risk be acceptable or unacceptable? The Agency conducted that analysis, that assessment, and determined the risk was unacceptable. It means that, if the water was being used at the concentration present,

the risk would not be acceptable, that means that it could have an adverse effect on human health. So, it means, therefore, that the Agency determined after obtaining that result, it's presenting the alternative to remedy the contamination–an action must be taken.

(Transcriber's Note – Turns to Slide 19: Remedial Investigation)

Ok. What did it determine? Basically what I just mentioned, that it's necessary to take remedial action to protect human health and the environment and to prevent the contaminant from continuing to spread. Remember that when the contaminant is in the soil, it will eventually continue moving from the soil to the groundwater, and once it's in the groundwater, it continues to move in the aquifer and continues impacting and spreading the contamination. Ok. Next.

(Transcriber's Note – Turns to Slide 20: Remedial Action Objectives)

What are the objectives of the remedial action or the remedial action proposed by the U.S. Environmental Protection Agency? First, to prevent or minimize the unacceptable risk that causes or may cause exposure to these contaminants, could cause exposure to these contaminants; and remember, I mentioned earlier that regardless of whether there is actual exposure by ingestion or inhalation, the Agency says what would happen if there were exposure, and if there were, I'm going take action, and the risk was established as unacceptable. This means the Agency has a mission or the task to prevent or minimize the unacceptable risk these contaminants and contaminated media are representing or may represent, now or in the future, for persons who could be exposed to these contaminants. Second, to restore groundwater to drinking water levels, to the previous levels, to drinking water standards for beneficial use, and third, to reduce the potential of these contaminants from continuing to what? Continue moving from the source to the different media, where umm,

those contaminants could be moving. Remember, the contaminant can move from the soil to the water, from the soil to the air, right? It can vaporize, it can evaporate, it can go from the soil to the air, it can also go from the water to the air, those contaminants. It means the Agency tries to prevent those contaminants from continuing, from continuing to move and continue impacting areas that are currently not affected, and that the impacted areas don't continue, don't continue increasing, that level doesn't continue spreading, neither vertically or horizontally, of those contaminants. Next.

(Transcriber's Note – Turns to Slide 21: Remedial Alternatives)

Based on this, the U.S. Environmental Protection Agency prepared the document titled Feasibility Study, where different alternatives were evaluated, were different alternatives were presented, analyzed, studied that could be used, umm, at this site. Every site evaluated by the U.S. Environmental Protection Agency, the basis of the evaluation begins with the premise, from the first premise, no action, and you could ask, why include no action if I know there is contamination? That is the initial basis, what would happen if nothing is done. Definitely, the Agency, through the evaluation, says: "No, something needs to be done, because if nothing is done, then there definitely continues to be an unacceptable risk, different media continue being impacted, the contaminant continues spreading and I'm not protecting people's health and wellbeing." It means, the first alternative, no action, is analyzed. The second alternative evaluated was groundwater extraction, installing wells, groundwater extraction, extracting the water through a treatment system, a treatment system. Eventually, well, correctly disposing of

this treated water, right, and eventually also include monitoring natural attenuation to determine, umm, how the concentration behavior of these contaminants is reduced as remediation is performed at the site. We're clear about this alternative. It means the proposed alternative here is to install a series of wells, from the source out, right, away from the source, the impacted area; install a series of wells in order to extract groundwater, treat it in a treatment system, and monitor groundwater behavior, as well as how the natural attenuation of those contaminants is occurring. How those contaminants continue to biodegrade until, eventually, concentrations can be lowered or made less harmful. The third alternative evaluated was treatment on site, known as "in situ"--In Situ Treatment and Monitored Natural Attenuation. Note that this third alternative not only includes monitoring groundwater and natural attenuation, but also monitoring, following up on, the vapors that may be accumulating in buildings within the impacted area. It means the U.S. Environmental Protection Agency says that as part of this alternative number three it includes continuing to perform, performing, continue performing, monitoring the building. Note, when we talk about a building, we are talking about drilling a "small hole" in the structure, I had mentioned about forty-three, forty-five structures, residences in the area, right, in different areas, to get an idea, and samples were collected to determine if vapors were accumulating beneath the building; because if these vapors build up and the house has cracks, those contaminants could be intruding into the home, and samples are collected inside the house. Samples are taken from under the slab, under the floor in order to determine if remedial action is needed to remedy or remove those contaminants accumulating under the buildings. This had been done in the past; samples were collected and the Agency says it needs to continue happening so just as we're remedying the groundwater, we continue evaluating the study in order to determine the behavior of those

contaminants, if any, beneath the different buildings. In-situ treatment basically entails injecting, adding certain nutrients through... installing some wells and injecting some nutrients into the groundwater to promote, stimulate bacterial activity. There are some bacteria present so it means this is being stimulated, and the investigation, this has been proven, this is not something under study, this has been proven to be an effective alternative for removing volatile organic compounds, the use of what is known as in-situ treatment, where bacterial activity is stimulated in order to then remedy and remove those contaminants, those contaminants. There are different ways of doing this, if it's vertical wells, or horizontal, the way it is done, the number of wells that are needed. But once the U.S. Environmental Protection Agency... let's go to the next slide to see the associated costs, the associated costs of each alternative being proposed.

(Transcriber's Note – Turns to Slide 22: Alternative 1 – No Action)

The No Action alternative, well we know it has no cost, right? Because if nothing is done, nothing is resolved, right? Nothing is resolved.

(Transcriber's Note – Turns to Slide 23: Alternative 2 – Groundwater Extraction, Ex Situ Treatment and MNA)

Second Alternative. The second alternative, umm, Groundwater Extraction, Ex Situ Treatment and Monitored Natural Attenuation, the total cost of this alternative says the capital cost is $7.8 million, then when you add the cost of operation and maintenance, then the cost of the alternative, as established in this study, the total cost is $21.7 million, the cost of this alternative number 2.

(Transcriber's Note – Turns to Slide 24: Alternative 3, In Situ Treatment and MNA)

Alternative number 3, alternative number 3. The cost of remediation when we basically calculate the total, the total estimate is a cost of $17.3 million. It means the first alternative is zero cost, the No Action alternative. The second alternative, Extraction, treatment outside… outside, in a treatment system, Groundwater Monitoring. We had said the cost of that remediation was $21.7 million, and the cost of alternative number 3 is $17.3 million. The cost of alternative number 3, after the U.S. Environmental Protection Agency compared all of these alternatives against the nine criteria established by the Agency's Superfund Program--the program through which the U.S. Environmental Protection Agency has the authority to identify contaminated sites, identify the parties who are potentially responsible, perform the investigation, and, beyond the investigation, if remediation is needed, conduct the remediation. There are nine criteria for evaluating each of these alternatives. The alternatives are evaluated.

(Transcriber's Note – Turns to Slide 25: Criteria for Selecting a Remedial Alternative under CERCLA)

For example, some criteria are: the protection of human health and the environment, umm, how effective that alternative is or alternatives are in protecting human health and the environment. Number two, you can see some acronyms there that say ARAR, those are rules, regulations that may apply in one way or another, that apply, or should be considered in that remediation. Here we have, see point number nine here, acceptance by the community, acceptance by the state agencies. We have cost-effectiveness, investment vs. results. I can invest fifty million in one type of action and I can invest twenty, and the fifty million investment

is not necessarily going to give me greater results or better results than the lower, lower-cost alternative. This is very important: Short-term effectiveness, long-term effectiveness, reduction of toxicity, mobility or volume through treatment, through the remedial action. Once the U.S. Environmental Protection Agency, after evaluating these alternatives against the nine criteria established under the comprehensive CERCLA legislation that gives the Environmental Protection Agency the authority, under the Superfund Program, to conduct this type of analysis... Once these alternatives are evaluated, and in communication with the Government of Puerto Rico, specifically the Environmental Quality Board, now it's the Department of Natural and Environmental Resources, right, the Secretary of Natural Resources, the Government of Puerto Rico is onboard, is in agreement with the Environmental Protection Agency about recommending alternative number three, which is the next slide.

(Transcriber's Note – Turns to Slide 26: Proposed Plan)

Alternative number 3, to be implemented as part of Operable Unit Number Two. Specifically, alternative number 3 is called In Situ Treatment and Monitored Natural Attenuation. Also, monitoring concentrations, how do I know how effective is the remediation... every five years... the Program establishes, CERCLA establishes, that a site evaluation must be performed every five years to determine if the action is being effective or if any type of modification is needed in the remedial action being performed. This means that this is not simply beginning the treatment and leaving it there for years and years... but that the U.S. Environmental Protection Agency has to keep evaluating how effective this remediation is and make any modification, in communication with the Government of Puerto Rico, how effective that remediation and any

amendment, change needed to increase that action's effectiveness. I mentioned that this alternative also includes monitoring the vapors that are or may be generating beneath the buildings in the area. This means the Agency must be diligent, must maintain and maintain and establish a more assertive communication plan with the community. We are meeting with you, with the community, to give you more information, to give you further information about the work that is being performed. Eventually, one of the Agency's goals, as we mentioned, Operable Unit Number 1, that was selected in 2015, was the extraction of soil vapors, right, umm, In-situ Treatment, contaminated groundwater treatment, specifically in the Industrial Park area. We're in the design stages, but the Agency's goal is to try to join both remediations in order to make it more efficient and to accelerate the remediation even more, to be more effective, to prevent this contaminant from continuing to migrate, to lower the movement ratio of that contaminant, but also to be more effective with respect to costs, more cost-effective. To use the money and maximize the use of funds to remediate the site faster and more effectively. People sometimes ask how long the remediation will take. A remediation of this type is possibly set at twenty to thirty years. I have sites here in Puerto Rico that have been remediated since 1984. Remember, when we're talking about groundwater that you cannot see, you have no control, because it's not like you can say, "I'll remove this stand, I'll take it;" when we're talking about groundwater, umm, it's not easy, it takes time, and as the concentration is reduced in the aquifer, in the groundwater, it will get more difficult to remove that contaminant. I also wanted to mention that the remediation includes some processes. The remediation says, selected, there has to be a part of the design where you obtain additional information and you are able to design that treatment system; it also says you have to maintain certain institutional controls. In the case of Puerto Rico, the Department of Natural and

Environmental Resources has a permits division, they are the ones who issue the permits for the wells. For years we have requested, and continue to request… in the past, we know that in the past private wells were installed here in the area; and we have identified private wells by talking to folks in the community, they have identified private wells and we have collected samples from those wells. There are other wells that we cannot say if they still exist or if they have been closed. We do ask the community to let us know if they have knowledge of a well, a private well, a private well that is not necessarily in use, is in use, so we can include it as part of the investigation, the sampling we'll be conducting. The wells from where samples were collected, the sampling of the wells was funded by the U.S. Environmental Protection Agency; the homeowners did not have to pay anything. The Agency collected samples, obtained a result. On the other hand, we recommend people don't use those wells; if there is a private well, do not use it. This means that the department... and this is with respect to private wells. As for new wells that any entity may want to install in the area, well, they need to have a permit from the Department of Natural Resources, who contacts us, the Board, and the appropriate evaluation is conducted. That is the alternative we're proposing through this Proposed Plan, and this concludes this afternoon's presentation.

(Transcriber's Note – Turns to Slide 27: Comment Period)

(Transcriber's Note – Turns to Slide 27: Public Comment Period)

Brenda Reyes: Thank you, Adalberto. In the sheet all of you have, in the Fact Sheet, it says the public comment period began on July 12 and ends on August 11, 2019. We published a notice in *Primera Hora* newspaper, right, to that end, and I have been notified of a request to extend the public comment period. We'll inform you via email, those of you who gave us your email and address, if the public comment period is extended.

(Transcriber's Note – Turns to Slide 28: Information Repositories)

The information repositories are available at the San Germán City Hall, EPA Region 2 in New York, and EPA Caribbean Office, in my office. So, those are the places where you will find the documents related to the San German Superfund Site. Besides that, I would now like to open the floor to questions. Adalberto, Mike, and Frances are here to answer your questions, so I'll place the microphone here if you'd like. Like I mentioned, it's important that you state your name so it will be on record in the transcription. Ah, it's here, they're telling me it's here. (*Points to the microphone for use by the public*).

Adalberto Bosque: There are several ways of submitting any comments the public may have about the U.S. Environmental Protection Agency's Proposed Plan. One of them is here, and we have people taking notes, that's why it's so important, as Brenda mentioned, it's very important that you identify yourself, ok, you identify yourself because any comment you make, when the Agency drafts the document called Record of Decision, will include a section specifically related to questions and comments made about this Proposed Plan. This means if there's any question this afternoon and we have the answer, we'll definitely give it to you this afternoon, and/or we'll add further information when it's answered, that document is drafted. In the event that you don't have any kind of question this afternoon, you may submit questions in writing. The residents of this community, if at any time during this stage of the process, you would like to meet with us, or you would like us to come here and meet with you personally, in your home or some other place you prefer, we're also happy to come here. Brenda and I are at your service and if necessary, we can bring Frances, Mike, or any technical staff who can provide additional information, we'll be happy to provide information. When she mentioned the comment period, Brenda was clear, thirty days, from July 12 to August 11 approximately,

August 11, as established in the notice and in the document. If there's an extension, it could mean thirty additional days. I want to mention that in the next weeks, possibly in the next weeks or so, well the Agency will be informing if the requested extension is accepted, ok; we understand that it will probably be accepted, ok, and how long the comment period will be extended.

Brenda Reyes: Well, if there are any questions, the microphone is over there, first name, last name, address. If you're a resident, if you represent a facility; and also, if you don't want to use the microphone and would like to speak with one us separately while we're here, we have until 7 p.m. And also, if you don't want to ask a question here at the front of the room, you can approach us. Well, yes, these are recorded (*referring to the questions made at the front of the room*).

Atty. Carlos López Freytes: Good afternoon. My name is Atty. Carlos López Freytes, I'm here representing PRIDCO, the [Puerto Rico] Industrial Development Company, and I have several comments, rather than questions, for EPA's consideration during this process. I agree with Brenda Reyes, we were part of the request for additional time in order to officially present our technical comments and, well, we reiterate that request, but now we would like to make a preliminary technical comment. We acknowledge that at this phase of the process we are in OU-2, which is the groundwater contamination part, and, as part of the investigations performed, up to now we noticed there were some screenings performed, not monitoring wells, but just screenings made in the southeast area, I believe the wells are marked as T01, T02, T03, which is toward the southwest end of the property, umm, yes, for those of you who don't have this document, it's basically the area below the graphic *(refers to a graphic shown at the front of the room*). The green and pink area, the detection, umm, of the TCE in those

screenings was below the limit areas of the five parts per million [sic] but it was detected, and since it was detected, we know TCE is not a material that occurs naturally, I mean, from nature, but has to get there from somewhere else. Ok, and it has not been determined as part of the evaluation made for that portion of the plume, the contamination gets there, or if it originates in that area. However, well, since it was detected, the question is why that consideration has not been made afterwards or evaluated, why that determination has not been considered, because, obviously, it could originate because the groundwater movement is toward the northeast, that another contamination source could be detected in that area. And you may ask why, if it's below the screening, it's telling me that. Well, it's important to read the document as part of the explanation presented by Adalberto Bosque; Dr. Bosque explained, umm, that the contamination was seen at different levels, and obviously as part of the soil, umm there were geological areas, a part in the saprolite, and another part, which is the unstable bedrock. That's why the [UR] is part of the monitoring wells and the highest concentration was mostly seen where there was UR present. Many of them, depending on the area, could be at forty feet, others at fifty feet. The screenings that were made at 20 feet. Therefore, the detection obtained was quite low because, perhaps, if the screenings had been a bit deeper, the contamination could have been detected, and so, part of our comments is for the EPA to consider these circumstances in order to determine if they're going to evaluate it or if they're going to perform an additional task with that perspective in mind. Thank you.

Adalberto Bosque: Good, we appreciate the comment; the comment has been recorded and will definitely be addressed. When the Federal Agency prepares the response to comments document, it will be taken into consideration. What the attorney is mentioning, when the investigation was conducted, some transects were made, ok, some transects were made,

umm, from... I'm looking, it's around here. Some transects were made, some transects were made, right, one… I don't remember if there were nine, ten different types of transects, of transects, in order to try to identify, to get an idea of the area and the impact, or the water quality in that area, in that area, and eventually for purposes of conducting the investigation. Definitely, umm, we have already seen the results, right? Higher concentration, lower concentration, or maybe screening levels and eventually no concentration, but, at any rate, we reaffirm that the point will be addressed in the Responsiveness Document, the comment you presented, ok, will be taken into consideration. Ok. It will be taken into consideration, including in the design part, during the design part of the remediation system, since the Agency definitely has to conduct a subsequent study in order to define that system a little better, right, that system. The points where remediation is taking place. We will record your comment and it will be addressed. Thank you.

Any other comments? I want, I want to mention something extremely important. I want to emphasize something I mentioned earlier. Remember, as members of the community, any questions, any, any concerns you may have, it's important, you can have Brenda's and my telephone numbers and we'll be happy to come here, here to the communities. Whenever you think it's convenient, ok, we can come here and share with you, and answer any questions you may have. All the years we have been here, look, this is a very, a very, how can I say, very agreeable community, full of warmth. I'm saying this because when I first arrived for the investigation, I was offered rice pudding, chocolate, coffee, juice, your food, right? We were able to share and we were able to see how the community, well, we really appreciate how the community allowed us to conduct the investigation. We thank the community for its patience, ok, for the patience you showed while we were conducting the investigation. The Agency has a

mandate, by law, to conduct this investigation, but our purpose as an agency, both at the state and the federal level, is to protect people's health and the environment--that is our duty. This means that any concern, any doubts you may have, or any recommendations, we would really appreciate if you share any comments with us, any recommendations that you may have. We are thankful to the Municipality also, for having allowed us to conduct this investigation, for working with us. The Agency staff, I personally want to thank the agency staff here with us today, the organizations with us today. We also thank the facilities were the investigations were conducted in these two phases, Operable Unit Number 1 and Number 2, for having enabled us to conduct our investigative work quickly, without setbacks. The work continues, it hasn't concluded, we mentioned that if the investigation lasted five, six, seven years, then the cleanup work could take up to thirty years. It could take some twenty or thirty years. We'll have further information regarding remediation time when we reach the design phase, that's being remedied, when the design is clear, right, of what we're going to be doing. We also believe that the work done… ok, remember that any information about private wells, if you know of any private wells in the area, speak to the owner, the owner of the house, share the information with us. We go and take samples to check the quality of that water that you may be ingesting, ok. We're at your service, right, if there's nothing else, then, we thank you all for your participation, for your presence here this afternoon. We'll stay a while longer, as Brenda said, right, we'll stay a while longer. If you have any questions, we're available to answer them. Thank you.

(Transcriber's Note – a resident wishes to ask a question without the microphone, but on the record)

José López Quiñones: My name is José López Quiñones, I live here in Riverside. We have a private well; a sample was collected from it some years ago. I don't know exactly how along ago it was, but I wanted to know if it's feasible to take another sample to check if there's any, umm, if there's, what kind of contaminants are present. Well, and if that water well, we know you can't drink it, right, but if maybe it can be used for other purposes. (*A person asks, off the record, if they're using it at the moment)*. After the hurricane, when we had no water, but we used it for cleaning, for the bathrooms, but we didn't use it for drinking and we hardly use it. We have it in case any situation suddenly arises.

(*They wait for Dr. Adalberto Bosque to answer the question*)

José López Quiñones: (*Repeats the questions for Dr. Adalberto Bosque*.) We have a well at home. A sample was taken from this well at some point, my Dad tells me it was years ago.

Adalberto Bosque: If we collected samples from the well, and I can verify this when I get to the office, or I can tell CDM, I tell them, I give them the go-ahead, give CDM, who's the consultant for the EPA, so they can check the results of that well, and we'll let you know. We'll do that. (*Addresses Frances Delano from CDM*). You can take that information, right, Frances? (*Frances Delano answers yes*). Frances, please take the information so that we can check the results and let them know the results and explain the results to them.

José López Quiñones: Yes, of course.

Adalberto Bosque: Because this is what could happen, this is important, two things could happen with a well. I'm not saying this is your case. One, the level of concentration is below drinking water limits, is ok. This doesn't necessarily mean that you can use it. Why? Because contamination moves, and it's possible I could say today, "it's good," but a month from now the

contaminant moved and impacted me and I didn't know it and now I'm drinking contaminated water. We say "don't drink it," or maybe that day it exceeded the limits, if it exceeded the limits, you may say, let's lock it with my small key, let's lock it with your small lock and not use it until the time comes, until they tell me "the site has been cleaned." It's good to know if the well was impacted or not, because if right now someone is going to buy the property and asks... because when someone is selling a property, they may say, "see here, I'm selling you my property, it has a well, it's good because it has a well you can use when there's no water supply, that's a good thing," but if you sell a house and tell them it has a well for use and that water is contaminated, eventually... The person [who bought it] will come and say, "you knew it might be contaminated, and you didn't tell me." That's why it's good to have the information, and we're going to provide it to you. We're at your service to provide you the information and clarify any doubts you may have.

Frances Delano: Another thing, what we sample is not drinking water parameters, we test only for volatile organic compounds. In other words, the results we're going to provide you are those that we test for. They don't include everything.

Adalberto Bosque: Specifically, the chemicals detected at the site.

José López Quiñones: Ok.

Adalberto Bosque: But it's good for you to know, and we're at your service to provide you the information.

José López Quiñones: Of course it is, and we appreciate it.

Adalberto Bosque: And if you know anyone else who has a well, because we have asked around. There are people who say "yes, I have a well." Once we went to this street, Don

Herbert, whom I believe has passed away; we went there and saw a well with a hand pump, the well. He says to me, “no, I have a well, but I’m not using it,” and I say, “Does it work?” He says, “of course it does,” and he went and pumped water from it. I’m not saying that he’s using it, but if it has the potential of being used at some point, “oh, there’s no water, we can use it for flushing the toilets,” he should know that if water comes in contact with your hands, there could be dermal contact. It's important to know this, and it’s why the Agency collects samples and pays for them. We’re at your service. It's been a pleasure having you here with us.

(Frances Delano and José López Quiñones continue speaking off the record to take note of Mr. López's information)

The meeting is adjourned and the record is closed at 6:38 p.m.

CERTIFICATE OF TRANSCRIPTION

I, Aledawi Figueroa Martínez, transcriber of Smile Again Learning Center, Corp. CERTIFY:

That the forgoing constitutes a true and faithful transcription of the recording made during the meeting held at the site and on the date indicated on page one of this transcription.

I further testify that I have no interest in the results of this matter nor do I have a relationship of any degree of consanguinity with any of the parts involved in this matter.

In Isabela, Puerto Rico, on August 3, 2019.

_____

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CERTIFICADO DE TRADUCCIÓN AL INGLÉS	**CERTIFICATE OF TRANSLATION INTO ENGLISH**
Yo, Vivian Otero, traductora profesional con Maestría en Traducción, por la presente certifico que a mi mejor entender el documento anterior es una traducción fiel y exacta al inglés del texto en español, realizada a solicitud de la parte interesada.	I, Vivian Otero, a professional translator with an M.A. in Translation, hereby certify that, to the best of my knowledge and abilities, the foregoing is a true and faithful rendering into English of the Spanish text, made at the request of the interested party.
En San Juan, Puerto Rico, hoy 20 de agosto de 2019.	In San Juan, Puerto Rico, today August 20, 2019.
	
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REUNIÓN PÚBLICA
CONTAMINACIÓN DEL AGUA SUBTERRÁNEA DE SAN GERMÁN
SAN GERMÁN, PUERTO RICO
30 DE JULIO DE 2019

Notas de transcripción:
Hora pautada de reunión: 5:00pm
Lugar: Cancha de la Urbanización Santa Marta

Se abre récord a las 5:15pm

Brenda Reyes: Buenas tardes. Mi nombre es Brenda Reyes Tomassini, oficial de asuntos públicos de la Agencia Federal de Protección Ambiental, la EPA. En la tarde de hoy, estamos aquí reunidos para explicar la acción preferida para el Lugar de Superfondo de San Germán, conocido como Pozos de San Germán. Nosotros en la tarde de hoy, los compañeros de la EPA, mi agencia y CDM, contratistas, van a estar haciendo una presentación donde mostrarán aquí a ustedes, al público, la alternativa seleccionada para la Unidad Operacional de agua subterránea. Así que les voy a dar un poquito de trasfondo. Nosotros estamos trabajando en esta comunidad hace alrededor, activamente, hace alrededor de unos 7 años. Para quienes no lo conozcan llevamos 7 años trabajando en la comunidad, verdad, bajo el Programa de Superfondo. Nosotros tenemos también esta noche a los compañeros de la Junta de Calidad Ambiental, que nos están acompañando. Le queremos dar las más expresivas gracias al Sr. alcalde. El Sr. alcalde que nos facilitó y nos ayudó para tener el uso de la cancha y también pues para anunciar la reunión. En la entrada tienen esta hoja que es una hoja informativa del Programa de Superfondo, donde detalla la alternativa seleccionada. Hay una evaluación de riesgo, se les resume y qué es lo que pretendemos lograr con esta acción remedial. Les voy a pedir que las preguntas las dejan para el final, vamos a estar haciendo una

breve presentación. Cuando vayan a hacer las preguntas, les voy a pedir que den su nombre porque tenemos servicio de transcripción. Siempre es importante tener transcripción en todos los casos de Superfondo. Así que, pues, sin más preámbulos, comencemos. Dr. Adalberto Bosque, mi compañero, Gerente de Proyecto.

Adalberto Bosque: Bien, buenas tardes. Buenas tardes. Me gusta caminar, salirme de aquí. Bien, es un placer para la Agencia de Protección Ambiental Federal, para este servidor y para el equipo de trabajo tanto de la Agencia, como de la Junta de Calidad Ambiental, estar en esta tarde haciendo una presentación específicamente relacionada a la investigación que ha realizado la Agencia de Protección Ambiental Federal aquí en este caso de San Germán, conocido como el agua subterránea contaminada de San Germán, bien.

(Nota de la transcriptora – Comienza discutiendo la presentación)

Bien, ¿qué estaremos discutiendo en esta tarde? En esta tarde, la presentación entendemos que va a ser sencilla, al punto.

(Nota de la transcriptora – Se pasa a la laminilla 2)

Vamos a estar hablando, número uno, definir, estaremos hablando sobre la magnitud y la extensión de la contaminación según definida en los estudios que se realizaron aquí en el caso de San Germán. Entiéndase, cuando la Agencia de Protección Ambiental Federal comenzó con el caso de San Germán dividió, organizó la investigación en dos etapas, dos etapas. Siendo la etapa número uno conocida como la Unidad Operacional Número 1 (*referida en la presentación como OU-1*). La investigación que se realizó para determinar la fuente de contaminación. Fuente que se determinó procedía o procede del

Parque Industrial El Retiro, y estaremos viendo próximamente unas figuras para ubicarnos con relación al comienzo, el origen de esta contaminación. Específicamente, dos contaminantes principales. El primer contaminante se llama Tetracloroetileno, el segundo contaminante principal se llama Tricloroetileno. Quiere decir que estaremos hablando acerca de la magnitud y la extensión de la contaminación, según realizada por el estudio de investigación remedial, remediativa llevada a cabo por la Agencia de Protección Ambiental Federal para lo cual muchos de los residentes, pues, pudieron ver el equipo de trabajo, de los consultores de la Agencia Federal de Protección Ambiental Federal, hincando pozos haciendo ciertos barrenos, tomando muestras de suelo, tomando muestras de agua superficial, tomando muestras de aguas subterráneas, y así también tomando muestras de agua superficial, tanto de un dique que está ubicado en el Parque Industrial El Retiro. Así también, como muestras de agua superficial que se realizaron o se tomaron del Río Guanajibo. La segunda etapa de la investigación consistió en un avalúo del riesgo, un estudio que realizó la Agencia Federal de Protección Ambiental para determinar si las concentraciones detectadas en el área, tanto en el suelo como del agua subterránea, si las concentraciones, las cantidades de contaminantes de estas sustancias químicas que están presentes en el suelo, o están presenten en el agua, pudieran significar un riesgo no aceptable para la salud de las personas y el medio ambiente, y hago una salvedad. Cuando hablamos de riesgo, tenemos que decir, todo tipo de actividad conlleva un riesgo. Cuando hablamos de efecto adverso a la salud de unos contaminantes en las personas, en la salud de las personas, tenemos que decir el riesgo es aceptable o el riesgo es no aceptable, porque aún cuando una persona se levanta de la cama, hay un riesgo. Hay un riesgo de que uno se enrede en la frisa y se

caiga, cuando uno se monta en un avión, hay un riesgo, hay un riesgo de que ese avión se caiga. Cuando uno guía un vehículo de motor transita en las vías, en las carreteras, hay un riesgo, pero el riesgo es aceptado. Quiere decir que uno viaja en avión o uno guía un vehículo de motor, quiere decir que se hace un estudio para identificar quiénes son las posibles personas que se pueden estar exponiendo a los contaminantes de preocupación, a los diferentes medios: suelo, agua subterránea, agua superficial. Si hubiera vapores que se estén generando por los contaminantes según se van evaporando, se van vaporizando, si hay un riesgo aceptado o es riesgo no aceptado. Posteriormente, se preparó o se redactó el documento que se conoce como el Estudio de Viabilidad, donde se presentan, o se evaluaron diferentes alternativas posibles para ser implementadas en el lugar y esas eventualmente la Agencia Federal de Protección con anuencia del Gobierno de Puerto Rico a través de la Junta de Calidad Ambiental, del Departamento de Recursos Naturales y Ambientales, la Agencia propone una alternativa, la cual es el motivo y razón de esta reunión con el público, y va a haber un periodo de comentarios, según especificado por Brenda y le estaremos dando quizás mayor información al final de la presentación. Finalmente, la Agencia presenta las alternativas que se evaluaron, y esas alternativas para lidiar con el programa de contaminación. La agencia recomienda una alternativa y el público, la comunidad, las agencias pertinentes, pues tienen la oportunidad para someter comentarios que la Agencia Federal estará respondiendo en un documento que se llama el Documento de Respuestas a las preguntas y a los comentarios que se estén emitiendo. Prácticamente, ese el proceso, son las diferentes etapas que se llevan a cabo, las diferentes etapas que se llevan a cabo … dame el pointer, por favor, el pointer mío, ese (*pide el pointer para la presentación*).

(Nota de la transcriptora - Se pasa a la laminilla 3: Proceso Superfondo)

Estas son las diferentes etapas que se llevan a cabo en el proceso de evaluación desde que se descubre un lugar o la Agencia Federal de Protección Ambiental Federal tiene conocimiento de que hay una contaminación en un lugar. En este caso, la Agencia Federal de Protección Ambiental Federal a través del Departamento de Salud, a través de la Autoridad de Acueductos y Alcantarillados detectaron una contaminación en los Pozos Retiro, Lola I y Lola II. Estaremos viendo luego la cronología para ver más o menos los años los cuales acontecieron estos eventos. La Agencia Federal de Protección Ambiental Federal tuvo conocimiento de que estaba, había contaminación en estos pozos, que estaban excediendo los niveles establecidos por la Ley de Agua Potable y la Agencia interviene. Entiéndase, antes de eso pues el Departamento de Salud intervienen y ordena el cierre en este caso de los pozos. Eso estamos hablando inicialmente. Posteriormente, la Agencia realiza una investigación preliminar donde la Agencia evalúa, obtiene información para determinar si se amerita una investigación más exhaustiva. Después se incluye el lugar en la lista nacional de prioridad. En marzo 2008 el lugar se incluyó en la lista nacional de prioridad. De esa lista, es una lista que tiene la Agencia Federal de Protección Ambiental Federal donde se evalúan todos aquellos lugares donde hay un problema de contaminación, eso es se le lleva un sistema de puntuación y si excede una cierta puntuación, 28.5. Si excede una puntuación en base a una evaluación que se hace, pues el lugar se nomina para ser incluido en la lista nacional de la Agencia Federal de Protección Ambiental, que es una lista que establece y le da la autoridad a la Agencia de Protección Ambiental Federal para invertir dinero federal en la investigación y, de ser necesario, la remediación de ese lugar. Posteriormente a eso, pues se comienza

la investigación, se hincan pozos, muestreo de agua subterránea, agua superficial, muestreo de suelos. Se identifican las áreas que pudieran ser ecológicamente sensitivas, que se pudieran estar afectando, quién se puede afectar, qué población se puede afectar, cómo se pudieran estar afectando, de dónde puede haber surgido la contaminación, cuáles son los contaminantes, cuáles son las concentraciones que están presentes en el área, el tipo de contaminante. Eventualmente, se estudia y se determina el tipo de efecto que puede tener ese contaminante en la salud de las personas y el ecosistema y, posteriormente, se hace el avalúo del riesgo para determinar si el riesgo es aceptado o no aceptado. El estudio de viabilidad, donde se determinan las posibles alternativas que se pueden estar implantando. La Agencia posteriormente a eso, qué hace, emite, redacta lo que se conoce como el Plan Propuesto. Aquí es lo que estamos presentando, se hizo público en julio 12, viernes, julio 12. La Agencia Federal de Protección Ambiental Federal hizo público el documento que algunos de ustedes ya tienen en “hard copy”, se les suministró aquí en esta reunión, este, para que las personas puedan someter comentarios con relación a la investigación y con relación a las alternativas que la Agencia, o la alternativa que la Agencia está proponiendo. Luego de este periodo de comentarios, la Agencia estará firmando lo que se conoce como un Récord de Decisión. Récord de Decisión es el documento aquel donde la Agencia Federal de Protección Ambiental Federal, una vez habiendo recibido, evaluado los comentarios de la comunidad y de las agencias o entidades pertinentes, la Agencia de Protección Ambiental Federal, habiendo recibido una carta de aceptación del Gobierno de Puerto Rico a través de la Junta de Calidad Ambiental, pues la Agencia firma lo que se conoce como el Récord de Decisión. Es el documento donde finalmente la Agencia selecciona

la alternativa que se va a implantar en el área. En este caso en particular, en el año 2015 se firmó el récord, septiembre 2015, se firmó el Récord de Decisión de la primera etapa de investigación de este caso de San Germán, en el año 2015. En ese momento en el año 2015 habíamos dicho anteriormente que esta primera etapa había sido llevada específicamente para identificar la fuente de contaminación, en este caso la fuente de contaminación se identificó proviniendo del Parque Industrial el Retiro, específicamente dos lotes que están ubicados en este Parque Industrial y estaremos viendo figuras al respecto. La Unidad Operacional Número 1, la Unidad Operacional Número 1, cuyo Récord de Decisión fue firmado en el año 2015, en este momento se encuentra en la etapa de diseño de la alternativa de remediación. Quiere decir que los consultores de la Agencia o el contratista de la Agencia de Protección Ambiental Federal ha estado en los últimos meses realizando algunos muestreos adicionales para poder definir con mayor exactitud la extensión y la magnitud de la contaminación y posteriormente, hacer el diseño del sistema que va a estar tratando o remediando la contaminación encontrada en la primera etapa. Por eso es que presentamos este flujograma (*se refiere a la presentación*). Aquí tenemos Unidad Operacional Número 1 y en esta etapa aquí podemos ver Unidad Operacional Número 2 (*referida en la presentación como OU-2*) que es de los que vamos a estar hablando en esta tarde. Quiere decir que la Etapa Número 1 está más adelantada que la 2 pero el propósito o el plan que se tiene es tratar de eventualmente unir ambas etapas para que ambas etapas puedan una como la otra, puedan maximizar la remediación que se esté realizando para lidiar, no solamente con la fuente de contaminación, para tratar de remediar ese suelo contaminado y evitar de que ese suelo, esos contaminantes sigan llegando al agua subterránea y se siga

moviendo. Entiéndase, el Parque Industrial el Retiro, el Parque Industrial el Retiro queda aproximadamente a 1,300 pies de distancia de los pozos que se impactaron. Esos pozos ya están cerrados. Bien, próximo “slide”.

(Nota de la transcriptora - Se pasa a la laminilla 4: Mapa de Localización)

Bien. En esta figura, esta figura aparece en el “Proposed Plan”, en el plan propuesto. Aquí prácticamente presenta la ubicación. Todos nosotros sabemos dónde estamos actualmente en el municipio de San Germán y donde estamos actualmente o donde se encuentra en el lugar, uno de los lugares que están en la Lista Nacional de Prioridad que es el caso de San Germán, de los pozos contaminados de San Germán. Próximo.

Nota de la transcriptora - Se pasa a la laminilla 5: Imagen Satelital de Ubicación de los Pozos)

En esta figura pues lo que podemos ver es la ubicación de los pozos, tanto Lola I, Lola II, el Pozo el Retiro con la ubicación del Parque Industrial el Retiro. Parque Industrial el Retiro. Cuando se comenzó los trabajos de investigación en este lugar del Superfondo, pues la Agencia de Protección Ambiental Federal llevó a cabo un avalúo, una identificación de posibles lugares que pudieran haber sido causantes de contaminación o focos de contaminación, se identificaron aproximadamente cuarentipico lugares como posibles focos de investigación. Se realizó la investigación y la Agencia de Protección Ambiental Federal determinó eventualmente en su investigación que la contaminación de los Pozos Lola I, Lola II y el Retiro provenían del Parque Industrial el Retiro. Aquí en el pueblo de San Germán, hay dos parques industriales, uno que está al Norte del Río Guanajibo, el Río Guanajibo y otro que está al sur del Río Guanajibo. Cuando se hizo la

investigación pues podemos ver la ubicación del Parque Industrial, podemos ver el origen de la contaminación. Como esa contaminación eventualmente se movió en una dirección noroeste, noroeste o norte noroeste, según lo estaremos viendo posteriormente, hasta impactar el Pozo Retiro, Lola I y Lola II. Se entiende, y se piensa, que cuando estos pozos Lola I, Lola II y el Retiro estuvieron en operación pues creaban un cono de abatimiento, y quiere decir que al crear ese cono de abatimiento pues movieron ese contaminante en esa dirección hacia, o aligeraron el proceso, de movilidad de esos contaminantes hacia estos tres pozos. Entiéndase la información que nosotros tenemos indica de que para el tiempo que fueron impactados estos pozos había siete pozos de la Autoridad de Acueductos y Alcantarillados, que estaban en operación. Aparte de eso, tomaban agua también estas comunidades se suplían de dos fuentes superficiales que suplía la Autoridad de Acueductos y Alcantarillados, al verse afectados estos tres pozos pues Acueductos y Alcantarillados pues suplió, siguió supliendo agua a las comunidades de un área que no está impactada. Sumamente importante, la Autoridad de Acueductos y Alcantarillados tiene que cumplir con una orden del Departamento de Salud, quiere decir que el agua que se sirve tiene que cumplir con unos parámetros de agua potable y si esa cantidad se excede de esos contaminantes que puedan estar en el agua, presentes en el agua se excede, quiere decir que el Departamento de Salud ordena el cierre de qué, de los pozos. Quiere decir que el agua que nosotros tomamos el Departamento de Salud debe estar monitoreando, debe estar monitoreando que cumpla con unos parámetros de agua, de agua potable, pues podemos ver en el transcurso del Parque Industrial hacia los pozos, podemos ver una serie de comunidades, entre ellas

Santa Marta. Esta urbanización, Porta Coeli, en dirección hacia los pozos impactados. Próxima.

(Nota de la transcriptora - Se pasa a la laminilla 6: Descripción del Lugar)

Bien, ya hablamos de la ubicación con relación al lugar. Hablamos acerca del área de investigación que fue la foto o la figura que presenté anteriormente y se incluyó, según mencionado también, el Parque Industrial el Retiro, identificado como el lugar de donde se originan los contaminantes que impactaron estos tres pozos y se estudiaron también áreas aledañas. Específicamente, en una dirección, en una dirección noroeste, norte noroeste. Recuérdense, cuando se hace una investigación, la Agencia hinca una serie de pozos para tomar muestras al agua subterránea, se estudia y se determina en qué dirección se mueve el agua subterránea, por eso es que el estudio es un estudio bastante completo, bastante completo. Se hincan pozos de 20, 25 pies de profundidad, 70, 55, 60, 70, 80, 90. En este lugar se hincaron pozos hasta de aproximadamente de 170, 180, 190 pies de profundidad y cuando se hacen estos pozos se toman muestras de agua subterránea y de suelo, a diferentes profundidades para poder definir qué área de una forma vertical y de una forma horizontal se encuentran estos contaminantes.

(Nota de la transcriptora - Se pasa a la laminilla 7: Trasfondo histórico)

Esto es prácticamente el trasfondo histórico, 2001-2005 se detecta la presencia de contaminación en los pozos de Acueductos. En el 2006 el Departamento de Salud ordena el cierre de los pozos, 2006 la Agencia Federal de Protección Ambiental, la Junta de Calidad Ambiental intervienen, comienzan a hacer los estudios para tratar de identificar y posteriormente recomendar la inclusión del lugar en la Lista Nacional de Prioridad lo

cual fue realizado en el año 2008. Del 2010 al 2015 se realizó esta investigación de la Unidad Operacional Número 1, cuando se realizó esta investigación se hincaron pozos desde el Parque Industrial hacia el Parque Retiro. Se realizó estudios de suelo, así también como se tomaron muestras de vapores que pudieran estar acumulándose debajo de estructuras. Recuérdense, estamos hablando de sustancias orgánico-volátiles, quiere decir que una sustancia orgánico-volátil se volatiliza, salen unos vapores y eso vapores pudieran estar subiendo y pudieran estar acumulándose en estructuras. Quiere decir que como parte de la Unidad Operacional Número 1, del estudio previo se hicieron estudios y en aproximadamente, cerca de cuarenta y pico de residencias en esta urbanización y en la aledaña, se hincaron unos puertos, se hicieron unos “barrenitos” para determinar si habían vapores acumulándose debajo de la estructura y si había concentración de estos contaminantes dentro de la estructura que excedieran unos niveles que levantara una banderita, que la Agencia dijera “tengo que tomar acción”. En aquel momento, o cuando se hizo este estudio, se determinó que no había contaminantes dentro de la vivienda que se hizo el estudio y estaremos hablando del próximo paso en esa dirección que estará realizando la Agencia de Protección Ambiental, según está recomendando en la Alternativa propuesta. Así también en el Parque Industrial se realizaron también estudios para determinar si se estaban acumulando vapores debajo de estructuras, facilidades, en el Parque Industrial el Retiro y esa información también se realizó y se documentó. Del año 2015 al año 2018 pues es el estudio que estaremos presentando en esta tarde y eventualmente la alternativa que estamos proponiendo. Próximo.

(Nota de la transcriptora - Se pasa a la laminilla 8: Investigación Remediativa)

Cuando hablamos de un estudio pues ya mencionamos acerca, se tiene que determinar la naturaleza, cómo se originó esa contaminación, determinar exactamente cuándo se originó, que cantidad de contaminantes, a veces no es tan sencillo, pero sí se puede delimitar la fuente o posible fuente de contaminación, o de la razón por la cual el agua subterránea, el agua superficial o el suelo fue impactada. Los contaminantes de preocupación encontrados en este lugar, lo que determinó la Unidad Operacional Número 2, el estudio que se concluyó ahora en el año 2018, comienzos del 2019, indicaron que eran los mismos contaminantes que se habían detectado en la Unidad Operacional Número 1, los que se presentaron cuando hubo aquí el “meeting” público en septiembre 2015 son los mismos contaminantes. Específicamente, contaminantes mayormente son contaminantes que son solvente, utilizados como solventes, son compuestos orgánicos-volátiles. Tetracloroetileno, es el primero que dice PCE, que eso es por sus siglas en inglés, Tetracloroetileno, tricloroetileno, Cis 1-2, Dicloroetileno, así sucesivamente hasta “vynil chloride”. Esos son los contaminantes de preocupación. El contaminante con la mayor concentración cuando se hizo el estudio de la Unidad Operacional Número 1 había sido Tricloroetileno, que se había detectado hasta una concentración de hasta sesenta y cinco mil partes por billón, sesenta y cinco mil. El estándar de agua potable es cinco partes por billón. Se había detectado hasta sesenta y cinco mil en un punto dado. Eso fue en un punto dado la concentración mayor. Posteriormente a eso, se ha encontrado menos concentración, pero por encima del estándar de cinco que es nivel de agua potable y el otro contaminante de mayor concentración fue el contaminante Tetracloroetileno que se encontró cuando se hizo el estudio de la Unidad Operacional Número 1, se encontró en una concentración de

veintiséis, veintiséis mil partes por billón, veintiséis mil partes por billón, el estándar es cinco de agua potable, veintiséis mil partes por billón eso fue el estudio, el primer estudio específicamente en la fuente. Posteriormente, en este estudio la concentración mayor de este contaminante Tetracloroetileno es de dieciséis mil partes por billón y estaremos viendo la figura para tener una idea físicamente, bien. Algunos de estos contaminantes y hago la salvedad, algunos de estos contaminantes se originan directamente, son productos directos, o algunos de ellos son productos que se generan de la biodegradación de otros contaminantes. Ejemplo, Tetracloroetileno, Tricloroetileno, etcétera, etcétera y después viene "Vinyl Chloride", cloro de vinilo, se van biodegradando, pero todavía siguen teniendo un efecto adverso, por eso la agencia indica "todos estos hay que remediarlos".

(Nota de la transcriptora - Se pasa a la laminilla 9: Figura Investigación Remediativa)

Aquí tenemos las figuras. Esta figura viene del primer estudio que se realizó. Esta figura es la figura pues 1-3 del estudio, la investigación remediativa que se realizó para los años 2015, terminando el 2015. Esta figura lo que está presentando es desde el Parque Industrial, desde el Parque Industrial, en dirección a los Pozos Lola 1, Lola 2 y el Pozo el Retiro. Quiere decir que cuando se hizo la investigación, se determinó que la fuente de contaminación provenía del Parque Industrial. Específicamente, cuando se hace la investigación se determinan dos lotes, dos lotes, donde se originan, o se entiende que se originan en base a la investigación, estos contaminantes. Siendo el lote donde se origina, estoy hablando lote donde se origina la contaminación, donde está actualmente la compañía Wallace, opera actualmente y la fuente de contaminación según, próxima.

(Nota de la transcriptora - Se pasa a la laminilla 10: Figura Investigación Remediativa)

Según identificada en la etapa primera la Unidad Operacional Número 1 y confirmada en esta etapa número 2 para Tricloroetileno se identifica el lote donde anteriormente estaba operando CCL, como la fuente principal de Tricloroetileno. Por eso podemos ver en este caso, en esta figura, esa "líniecita", esos contornos que vienen siendo originados en la facilidad donde era, operaba anteriormente la facilidad CCL. Estamos. Próxima.

(Nota de la transcriptora - Se pasa a la laminilla 11: Investigación Remediativa, Naturaleza y Extensión de la Contaminación)

Para esta investigación que acabamos de concluir se realizaron dos rondas de muestreo. Quiere decir que los pozos se muestrearon dos veces. Los pozos, o cierta cantidad de pozos, se llevó a cabo dos rondas de muestreos. Aparte de eso después del paso del huracán María, que hubo mucha lluvia, la Agencia de Protección Ambiental Federal encontró prudente realizar otro estudio, otra ronda de muestreo para poder determinar si había habido algún tipo de efecto por la mucha lluvia. Recuérdense la lluvia cae, la lluvia eventualmente percola en el terreno y eso pudiera tener algún tipo de efecto. Se realizó otro "round" adicional después del paso de María se tomaron muestras de un total de veintisiete pozos en el área. Estaremos viendo las figuras, veintisiete pozos en el área, tres rondas de muestreo, y prácticamente después del paso de María, el estudio reveló que el efecto había sido menor o prácticamente ninguno. Estamos hablando con relación al movimiento, esa extensión, esa extensión o las concentraciones que se habían detectado en los pozos ya previamente muestreados, pero esa información se obtuvo.

(Nota de la transcriptora - Se pasa a la laminilla 12: Ubicación de los Pozos de Muestreo)

Aquí podemos ver la ubicación de los pozos, la ubicación de los pozos que, eh, donde se muestreó el agua subterránea. Algunos de estos pozos pues van a tener tres numeritos, no, tres numeritos, quiere decir que ahí hay más de un pozo, no, ahí se tomó, ahí hay más de un pozo. Por eso cuando hablamos de veintisiete, hablamos de veintisiete, si usted cuenta los circulitos posiblemente hay menos de veintisiete, pero cuando cuenta en cada uno, en algunos de ellos, ve que aquí tenemos tres, no, y aquí tenemos tres (*señala los pozos en la foto*), aquí tenemos tres y así sucesivamente y en alguno de ellos tenemos más de un punto de muestreo. Quiere decir que se muestrearon veintisiete pozos durante la segunda etapa de investigación en este lugar.

(Nota de la transcriptora - Se pasa a la laminilla 13: Ubicación de los Pozos de Muestreo)

Aquí podemos ver los pozos que se muestrearon luego del paso del huracán María para poder confirmar si el huracán María había tenido algún tipo de efecto que pudiera cambiar lo que ya se había determinado, o identificado, previamente en los estudios que se habían realizado. Próxima.

(Nota de la transcriptora - Se pasa a la laminilla 14: Investigación Remediativa; Resultados de Estudio de Agua Subterránea)

¿Qué se determinó durante esta segunda etapa de la investigación? Eh, específicamente con relación al contaminante Tetracloroetileno, Tetracloroetileno, pues se encontró que la concentración máxima detectada durante esta etapa era de dieciséis mil partes por

billón, dieciséis mil partes por billón. El estándar de agua potable es cinco, recuérdense, estoy hablando de un pozo de monitoreo de agua. No estoy hablando de un pozo porque desde que se desconectó, los pozos el Retiro, la Autoridad de Acueductos y Alcantarillados pues no está utilizando estos pozos. Está utilizando, supliendo agua de otros pozos que no están impactados, por lo menos están cumpliendo con la orden, el mandato del Departamento de Salud, la calidad de agua potable, no, el estándar de agua potable. Dieciséis mil partes por billón, el pozo que conocemos como 2S lo estaremos viendo dos mil cuatrocientos en un pozo que estaremos cuatro veces y mil trescientos en otros pozos. Esos fueron las concentraciones mayores que se detectaron. Entiéndase la concentración mayor detectada de Tetracloroetileno en este estudio pues fue encontrada en el Parque Industrial en el lote que habíamos mencionado anteriormente como fuente de, identificada, de Tetracloroetileno. Bien, y en una forma más profunda, posiblemente setenta, ochenta pies, noventa pies de profundidad, setenta a ochenta pies de profundidad, se detectó dos mil cuatro… una concentración máxima de dos mil cuatrocientas partes por billón. Eso es la concentración mayor en una profundidad de aproximadamente setenta, ochenta pies de profundidad. Próxima.

(Nota de la transcriptora - Se pasa a la laminilla 15: Investigación Remediativa; Resultado de Estudio de Aguas Subterráneas)

Con relación a Tricloroetileno, entiéndase, habíamos hablado de la fuente identificada de Tricloroetileno. Habíamos dicho el lote donde anteriormente estaba u operaba CCL Label se encontró una concentración de, máxima, de seiscientos ochenta partes por billón y también de quinientos ochenta partes por billón, y a una profundidad de setenta, ochenta

pies de profundidad en otros pozos instalados en el área se encontró una concentración de veintiún partes por billón. Ese específicamente en el pozo 14UR. Próxima.

(Nota de la transcriptora - Se pasa a la laminilla 16: Figura)

Aquí podemos ver prácticamente la ubicación de los pozos, no. Esa figura está en el documento que ustedes tienen. En el documento que ustedes tienen pues ustedes van a ver aquí, específicamente aquí podemos ver el pozo 2S, no. Pozo 2S está ubicado en este punto, no, en este punto, ubicado estamos hablando del Parque Industrial, no, la ubicación donde está ubicado el Parque Industrial. El 4S y el 6S está, entiendo yo que es este que está por aquí (*señala la figura en la laminilla*), el 6S. Quiere decir que cuando hablamos nosotros de dieciséis mil partes por billón están hablando de aquí (*señala un punto en la figura en la laminilla*), cuando estamos hablando de dos mil trescientos aproximadamente están hablando de este punto (*señala un punto en la figura en la laminilla*), cuando estamos hablando de mil trescientos partes por billón estamos hablando de este punto por aquí (*señala un punto en la figura en la laminilla)*. Este es el contorno de Tetracloroetileno, bien. Próximo. Hacia atrás, perdóname *(continúa en la laminilla 16)*. El contorno verde, el contorno verde. Estas líneas verdes, no, estas líneas de contorno verde lo que representan o presentan es la concentración de Tricloroetileno, y usted va a ver de que aquí hay como dos contornos diferentes. Uno de Tetracloroetileno siendo contaminante principal. No estamos diciendo que ese contorno de Tetracloroetileno no tenga Tricloroetileno, estamos diciendo que el contaminante principal es Tetracloroetileno. El otro contorno principal es el de Tricloroetileno, que habíamos hablado concentración máxima en esta investigación como seiscientos ochenta partes por billón. Seiscientos y pico, quinientos ochenta y pico, la concentración

mayor de Tricloroetileno y estamos viendo, pues, la concentración mayor. Esto es donde antiguamente operaba la facilidad CCL. Bien. Quiere decir que confirmó lo que se había encontrado anteriormente. Eventualmente, ambos contaminantes, o ambas áreas contaminadas de agua subterránea pues eventualmente se unía. Bien. Próximo.

(Nota de la transcriptora - Se pasa a la laminilla 17: Investigación Remediativa; Resultados de Estudio de Aguas Superficiales y Sedimentos)

Con relación a las aguas superficiales, aguas superficiales, cuando se realizó la investigación de la Primera Unidad Operacional, se tomó muestra del Río Guanajibo, muestra de agua superficial, muestra de sedimento. Así también se tomó muestra de un dique que se encuentra en el Parque Industrial. Un dique que se encuentra en el Parque Industrial. La Primera Unidad Operacional había detectado concentraciones que en ese momento estaban excediendo los niveles de agua potable en agua superficial. Se había en la Unidad Operacional Número 1 cuando se realiza la Unidad Operacional Número 2, en estos momentos no se encontró ninguno de los contaminantes excediendo los niveles de cinco partes por billón, ni en el Río Guanajibo no excedía, ni en los sedimentos excedían unos niveles que le dijera a la Agencia Federal de Protección Ambiental Federal, que levantara una bandera. Recuérdense, el contaminante se mueve y según el contaminante se mueve pues trata de ir buscando el río, no, sigue buscando el río. Hay una dirección noroeste o norte noroeste entendemos que posiblemente el abatimiento del río, abatimiento del río, posiblemente las características hidrológicas en el área pues hacen que ese contaminante pues en vez de ir directamente hacia el norte, hacia el río pues se esté moviendo en una dirección noroeste o norte noroeste, según el contaminante, el movimiento del Tricloroetileno. No así cuando se toman muestras del

dique del agua superficial del dique que está ubicado en el Parque Industrial. Cuando se realizaron los análisis, se tomaron muestras de esa agua de ese dique, se encontró que había concentraciones de Tetracloroetileno de hasta veinticinco partes por billón. Veinticinco partes por billón para Tetracloroetileno y concentraciones de Tricloroetileno de hasta cincuenta y ocho partes por billón. Estamos claros hasta ahí. Recuérdense, que cuando se realiza este tipo de investigación se toman muestras, pero se sigue tomando muestras gradiente abajo, corriente abajo, corriente abajo para poder determinar hasta donde llega esa concentración, hasta donde llega esa concentración. Estos contaminantes son orgánicos-volátiles quiere decir que, con la alta temperatura, pues ellos van a tender a qué, a evaporarse. Tienden a evaporarse, estoy hablando el agua superficial en este momento. Próximo.

(Nota de la transcriptora - Se pasa a la laminilla 18: Resumen de Riesgo en el Lugar)

En base a la información que la Agencia Federal de Protección Ambiental recopiló, realizó lo que mencioné anteriormente que se conoce como un avalúo de riesgo. Un avalúo de riesgo se realiza para determinar si las concentraciones presentes, eh, si las personas de una forma u otra pudieran exponerse a esos contaminantes. Recuérdense, cuando nosotros hablamos de exposición a un contaminante, estamos hablando de diferentes rutas de exposición. Una de las rutas de exposición es cuál, es ingestión. Si yo tomo agua contaminada, qué va a pasar, pues me estoy exponiendo quiere decir que me estoy exponiendo y pudiera haber un efecto adverso. Si yo, ese contaminante, lo inhalo, inhalo, esa es otra ruta de exposición. Si yo entro en contacto dermal con ese contaminante, a través de la piel, no, contacto dermal, quiere decir que yo me estoy exponiendo a ese contaminante. Hay una cuarta ruta que es la inyección, pero en este

caso pues no entra en juego, no. Las rutas de exposición que se están evaluando son cuáles, ingestión, inhalación y contacto dermal. Ejemplo, si hay agua contaminada y yo ingiero el agua, estoy ingiriendo ese contaminante a la concentración que ese contaminante pudiera estar presente, no, pudiera estar presente. Si yo inhalo o hiervo esa agua o ese contaminante se va al aire y yo respiro, inhalo, quiere decir que estoy inhalando ese contaminante. Me estoy exponiendo a ese contaminante, y el contacto dermal que pudiera ser me estoy bañando o estoy utilizando esa agua que pudiera estar contaminada. La Agencia identifica quién y cómo se pudiera estar exponiendo, quiénes pudieran ser las personas que se pudieran estar exponiendo. Recuérdense, cuando hablamos de exposición y el efecto adverso hay diferentes tipos de personas que pueden ser más susceptibles que otras, no. Recuérdense, una mujer embarazada más susceptible que una persona joven que no está embarazada. Una persona que pudiera tener un sistema inmunológico comprometido puede estar más susceptible a tener un efecto, una respuesta a la exposición a ese contaminante. Pudiera haber un efecto que pudiera ser agudo, a corto plazo, o pudiera ser un efecto a largo plazo de la exposición. Recuérdense, cuando se determinó que estos pozos estaban contaminados el Departamento de Salud ordenó el cierre de estos pozos. Quiere decir que estos pozos no se están utilizando. La Agencia al identificar quién se puede exponer, identifica los residentes tanto niños como adultos que pudieran de una forma u otra exponerse a estos contaminantes. Importante, independientemente, independientemente que no se esté utilizando el agua que esté contaminada, no se esté utilizando para propósitos de utilización, agua potable o no la esté utilizando, no esté en contacto con esta agua, Agencia Federal de Protección Ambiental identificar e indica cual sería el caso peor que

pudiera ocurrir y el caso peor que pudiera ocurrir es que aunque no se esté utilizando el agua, qué sucedería si una persona estuviera utilizando de esa agua, estuviera ingiriendo de esa agua a esa concentración mayor detectada por un periodo de setenta años, setenta años y, en base a eso, hace unos cómputos para identificar si el riesgo es aceptado o el riesgo no es aceptado. Estamos bien hasta ahora, o sea que se hace unos estudios para determinar, eh, si el riesgo es aceptado o no aceptado. Si es no aceptado quiere decir que la Agencia de Protección Ambiental Federal tiene que tomar una acción para remediar el problema de contaminación. Aparte de esto, se identifican como posibles personas que personas que pudieran estar en contacto con los contaminantes es uso recreacional. Aquellas personas que de una forma u otra pudieran estar en contacto con el agua superficial, que se vayan al río, bañen, se bañen en el río, se bañen, caminen por el dique, por el dique que yo les mencioné, el agua superficial que está en ese dique, que transcurre en el Parque Industrial. Qué sucedería si una persona se expone a esa concentración por equis cantidad de tiempo, si ese riesgo sería aceptado o no aceptado. La Agencia hizo dicho análisis, dicho avalúo y determinó que el riesgo es no aceptable. Quiere decir, que si se estuviera utilizando esa agua a esa concentración presente, no, no, el riesgo es no aceptado, quiere decir que puede tener un efecto adverso para la salud de las personas. Bien, quiere decir por lo tanto que la Agencia determinó al haber obtenido dicho resultado, está presentando la alternativa para remediar el problema de contaminación, hay que tomar acción.

(Nota de la transcriptora - Se pasa a la laminilla 19: Investigación Remediativa)

Bien. ¿Qué determinó?, pues prácticamente lo que yo les mencioné, que es necesario que se tome una acción remediativa para proteger la salud de las personas, el bienestar

del medioambiente y evitar de que ese contaminante siga moviéndose. Recuérdense, el contaminante cuando está en suelo eventualmente del suelo sigue moviéndose hacia el agua subterránea, y una vez en el agua subterránea pues se sigue moviendo en el acuífero y se sigue impactando, expandiendo la contaminación. Bien. Próximo.

(Nota de la transcriptora - Se pasa a la laminilla 20: Objetivos de la Acción Remedial)

¿Cuáles son los objetivos de la acción remediativa o la acción remedial que está proponiendo la Agencia Federal de Protección Ambiental Federal? Número uno, prevenir o minimizar el riesgo no aceptable causado que causa o pudiera causar la exposición a estos contaminantes, pudiera causar la exposición a estos contaminantes, y recuérdense aclaré que independientemente no haya una exposición actual por ingestión o por inhalación, la Agencia dice qué sucedería si lo hubiera, y si lo hubiera yo voy a tomar acción y se estableció el riesgo no aceptable. Quiere decir que la Agencia tiene una misión o una encomienda de prevenir o minimizar el riesgo no aceptable que estos contaminantes, los medios contaminados están representando o pudieran representar al presente o en el futuro para aquella persona que se pudiera exponer a estos contaminantes. Número dos, restaurar el agua subterránea a niveles de agua potable, a los niveles, eh, anteriores, a niveles de agua potable para su uso beneficioso y número tres, reducir el potencial de que estos contaminantes sigan qué, sigan moviéndose desde la fuente hacia los diferentes medios, eh, que se pudiera estar moviendo ese contaminante. Recuérdese, el contaminante se puede mover del suelo al agua, del suelo al aire, no, se puede vaporizar, se puede evaporar, se puede ir del suelo al aire, se puede ir del agua al aire también, esos contaminantes. Quiere decir que la Agencia pues busca tratar de evitar que esos contaminantes se sigan, se sigan moviendo y sigan impactando

áreas que actualmente no están impactadas y que las áreas impactadas no se sigan, no siga aumentando, no se siga expandiendo ese nivel tanto vertical como horizontal de esos contaminantes. Próxima.

(Nota de la transcriptora - Se pasa a la laminilla 21: Alternativas Remediativas)

En base a esto la Agencia Federal de Protección Ambiental preparó el documento que se llama el Estudio de Viabilidad donde se evaluaron, donde se presentaron, se analizaron, se estudiaron diferentes alternativas que pudieran ser, eh, utilizadas, eh, en este lugar. Todo lugar evaluado por la Agencia Federal de Protección Ambiental Federal, la base para la evaluación parte desde la premisa, desde la primera premisa, no acción, y uno pudiera decir, pero por qué incluir no acción si sé que hay contaminación. Esa es la base inicial, qué sucedería si no se hace nada. Definitivamente, la Agencia a través de la evaluación indica: “no, hay que hacer algo, porque si no se hace nada pues definitivamente sigue habiendo un riesgo no aceptable, se sigue impactando los diferentes medios, el contaminante se sigue expandiendo y no estoy protegiendo la salud ni el bienestar de las personas”. Quiere decir, se evalúa la alternativa primera de no acción, la segunda alternativa que se evaluó fue la extracción del agua subterránea, hincar pozos, extraer agua subterránea, tratarla afuera, no, a través de un sistema de tratamiento, un sistema de tratamiento. Eventualmente, pues disponer apropiadamente de esa agua tratada, no, y eventualmente también incluir un monitoreo de atenuación natural para determinar, eh, cómo va reduciéndose el comportamiento de las concentraciones de estos contaminantes según se está realizando la remediación en el lugar. Estamos claros con esta, con esta alternativa. Quiere decir, aquí lo que está proponiendo que se hinquen una serie de pozos, desde la fuente hacia afuera de la

fuente, no, hacia afuera, el área impactada, se hinquen una serie de pozos, para que se extraiga el agua subterránea, se trate en un sistema de tratamiento y se monitoree el comportamiento del agua subterránea, así también como está ocurriendo esa atenuación natural de esos contaminantes. Como se van biodegradando esos contaminantes hasta eventualmente hacerse pues bajar las concentraciones o hacerse menos nocivos. La tercera alternativa que se evaluó fue el tratamiento en el lugar, lo que se conoce como tratamiento “in situ”, tratamiento en el lugar y Monitoreo de Atenuación Natural. Entiéndase, esta tercera alternativa también incluye no solamente el monitoreo del agua subterránea y la atenuación natural, si no también incluye el monitoreo, darle seguimiento a los vapores que pudieran estar acumulándose en estructuras en el área impactada. Quiere decir que la Agencia Federal de Protección Ambiental Federal indica que como parte de esta alternativa número tres se incluye el seguir realizando, realizar, seguir realizando, monitoreo de la estructura. Entiéndase, cuando digo estructura estoy hablando de hacer un “barrenito” en la estructura, había mencionado que se había hecho aproximadamente cuarenta y tres, cuarenta y cinco estructuras, residencias en el área, no, en diferentes áreas para tener una noción y se tomó muestra para saber si se estaban acumulando vapores debajo de la estructura porque esos vapores si se acumulan y la casa tiene grietas esos contaminantes pudieran estar reflejándose dentro del hogar, y se toma muestras dentro de la casa. Se toma muestras debajo de la losa, debajo del piso para poder determinar si se amerita o no que se tome una acción para remediar o remover esos contaminantes que se están acumulando debajo de estructuras. Se hizo en el pasado, se tomó muestras la Agencia indica hay que seguirlo realizando para según estamos remediando el agua subterránea pues seguir realizando este estudio para poder

determinar ese comportamiento de esos contaminantes, si alguno, debajo de diferentes estructuras. El tratamiento “in situ” lo que hay, lo que prácticamente conlleva es, inyectar, añadir ciertos nutrientes a través … hincar unos pozos e inyectar unos nutrientes en el agua subterránea para promover, incentivar la actividad de las bacterias. Hay unas bacterias que están y quiere decir que se incentiva y los estudios, eso está probado, eso no es algo que se está estudiando, se ha probado que una alternativa, eh, eficaz para la remoción de compuestos orgánicos-volátiles es la utilización, lo que se conoce como tratamiento en el lugar donde se incentiva unas actividades de unas bacterias, de las bacterias para poder entonces remediar y remover esos contaminantes, esos contaminantes. Hay diferentes formas de hacerlo, si son unos pozos verticales, horizontales la forma que se hace, la cantidad de pozos que fueran necesario, pero una vez la Agencia Federal de Protección Ambiental Federal, vamos a la próxima para ver los costos asociados, los costos asociados, con cada alternativa que se está proponiendo.

(Nota de la transcriptora - Se pasa a la laminilla 22: Alternativa 1 No Acción)

La alternativa de No Acción pues sabemos que no tiene costo, no, porque no se hace nada, pero no se resuelve nada, no, no se resuelve nada.

(Nota de la transcriptora - Se pasa a la laminilla 23: Alternativa 2 Extracción del Agua Subterránea, Tratamiento fuera del lugar (Ex Situ) y MNA)

Segunda alternativa. La segunda alternativa, eh, que es la de Extracción del Agua Subterránea, Tratamiento fuera del lugar y Monitoreo de Atenuación Natural, el costo total de la alternativa dice que el costo capital son $7.8 millones, costo de operación y

mantenimiento, cuando se le añade pues entonces el costo de la alternativa según establecido en este estudio que se realizó de costo son $21.7 millones, el costo de esta alternativa número 2.

(Nota de la transcriptora - Se pasa a la laminilla 24: Alternativa 3 Tratamiento In Situ y MNA)

Alternativa número 3, alternativa número 3. El costo de la remediación cuando lo llevamos a una forma prácticamente total, un estimado total es un costo de $17.3 millones. Quiere decir que la primera alternativa era cero costo, la alternativa de No Acción. La alternativa segunda Extracción, Tratamiento fuera de … afuera, en un sistema de tratamiento, Monitoreo de Agua Subterránea, habíamos dicho que el costo de la remediación son $21.7 millones y el costo de la alternativa número 3 son un costo de $17.3 millones. El costo de la alternativa número 3, luego de la Agencia Federal de Protección Ambiental Federal haber comparado todas estas alternativas contra nueve criterios que están establecidos bajo el Programa de Superfondo de la Agencia, el Programa de Superfondo es aquel programa de la Agencia Federal de Protección Ambiental Federal que tiene la delegación para identificar lugares contaminados, identificar posibles partes responsables, realizar la investigación y no solamente la investigación, si hace falta la remediación, realizar la remediación. Hay nueve criterios con los cuales se evalúan cada una de estas alternativas. Se evalúan las alternativas.

(Nota de la transcriptora - Se pasa a la laminilla 25: Criterios para la Selección de la Acción Remediativa Bajo CERCLA)

Algunos de ellos, por ejemplo, son la protección de la salud humana y el medioambiente, eh, cuán eficaz, no, es esa alternativa o son las alternativas para proteger la salud de las personas y el medioambiente. El punto número dos, usted ve ahí unos acrónimos que dice ARAR, eso son cualquier norma, reglamento que pueda ser de una forma u otra aplicable que aplique o se debe de considerar en esa remediación. Por aquí tenemos, miren por aquí el punto número nueve, aceptación de la comunidad, quiere decir aceptación de las agencias estatales. Tenemos costo-efectividad, la inversión vs el resultado. Yo puedo invertir cincuenta millones en un tipo de acción y puedo invertir veinte, no necesariamente la inversión de cincuenta me va a dar mayor resultado o mejor resultado que la alternativa de menos, de menos costo. Eso es bien importante. Efectividad a corto plazo, efectividad a largo plazo, reducción de la toxicidad, movilidad o volumen a través del tratamiento, a través de la acción remediativa. Una vez la Agencia Federal habiendo evaluado estas alternativas con los nueve criterios establecidos en la Ley CERCLA, abarcadora que le da la autoridad a la Agencia de Protección Ambiental bajo el Programa de Superfondo para realizar y llevar a cabo este tipo de análisis. Una vez evaluadas estas alternativas y en comunicación con el Gobierno de Puerto Rico, específicamente la Junta de Calidad Ambiental, ahora es el Departamento de Recursos Naturales y Ambientales, no, la Secretaria de Recursos Naturales, el Gobierno de Puerto Rico está cónsono, está de acuerdo con la Agencia de Protección Ambiental para recomendar la alternativa número tres, que es el próximo “slide”.

(Nota de la transcriptora - Se pasa a la laminilla 26: Plan Propuesto)

La Alternativa Número 3 para ser implementada como parte de la Unidad Operacional Número Dos. Específicamente, la alternativa número 3 llama el Tratamiento en el Lugar, Monitoreo de Atenuación Natural. Así también, monitoreo de las concentraciones, cómo sé cuan efectiva es la remediación, entiéndase cada cinco años el Programa establece, la Ley CERCLA establece que cada cinco años se tiene que realizar una evaluación del lugar para determinar si la acción está siendo efectiva o si hubiera que hacer algún tipo de modificación a los trabajos de remediación que se están haciendo. Quiere decir que esto no es simplemente comienzo el tratamiento lo dejo ahí por años y años, sino que la Agencia Federal de Protección Ambiental Federal tiene que mantenerse evaluando cuan efectiva está siendo esa remediación y hacer cualquier modificación en comunicación con el Gobierno de Puerto Rico, cuán efectiva esa remediación y cualquier enmienda, cambio que se debiera de realizar para que esa acción sea más efectiva. Mencioné que esta alternativa también incluye el monitoreo de los vapores que están, o que se pudieran estar generando debajo de las estructuras en el área. Quiere decir que la Agencia tiene que ser diligente, tiene que mantenerse y se mantendrá y establecerá un plan de comunicación, más agresivo con la comunidad. Nos estaremos reuniendo con ustedes, con la comunidad para brindarle mayor información, para brindarle mayor información, de los trabajos que se estén realizando. Eventualmente, uno de los propósitos que tiene la Agencia, ya mencionamos que la Unidad Operacional Número 1, lo que se seleccionó en el año 2015, que fue extracción de vapores del suelo, no, eh, “In Situ Treatment”, tratamiento de agua subterránea contaminada específicamente en el área del Parque Industrial, estamos en el etapa de diseño pero el propósito de la Agencia es tratar de unir

ambas remediaciones para hacer de esta forma más eficiente y que se pueda, que se pueda aligerar aún más la remediación, sean más efectivos, se evite eh, que ese contaminante siga migrando, disminuir esa razón de movimiento de ese contaminante, pero también ser más efectivos con relación al costo, la costo-eficiencia. Utilizar el dinero y maximizar la utilización del dinero para remediar el lugar de una forma más efectiva, más rápida. Hay preguntas que hay veces las personas hacen, cuánto tiempo puede tardar la remediación. Una remediación como esta se establece posiblemente veinte o treinta años la remediación. Yo tengo lugares aquí en Puerto Rico que se han estado remediando desde 1984. Recuérdense, cuando estamos hablando de aguas subterráneas que no se ve, usted no tiene control, pues tarde no es algo que usted puede decir, “yo remuevo este “stand”, me lo llevo”, cuando estamos hablando de aguas subterráneas, eh, no es tan fácil toma tiempo, y a medida que esa concentración disminuye en el acuífero, en el agua subterránea, pues se hace más difícil remover ese contaminante. Quería mencionar también que como parte de la remediación hay unos procesos. La remediación dice, seleccionado, hay que llevar a cabo la parte de diseño donde en la parte de diseño pues se va a obtener una información adicional y poder diseñar ese sistema de tratamiento, también indica que tiene que mantenerse unos controles institucionales. En el caso de Puerto Rico, el Departamento de Recursos Naturales y Ambientales tiene una división que es de franquicias, ellos son los que emiten los permisos de los pozos. Nosotros hemos estado por años y seguimos manteniendo, no, manteniendo el pedido de que en el pasado tenemos conocimiento de que aquí en el pasado se hincaron pozos privados y hemos identificado pozos privados que dialogando con la comunidad nos han identificado pozos privados y hemos tomado

muestras de esos pozos. Hay otros pozos que no podemos decir si siguen existiendo o fueron cerrados. Lo que sí le solicitamos a la ciudadanía es que si tienen conocimiento de que existe un pozo, pozo privado, pozo privado que no necesariamente lo estuvieran utilizando, lo estén utilizando, que no los dejen saber, pues para nosotros incluirlo como parte del estudio, del muestreo, del muestreo que estaremos realizando. Los pozos que se tomaron muestras, la muestra la costeó la Agencia Federal de Protección Ambiental Federal, el dueño de la vivienda pues no tuvo que pagar nada. La Agencia tomó muestras, obtuvo un resultado. De otra forma, recomendamos que no se utilicen estos pozos, si hubiera un pozo privado, no se utilice pozos. Quiere decir que el departamento … y esto hablando los pozos privados. Pozos nuevos que alguna entidad quisiera hincar en el área, pues tiene que tener un permiso del Departamento de Recursos Naturales que hace contacto con nosotros, con la Junta y se lleva a cabo una evaluación pertinente. Esa es la alternativa que estamos proponiendo en este Plan Propuesto y con esto terminamos la presentación en esta tarde.

(Nota de la transcriptora - Se pasa a la laminilla 27 periodo de comentarios)

Brenda Reyes: Gracias, Adalberto. En la hojita que tienen ustedes, en la Hoja Informativa indica que el periodo de comentario público comenzó el 12 de julio y culmina el 11 de agosto de 2019. Nosotros publicamos un anuncio en el periódico Primera Hora, eh, verdad, a tales fines, tengo notificación que hay una solicitud extensión del periodo de comentario público. Luego les estaremos dejando saber vía correo electrónico, quienes dejaron allí su correo electrónico y su dirección si se extendió el periodo de comentario público.

(Nota de la transcriptora - Se refiere a la laminilla 28 Repositorios)

Los repositorios de información están en la alcaldía de San Germán, en la Región 2 de la EPA en Nueva York y en la Oficina del Caribe, en mi oficina. Así que pues ahí es donde van a encontrar los documentos relacionados al Lugar de Superfondo de San Germán. Aparte de eso me gustaría abrir el piso para hacer preguntas. Aquí están Adalberto, Mike, Frances para poder contestar sus preguntas, así que si gustan puedo poner el micrófono aquí. Como les dije, importante que digan su nombre para que quede para el récord de transcripción. Ah, está acá, me dicen que está acá. (*Señala al micrófono disponible para el público*).

Adalberto Bosque: Los comentarios que el público pueda tener con relación al Plan Propuesto de la Agencia Federal de Protección Ambiental Federal hay varias formas de realizarlos. Una, y aquí tenemos personas que están tomando notas por eso es que es sumamente importante, y Brenda mencionó, que es sumamente importante que usted se identifique, no, que usted se identifique, porque todo comentario que se realice, eventualmente cuando la Agencia redacte el documento que se llama el Récord de Decisión, hay una sección que tiene que ver específicamente con toda pregunta o comentario que se realice con relación a este Plan Propuesto. Quiere decir, que si hay una pregunta en esta tarde y tenemos la contestación pues definitivamente se la vamos a dar esta la contestación en esta tarde, y/o añadir mayor información cuando se conteste, se redacte ese documento. Si acaso no tuviera algún tipo de pregunta en esta tarde lo puede hacer de una forma escrita. Los residentes aquí de la comunidad, si en algún momento durante esta etapa de proceso quisieran reunirse con nosotros, o que nosotros viniéramos aquí y nos reuniéramos con ustedes de una forma personal o en su

hogar o en algún sitio que ustedes interesen aquí, estamos en la mejor disposición de venir aquí también. Brenda, este servidor estamos en la mejor disposición y cualquier cosa si es necesario traer a Frances, Mike o algún personal técnico que pueda brindar mayor información, estamos en la mejor disposición de proveer información. Cuando se habló de periodo de comentarios, Brenda fue clara, treinta días, julio 12 a agosto 11 aproximadamente, agosto 11, según establecido en la notificación y en el documento. Si hay una extensión pudiera extenderse treinta días adicionales. Quiere decir que, en las próximas, próximo, posiblemente próximas semanas o algo así, pues la Agencia estará dando a conocer si esa extensión de tiempo, solicitud es aceptada, no. Entendemos que va en esa dirección de ser aceptada, no, y hasta donde se estaría extendiendo el periodo de comentarios.

Brenda Reyes: Pues si hay alguna pregunta por allí está el micrófono, nombre, apellido, dirección. Si es residente, si representa alguna facilidad, y también si no quieren utilizar el micrófono y quieren hablar con nosotros aparte durante el tiempo que estamos aquí, que tenemos hasta las siete de la noche. Eh, también, pues, si no quieren hacer ninguna pregunta aquí al frente pues nos pueden abordar. Sí, bueno, esas quedan para el récord (*refiriéndose a las preguntas hechas al frente*).

Lcdo. Carlos López Freytes: Buenas tardes. Mi nombre es el Lcdo. Carlos López Freytes, vengo aquí en representación de la compañía de Fomento Industrial PRIDCO y yo tengo varios comentarios, más que preguntas, realmente para la consideración de la EPA durante este proceso. Me uno al planteamiento que Brenda Reyes hiciera, nosotros fuimos parte de los que acabamos de solicitar también tiempo adicional para poder oficialmente presentar nuestros comentarios técnicos, y pues nos reiteramos en ese

pedido, pero preliminarmente queremos dar un comentario técnico que tenemos. Reconocemos que en esta etapa del proceso se está en el OU-2, que es la parte de la contaminación en el agua subterránea y, como parte de los estudios que se han hecho, hasta el momento pudimos detectar que hay unos “screenings” que se hicieron, no pozos de monitoreo, sino meramente “screenings” que se hicieron al área sureste, creo que los pozos están marcados como T01, T02, T03, que es hacia el área más suroeste de la propiedad, eh si, para los que no tienen ese documento se ve básicamente en el área más abajo de la gráfica (*se refiere a gráfica que está presentada al frente*). El área verde y rosita, y la detección, eh, que se hizo de TCE en esos “screenings” fueron por debajo de las áreas de los límites de los cinco partes por millón, pero hubo detección, y como hubo detección sabemos que el TCE no es una materia que nace naturalmente, perdón, de la naturaleza, sino que llega ahí por algún lugar. Eh, y como parte de la evaluación que se ha hecho no se ha determinado que para esa porción el plumacho llega, o la contaminación surge de esa área. Sin embargo, pues, al haber detección pues se pregunta por qué esa consideración después no se ha hecho o que se evalúe el por qué esa determinación no se ha considerado porque obviamente pudiera surgir por el movimiento ser hacia el noreste de las aguas subterráneas, que se detecte que hay otro punto de contaminación para esa área. Y por qué se preguntan si está por debajo del “screening” me está diciendo eso, bueno. Es importante leer el documento como parte de la explicación que bien hiciera Adalberto Bosque, el Dr. Bosques, explicó eh, que la contaminación se veía a distintos niveles y obviamente como parte del suelo, eh, la geología había áreas, una parte en el “saprolite”, otra parte que es el “unstable bedrock”. Por eso es que parte de los pozos de monitoreo es el UR y la mayor concentración casi

siempre se vio dónde estaba el UR. Muchas de ellas, dependiendo del área, podía estar en cuarenta pies, cincuenta pies en otras. Las “screenings” que se hicieron se hicieron en 20 pies. Por lo tanto, la detección que se dio es bien baja porque si se, a lo mejor, si se hubiese evaluado un poco más profundo pudiese haber detectado una contaminación, y pues, como parte de los comentarios que tenemos es que la EPA considere esas circunstancias para identificar si lo va a evaluar o si va a hacer alguna tarea adicional con esa perspectiva. Muchas gracias.

Adalberto Bosque: Bien, este, agradecemos el comentario, y ya se tomó nota del comentario y definitivamente el comentario se va a estar atendiendo. Cuando la Agencia Federal haga el documento de respuesta a los comentarios se va a tomar en consideración. Lo que el Licenciado está mencionando, cuando se hizo la investigación, se hicieron unos transectos, no, se hicieron unos transectos, este, desde … estoy mirando por aquí está. Se hicieron unos transectos, se hicieron unos transectos, no, uno … no recuerdo si eran nueve, diez, diferentes tipos de transectos, de transectos para poder tratar de identificar, tener una noción del área y el impacto o la calidad del agua en esa área, en esa área y eventualmente para realizar el estudio. Definitivamente, eh, los resultados pues ya los vimos, ¿no?. Mayor concentración, menos concentración, o quizás “screening levels” y eventualmente no concentración, pero como quiera que sea le reafirmamos que en el documento Respuestas a Comentarios se va a tomar ese punto, comentario que usted presentó, no, se va a tomar en consideración. Bien. Se va a tomar en consideración e inclusive durante la parte de diseño, durante la parte de diseño del sistema de remediación, pues la Agencia pues definitivamente tiene que realizar algún estudio posterior para poder definir un poquito más ese sistema, no, ese sistema. Los

puntos donde se está remediando. Tomamos nota y se va a estar atendiendo su comentario. Gracias.

¿Algún otro comentario? Quiero, quiero, mencionar algo sumamente importante, quiero reafirmar lo que mencioné anteriormente. Recuérdense, los miembros de la comunidad cualquier pregunta, cualquier, este, cualquier duda que ustedes tengan, importante pueden tener los teléfonos de Brenda y el mío y estamos en la mejor disposición de venir aquí, aquí a las comunidades. Cuando ustedes entiendan conveniente, no, podemos venir para compartir con ustedes y contestarles cualquier pregunta. Los años que hemos estado aquí, miren, esta comunidad es una comunidad bien, cómo se dice, bien familiar, un calor humano. Se lo digo porque yo llegué cuando durante la investigación, comí arroz con dulce, que si chocolate, que si café, que si jugo, eh, su comidita, no. Pudimos compartir y pudimos ver cómo la comunidad pues, agradecemos a la comunidad, no, por habernos permitido realizar la investigación. Agradecemos a la comunidad, por la paciencia, no, por la paciencia que tuvieron cuando estuvimos realizando los trabajos de investigación. La Agencia tiene un mandato por ley de realizar estos trabajos de investigación, pero el propósito que nosotros tenemos como Agencia, tanto a nivel estatal como a nivel federal es proteger la salud de las personas y el medioambiente, a eso nos debemos. Quiere decir que cualquier preocupación, cualquier duda que ustedes puedan tener o cualquier recomendación, muy gustosamente le agradecemos que nos hagan llegar ese comentario, esa recomendación que ustedes puedan tener. Agradecemos también al Municipio por habernos permitido, colaborado en esta investigación. Personal de la Agencial, personalmente agradezco a personal de la agencia que se encuentran con nosotros, entidades que se encuentran con nosotros. Así también como las

facilidades donde se realizó estudios en estas dos etapas. La Unidad Operacional Numero 1 y la Número 2 por habernos facilitado el que se pudiera realizar de una forma rápida, y sin ningún tipo de contratiempos, se pudieran realizar los trabajos de investigación. El trabajo continúa, no se ha acabado, mencionamos que si los trabajas de investigación tardaron cinco, seis, siete años en realizar la investigación, los trabajos de limpieza pueden tardar hasta treinta años. Unos veinte, treinta años, pudieran estar tardando. Tendremos mayor información de con relación al tiempo de remediación cuando lleguemos a la parte de diseño, que se esté remediando, se tenga claramente el diseño, no, de lo que se va a estar realizando. Así también entendemos que los trabajos que se realicen, no, recuérdense cualquier información los pozos de agua privada, si usted tiene conocimiento de pozos privados que se encuentran en el área, hable con el dueño, el dueño de la casa, díganoslo a nosotros. Nosotros vamos, tomamos muestras para verificar la calidad de esa agua que usted pudiera estar ingiriendo, bien. Estamos aquí a la orden, no, sin más que decir entonces, le agradecemos a todos ustedes por la participación, por su presencia en esta tarde. Nos quedamos como dijo Brenda, no, nos quedamos un rato más. Si usted tiene alguna pregunta, pues estamos a la mejor disposición de poderle contestar dicha pregunta. Muchas gracias.

(Nota de la transcriptora – Un residente desea hacer una pregunta fuera de micrófono, pero que conste en récord)

José López Quiñones: Mi nombre es José López Quiñones, resido aquí en Riverside. Nosotros tenemos un pozo privado, hace unos años se tomó una muestra. No sé exactamente cuántos años hace de eso, pero a ver si es factible que tomaran otra muestra para ver en qué forma pues, este, existen, qué tipo de contaminantes existen.

Este, y si esa agua pues, eh sabemos que no se puede tomar, verdad, pero si se puede utilizar para otras cosas. (*Una persona le pregunta fuera de récord si lo están utilizando al momento*). Después del huracán, que estuvimos sin agua, pero lo utilizamos para limpieza, uso de los baños, pero para ingerir no lo llegamos a utilizar y casi no se usa. Lo tenemos pues por alguna situación que surja de momento.

(*Esperan por el Dr. Adalberto Bosque para contestar la pregunta*)

José López Quiñones: (*Repite la pregunta para el Dr. Adalberto Bosque*) En la residencia tenemos un pozo. Este, ese pozo pues anteriormente se había tomado de muestra de él, hace unos años me dice papi.

Adalberto Bosque: Si nosotros tomamos muestras de los pozos, y eso yo puedo verificarlo cuando llegue a la oficina, o yo puedo decirle a CDM, yo le digo a ellos, les doy el "go ahead" a ellos, a CDM que es consultor de la EPA para que ellos verifiquen los resultados de ese pozo, y nosotros hacérselo llegar a usted. Eso lo vamos a hacer. (*Se dirige a Frances Delano de CDM*). ¿Tú puedes tomar la información, verdad, Frances? (*Frances Delano responde que sí*). Frances toma la información para entonces nosotros verificar cuál fue el resultado y hacerle llegar ese resultado y explicarle el resultado.

José López Quiñones: Claro que sí.

Adalberto Bosque: Porque aquí lo siguiente, importante, pueden pasar dos cosas en un pozo. No digo que ese es el caso de usted. Uno, que el nivel de concentración esté por debajo de agua potable, esté bien. No necesariamente quiere decir que lo puede utilizar, ¿por qué?, porque la contaminación se mueve y puede ser que hoy yo diga "está

bien", pero de aquí a un mes ese contaminante se movió y me impactó y yo no lo sabía y sigo tomando agua contaminada. Se dice "no lo tomes", o pudiera ser que ese día se excedió, si se excedió pues usted qué dice, vamos a ponerle mi llavecita, vamos a cerrarlo con su candadito y no utilizarlo hasta que sea el tiempo, hasta que me digan "se limpió el lugar". Es bueno saber si el pozo está impactado o no, porque si ahora mismo una persona va a comprar la propiedad y le dice … porque hay personas que posiblemente puedan decir cuando venden una propiedad "mira yo te vendo una propiedad, tiene un pozo, es bueno porque tiene un pozo ahí que puede utilizar esa agua cuando se va el agua, eso es bueno", pero si usted vende una casa y le dice tiene el pozo para usarlo y esa agua está contaminada eventualmente. Viene la persona y le dice "tú sabías que podía estar contaminada, no me lo dijiste". Por eso es bueno tener la información, y le vamos a hacer llegar la información. Estamos a la mejor disposición de darle la información, cualquier duda que usted tenga.

Frances Delano: Otra cosa, lo que nosotros muestreamos no son los parámetros para consumo de agua, son exclusivos para volátiles orgánicos. O sea, que los resultados que le vamos a dar son para lo que muestreamos. Eso no lo incluye todo.

Adalberto Bosque: Específicamente las sustancias químicas que se detectaron en el sitio.

José López Quiñones: Okay.

Adalberto Bosque: Pero es bueno que usted lo sepa y estamos a la mejor disposición de brindarle la información.

José López Quiñones: Claro que sí, se lo agradecemos.

Adalberto Bosque: Y si ustedes conocen a alguna otra persona que tiene pozo, porque nosotros hemos preguntado. Hay personas que nos dicen “sí, yo tengo un pozo”. Una vez nosotros fuimos a esta calle así, Don Herbert, que ya yo entiendo que falleció, fuimos allí y vimos un pozo que tiene la manigueta, el pozo. Me dice “no, tengo un pozo, pero no lo estoy utilizando”, yo le digo “¿y funciona?”. Me dice “claro que sí”, va allí y sacó agua. Yo no estoy diciendo que lo está utilizando, pero si tiene el potencial de ser utilizado en algún momento, “ah se fue el agua, para bajar los inodoros”, debe de saber porque si agua me cae en las manos, eso puede ser contacto dermal. Es importante saber y es algo que la Agencia es que toma la muestra y paga por ella. Estamos a la orden. Un placer que hayan venido con nosotros.

(Frances Delano y José López Quiñones continúan hablando fuera de récord para anotar la información del Sr. López)

Se dan por terminadas las labores y se cierra récord a las 6:38pm.

CERTIFICADO DE TRANSCRIPTORA

Yo, Aledawi Figueroa Martínez, transcriptora de Smile Again Learning Center, Corp. CERTIFICO:

Que la que antecede constituye la transcripción fiel y exacta de la grabación realizada durante la reunión celebrada en el sitio y la fecha que se indican en la página uno de esta transcripción.

Certifico además que no tengo interés en el resultado de este asunto y que no tengo parentesco en ningún grado de consanguinidad con las partes involucradas en él.

En Isabela, Puerto Rico, a 3 de agosto de 2019.

Aledawi Figueroa Martínez
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APPENDIX VII
RESPONSIVENESS SUMMARY

San German Groundwater Contamination Superfund Site
OU-2

PUBLIC COMMENTS PREPARED IN SUPPORT

OF THE RESPONSIVENESS SUMMARY FOR THE

RECORD OF DECISION

SAN GERMAN GROUNDWATER CONTAMINATION SITE – OU-2

SAN GERMAN, PUERTO RICO

On July 12, 2019, the U.S. Environmental Protection Agency (EPA) released for public comment the Proposed Plan for the San German Groundwater Contamination Site (Site) – Operable Unit 2. During the public comment period, EPA held a public meeting on July 30, 2019, to discuss and accept comments regarding the Proposed Plan. EPA received verbal comments at the public meeting as well as written comments during the public comment period, which lasted from July 12, 2019 through September 10, 2019. EPA's initial thirty (30) days comment period was extended in response to requests for an extension. This document summarizes comments from the public at the public meeting on July 30, 2019, and those submitted via mail. EPA's responses are provided following each comment.

The comments are grouped generally in the following categories:

- Background
- Remedial Investigation
- Preferred Alternative - Alternative 3
- Miscellaneous

- Background
    1. CCL Puerto Rico respectfully requests that EPA refrain from identifying one of the source areas of contamination at the Retiro Industrial Park as the CCL property. Referring to this Property with CCL's name, could give a false and wrong impression to the public and to its employees that CCL is responsible for contaminating the Site.

       Response 1: The name designation "Former CCL property" for the source areas is made solely for the ease of reference and is not intended to imply a determination of liability on the part of the companies that currently or formerly occupied the property. While referring to the property, EPA cites it as the property formerly occupied by CCL, and that the lot is currently owned by the Puerto Rico Industrial Development Company.

    2. CCL Puerto Rico incorporates by reference its comments provided in the Administrative Record of the OU-1 in its letters of 2015 with the exhibits, attachments and references cited.

Response 2: EPA notes the information provided in the comment.

3. CCL indicated based on PRIDCO's records, the Property appears to have been leased for the first time in 1963 and thereafter continuously until 1992 to multiple tenants in the clothing and electronic manufacturing industries. CCL notes that the Property appears to have been vacant from 1992 until August 15, 1995, when it was leased by Insert Corporation of Puerto Rico Inc. ("Insertco"), the first inserts printing company (same line of industry as CCL) that leased the Property. CCL Puerto Rico further indicated that based on documents in PRIDCO's files, lnsertco and/or its successor NJP Insertco, Inc., ("NJP"), a subsidiary of Menasha Corporation ("Menasha"), did not move into the Property until March of 1996.

Response 3: EPA notes the information provided in the comment.

4. CCL indicated that the presence of Vinyl Chloride ("COC") at the Property pre-dates the lease and occupation by CCL and/or any of its predecessor companies in the same line of industry based on sampling results obtained in 1995 by Menasha Corporation ("Menasha").

Response 4: EPA notes the information provided in the comment.

5. CCL Puerto Rico indicated that toxicity characteristic leaching procedure ("TCLP") characterization Analysis Report of NJP's waste residual solution from its printing process, dated November 10, 1995, pre-dating the occupation of the Property by Insertco and/or its successor, NJP Insertco, Inc. ("NJP"), revealed that its wastes were non-hazardous and were also non-detect for PCE, TCE, 1,2-Dichloroethane and Vinyl Chloride, which are the same four COC found pre-existing at the Property.

Response 5: EPA notes the information provided in the comment.

6. CCL PR indicated that per documents in PRIDCO's files, the Property is connected to the Puerto Rico Aqueduct and Sewer Authority ("PRASA") sanitary system since 1995, and its septic tank system was removed in December of 1995. CCL Puerto Rico further indicated that, this pre-date the occupancy of the Property by Insertco, NJP and its successors.

Response 6: EPA notes the information provided in the comment.

7. CCL Puerto Rico indicated that the Plan and the other studies and documents in the Administrative Records of the OU-1 and OU-2 lack evidence of documented releases of these COCs at the Property.

Response 7: EPA does not agree with the assessment that there is a lack evidence of documented releases of these COCs at the Property The soil contamination above the water table on the eastern side of the building previously occupied by CCL Label could not have originated at another location and the groundwater contamination in this area is clearly linked to the source area on the eastern side of the building.

8. CCL understands that there could be migration and degradation of COC from other potential sources into the Property.

Response 8: TCE can be a degradation product of PCE under certain environmental conditions, though TCE itself is a common chemical for degreasing and cleaning purposes in many industrial operations. Based on the pattern of contamination observed at the two source areas, EPA believes that the TCE in both soil and groundwater in the vicinity of the building formerly occupied by CCL does not originate from another source. TCE is observed at much higher levels than PCE in both soil and groundwater near the building formerly occupied by CCL, whereas PCE is observed at much higher levels than TCE in both soil and groundwater in the vicinity of the other source area. In addition, TCE observed in soil samples above the water table in the vicinity of the building formerly occupied by CCL cannot have plausibly originated at another source. The hydrologic conditions and sampling results support that there are two separate source areas. However, additional groundwater samples will be collected as part of the OU-1 and OU-2 Preliminary Design investigations to confirm the nature and extent of these source areas.

9. CCL understands that there can be no conclusion that the Property is a source of TCE without first addressing the possibility that COC at the Property is the result of degradation or migration of COC from other properties at the Site.

Response 9: As stated in the response to comment number 7 and 8, EPA does not agree with the assessment there is a lack evidence of documented releases of COCs at the Property. The soil contamination above the water table on the eastern side of the building occupied by CCL Label could not have originated at another location

and the groundwater contamination in this area is clearly linked to the source area on the eastern side of the building.

10. Wallace Silversmiths de Puerto Rico, Ltd. (WSPRL), noted that OU-1 ROD indicated that under the Pre-Design Investigation (PDI), a pilot study would be performed to collect design parameters for the SVE and DPE systems. Neither the results of this study nor any other PDI documents have been made available for public review**.**

Response 10: Currently EPA is conducting the preliminary design investigation for OU-1; a pilot study has yet to be initiated. Once final documents are generated EPA will be able to make them available.

11. WSPRL, indicated that EPA should refer to the current occupant of the Wallace Lot as "WSPRL" which is an acronym for Wallace Silversmiths de Puerto Rico, Ltd. (the correct name of the current occupant) and distinct from former occupant (Wallace International de P.R., Inc.).

Response 11: EPA notes the information provided in the comment.

- Remedial Investigation

12. The Puerto Rico Industrial Development Co. (PRIDCO) indicated during the public meeting and in its comments submitted that a more thorough analysis is still required in order to conclude that the sources areas of the contamination for the site are located just within the Wallace and former CCL properties. PRIDCO indicated that even though the identified source areas have seen detections of contaminants in the soil and groundwater, the analysis of possible sources upgradient from these two source areas, has been limited so as to disregard additional contaminant areas. It is PRIDCO's recommendation that before a final Record of Decision is made, EPA should consider a more specific sampling plan and investigation to determine the possibility of contamination arising from other properties that are upgradient from the Wallace and CCL lots, such as the industrial properties previously occupied by General Electric and other adjacent properties.

Response 12: Additional groundwater samples will be collected as part of the OU-1 and OU-2 Preliminary Design Investigation that will allow EPA to better define the soil and groundwater contamination for RD purposes and could provide further information. In the unlikely event that additional contaminant sources are

detected, they will be addressed appropriately. However, the remedies for the Wallace and CCL source areas would not change.

13. CCL Puerto Rico made referenced to the surface water samplings results from 2017 as part of the OU-2 study in the small drainage ditch or creek on the northeastern side of the Property, between the Property and the PRIDCO lot formerly leased by Baytex, and downstream from the Property at SW-9, SW-10, SW-11, and SW-12. They indicated that sampling result could be affected from upgradient storm water discharges. In addition, CCL Puerto Rico indicated that there was no background sample of the small creek upstream of the Property**.**

    Response 13: As stated in the OU-2 Final Remedial Action Report, the objective of collecting surface water samples at the drainage ditch or creek north of the former CCL lot and the former Baytex lot was to confirm OU-1 surface water results and to determine if contaminated groundwater from the sources was discharging to the drainage ditch. Surface water sample results from both OU-1 and OU-2 confirmed the discharge of contaminated groundwater into surface water. Monitoring of surface water for the evaluation of the effectiveness of site remediation will be considered during the remedial design and the necessity of collecting a background sample of the small creek upstream of the property will be evaluated.

14. Wallace Silversmiths de Puerto Rico, Ltd. (WSPRL), indicated that data collected shows an additional source of chlorinated solvents in this area, the former Baytex Lot. They further indicate that the former Baytex lot should be included as a source of contamination in connection with OU-2).

Response 14: The former Baytex facility is not currently considered as a source of contamination because soil contamination was not detected above the water table (approximately five feet bgs). For example, the soil sample result from FB-05 was detected at 180 ppb for PCE, a lower concentration in comparison to sources at Wallace (i.e., >10,000 ppb for PCE). The groundwater screening sample result from FB-05 was detected at 2,690 ppb. A concentration of soil contamination of 180 ppb would not yield a groundwater concentration of 2,690 ppb at FB-05. Since the former Baytex facility is directly downgradient of Wallace, the source of contamination found at former Baytex is likely from the migration of the plume from the upgradient source areas. In addition, the western portion of the lot (i.e., directly downgradient of the source areas at Wallace) exhibited higher concentrations in groundwater than the eastern portion of the lot which further suggests that the contamination is originating upgradient and that the western portion of the lot is within the plume from the source areas at Wallace.

15. WSPRL, indicated that EPA does not appear to have addressed sewers or discharges thereto within the Retiro Industrial Park as being sources of contamination and does not appear to have focused on upgradient lots formerly occupied by Caribe GE Distribution Components as potential sources of contamination, although EPA's Pre-CERCLIS Screening Report identified the use of chlorinated solvents by Caribe GE.

    Response 15:
    During the OU1 RI, surface water and sediment samples were collected at locations near the industrial buildings in Retiro Industrial Park. Samples were collected both in catch basins and in channelized streams. Only a limited number of sample results exceeded the screening criteria used for the OU1 RI Report and EPA determined in the OU1 FS that remediation of surface water and sediment was not needed because the soil remedy is expected to reduce contaminants in these media in the future due to the fact that the TCE and PCE source areas were the likely source of these surface water/sediment detections. No other source areas were identified in the OU1 RI.

    The groundwater screening and soil sampling results at the Wallace and CCL lots showed higher levels of contamination than the trace levels the trace levels of contamination detected in the three screening wells immediately upgradient of the CCL lot. However, additional groundwater samples will be collected as part of the OU-1 and OU-2 Preliminary Design Investigations that will allow EPA to better define the soil and groundwater contamination for RD purposes. If additional contaminant sources are detected, they will be addressed appropriately. However, the remedies for the Wallace and CCL source areas would not change.

16. A resident indicated at the public meeting that his private well which is not in use was sampled in the OU-1 investigation and requested a copy of the sampling results.

    Response 16: EPA will verify the information and will provide sampling results to the private well owner.

- Preferred Alternative - Alternative 3

17. WSPRL, indicated that EPA failed to perform an adequate evaluation of properties in proximity to the Wallace and CCL Lots that are contributing to the contamination subject to the proposed remedy. There is at least one additional property (the Baytex Lot) responsible for contributing to the chlorinated solvent contamination in soil and groundwater. The selected remedy should recognize the Baytex Lot as a source of contamination and provide for further investigation and eventual modification of the remedy as warranted.

Response 17: See response to Comment 14.

18. WSPRL, indicated EPA's Preferred Remedy is overly elaborate, and the costs to implement it are questionable. Since this remedy has been insufficiently evaluated – in particular, it does not appear that any bench-scale or field pilot-scale testing has been performed – it is uncertain whether or not the project-specific Remedial Action Objectives (RAOs) can successfully be achieved within the proposed duration and/or estimated cost.

    Response 18: Remedial alternatives were evaluated in the feasibility study in accordance with *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* and the Preferred Remedy was selected in the Proposed Plan in accordance with *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and other Remedy Selection Decision Documents*. Per feasibility study guidance, the remedial alternative costs have an expected accuracy range of -30 to +50 percent. As the project progresses through the remedial design phase and additional information is gathered and evaluated from pre-design investigations, including bench-scale or field pilot-scale testing (as required), the proposed duration and/or accuracy of the estimated costs will be further refined.

19. WSPRL, indicated that since the Plan does not specify the number of injection rounds, the proposed cost is inaccurate and misleading.

    Response 19: See response to Comment 18.

20. WSPRL, indicated that the remedies for soil and groundwater can potentially be combined to achieve the RAOs in a more cost-effective way.

    Response 20: EPA notes the information provided in the comment. EPA is aiming to perform the work as efficiently and cost-effectively as practicable; however, must contend with other moderating factors (e.g., environmental site conditions, access, operations, etc.). Combining remedies for soil and groundwater is under consideration and is not uncommon at other CERCLA Sites.

21. WSPRL, indicated that the remedy should recognize the Baytex Lot as a source of contamination and provide for further investigation and eventual modification of the remedy as warranted.

    Response 21: See response to Comment 14. Monitoring at Baytex will be performed as part of the remedy. Additional investigations might be performed at

Baytex only if new evidence demonstrates that treatment at Wallace could not reduce the contamination level at Baytex.

22. WSPRL, indicated that without releasing information to the public on the progress, if any, of work on OU-1, EPA has issued a Proposed Plan for OU-2 that relies on a Feasibility Study lacking in bench-scale and pilot studies for the preferred remedy, paying only lip service to coordination with action for OU-1, and reflecting questionable costs; EPA should reevaluate its costing and approach to remediation.

    Response 22: See response to Comment 18 and 20.

23. WSPRL, indicated that although the Plan mentions several chemical reagents that can be used in the proposed injection program, there has not been site-specific field testing regarding injection levels needed to maintain full anaerobic conditions in the subsurface to achieve the dechlorination process.

    Response 23: Site-specific field tests (pilot study) will be conducted during the remedial design. The chemical reagent(s) to be selected, the quantity of these reagents, and methods of reagents delivery to the subsurface to maintain full anaerobic conditions will be developed in remedial design.

24. WSPRL, indicated that the cost estimate in the FS is based on two rounds of injections being performed. (FS, OU-2, July 20, 2018, Appendix C-2.) They also indicated that two-time injection regime may not achieve the RAOs to assure regulatory compliance, because the desired level of dechlorination would not be achieved.

    Response 24: See response to Comment 18.

25. WSPRL, indicated that another point to emphasize about the proposed technology is that the reductive dechlorination process might in turn generate vinyl chloride (VC), which is a significantly volatile constituent and cannot be degraded by the same anaerobic process as the PCE and TCE. The generation and accumulation of VC would pose a high vapor intrusion risk to the nearby residents. WSPRL also indicated that the design, successful employment, and cost of the remedy are highly dependent on field tests and pilot study. Accordingly, EPA should review its evaluation and cost estimate for this technology in light of our comments and document its approach accordingly.

    Response 25: See response to Comment 18. EPA is aware that the generation of vinyl chloride is a possibility. These concerns will be evaluated as part of the pilot study.

26. WSPRL, indicated that monitored natural attenuation in concert with more limited in-situ treatment would be a more cost-effective remedy to achieve remedial objective outcomes**.**

    Response 26: Comment noted. As presented in the OU-2 Final Remedial Investigation Report, naturally occurring anaerobic biodegration of the PCE plume originated from Wallace is limited at the Wallace property and in the downgradient plume area. Soil in shallow saprolite zone contains silt and clay, which are capable of holding elevated level of contaminants and releasing the contaminants into groundwater slowly over time. Active treatment of groundwater contamination at the two source properties and within the contaminant plume is considered necessary to achieve the RAOs. Additional site-specific data will be collected and the actual locations, extents, and rounds of in situ treatment to be performed will be determined during the remedial design and remedial action.

27. WSPRL indicated that MNA is a feasible technology for the Site, provided that the source(s) of groundwater contamination is eliminated.

    Response 27: See Response to Comment 26

28. WSPRL indicated that the remedies for OU-1 and OU-2 should be combined in a holistic manner.

    Response 28: See response to Comment 20.

29. WSPRL indicated that besides the remedial alternatives discussed in the PP, other technologies exist to address VOC contamination. One such technology is Electric Resistance Heating (ERH), which is likely to be the most efficient technology to address both soil and groundwater impacts in a relatively shorter period of time (within several years as opposed to decades) even though its capital cost is almost always higher.

    Response 29: EPA notes the information provided in the comment. In situ thermal remediation was considered as Alternative 4 in OU1 feasibility study. Due to implementability issues at an active facility and high costs, EPA selected an equally effective alternative, Alternative 3, for the OU1 proposed plan. In situ thermal remediation was screened out in the OU2 groundwater feasibility study because it was not considered to be cost effective to treat the OU-2 groundwater contamination outside the OU-1 source areas

- Miscellaneous

30. Wallace Silversmiths de Puerto Rico, Ltd. (WSPRL), indicated that EPA should provide an updated notice and information request to the former occupants of the Baytex Lot indicating that they are Potentially Responsible Parties (PRPs).

    Response 30: See response to Comment 14.

31. Wallace Silversmiths de Puerto Rico, Ltd. (WSPRL), indicated EPA has not made available its OU-1 Pre-Design Investigation and Remedial Design Investigation Reports or Memos in connection with Implementation of the Remedy for OU-1. Lack of such data restricts the public's ability to provide meaningful comment based on complete information.

    Response 31: See response to Comment 10.

APPENDIX VIII
FIGURES

San German Groundwater Contamination Superfund Site
OU-2

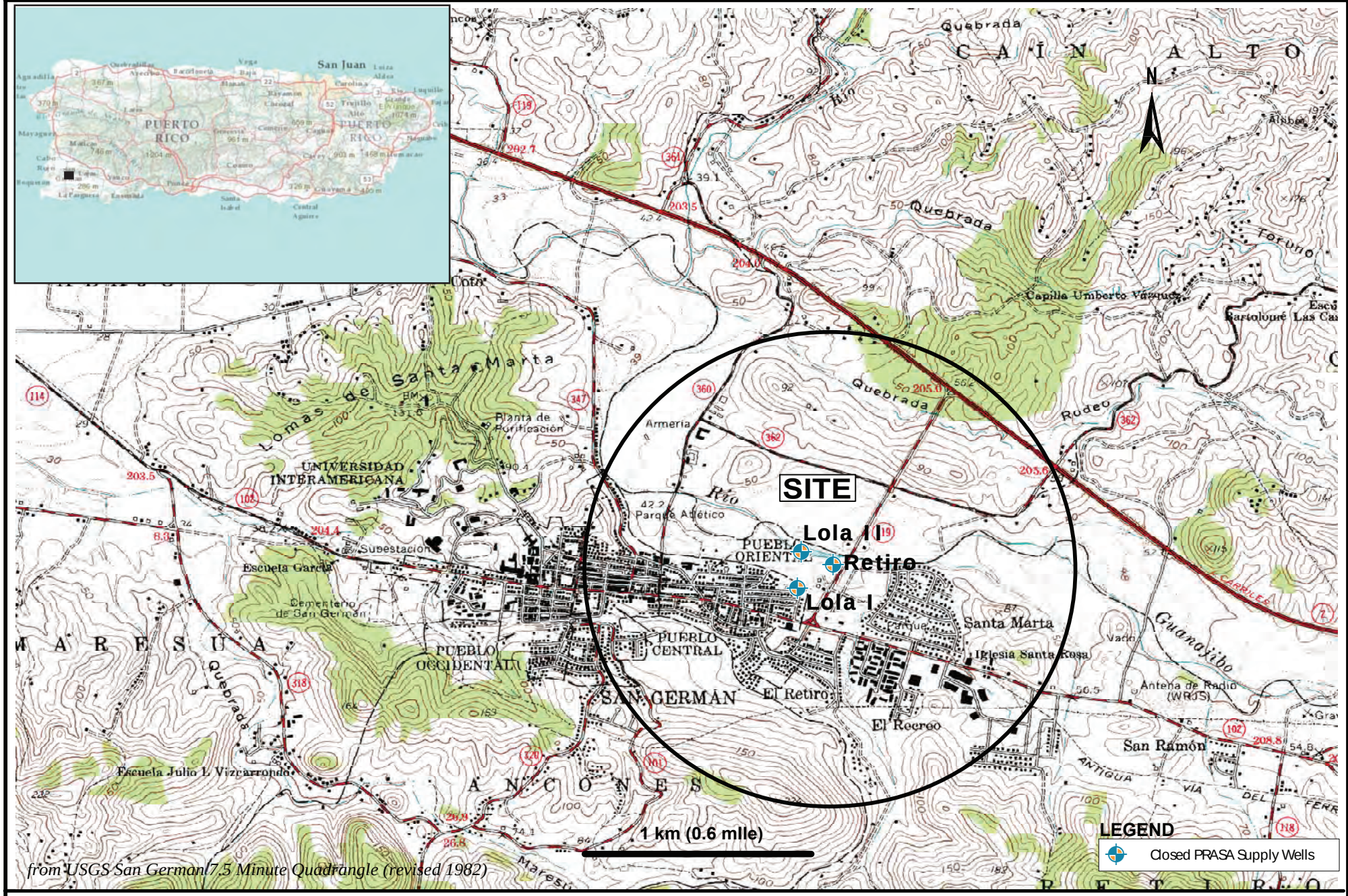
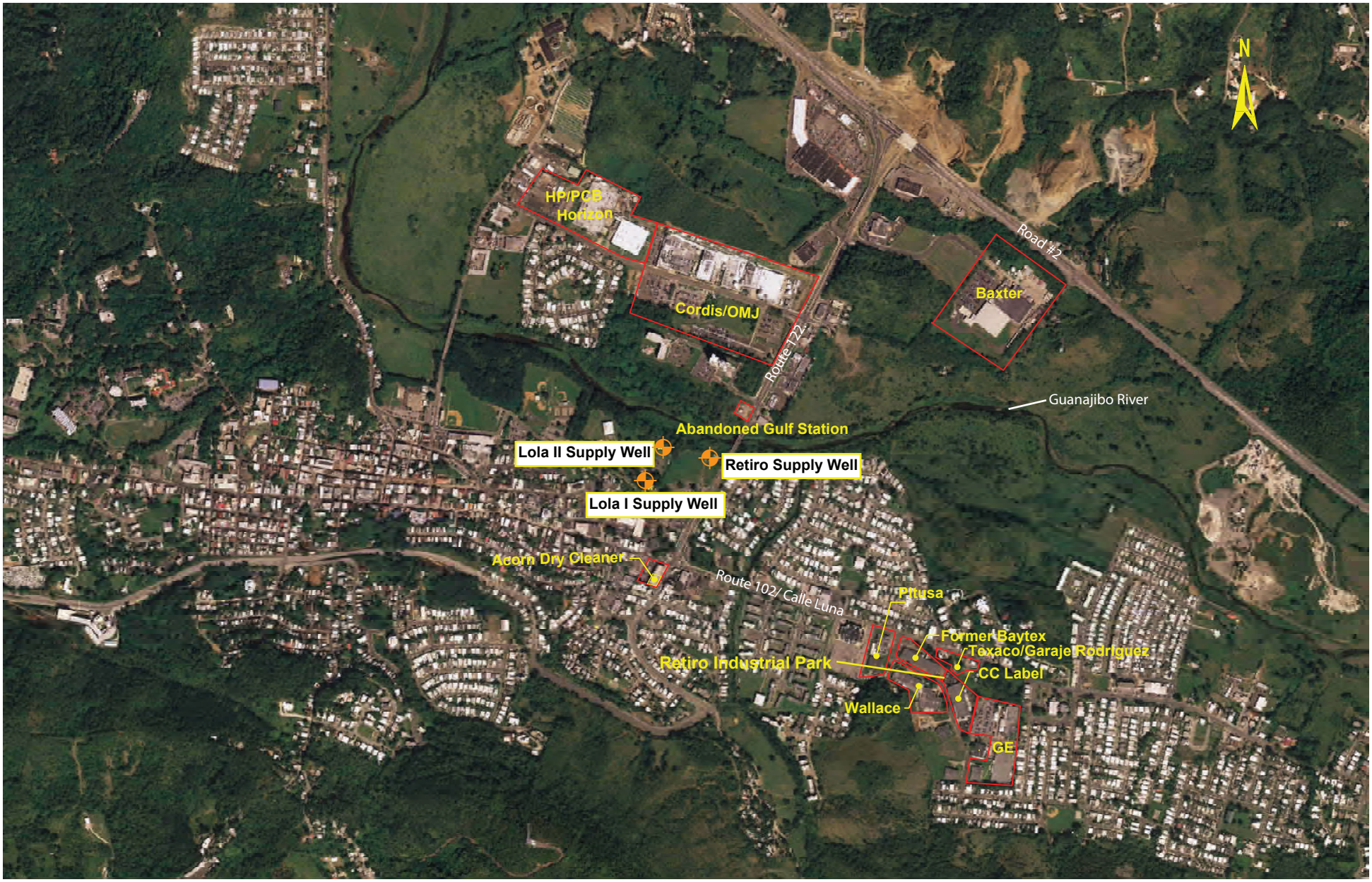


Figure 1
Site Location Map
San Germán Groundwater Contamination Site, OU-2
San Germán, Puerto Rico

CDM Smith



Legend

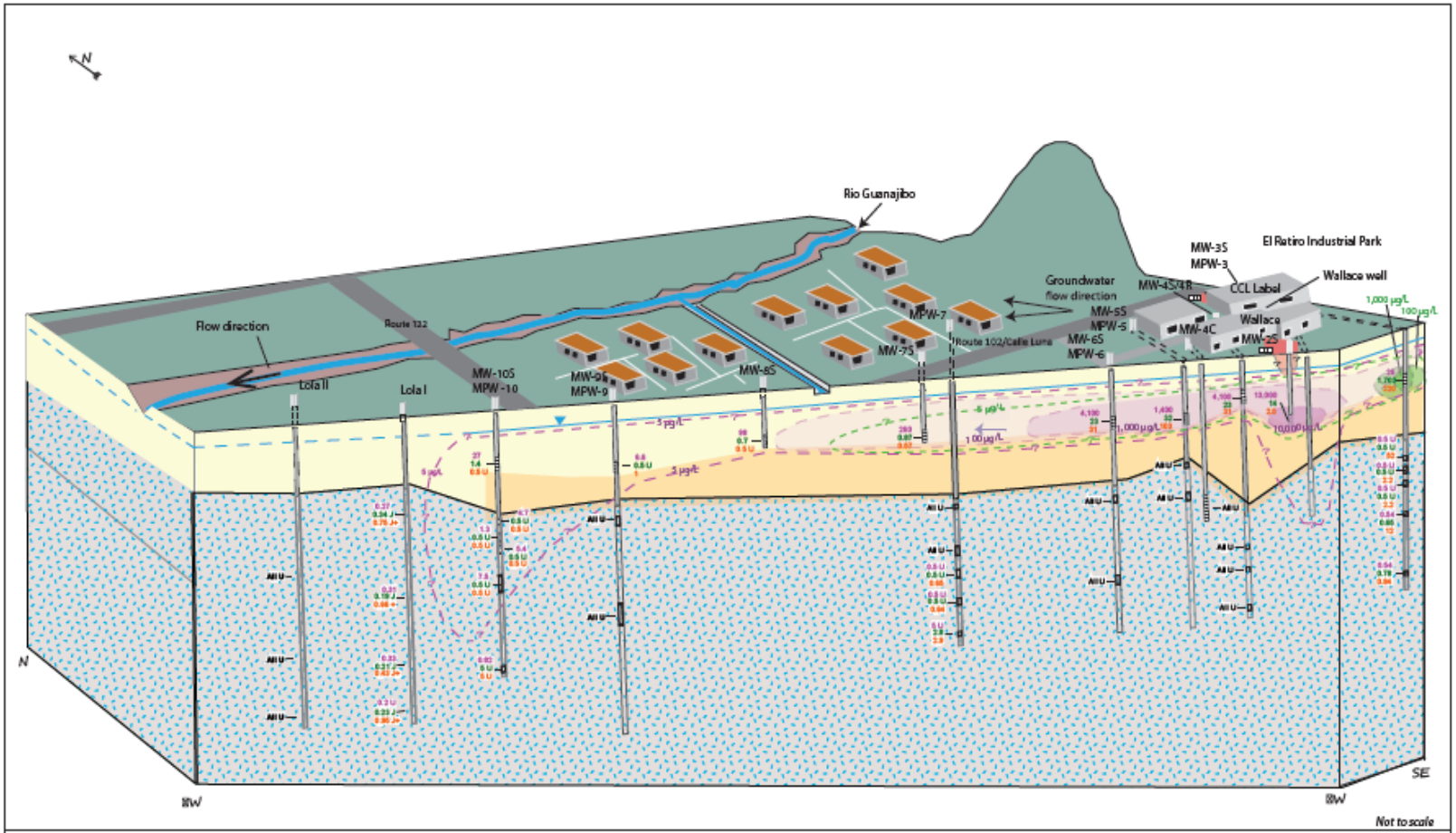
Former supply well location

1,000 0 500 1,000

Approximate Scale (in feet)

Figure 2
Site Map
San Germán Groundwater Contamination Site,OU-2
San Germán, Puerto Rico

CDM Smith



Legend

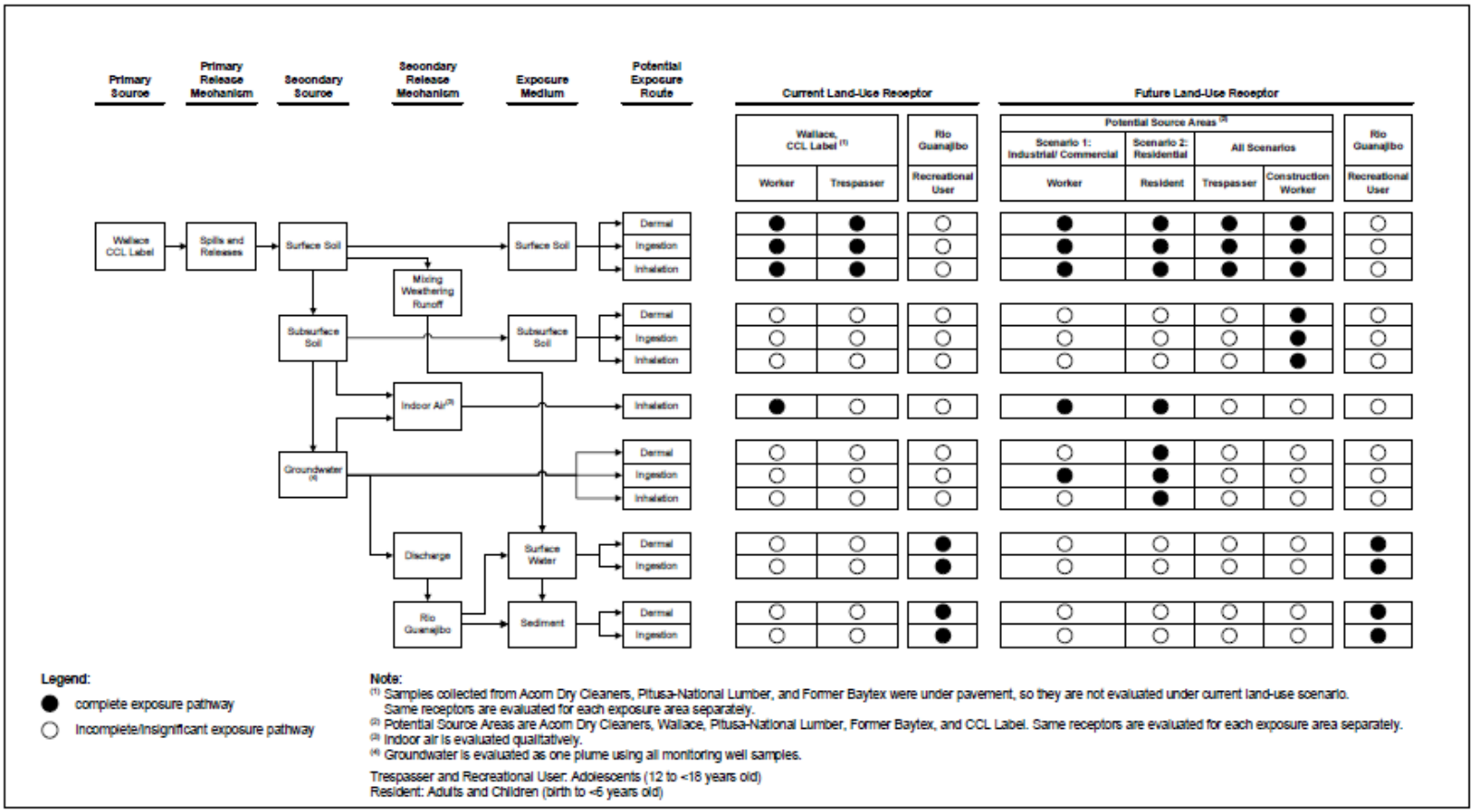
- Saprolite Zone
- Serpentinite Bedrock
- Approximate Spill Area
- Contaminant flow path
- Groundwater level
- Tetrachloroethene (PCE) contamination plume
- Trichloroethene (TCE) contamination plume
- Unknown/unstable zone

1.3 - Tetrachloroethene detection
2.8 - Trichloroethene detection
2.9 - cis-1,2-Dichloroethene detection
U - Not detected
Concentrations in micrograms per liter

J - Estimated value
J+ - Estimated high value

Figure 3
Conceptual Site Model
San German Groundwater Contamination Site
San German, Puerto Rico

CDM Smith



Legend:

- ● complete exposure pathway
- ○ incomplete/insignificant exposure pathway

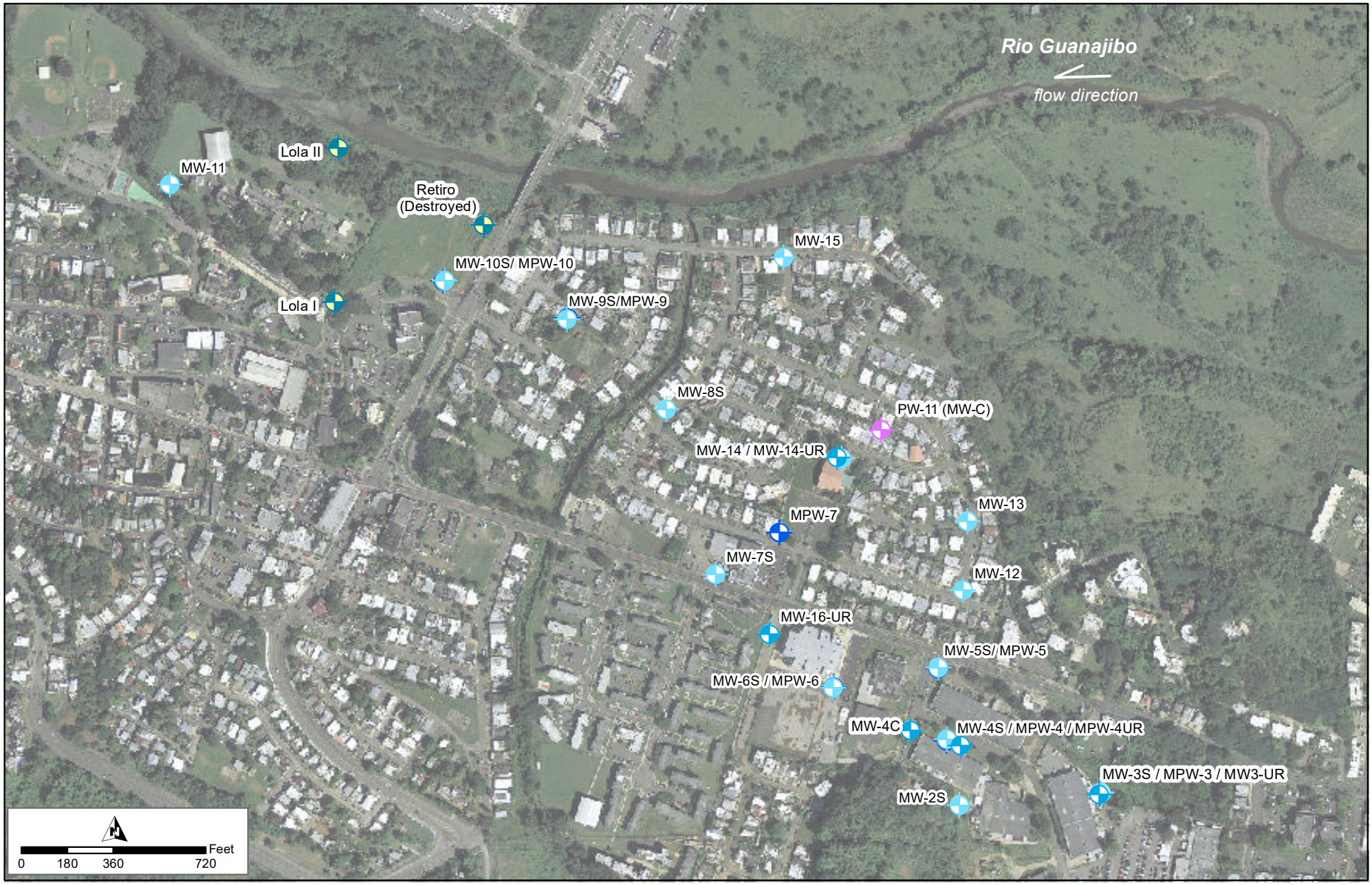
Note:

(1) Samples collected from Acorn Dry Cleaners, Pitusa-National Lumber, and Former Baytex were under pavement, so they are not evaluated under current land-use scenario. Same receptors are evaluated for each exposure area separately.
(2) Potential Source Areas are Acorn Dry Cleaners, Wallace, Pitusa-National Lumber, Former Baytex, and CCL Label. Same receptors are evaluated for each exposure area separately.
(3) Indoor air is evaluated qualitatively.
(4) Groundwater is evaluated as one plume using all monitoring well samples.

Trespasser and Recreational User: Adolescents (12 to <18 years old)
Resident: Adults and Children (birth to <6 years old)

Figure 4
Conceptual Site Model
San German Groundwater Contamination Site
San German, Puerto Rico

CDM Smith



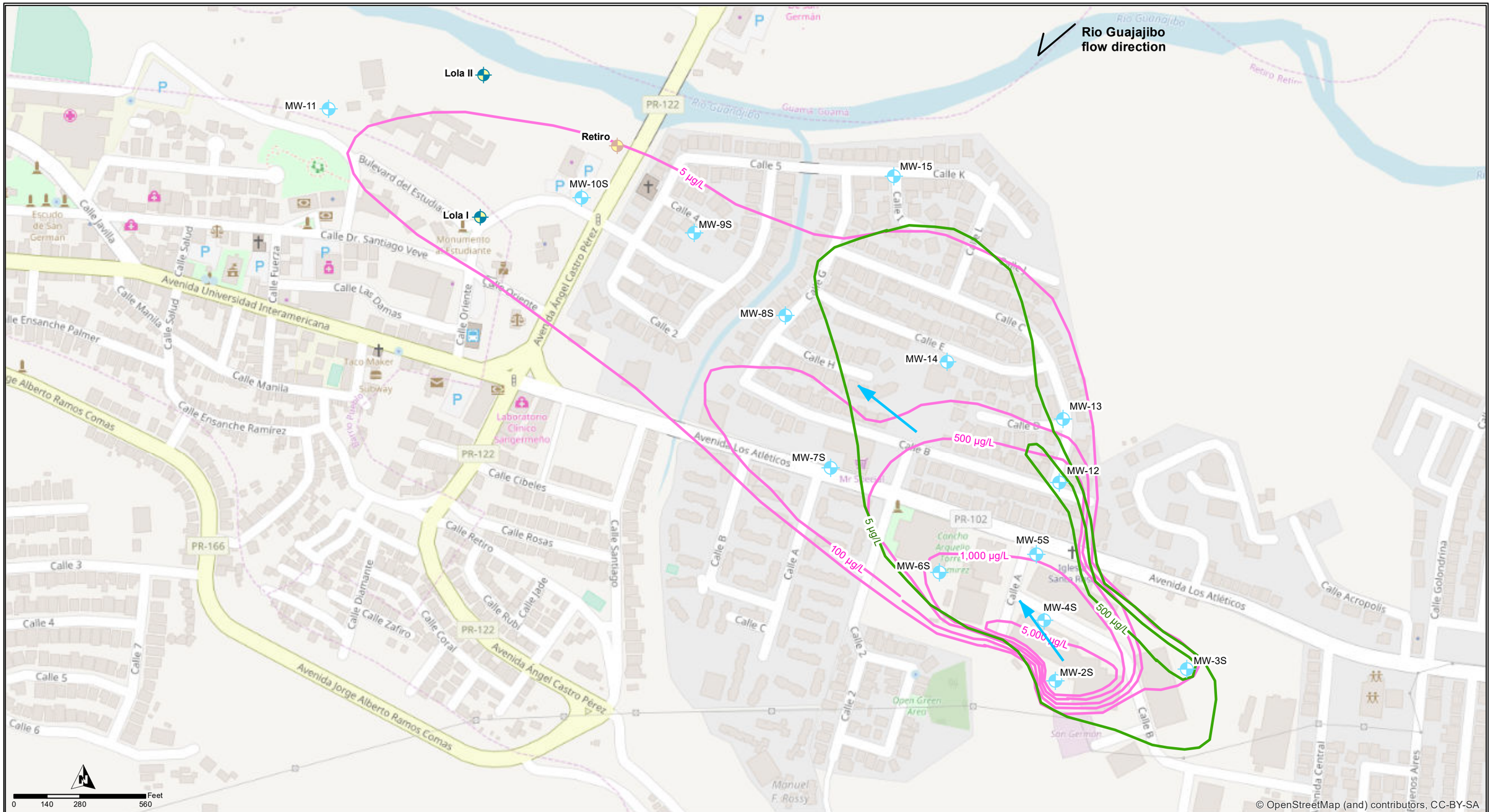
Legend

- Multiport well
- Shallow monitoring well
- Unstable bedrock monitoring well
- Residential well
- Former public supply well

Acronyms:
MW-2S - Saprolite Monitoring Well
MWP-7 - Multiport Bedrock Well
MW-14UR - Unstable Bedrock Monitoring Well
MW-C - Conventional Bedrock Well

Figure 5
Sampled Wells
San Germán Groundwater Contamination Site, OU-2
San Germán, Puerto Rico

CDM Smith



Legend

- Former public supply well
- Saprolite monitoring well
- TCE isocontour in µg/L
- PCE isocontour in µg/L
- Destroyed former public supply well
- Groundwater flow direction

Acronyms:

PCE - tretrachloroethylene
TCE - trichloroethylene
OU - Operable Unit

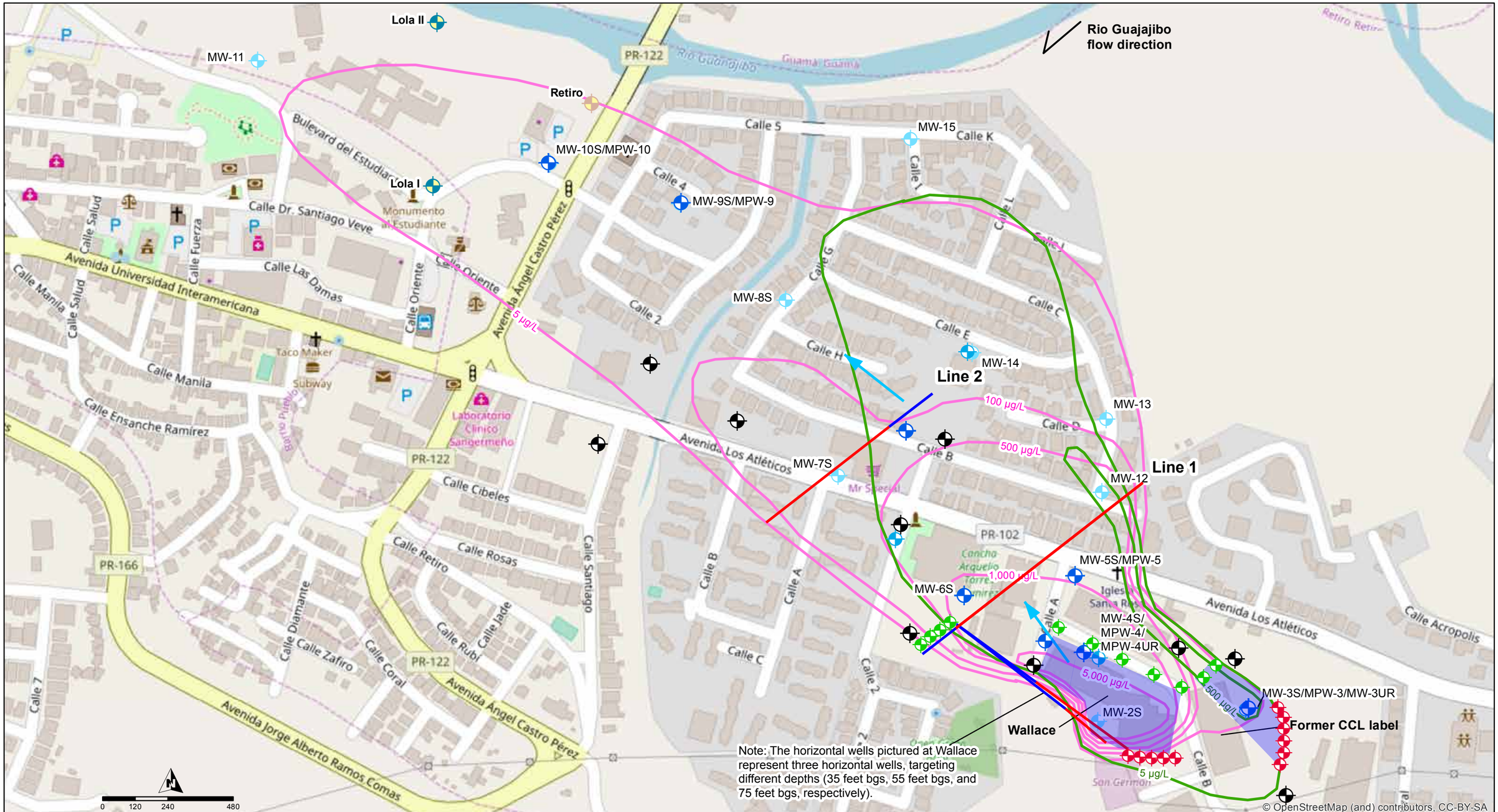
Notes:

1 - Given the elevated PCE detection and elevated TCE detection limit,TCE is expected to be present at MW-2S at concentrations above 5 micrograms per liter (µg/L) and therefore is included in the contour line.

2 - Monitoring well PCE and TCE detections are included on Figures 4-5 and 4-7.

Figure 7
PCE and TCE Saprolite Zone Round 1 Plumes Map
San Germán Groundwater Contamination Site, OU-2
San Germán, Puerto Rico

CDM Smith



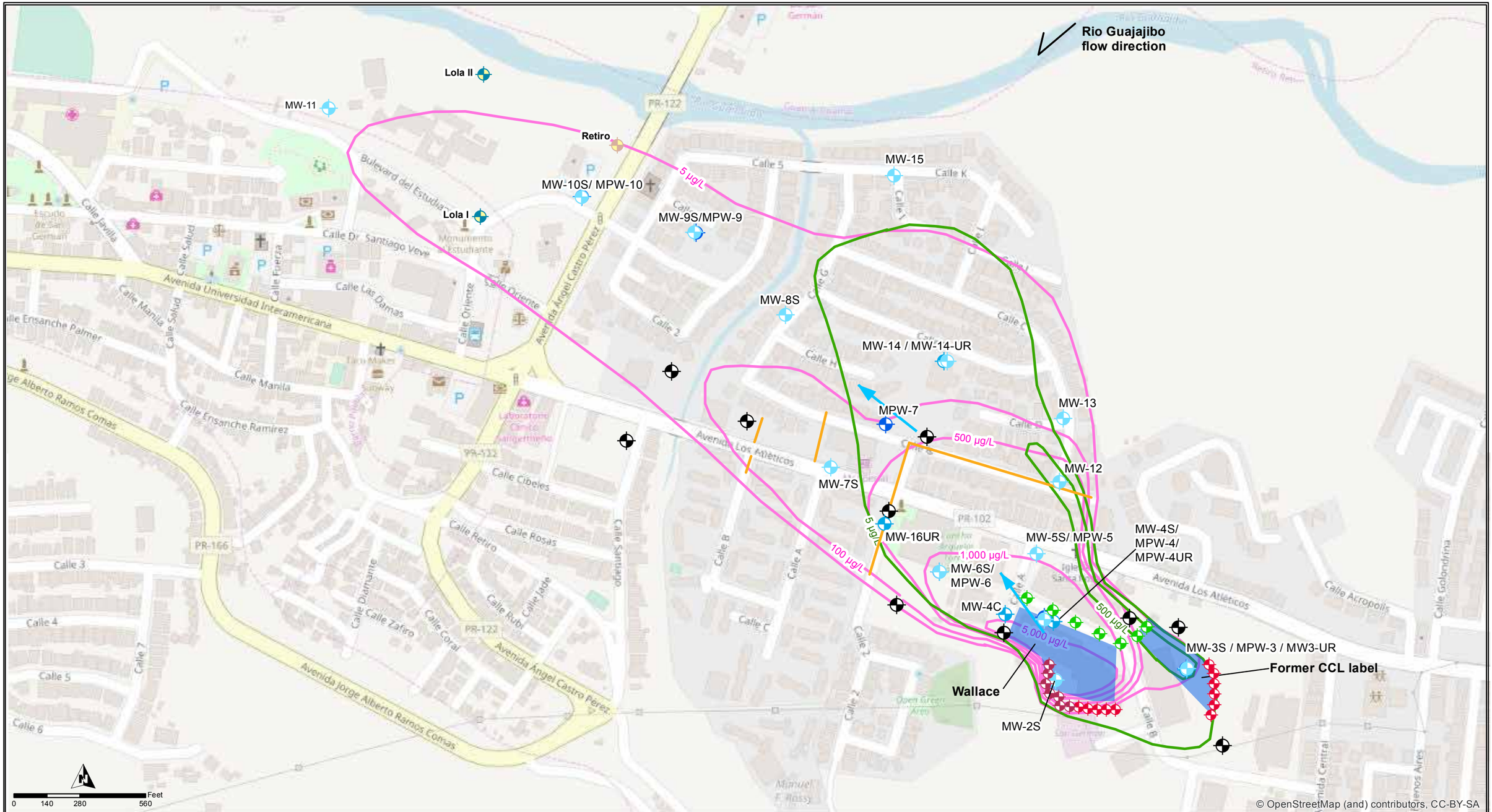
- Former public supply well
- Destroyed former public supply well
- Saprolite monitoring well
- Unstable bedrock monitoring well
- Multiport well
- Proposed new monitoring wells
- Proposed injection wells
- Proposed extraction wells
- Proposed horizontal well
- Groundwater flow direction
- In Situ Treatment Zone
- TCE isocontour in µg/L
- PCE isocontour in µg/L

Note: Each extraction well pictured at Wallace and CCL Label represents two wells; one with a total depth of 45 feet bgs and the other with a total depth of 75 feet bgs.

Acronyms:
PCE - tetrachloroethylene
TCE - trichloroethylene
OU - operable unit
µg/L - microgram per liter
bgs - below ground surface

Figure 8
Alternative 3 - In Situ Treatment with Horizontal Wells
San Germán Groundwater Contamination Site - OU2 Groundwater
San Germán, Puerto Rico

CDM Smith



Destroyed former public supply well
Former public supply well
Saprolite monitoring well
Multiport well
Unstable bedrock monitoring well

TCE isocontour in µg/L
PCE isocontour in µg/L
Proposed new monitoring wells
Proposed injection wells requiring low-profile rigs
Proposed injection wells
Proposed extraction wells

Groundwater flow direction
In Situ Treatment Zone
Vertical Injection Wells Barriers

Note: Each injection well requiring low-profile rigs represents a well cluster of three wells each with different total depths (45 feet bgs, 70 feet bgs, and 95 feet bgs, respectively).

Note: Each extraction well pictured at Wallace and CCL Label represents two wells; one with a total depth of 45 feet bgs and the other with a total depth of 75 feet bgs.

Acronyms:
PCE - tetrachloroethylene
TCE - trichloroethylene
OU - operable unit
µg/L - microgram per liter

Figure 9
Alternative 3 - In Situ Treatment with Vertical Wells
San Germán Groundwater Contamination Site, OU-2
San Germán, Puerto Rico

CDM Smith

APPENDIX IX
TABLES

San German Groundwater Contamination Superfund Site
OU-2

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

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

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	cis-1,2-Dichloroethene	0.22	310	ug/l	30/37	125	ug/l	97.5% KM (Chebyshev) UCL
	Tetrachloroethene	0.29	16000	ug/l	34/37	5071	ug/l	97.5% KM (Chebyshev) UCL
	Trichloroethene	0.32	890	ug/l	32/37	336	ug/l	97.5% KM (Chebyshev) UCL
	Vinyl Chloride	0.012	32	ug/l	16/37	11.6	ug/l	97.5% KM (Chebyshev) UCL

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Chemical of Concern[1]	Concentration Detected (Qualifier)		Concentration Units	Frequency of Detection	Exposure Point Concentration[1] (EPC)	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Surface Water	cis-1,2-Dichloroethene	10	57	ug/l	4/9	24	ug/l	95% KM (t) UCL
	Tetrachloroethene	1.4	25	ug/l	3/9	25	ug/l	Maximum Detected Value
	Trichloroethene	4.6	58	ug/l	4/9	38	ug/l	95% KM (Chebyshev) UCL
	Vinyl chloride	1.1	2.9	ug/l	4/9	1.6	ug/l	95% KM (t) UCL

Footnotes:

(1) The UCLs were calculated using EPA's ProUCL software (Version 5.1.002); for chemicals with at least 5 samples in a dataset and 4 detected values.

Definitions:

EPC = Exposure point concentration
ug/L = Micrograms per liter
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
Future	Groundwater	Groundwater	Sitewide	Worker	Adult	Ingestion Dermal Inhalation	Quant	Groundwater is used as drinking water
				Resident	Adult and Child (birth to 6 years old)	Ingestion Dermal Inhalation	Quant	Resdients use groundwater as drinking water.
Current/Future	Surface Water	Surface Water	Rio Guanajibo	Recreational User	Adolescent (12 to 18 years)	Ingestion Dermal	Quant	Recreational users may come into contact with contaminants in surface water through incidental ingestion and dermal contact while visiting the site.

Definitions:

Quant = Quantitative risk analysis performed

Summary of Selection of Exposure Pathways

This table describes the exposure pathways associated with the varying media (groundwater and surface water) 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)[1]	Adjusted RfD for Dermal[2]	Adj. Dermal RfD Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD Target Organ	Date of RfD Source[3]
cis-1,2-Dichloroethene	Chronic	2.0E-03	mg/kg-day	1	2.0E-03	mg/kg-day	Kidney	3000	IRIS	2/21/2018
Tetrachloroethene	Chronic	6.0E-03	mg/kg-day	1	6.0E-03	mg/kg-day	Nervous System/ Liver/Kidney	1000	IRIS	2/21/2018
Trichloroethene	Chronic	5.0E-04	mg/kg-day	1	5.0E-04	mg/kg-day	Heart/Immune System/ Developmental/Kidney	10 to 1000	IRIS	2/21/2018
Vinyl chloride	Chronic	3.0E-03	mg/kg-day	1	3.0E-03	mg/kg-day	Liver	30	IRIS	2/21/2018

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
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	Chronic	4.0E-02	mg/m^3	NA	NA	CNS/Liver/Kidney	1000	IRIS	2/21/2018
Trichloroethene	Chronic	2.0E-03	mg/m3	NA	NA	Heart/Immune System/Liver	10 to 100	IRIS	2/21/2018
Vinyl chloride	Chronic	1.0E-01	mg/m^3	NA	NA	Liver	30	IRIS	2/21/2018

Footnotes:

(1) Oral absorption Efficiency for Dermal from Regional Screening Levels, November 2017 http://www.epa.gov/region09/waste/sfund/prg/index.html

(2) Adjusted RfD for Dermal = Oral RfD x Oral Absorption Efficiency for Dermal.

(3) Date shown for IRIS is the date IRIS was searched http://www.epa.gov/iris

Date for other sources is the publication date.

Definitions:

CalEPA= California Environmental Protection Agency

IRIS = Integrated Risk Information System, U.S. EPA

PPRTV = Provisional Peer Reviewed Toxicity Values, U.S. EPA

mg/m^3 = Milligrams per cubic meter

mg/kg-day = Milligrams per kilogram per day

NA = Not available

CNS = Central Nervous System

RfC = reference concentration

RfD = reference dose

Table 4
Cancer Toxicity Data Summary

Pathway: Ingestion/ Dermal

Chemical of Concern	Oral Cancer Slope Factor[1]	Units	Adjusted Cancer Slope Factor (for Dermal)	Slope Factor Units	Weight of Evidence/ Cancer Guideline	Source	Date of Slope Factor Source Publication[2]
cis-1,2-Dichloroethene	NA	NA	NA	NA	IDQ	IRIS	2/21/2018
Tetrachloroethene	2.1E-03	$(mg/kg\text{-}day)^{-1}$	2.1E-03	NA	likely to be a carcinogenic	IRIS	2/21/2018
Trichloroethene [3][4]	4.6E-02	$(mg/kg\text{-}day)^{-1}$	4.6E-02	$(mg/kg\text{-}day)^{-1}$	carcinogenic to humans	IRIS	2/21/2018
Vinyl chloride [3][5]	7.2E-01	$(mg/kg\text{-}day)^{-1}$	7.2E-01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	2/21/2018

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer	Source	Date of Slope Factor Source Publication[2]
cis-1,2-Dichloroethene	NA	NA	NA	NA	IDQ	IRIS	2/21/2018
Tetrachloroethene	2.6E-07	$(ug/m^3)^{-1}$	2.6E-07	$(ug/m^3)^{-1}$	likely to be carcinogenic	IRIS	2/21/2018
Trichloroethene [3][6]	4.1E-06	$(ug/m^3)^{-1}$	4.1E-06	$(ug/m^3)^{-1}$	carcinogenic to humans	IRIS	2/21/2018
Vinyl chloride [3][7]	4.4E-06	$(ug/m^3)^{-1}$	4.4E-06	$(ug/m^3)^{-1}$	A	IRIS	2/21/2018

Footnotes:

(1) Oral slope factor (SF) for Dermal = Oral SF

(2) Date shown for IRIS is the IRIS was searched. Http://www.epa.gov/iris

Date shown for other sources is the publiclication date.

(3) Identified as a mutagen on the Regional Screening Level Table, November 2017

(4) TCE is considered carcinogenic by a mutagenic mode of action for induction of kidney tumors.

The adult-based oral SF for kidney cancer is 9.3×10^{-3} per mg/kg/day (IRIS, February 2018)

(5) Oral SF listed is based on continuous lifetime exposure during adulthood. The Oral SF for the

continuous lifetime exposure from birth is 1.5 per mg/kg/day (IRIS, February 2018)

(6) TCE is considered carcinogenic by a mutagenic mode of action for induction of kidney tumors.
The adult-based IUR for kidney cancer is 1×10^{-6} per ug/m3 (IRIS, February 2018)

(7) IUR listed is based on continuous lifetime exposure during adulthood. The IUR for the continuous lifetime exposure from birth is 8.8×10^{-6} per ug/m^3 (IRIS, February 2018)

Definitions:

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

EPA Weight of Evidence (EPA, 1986; EPA 1996):

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

EPA Weight of Evidence Narrative (EPA, 2005):

Carcinogenic to Human
Likely to be carcinogenic to humans
Suggestive evidence of carcinogenic potential
IDQ = inadequate information to assess carcinogenic potential
Not likely to be carcinogenic to humans

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: Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ[2]	Noncarcinogenic Hazard Quotient			
					Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater	cis-1,2-Dichloroethene	Kidney	1.3E+00	NA	NA	1.3E+00
			Tetrachloroethene	Nervous System/Liver/ Kidney/CNS	1.8E+01	NA	NA	1.8E+01
			Trichloroethene	Heart/Immune System/ Development/Kidney/liver	1.4E+01	NA	NA	1.4E+01
			Vinyl Chloride	Liver	8.3E-02	NA	NA	8.3E-02
							Groundwater Hazard Index Total[1] =	**34**
							Receptor Hazard Index[1] =	**34**
							CNS HI=	**18**
							Development HI=	**14**
							Heart HI =	**14**
							Immune System HI =	**14**
							Kidney	**34**
							Liver HI=	**33**
							Nervous System HI=	**18**

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

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ[2]	Noncarcinogenic Hazard Quotient			
					Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater	cis-1,2-Dichloroethene	Kidney	3.1E+00	NA	NA	3.1E+00
			Tetrachlorethene	Nervous System/Liver/ Kidney/CNS	4.2E+01	2.46E+01	7.49E+01	1.42E+02
			Trichloroethene	Heart/Immune System/ Development/Kidney/Liver	3.4E+01	5.67E+00	1.05E+02	1.44E+02
							Groundwater Hazard Index Total[1] =	**289**
							Receptor Hazard Index[1] =	**289**
							CNS HI=	**142**
							Development HI=	**144**
							Heart HI=	**144**
							Immune System HI=	**144**
							Kidney HI=	**288**
							Liver HI=	**286**
							Nervous System HI=	**142**

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

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ[2]	Noncarcinogenic Hazard Quotient			
					Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater	cis-1,2-Dichloroethene	Kidney	1.9E+00	NA	NA	1.9E+00
			Tetrachloroethene	Nervous System/Liver/ Kidney/CNS	2.5E+01	1.5E+01	1.1E+02	1.5E+02
			Trichloroethene	Heart/Immune System/ Development/Kidney/Liver	2.0E+01	3.5E+00	1.5E+02	1.70E+02
							Groundwater Hazard Index Total[1] =	**317**
							Receptor Hazard Index[1] =	**317**
							CNS HI=	**145**
							Development HI=	**170**
							Heart HI=	**170**
							Immune System HI=	**170**
							Kidney HI=	**317**
							Liver HI=	**315**
							Nervous System HI=	**145**

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: Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater	cis-1,2-Dichloroethene	NA	NA	NA	NA
			Tetrachloroethene	8.0E-05	NA	NA	8.E-05
			Trichloroethene	1.0E-04	NA	NA	1.E-04
			Vinyl chloride	6.0E-05	NA	NA	6.E-05
						Groundwater Risk Total[1]=	**3.E-04**
						Total Risk[1]=	**3.E-04**

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

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater	Groundwater	Tetrachloroethene	1.0E-04	8.0E-05	4.0E-04	6.E-04
			Trichloroethene	3.0E-04	5.0E-05	6.0E-04	9.E-04
			Vinyl chloride	5.0E-04	3.0E-05	2.0E-03	2.E-03
						Groundwater Risk Total[1]=	**4.E-03**
						Total Risk[1]=	**4.E-03**

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 12

Cost Estimate for Alternative 3
In Situ Treatment and Long-Term Monitoring
San German Groundwater Contamination Site, Operable Unit 2
San German, Puerto Rico

Item No.	Item Description	Extended Cost
CAPITAL COSTS		
1.	General Conditions (including temporary facilities)	$ 1,925,000
2.	Site Preparation	$ 150,000
3.	Well Installation (assuming 5 horizontal wells)	$ 2,467,000
4.	In Situ Treatment	$ 4,335,000
5.	In Situ Treatment Performance Monitoring	$ 680,000
	Subtotal	$ 9,557,000
	General Contractor Markup (profit - 10%)	$ 955,700
	Subtotal	$ 10,512,700
	General Contractor Bond and Insurance (5%)	$ 525,635
	Subtotal	$ 11,038,335
	Contingency (20%)	$ 2,207,667
	TOTAL CAPITAL COSTS	$ 13,247,000
OPERATION, MAINTENANCE & MONITORING COSTS		
6.	Second Round Amendment Injection (Year 4)	$ 1,900,000
7.	Annual Long-Term Monitoring for Groundwater	$ 207,000
8.	Periodic Sub-Slab and Indoor Air Sampling (Year 1, Year 3, Year 5)	$ 12,000
PRESENT WORTH		
	Total Capital Costs	$ 13,247,000
	Total for O&M and Long-term Monitoring	$ 4,048,000
	TOTAL PRESENT WORTH OF 30 YEAR COSTS	$ 17,295,000

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%.

3. Cost of using 5 horizontal wells is used as the representative remedial action approach. Costs using sonic drilling and vertical wells for this alternative is also presented for comparison purpose. The feasibility of using low profile sonic rig to install wells at the southern area of Wallace requires additional investigation.

Table 13
Chemical-specific ARARs, Criteria, and Guidance
San German Groundwater Contamination Site
San German, Puerto Rico

Regulatory Level	ARAR	Status	Requirement Synopsis	Feasibility Study Consideration
Federal	EPA Regional Screening Level (RSL) (November 2017)	To Be Considered	Establishes risk-based screening levels for the protection of human health.	The RSL will be considered in the development of the PRGs if there are no applicable standards.
Federal	National Primary Drinking Water Standards (40 CFR 141) - MCLs	Relevant and Appropriate	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. Groundwater at the site is currently not used as a source of drinking water.	The standards were used to develop the PRGs to accommodate any future use of site groundwater as a source of drinking water supply.

Acronyms:
ARARs - Applicable or Relevant and Appropriate Requirements CFR • Code of Federal Regulations
PRGs · Preliminary Remediation Goals
MCLs - Maximum Contaminant levels

Table 14
Location-specific ARARs, Criteria, and Guidance
San German Groundwater Contamination Site
San German, Puerto Rico

Regulatory Level	ARARs	Status	Requirement Synopsis	Feasibility Study Consideration
Federal	Statement on Procedures on Floodplain Management and Wetlands Protection (40 CFR 6 Appendix A)	To Be Considered	This Statement of Procedures sets forth Agency policy and guidance for carrying out the provisions of Executive Orders 11988 and 11990.	According to FEMA's flood hazard map for the area, the majority of the plume core is located within an area of minimal flood hazard. The northern edge of the plume core is located within the 500-year flood boundary and the north portion of the plume fringe is located within the 100-year flood boundary. According to the National Wetlands Inventory, there is only one small wetland directly adjacent to Rio Guanajibo, north of the public supply wells, which is not within the site. Alternatives will take into consideration floodplain management.
Federal	National Environmental Policy Act (NEPA) (42 USC 4321; 40 CFR 1500 to 1508)	To Be Considered	This requirement sets forth EPA policy for carrying out the provisions of the Wetlands Executive Order (EO 11990) and Floodplain Executive Order (EO 11988).	The requirement will be considered during the development of alternatives.
Federal	National Historical Preservation Act Regulations (36 CFR Part 800)	To Be Considered	This requirement establishes procedures to provide for preservation of historical and archeological data that might be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program.	The impact of proposed remedy on historical and archeological sensitive areas will be evaluated during the identification, screening, and evaluation of alternatives.

Acronyms:
ARARs - Applicable or Relevant and Appropriate Requirements
CFR - Code of Federal Regulations
OSWER - Office of Solid Waste and Emergency Response

Table 15
Action-specific ARARs, Criteria, and Guidance
San German Groundwater Contamination Site
San German, Puerto Rico

Regulatory level	ARARs	Status	Requirement Synopsis	Feasibility Study Considerat ion
General - Site Remediation				
Federal	OSHA Recording and Reporting Occupational in injuries and illneses (29 CFR 1904)	Applicable	This regulation outlines the record keeping and reporting requirements for an employer under OSHA.	These regulations apply to the companies contracted to implement theremedy. All applicable requirements will be met.
Federal	OSHA Occupational Safety and Health Standards (29 CFR 1910)	Applicable	These regulations specify an 8-hour time-weighted average concentration for worker exposure to various organic compounds. Training requirements for workers at hazardous waste operations are specified in 29 CFR 1910.120.	Proper respiratory equipment will be worn if it is not possible to maintain the work atmosphere below the 8-hour time-weighted average at these specified concentrations.
Federal	OSHA Safety and Health Regulations for Construction (29 CFR 1926)	Applicable	This regulation specifies the type of safety equipment and procedures to be followed during site remediation.	All appropriate safety equipment will be on-site and appropriate procedures will be followed during remediation activities.
Federal	RCRA Identification and listing of Hazardous Wastes (40 CFR 261)	Applicable	This regulation describes methods for identifying hazardous wastes and lists known hazardous wastes.	This regulation is applicable to the identification of hazardous wastes that are generated, treated, stored, or disposed during remedial activities.
Federal	RCRA Standards Applicable to Generators of Hazardous Wastes (40 CFR 262)	Applicable	Describes standards applicable to generators of hazardous wastes.	Standards will be followed if any hazardous wastes are generated on-site.
Federal	RCRA Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities - General Facility Standards (40 CFR 264.10-264.19)	Relevant and Appropriate	This regulation lists general facility requirements including general waste analysis, security measures, inspections, and training requirements.	Facility will be designed, constructed and operated in accordance with this requirement. All workers will be properly trained.
Commonwealth of Puerto Rico	Regulation of the Puerto Rico Environmental Quality Board (PREQB) for the Prevention and Control of Noise Pollution	Applicable	This standard provides the standards and requirements for noise control.	This standard will be applied to any remediation activities performed at the site.
Commonwealth of Puerto Rico	Puerto Rico's Anti-degradation Policy	Applicable	Conserve maintain and protect the designated and existing uses of the waters of Puerto Rico. The water quality necesasry to protect existing uses including threatened and endangered species shall be maintained and protected.	This standard will be applied to any remediation activities performed at the site.
Commonwealth of Puerto Rico	Puerto Rico Water Quality Standards (PRWQS) Regulation, May 2016	Applicable	This regulation is to preserve, maintain and enhance the quality of the waters of Puerto Rico and regulate any discharge of any pollutant to the waters of Puerto Rico by establishing water quality standards. Water quality standards and use classifications are promulgated for the protection of the uses assigned to coastal and estuarine, surface, and ground waters of Puerto Rico.	The PRWQS will be used in the development of the PRGs.

APPENDIX X
COMMONWEALTH OF PR CONCURRENCE

San German Groundwater Contamination Superfund Site
OU-2

GOVERNMENT OF PUERTO RICO
Department of Natural and Environmental Resources

September 27, 2019

VIA EMAIL: bosque.adalberto@epa.gov

Mr. Adalberto Bosque, Remedial Project Manager
US Environmental Protection Agency
Caribbean Environmental Protection Division
City View Plaza II – Suite 7000
#48 Road 165 km 1.2
Guaynabo, PR 00968-8069

Dear Mr. Bosque:

RE: SAN GERMAN GROUNDWATER CONTAMINATION SITE (OU-2)
RECORD OF DECISION (ROD) CONCURRENCE LETTER

The Department of Natural and Environmental Resources (DNER, former PREQB) has completed its review of the aforementioned document. This ROD includes the preferred remedial alternative presented in the USEPA Proposed Plan (PP) to address groundwater contamination at the San Germán Groundwater Contamination Site. The preferred remedy includes In Situ Treatment (Enhance Anaerobic Bioremediation and Installation of two treatment barriers) and MNA (Monitor Natural Attenuation), alternative #3.

All DNER's comments and concerns were addressed through several meetings and conference calls with USEPA and CDM Smith (USEPA contractor) representatives. Therefore, DNER concurs with the ROD issued by the USEPA. Although DNER has reviewed the complete document, this letter is intended solely to grant its concurrence to the USEPA preferred remedy included in the ROD.

If you have any questions, please feel free to contact Mr. Pascual E. Velázquez, Remedial Project Manager assigned to this case at 787-761-8181, extension 2401 or 2431, or by email at pascualvelazquez@jca.pr.gov or melvinmenendez@jca.pr.gov.

Cordially,

Melvin Menéndez Figueroa, Manager
Superfund Program and
Environmental Emergencies Response Area

PEV P.V.