RECORD OF DECISION

CABO ROJO CONTAMINATION SUPERFUND SITE

CABO ROJO, PUERTO RICO

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 2

May 2019

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Cabo Rojo Groundwater Contamination Superfund Site
Cabo Rojo, Puerto Rico
PRN000206319

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) documents the selected remedy for the Cabo Rojo Groundwater Contamination Superfund Site, located in the Municipality of Cabo Rojo, Puerto Rico, which was chosen 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 the Site. This decision is based on the Administrative Record file for the selection of this remedy. Refer to Appendix III of the Decision Summary for a copy of the Administrative Record Index for the selection of this remedy.

The Puerto Rico Environmental Quality Board (PREQB) concurs with the selected remedy. Refer to Appendix VI of the Decision Summary for a copy of the concurrence letter.

ASSESSMENT OF SITE

The United States Environmental Protection Agency (EPA), in consultation with PREQB, has determined that actual or threatened releases of hazardous substances at the Site, if not addressed, may present a current or potential threat to human health and the environment. Therefore, remediation is necessary. This determination is based on the conclusions set forth in the remedial investigation, the human health risk assessment, and the screening level ecological risk assessment.

DESCRIPTION OF THE SELECTED REMEDY

EPA, in consultation with PREQB, selects the remedy summarized in this document to address soil, vapor and groundwater contamination detected at the Site. The selected remedy, Alternative 2 (Soil Vapor Extraction (SVE)/Dual Phase Extraction (DPE), Monitored Natural Attenuation (MNA) of Groundwater, a Contingency of In-Situ Groundwater Treatment, and Institutional Controls), includes the following major components:

- SVE/DPE to the target soil remediation zones and underlying groundwater at the Cabo Rojo Professional Dry Cleaners (CRPDC) and Extasy Q Prints (EQP) source areas;
- Installation of vapor monitoring points to assess removal of vapor-phase contamination;
- MNA and long-term monitoring of Plume 2 and the portion of plume 1 outside of the source area;
- Institutional controls; and
- A contingency remedy of in-situ treatment of groundwater in Plume 1 (Alternative 3) if certain conditions are met (e.g., detection of NAPL, contaminant concentration increases in

key monitoring wells, detections in sentinel wells, detections in supply wells).

SVE/DPE Installation, Operation, and Maintenance at Source Areas - At CRPDC property, DPE wells will be installed to address the vadose zone within the target soil remediation zone to be defined based on PDI results. Groundwater extraction will be a component of DPE to remove groundwater contamination at shallow depths also within the target soil remediation zone. At the EQP property, SVE wells and groundwater extraction wells will be installed separately to address the vadose zone and the shallow groundwater contamination since the groundwater aquifer is a confined unit. Vapor monitoring points will be installed to track the progress of removing vapor-phase contamination. The existing building slab and pavements will be inspected, improved, and sealed if necessary and will serve as a cap for the DPE and SVE systems. The SVE/DPE remedy will also serve to mitigate potential vapor intrusion into the buildings at the CRPDC and EQP properties. Construction is estimated at 2 to 5 years, and operation and maintenance (O&M) of the SVE/DPE system is estimated to take approximately 5 years. The long-term groundwater monitoring period is assumed to be 30 years.

SVE/DPE Performance Evaluation at Source Areas – The effectiveness of SVE and/or DPE in the vadose zone soil will be evaluated by collecting soil gas samples. An evaluation will be conducted prior to shut down of the system when VOC concentrations in extracted vapor are reduced to an asymptotic level such that continued operation of the system is no longer effective or in-situ concentrations meet the soil remediation (RGs).

The effectiveness of SVE and/or DPE in minimizing soil contamination from serving as sources to groundwater contamination and soil vapor contamination will be evaluated in conjunction with groundwater and sub-slab vapor sample results. Plume 2 and the portion of Plume 1 outside the target remediation zone will be managed through the implementation of MNA and long-term monitoring. The RGs for soil and groundwater, along with the vapor intrusion screening levels will be used to determine the effectiveness of the SVE/DPE.

Sub-Slab and Indoor Air Monitoring - Sub-slab and indoor air samples at the CRPDC and EQP properties would be collected periodically to monitor the potential or presence of vapor intrusion. Results of vapor samples would be compared to the sub-slab and indoor air vapor intrusions Screening Levels (VISLs). Monitoring will help inform the progress and effectiveness of the active source remedy (SVE or DPE) and will be conducted until the vadose zone source areas are remediated to levels that eliminate the need to mitigate vapor intrusion at the point of exposure. Post-treatment vapor monitoring will be conducted to confirm the sources have been remediated and no longer contribute to vapor intrusion.

Potential contributions of contaminants of concern (COCs) from sources inside the buildings at the CCRPDC and EQP properties will be considered during the vapor intrusion monitoring, especially at the EQP facility where active business operations (printing) may utilize products containing VOCs.

Triggers for In-Situ Groundwater Treatment for Plume 1 - Additional groundwater treatment beyond that which will occur as part of DPE is not expected to be required. However, this remedy also includes in-situ groundwater remediation as a contingency remedy, as described in Alternative 3. As additional data from the PDI and groundwater monitoring become available, especially in the vicinities of the two source areas, considerations and/or conditions that may indicate the need to trigger the contingency remedy include the following:

- Detection of NAPL in the vadose zone soil or PCE/TCE concentrations indicative of NAPL (e.g., 1% solubility) at the water table, indicating a continuing source of groundwater contamination;
- Significant increase of contaminant concentrations in MW-15 and/or MW-3R/MW-3RS to greater than one order of magnitude above the any RG and/or an increasing trend of contaminant concentration in plume wells, such as Ana Maria, MW-2, and MW-1;
- Detections of PCE and/or TCE in sentinel wells, such as MW-16, USGS-OW-1 (for PCE or TCE), and PRASA-1; and
- Consistent detections of PCE and/or TCE in the supply wells.

Institutional Controls - While groundwater contamination is still present, institutional controls will be implemented to help control and limit exposure to hazardous substances in the groundwater at the Site. The types of institutional controls which will be relied upon for the groundwater at the Site are: 1) existing local laws that limit installation of drinking water wells without a permit; 2) informational devices will be used to prevent well installation and prohibit occupancy, use, or new construction in the source areas unless appropriate vapor-intrusion investigations are conducted and/or mitigation measures (including periodic monitoring, as necessary) are implemented; and 3) advisories published in newspapers, periodic letters sent to local government authorities informing them of the need to prevent well installation, and inspection of local and/or Commonwealth health department records to insure that no wells are installed that could impact the groundwater plume or result in exposure to contaminated groundwater.

Green Remediation - The environmental benefits of the selected remedy may be enhanced by employing design technologies and practices that are sustainable in accordance with the EPA Region 2's Clean and Green Energy Policy.[1]

DECLARATION OF STATUTORY DETERMINATIONS

Statutory Requirements

The selected remedy meets the requirements for remedial actions set forth in Section 121 of CERCLA, 42 U.S.C. § 9621, because it meets the following requirements: 1) it is protective of human health and the environment; 2) it meets a level of standard of control of the hazardous substances, pollutants, and contaminants which at least attains the legally applicable or relevant and appropriate requirements under the federal and commonwealth laws unless a statutory waiver is justified; 3) it is cost-effective; and 4) it utilizes permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable.

In addition, Section 121 of CERCLA, 42 U.S.C. § 9621, includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances as a principal element. The selected remedy satisfies the preference for treatment, as it will result in the treatment of contaminated soil, vapors, and groundwater.

Five-Year Review Requirements

This remedy will not result in hazardous substances, pollutants, or contaminants remaining at the Cabo Rojo Groundwater Contamination Superfund Site above levels that would allow for unlimited use and unrestricted exposure. However, because it may take more than five years to attain the remediation goals, pursuant to Section 121(c) of CERCLA, 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,

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

protective of human health and environment.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record file 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 (O&M), 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 NCP criteria, highlighting those criteria which are key to the decisions) may be found in the "Evaluation of Remedial Alternatives" and "Statutory Determinations" sections.

AUTHORIZING SIGNATURE

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

5/9/19
Date

DECISION SUMMARY

CABO ROJO GROUNDWATER CONTAMINATION SITE
CABO ROJO, PUERTO RICO

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 2

May 2019

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SITE NAME, LOCATION, AND DESCRIPTION

The Cabo Rojo Groundwater Contamination Superfund Site (the Site) is located in the Bajura ward in the municipality of Cabo Rojo in southwestern Puerto Rico and includes three source areas with two separate groundwater plumes. The first source area is in and around the Cabo Rojo Professional Dry Cleaners (CRPDC) located in the northern area of Cabo Rojo. CRPDC is no longer operating. Located approximately 700 feet northeast of CRPDC is another source area, Extasy Q Prints (EQP), which is an active print shop (Figure 1, Appendix I). Approximately 0.7 miles southwest of both CRPDC and EQP is the third source area, Puerto Rico Industrial Development Company (PRIDCO) East, a complex of 10 separate, mostly vacant buildings with a long history of industrial and commercial operations.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

Routine groundwater sampling from the Cabo Rojo Urbano public water supply system, north of the source areas, from 2002 through 2011 revealed chlorinated volatile organic compounds (VOCs), tetrachloroethene (PCE) and trichloroethene (TCE), in several of the wells below federal maximum contaminant levels (MCLs). This sparked preliminary investigations by the U.S. Environmental Protection Agency (EPA) at potential source areas (PSAs) throughout Cabo Rojo from 2006 to 2012. Soil, groundwater, and soil vapor sampling at several facilities revealed detections of chlorinated VOCs above MCLs. Based on the data collected, a hazard ranking system package was prepared and the Site was added to the National Priorities List (NPL) on March 10, 2011.

Enforcement

EPA's search for potentially responsible parties (PRPs) is ongoing. EPA has issued notice letters to EQP and PRIDCO identifying them as PRPs for the Site under Section 107 of CERCLA, 42 U.S.C. § 9607.

EPA REMEDIAL INVESTIGATION/FEASIBILITY STUDY

In October 2013, EPA commenced a fund-lead Remedial Investigation (RI) at the Site. The overall purpose of the RI was to evaluate the nature and extent of the groundwater, soil, surface water, and sediment contamination at the Site. This was assessed during the RI by collecting and analyzing surface and subsurface soil, soil gas, surface water, sediments, and groundwater samples, and then comparing analytical results to federal, commonwealth, and Site-specific screening criteria. Screening criteria are values used in the RI to conservatively screen potential areas of contamination.

An RI Report was prepared by EPA to document the nature and extent of the contamination at the Site. As part of the RI, EPA also prepared a Baseline Human Health Risk Assessment (HHRA) Report to document the current and future effects of Site contaminants on human health 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 description of the HHRA and SLERA for this Site is provided in the Summary of Risk Section of this Record of Decision (ROD).

A Feasibility Study (FS) was prepared to present and analyze cleanup alternatives suitable for the Site. The purpose of the FS was to identify, develop, screen, and evaluate a range of remedial alternatives that protect human health and the environment from potential risks and enable EPA to select a remedy for the Site. A description of the cleanup alternatives evaluated for this Site 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 a Proposed Plan for the clean-up of the Site. A Proposed Plan summarizes the remedial alternatives considered in the FS and identifies EPA's preferred alternative and the rationale for the preferred remedy. On August 2, 2018, EPA made the Proposed Plan, the RI Report, the HHRA and SLERA Reports, and the FS Report for the Site available to the public. All of these documents, along with others, are included in the Administrative Record for the selection of this remedy, which has been made available to the public at the following locations: EPA's Docket Room in New York, New York; the Blanca E. Colberg Public Library, Cabo Rojo, Puerto Rico; the Puerto Rico Environmental Quality Board (PREQB) 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 Site remedy is provided in Appendix III of this ROD.

Notices of the availability (Appendix IV) of the Proposed Plan (Appendix V) and supporting documentation was published in the "Primera Hora" newspaper on August 2, 2018 and September 12, 2018. A public comment period was held from August 2, 2018 through October 5, 2018. In addition, a public meeting was held on August 9, 2018, at the Blanca E. Colberg Public Library Conference Auditorium, Cabo Rojo, Puerto Rico. 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 give comments on the proposed remedial alternatives described in the Proposed Plan and EPA's preferred alternative. At this meeting, representatives from EPA and PREQB were present to answer questions and receive comments about the remedial alternatives for the Site and the proposed clean-up plan for the Site. A copy of the attendance sheet for this meeting can be found in Appendix VII of this ROD. Appendix VIII of this ROD contains the official transcript 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 IX), which is part of this ROD.

SCOPE AND ROLE OF RESPONSE ACTION

EPA is addressing the cleanup of this Site by implementing a comprehensive remedial action to address the soil, vapor, and groundwater contamination at the Site.

SITE CHARACTERISTICS

CONTAMINATION OVERVIEW

The RI identified PCE, TCE, cis-1,2-dichloroethene (cis-1,2-DCE), vinyl chloride, and 1,1-dichloroethene (1,1-DCE) as Site-related chemicals. The fate of a chemical in the environment is a function of its physical and chemical properties and conditions at the Site. The potential for environmental transport is a function of the conditions at a site, including geological and hydrogeological characteristics. The primary fate and transport aspects of the Site are summarized below.

- Elevated concentrations of PCE were found at CRPDC and EQP in soils, likely from PCE releases to the ground as raw or waste product. The elevated concentration of cis-1,2-DCE at EQP is potentially a result of degradation of PCE or TCE. These contaminants in the vadose zone migrated through leaching into groundwater, volatilization, and degradation.
- PCE and TCE in soil and groundwater migrate via volatilization as vapor, as confirmed by the sub-slab results at the CRPDC and EQP buildings.
- Dissolved chlorinated VOCs in Plume 1 (PCE, TCE, cis-1,2-DCE, and vinyl chloride) and Plume 2 (1,1-DCE) migrate in groundwater primarily by advection (groundwater movement/flow), dispersion, diffusion, dilution, retardation (primarily via adsorption), volatilization, and degradation.
- Dilution and dispersion are significant attenuation processes in the alluvium, saprolite, and highly fractured bedrock.

TOPOGRAPHY AND DRAINAGE

The Site is within the Río Guanajibo alluvial valley. Surface drainage from the Site may either flow north-northeast into the Ciénaga de Cuevas swamp and eventually to the Río Guanajibo (located approximately 2 miles northeast of the Site) or recharge the bedrock aquifer.

GEOLOGY AND HYDROGEOLOGY

The soil at the Site generally consists of an unconsolidated overburden unit consisting of silty clay underlain by a saprolite zone composed of hard sandy to silty clay with angular rock fragments transitioning to a sand/gravel matrix with cobble sized rock fragments. Below the saprolite is the Sabana Grande formation, which consists of a shallow highly fractured, transmissive bedrock zone underlain by a low-transmissivity bedrock zone. A localized zone of alluvium replaces the shallow overburden unit around the CRPDC source area (dark brown clay, fine and medium sand, and brown silt and sand).

Within the unconsolidated zone (alluvium, overburden, and saprolite), the alluvium, where present, provides a preferential flow path for groundwater contamination to move from the unconsolidated deposits into the underlying bedrock. Little groundwater was encountered in the overburden silty clay unit, which, where present, acts as a semi-confining unit overlying the saprolite. The saprolite is a significant water-bearing unit that stores water and provides recharge to the underlying bedrock aquifer. The lateral direction of groundwater flow in the overburden is predominantly to the north in the Plume 1 area and to the north-northeast in the Plume 2 area.

Groundwater in the bedrock unit is confined, or semi-confined, based on observations during drilling and subsequent water level observations. Overall, the fractured bedrock is very transmissive with a higher hydraulic conductivity compared to the saprolite and alluvium, especially in the shallow bedrock. Site-wide groundwater flow in bedrock is to the north and in Plume 1 it was previously influenced by pumping in the former Ana Maria public supply well. In the northern portion of the Site, the flow is directed to the northeast due to a combination of natural groundwater discharge toward the Bajura area and the long-term pumping influence of active public supply wells farther downgradient (Figure 2). There is an upward vertical gradient from the deepest monitoring zones in the deep bedrock toward the higher transmissivity shallow zone. The vertical gradient is larger in the northern Site area, than in the southern Site area because it is closer to natural groundwater discharge in the Bajura area, and the water supply wells are completed in the limestone.

CULTURAL RESOURCES

In August 2013, a Stage 1A level Cultural Resources Survey was completed by Richard Grubb & Associates, Inc. under subcontract to CDM Smith (Appendix F of the RI [CDM Smith 2018c]). The Stage 1A survey included a comprehensive documentary research and Site visit designed to identify known or potential historical, architectural, and/or archeological resources within the area of potential effects (APE), a 450-acre area including all the locations investigated during the RI. Portions of the APE possess high and moderate sensitivity for archaeological resources. Six previously documented archaeological sites were reported within or adjacent to portions of the APE. These sites and zones of sensitivity for archaeological resources have been delineated based on cartographic evidence and field reconnaissance. Within the southwestern, northeastern, and central portions of the APE, zones of high and moderate sensitivity for archaeological resources have been delineated. Other portions of the APE possess extensive evidence of disturbance associated with previous earthmoving activities and are assessed as having low sensitivity for the survival of intact archaeological resources. Parking lots and yard areas within the low sensitivity zone, however, may possess potential for deep archaeological features, such as wells or privies associated with historic structures.

If proposed subsurface disturbance for remediation is planned within zones of high or moderate archaeological sensitivity, a Stage 1B archaeological survey is recommended within those areas of direct impact. If proposed subsurface disturbance will occur in registered archeological sites or in the downtown urban area, a close consideration of the location of proposed impacts is also recommended to determine whether small paved or open areas may possess potential for associated archaeological deposits or deep archaeological features. A close examination of the proposed impacts along the Quebrada Mendoza and other waterways in the APE is recommended to identify whether impacts will occur within deeply buried alluvial deposits possessing archaeological potential. Due to the low likelihood of the survival of intact archaeological and the fact that there will be little subsurface disturbance in the remediation areas, no additional archaeological survey is recommended for any planned remediation within this zone of the APE.

SOURCES OF CONTAMINATION

Two groundwater contamination plumes were identified at the Site: one plume in the northern area of Cabo Rojo (Plume 1) near CRPDC and EQP, and one plume in the southern area of Cabo Rojo (Plume 2) downgradient of PRIDCO East (Figure 3).

<u>Plume 1 Sources</u>

- CRPDC – This property used PCE in its dry-cleaning operations and produced PCE sludge as a waste product. PCE concentrations in soil ranged from 22J to 3,700 µg/kg. Elevated PCE concentrations in soil are consistent with areas formerly used to store PCE wastes and unused PCE. Although the CRPDC facility is no longer operating, vapor samples exhibited PCE and TCE at CRPDC, indicating these contaminants remain in soil in the vadose zone and provide a continuing source of contaminants to the groundwater and indoor air through migration as subsurface vapor.

- EQP – This property used solvent-based cleaning fluids containing PCE to clean screens used in the printing process. PCE and cis-1,2-DCE concentrations in soil samples exceeded their respective soil screening criteria. Vapor samples also exhibited PCE, TCE, and cis-1,2-DCE. Although the contaminant concentrations in soil at EQP are generally lower than those at CRPDC, PCE, TCE, and cis-1,2-DCE in soils at EQP provide a continuing source of contaminants to the groundwater and indoor air through migration as subsurface vapor.

<u>Plume 2 Sources</u>

PRIDCO East – Previous site uses include businesses that may have used 1,1-DCE and other VOCs during their operations. Soil vapor sampling in 2011 revealed detections of DCE in the northern portion of the property.

In 2013, soil sampling revealed detections of DCE in the northern portion of the property as well. Additionally, in May 2013, 1,1-DCE was found in groundwater screening samples, but at concentrations below the standard of 7 ug/L (max concentration was 2.6 ug/L). The presence of 1,1-DCE in soil, groundwater, and vapor suggests that a historic source of 1,1-DCE was present at the property.

Based on previous property uses and soil vapor concentrations, PRIDCO East is considered to be a source of the 1,1-DCE groundwater plume seen in MPW-9R and MW-19R located downgradient of PRIDCO East. 1,1-DCE was not detected in the shallow or deep background wells upgradient of PRIDCO East.

SUMMARY OF SOIL CONTAMINATION

Soil delineation samples were collected from five PSAs for laboratory analysis and validation. The soil analytical results revealed elevated concentrations of PCE and cis-1,2-DCE at EQP and PCE at CRPDC (Figures 4 and 5). The other three PSAs (D'Elegant Fantastic Dry Cleaners, Serrano II Dry Cleaners, PRIDCO East) exhibited either low detections or no detections of VOCs in the soil delineation samples. The soil analytical results and known prior uses established EQP and CRPDC as source areas.

As discussed above, additional RI soil and groundwater sampling was conducted in 2017 at PRIDCO East. These and prior results helped identify PRIDCO East as a source area.

SUMMARY OF GROUNDWATER CONTAMINATION

Two distinct areas of groundwater contamination have been identified. Plume 1, the groundwater plume to the north, encompasses the CRPDC and EQP source areas and the Ana Maria former supply well. At CRPDC, PCE, TCE, cis-1,2-DCE, and vinyl chloride are present in the shallow alluvium (MW-4) and in the upper bedrock aquifer (MW-4R), where the alluvium well is situated about 30 ft. above the bedrock well screen. Both wells are hydraulically upgradient of the Ana Maria well. The highest concentrations of PCE (530 ug/L), TCE (140 ug/L), cis-1,2-DCE (410 ug/L), and vinyl chloride (65 ug/L) occurred in an alluvial well (MW-4) at CRPDC during Round 1 (February 2014). Data collected in May 2017 (Round

2) showed an order of magnitude decrease of PCE (27 ug/L), TCE (10 ug/l), cis-1,2-DCE (44 ug/L), and vinyl chloride (1.2 ug/L) in this alluvial well. While VOC concentrations were lower in Round 2, they remain above screening criteria, with the exception of cis-1,2-DCE. The EQP facility is also a source area contributing to Plume 1. PCE, TCE, and cis-1,2-DCE were detected in soil and groundwater at EQP at lower concentrations than at CRPDC. VOCs in the unconsolidated zone of Plume 1 extend to the Ana Maria well area, but do not extend into the Bajura area. Historical pumping at the Ana Maria well likely drew contaminated groundwater from EQP and CRPDC toward the well. The Ana Maria well has been sampled by PRASA and EPA since 2002. From 2002 to 2017, PCE and TCE concentrations detected in the Ana Maria well range from non-detect to a maximum PCE concentration of 4.0 ug/L in 2002, below the EPA MCL of 5 ug/L.

In general, Plume 1 is primarily in the alluvium, the lower portion of the overburden/saprolite zone, and the upper portion of the bedrock zone. Concentrations of Site-related contaminants generally decreased in samples taken from the CRPDC wells during Round 1 to Round 2, due to a combination of natural attenuation and lack of ongoing releases from CRPDC. The one exception is Pozo Escuela, a former supply well for a school converted to a multi-port bedrock monitoring well, which showed a slight increase of PCE from Round 1 (1.3 ug/L) to Round 2 (5.1 ug/L) A third round of post-Maria hurricane data were collected in 2018 and concentrations were relatively consistent with some slight increases, most notably in MW-4. This suggests that large storm events most likely lead to the release of residual contamination into groundwater due to the continued presence of the source in the vadose zone and shallow groundwater at CRPDC and EQP.

Plume 2, the groundwater plume in the south, consists of a 1,1-DCE plume near PRIDCO East. A series of 3 shallow groundwater transects were collected (a total of 19 locations) across the PRIDCO East property. These samples were collected in the saprolite zone and exhibited concentrations of 1,4-dioxane and 1,1-DCE at concentrations up to 12 ug/L and 1.3 ug/L, respectively; these concentrations are below their respective cleanup criteria. The presence of these constituents in the saprolite groundwater at the PRIDCO East property suggests a historical source of groundwater contamination that can be linked to downgradient bedrock detections of 1,4-dioxane and 1,1-DCE through fractures in bedrock, allowing contamination to migrate through preferential pathways. The contaminants were detected in bedrock wells downgradient of PRIDCO East at concentrations up to 58 ug/L for 1,1-DCE (MW-18R, Round 1) and up to 9.3 ug/L for 1,4-dioxane (MPW-9R, Round 2). However, 1,4-dioxane concentrations observed at the Site did not yield any risk or hazard above EPA's thresholds for protection of human health or the environment. Therefore, Plume 2 is regarded mainly as a 1,1-DCE plume. Round 2 data show an overall decrease in 1,1-DCE concentrations. 1,1-DCE was non-detect in MW-18R and a reduction of 1,1-DCE between Rounds 1 and 2 was observed in MPW-9R for all four bedrock ports. The maximum concentration of 1,1-DCE during Round 2 was found in the new bedrock monitoring well, MW-19R. This well had a concentration of 34 ug/L (Figure 3). The third round of data collected after Hurricane Maria in Plume 2 monitoring wells was generally consistent with Round 2 data.

SUMMARY OF SURFACE WATER/SEDIMENT CONTAMINATION

No Site related contaminants were detected in surface water or sediment samples collected from drainage features near the PSAs.

SUMMARY OF VAPOR INTRUSION ANALYTICAL RESULTS

Sub-slab and indoor air samples were collected at 29 structures potentially impacted by vapors from soil and/or groundwater contamination. Results were compared to EPA residential and commercial vapor intrusion screening levels (VISLs) for indoor air and sub-slab vapor. Sub-slab vapor results revealed the highest concentrations of Site-related compounds, primarily PCE and TCE, at CRPDC and EQP. Indoor air samples had fewer occurrences of these compounds and at much lower concentrations. At CRPDC, there were two detections of PCE in indoor air, but neither sample exceeded either the residential or commercial VISLs. Nevertheless, the detections of PCE in both sub-slab and indoor air illustrate completed vapor intrusion pathways. At EQP, contaminants detected in sub-slab (exceeding both residential and commercial VISLs) were also detected in indoor air at concentrations exceeding the indoor air residential VISLs (but not the commercial VISLs). This also demonstrates completed vapor intrusion pathways at EQP. Other properties with high concentrations of Site-related contaminants in sub-slab vapors did not have correspondingly high indoor air concentrations (indicating incomplete vapor intrusion pathways). Other properties with high concentrations of Site-related contaminants in indoor air did not have correspondingly high sub-slab vapor concentrations (indicating potential indoor background source contamination interference). See Table 1 and 2, Appendix II.

CONCEPTUAL SITE MODEL

The Conceptual Site Model (CSM) is developed to integrate all the different types of information collected during the RI, including the physical setting, the nature and extent of contamination, and the contaminant fate and transport.

<u>Plume 1 Conceptual Site Model</u>

Two source areas that used PCE in their operations, CRPDC and EQP, overlie Plume 1. At both CRPDC and EQP, raw material and waste containing PCE was discharged to the ground. Contamination entered the subsurface dissolved in discharged waste and/or dissolved in rainwater. Once in the subsurface, contamination would be in either a vapor phase (as indicated by the sub-slab vapor sampling results), sorbed to soil (as suggested by the high soil distribution coefficient for PCE in the alluvium and overburden), or in a dissolved phase, moving from the vadose zone into the saturated zone (as indicated by the presence of groundwater contamination).

While groundwater concentrations in Plume 1 were no more than one order of magnitude above criteria (*i.e.*, relatively low), the presence of contaminant mass in both the vadose zone and groundwater indicates that CRPDC and EQP are continuing sources of groundwater contamination.

Once in the aquifer, contaminant migration is currently driven primarily by advection. In the past, pumping in the Ana Maria public supply well (now closed) likely enhanced the migration of contaminated groundwater from the EQP and CRPDC source areas toward the Ana Maria well. Without pumping, there is still a component of groundwater flow from the vicinity of wells at EQP toward the Ana Maria well (northwesterly). Natural groundwater flow at the CRPDC source area is still toward the Ana Maria well (northerly).

Contaminant migration varies in different hydrostratigraphic units. Migration in the overburden is expected to be slow. Migration is expected to increase as contaminants migrate downward from the overburden into the more permeable underlying units under the influence of rainwater infiltration and local downward groundwater gradients. Migration in the alluvium is likely faster than in the overburden and may be acting as a localized preferential pathway near MW-4/4R and MW-15. In the saprolite and highly fractured bedrock, dilution and dispersion are expected to actively reduce concentrations as groundwater moves downgradient. However, the continuing discharge of mass from the shallow silty clay into these zones likely replenishes at least a portion of the mass in these units, sustaining concentrations above criteria. It should be noted that concentrations in the saturated alluvium (MW-4) decreased by an order of magnitude between Round 1 and Round 2, likely due to a combination of natural attenuation mechanisms and ceased operations at CRPDC. Concentrations in the Ana Maria well have been below screening criteria for the past 15 years and fluctuate between non-detect and trace concentrations of chlorinated VOCs in recent RI sampling rounds. Contaminant concentrations also increased in well MW-4 at CRPDC in the Post-Maria sampling event, indicating that while the plume is not significantly impacting the Ana Maria well, the residual source area (*i.e.* CRPDC) continues to feed the groundwater contamination.

Plume 2 Conceptual Site Model

The Plume 2 source area is the PRIDCO East property. Previous property uses include businesses that may have used 1,1-DCE and other VOCs in their operations, suggesting a source was present at the property in the past. Soil vapor sampling in 2011 and soil screening sampling in 2013 revealed detections of DCE in the northern portion of the property. The presence of 1,1-DCE in soil, groundwater screening samples, and soil vapor is evidence of a past source at the property. Similarly, 1,4-dioxane likely also migrated to groundwater from PRIDCO East operations; however, the concentrations observed were not determined to yield significant risks. Therefore, Plume 2 is discussed only in terms of 1,1-DCE.

Waste material containing 1,1-DCE from operations at PRIDCO East likely was discharged to the ground in the past. Contamination entered the subsurface dissolved in discharged waste and/or dissolved in rainwater. Once in the subsurface, contamination would have entered a vapor phase, sorbed to soil, or entered the dissolved phase. Once in the saprolite, highly fractured bedrock, and bedrock fractures, contaminant migration is driven primarily by advection in groundwater within the highly transmissive upper bedrock and underlying deep bedrock zones.

In the saprolite and highly fractured bedrock, dilution and dispersion are expected to actively reduce concentrations moving downgradient. The highest concentrations in Plume 2 were found in the fractures in the deeper competent bedrock. Ambient groundwater flow is relatively slow in these fractures; hence, contamination is expected to migrate more slowly with less dilution and dispersion compared to shallow bedrock. Limited evidence was found for sustained destructive natural attenuation of 1,1-DCE in Plume 2. Trace detections of vinyl chloride in MPW-9R, MW-18R, and MW-19R in Round 2 suggest possible localized reductive dechlorination of 1,1-DCE under methanogenic conditions (biological degradation under reducing conditions). Concentration reductions in Plume 2, however, are still more likely dominated by dilution and dispersion.

Evaluation of Natural Attenuation

"Natural attenuation" refers to naturally occurring attenuation processes that may already be present in an aquifer to decrease contaminant concentrations. It can be considered as a remedial component if it can be expected to achieve Site-specific remediation goals within a reasonable time frame when compared to other remedial measures. Natural attenuation processes that reduce chlorinated-VOC contaminant concentrations in groundwater include destructive (*e.g*., biodegradation, abiotic degradation, and chemical reactions with other subsurface constituents) and nondestructive mechanisms (*e.g*., volatilization, dissolution, dilution/dispersion, and adsorption/desorption).

Biodegradation is frequently a significant destructive attenuation mechanism. Chlorinated solvents, such as PCE and TCE, attenuate predominantly by reductive dechlorination under anaerobic conditions.

During the RI investigation, MNA indicator parameters of biotic and abiotic degradation were collected from monitoring wells to evaluate whether subsurface conditions are conducive to *in-situ* natural degradation of chlorinated VOCs. MNA parameters included the following:

> Field parameters: pH, specific conductivity, dissolved oxygen (DO), temperature, ferrous iron and Oxidation reduction potential (ORP) as Eh Laboratory analysis: nitrate/nitrite, sulfate, sulfide, alkalinity, chloride, total organic content (TOC), methane, ethane, ethene, acetylene, and propane.

The MNA data were collected for Rounds 1 and 2 and used to evaluate which MNA mechanisms are occurring in Plumes 1 and 2. Plume 1 was found to show some evidence that natural attenuation has been occurring. While there is limited evidence of ongoing anaerobic biodegradation occurring in the plumes (*e.g.,* low organic carbon levels, lack of electronic receptors), the presence of degradation products (showing degradation to vinyl chloride) in Plume 1 is suggestive that they were generated during the early life of the plume, potentially in the vadose zone or shallow groundwater in and around the release point. The elevated chloride found in Plume 1 monitoring wells is indicative of the dechlorination of PCE. The redox conditions were variable between Rounds 1 and Round 2, indicating reducing conditions may be temporally variable in the aquifer. Additionally, the pH and temperature ranges were shown to be optimal for the growth of bacteria, further supporting a potential for biodegradation.

The order of magnitude decreases in concentrations of PCE and its three daughter products between Round 1 and Round 2 in MW-4 are indicative of a pattern of reduced discharge from the vadose zone to the saturated zone or dilution/dispersion. Additionally, the 2002 peak in PCE concentrations in the Ana Maria well has shown an overall reduction in VOC concentrations and most recently non-detect levels in 2017 providing further evidence of an overall decrease in concentrations in Plume 1 groundwater.

Plume 2 primarily consists of 1,1-DCE with a maximum concentration of 34 ug/L. While organic carbon levels are higher in Plume 2 compared to Plume 1, suggesting a higher potential for biodegradation activity, the levels were still rather low. However, the pH and temperature ranges are supportive for bacterial growth and dissolved oxygen levels range, similar to Plume 1, suggesting certain temporal conditions may be more supportive of biodegradation. Trace concentrations of vinyl chloride in Round 2 suggest localized reduced dechlorination of 1,1-DCE under methanogenic conditions.

Lastly, given the high transmissivity in the upper fractured bedrock, and even the shallow groundwater in both the saprolite and alluvium, the MNA mechanisms of dilution and dispersion will have considerable influence in this aquifer for both Plumes 1 and 2.

CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The Cabo Rojo municipality is 72 square miles in size, with a population of 50,917; the Bajura ward has a population of 2,423 (U.S. Census 2010). The primary land uses near the Site are agricultural, residential, and commercial development. The areas immediately surrounding the sources areas are highly developed and urban in nature and are expected to remain so in the future.

SUMMARY OF SITE RISKS

As part of the RI/FS, 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 HHRA and a SLERA. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline risk assessment for the Site.

HUMAN HEALTH RISK ASSESSMENT

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

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

Hazard Identification

In this step, COPCs in each medium are 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 HHRA began with selecting COPCs in soil, groundwater, surface water, and sediment at the Site that could potentially cause adverse health effects in exposed populations. COPCs are selected by comparing the maximum detected concentrations of each chemical identified with Commonwealth and federal risk-based screening values. While potential exposures to soil, sediment and surface water were considered, the chemical concentrations detected in these media were below the applicable screening values. As a result, direct exposure to these media are not expected to result in elevated cancer risk or noncancer health hazard. Therefore, COPCs were only selected for groundwater. This was the only media quantitatively evaluated in the HHRA, although the risks associated with the vapor intrusion pathway were evaluated qualitatively as well.

The Site-related COCs exceeding risk and hazard thresholds include PCE, TCE, cis-1,2-DCE, and vinyl chloride. Although unassociated with elevated risk, 1,1-DCE was also identified in groundwater at concentrations exceeding the Puerto Rico Water Quality Standard and Federal MCL (7 ug/L). Therefore, this chemical is considered a COC as well. A comprehensive list of all COPCs identified in the risk assessment (entitled "Final Human Health Risk Assessment Cabo Rojo Groundwater Contamination Site" dated April 2018), is available in the administrative record for the Site. Only chemicals exceeding risk and hazard thresholds are included in Table 3 of Appendix II.

Exposure Assessment

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

As previously stated, two separate plumes of groundwater contamination were identified at the Site. The HHRA evaluated potential risks to populations associated with both current and potential future land uses for each plume as two distinct exposure areas. The groundwater plumes are located in mixed residential and commercial areas and future land use is expected to remain the same. Although potable water is currently provided by a treated public water supply, the HHRA assumed groundwater from each plume could be used as a source of drinking water in the future. Exposure pathways were identified for each potentially exposed population and each potential exposure scenario for groundwater and indoor air via vapor intrusion. Based on the current and anticipated future land uses described above, the following exposure populations and pathways were evaluated under the current and future land use scenarios:

- Site Worker (adult): Ingestion of groundwater used as tap water (future) and inhalation of indoor air via vapor intrusion (current and future).

- Resident (child and adult): Ingestion, dermal contact, and inhalation of groundwater chemical contaminants while showering/bathing (future), and inhalation of indoor air via vapor intrusion (current and future).

A summary of the exposure pathways included in the HRRA can be found in Appendix II, Table 4. 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 may be the maximum detected concentration. A summary of the exposure point concentrations for the COCs in groundwater can be found in Appendix II, Table 3. Contaminant information relevant to the vapor intrusion pathway is displayed in Table 9 of Appendix II and discussed in the following subsections. A comprehensive list of exposure point concentrations for all COPCs can be found in Appendix B (Table 3 series) of the HHRA.

Toxicity Assessment

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

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

Toxicity data for the human health risk assessment were provided by the Integrated Risk Information System (IRIS) database, the Provisional Peer Reviewed Toxicity Database (PPRTV), or another source that is identified as an appropriate reference for toxicity values consistent with EPA guidance. This information is presented in Table 5 (Non-Carcinogenic Toxicity Data Summary) and Table 6 (Cancer Toxicity Data Summary) of Appendix II. Additional toxicity information for all COPCs is presented in the HHRA.

Risk Characterization

This step summarized and combined outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks. Exposures were evaluated based on the potential risk of developing cancer and the potential for noncancer health hazards.

Noncarcinogenic risks were assessed using a hazard index approach, based on a comparison of expected contaminant intakes and benchmark comparison levels of intake (reference doses, reference concentrations). Reference doses (RfDs) and reference concentrations (RfCs) are estimates of daily exposure levels for humans (including sensitive individuals) which are thought to be safe over a lifetime of exposure. The key concept for a noncancer HI is that a "threshold level" (measured as an HI of less than 1) exists at which noncancer health effects are not expected to occur. The estimated intake of chemicals identified in environmental media (*e.g.,* the amount of a chemical ingested from contaminated drinking water) is compared to the RfD or the RfC to derive the hazard quotient (HQ) for the contaminant in the particular medium. The HI is obtained by adding the HQs for all compounds within a particular medium that impacts a particular receptor population.

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

HQ = Intake/RfD

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

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

As previously stated, the HI is calculated by summing the HQs for all chemicals for likely exposure scenarios for a specific population. An HI greater than 1 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 noncarcinogenic 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 presented in Table 7 of Appendix II.

As seen in Table 7, the noncancer HIs exceed EPA's threshold value of 1 for the future child resident and adult worker in Plume 1. Noncancer hazards were evaluated for the child only as the most sensitive residential receptor. Hazards to the child are considered representative of any hazards to the adult resident. The hazard estimates were driven by exposure to PCE, TCE, cis-1,2-DCE and vinyl chloride for the child resident and TCE and cis-1,2-DCE for the adult worker. Although noncarcinogenic hazards were also evaluated for the resident and worker within Plume 2, the resulting hazards were below the target HI of 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 Exposure Assessment. Current Superfund guidance identifies the range for determining whether a remedial action is necessary as an individual lifetime excess cancer risk of 1 x 10^{-6} to 1 x 10^{-4} (corresponding to a one-in-a-million to a one-in-ten-thousand excess cancer risk), with 1 x 10^{-6} being the point of departure.

As summarized in Table 8 of Appendix II, the estimated cancer risk exceeded EPA's target risk range of 1 x 10^{-6} to 1 x 10^{-4} for the future resident and adult worker exposed to groundwater within Plume 1. Total carcinogenic risks greater than 1 x 10^{-4} were primarily attributable to TCE, vinyl chloride and chromium. However, chromium is not considered a site-related COC as discussed in further detail under the uncertainties section. Cancer risks estimated for the resident and worker within Plume 2 were equal to the upper bound limit (1 x 10^{-4}) and within the acceptable risk range established by the NCP, respectively, with 1 x 10^{-6} being the point of departure. In addition, 1,1-DCE was detected within Plume 2 at concentrations above the Puerto Rico Water Quality Standard and Federal MCL (7 ug/L), which are based on liver impacts resulting from long-term exposures. Cancer risks could not be quantitatively evaluated for 1,1-DCE as there is no SF or IUR associated with it. Nevertheless, this chemical is classified as a potential human carcinogen by EPA. Given this uncertainty, in addition to exceedances of Commonwealth and Federal health-based drinking water standards, 1,1-DCE is considered a site-related COC as well.

During the RI, a vapor intrusion investigation was conducted to assess the potential migration of VOC-contaminated vapors into both residential and commercial structures in Cabo Rojo and to evaluate impacts on indoor air. The indoor air and sub-slab vapor results were compared to EPA vapor intrusion screening levels (VISLs) based on a cancer risk of $1x10^{-6}$ and hazard quotient of 1 for both residential and commercial use. Results of the data collected indicate that elevated sub-slab vapor and indoor air concentrations predominantly consisted of site-related PCE and TCE, which were primarily associated with the CRPDC and EQP source areas. CRPDC is currently an inactive facility, and EQP is still in use as a commercial facility. Although indoor air concentrations at EQP exceed residential VISLs, the detected concentrations do not exceed commercial VISLs. Indoor air concentrations of site-related contaminants at CRPDC do not exceed either residential or commercial VISLs. However, elevated sub-slab concentrations indicate there is a potential risk from vapors migrating into the structure in the future (see Table 9 of Appendix II). Additional discussion of the sub-slab vapor and indoor air results can be found in the HHRA.

In summary, the results of the HHRA indicate that there are significant carcinogenic risks and noncarcinogenic health hazards to potentially exposed populations resulting from exposure to groundwater onsite. Site worker and resident exposure to PCE, TCE, cis-1,2-DCE and vinyl chloride in groundwater from Plume 1 results in either an excess lifetime cancer risk that exceeds the acceptable risk range established by the NCP or an HI above the acceptable level of 1, or both. 1,1-DCE was identified within Plume 2 at concentrations above the Puerto Rico Water Quality Standard and Federal MCL as well. Future workers may also be exposed to elevated VOC concentrations in air via the inhalation of vapors emanating into ambient air by vaporization from underlying soil or groundwater contamination at the CRPDC and EQP source areas. The noncarcinogenic hazards and carcinogenic risks from all COPCs as well as the indoor air and sub-slab vapor intrusion results can be found in the HHRA.

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:

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

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

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

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the risk assessment provides upper-bound estimates of the risks to populations near the Site, and is highly unlikely to underestimate actual risks related to the Site. In addition, chromium in groundwater was shown to contribute unacceptable risk for future residents using water from Plume 1. However, it is likely that the risk due to chromium is overestimated because it was assumed that all the chromium present is in the more toxic hexavalent form. This is conservative since chromium in the environment is generally dominated by the less toxic, trivalent form. Furthermore, chromium was not detected at levels exceeding the Puerto Rico Water Quality Standard and Federal MCL in groundwater. Historical information does not indicate the use of hexavalent chromium in source area processes as well. Therefore, chromium is not considered a site-related contaminant.

Due to a limited number of detections, a 95% UCL could not be calculated for several of the COPCs identified in Plumes 1 and 2. Instead, the maximum detected concentrations were used as the EPC for each of these COPCs. Using the maximum concentration as the EPC is a conservative (*i.e.*, health protective) assumption, which is likely to overestimate risks from exposure to groundwater contaminants in these exposure areas.

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

ECOLOGICAL RISK ASSESSMENT

A SLERA was conducted for the Site to evaluate the potential for risks to ecological receptors from exposure to Site media. Conservative assumptions were used to identify exposure pathways and, where possible, quantify potential ecological risks.

SLERA results indicate that although two Site-related COPCs were identified in surface soil (cis-1,2-DCE and TCE), there is no suitable habitat for ecological receptors due to the urban nature of the area and the fact that the sample location is in a small area of mowed turf between a parking lot and a building, posing no exposure risk to wildlife receptors. Non-Site-related contaminants were detected near sediment sample location SD-02 (near CRPDC and RETO Plant II) and upstream source areas. There is no risk to ecological receptors from exposure to the Site-related chemicals.

RISK ASSESSMENT SUMMARY

Based on the results of the human health and ecological risk assessments, a remedial action is necessary to protect public health, welfare, and the environment from actual or threatened releases of hazardous substances in the soil and groundwater.

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.

Although unassociated with direct-contact risk to human health, concentrations of COCs detected in soil samples at CRPDC (PCE up to 3,700 µg/kg) and EQP (PCE up to 73 µg/kg and cis-1,2-DCE up to 480J µg/kg) indicate contaminated soil could serve as a continuing source of groundwater contamination for Plume 1 as well as contaminated soil vapor at CRPDC and EQP. As a result, soil is a medium of concern, and RAOs have been developed for the Site soils.

PCE and its daughter products and 1,1-DCE were detected above RI screening criteria in both groundwater plumes. The HHRA demonstrated that contaminated groundwater poses human health risks. Therefore, groundwater is a medium of concern and RAOs have been developed for groundwater.

Surface water and sediment samples were collocated. No COCs were detected in surface water and sediment samples collected from drainage features near source areas. As a result, both surface water and sediment are not considered media of concern, and no RAOs have been developed for either medium.

Based on the results of indoor air and sub-slab vapor sampling collected in the RI, vapor containing PCE (and to a lesser degree, TCE) in sub-slab has been detected at several buildings, including the CRPDC and EQP buildings. The HHRA report indicates there is a potential risk from vapors migrating into the CRPDC building in the future, but vapor intrusion would not currently pose a risk to workers were it to be occupied. At EQP, the HHRA indicated that vapor intrusion may be occurring, but not at levels currently causing a risk to workers. By addressing the soil and groundwater contamination at CRPDC and EQP, soil vapor contamination at these two areas would also be addressed.

To protect human health and the environment, RAOs have been established.

RAOs for Soil

- Prevent contaminated soil from serving as a source of groundwater contamination;
- Minimize contaminated soil from serving as a source of current and future vapor intrusion.

RAOs for Groundwater

- Prevent human exposure to contaminated groundwater with concentrations above federal or more stringent Commonwealth standards;
- Restore contaminated groundwater as a potential source of drinking water in a reasonable time period by reducing contaminant levels to the federal MCLs or more stringent Commonwealth standards;
- Minimize contaminated groundwater from serving as a source of current and future vapor intrusion.

REMEDIATION GOALS (RGS)

To meet the RAOs, RGs were developed to aid in defining the extent of contaminated groundwater requiring remedial action. RGs are chemical-specific measures for each media and/or exposure route that are expected to be protective of human health and the environment. 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.

RGs for Soil

There are no promulgated federal or Commonwealth chemical-specific ARARs for soil. To meet the RAOs for protection of groundwater, Site-specific impact to groundwater soil cleanup levels were developed. The RGs for soil are shown in Table 10 of Appendix II.

RGs for Groundwater

Groundwater at the Site is classified as Class SG, which includes all groundwater as defined in Puerto Rico's Water Quality Standards (PRWQS) [Puerto Rico Environmental Quality Board [PREQB 2016]), that is suitable for drinking water use and for use as a source of potable water supply in the Commonwealth of Puerto Rico. The RGs for contaminants in groundwater are the federal Maximum Contaminant Levels (MCLs) or the more stringent Commonwealth standards. Table 11 of Appendix II presents the RGs for groundwater.

Screening Criteria for Vapor Intrusion

The sub-slab contaminant-screening criteria and indoor air concentrations requiring mitigation were based on EPA's VISLs guidance for commercial properties and are presented in Table 12 of Appendix II. However, the VISLs referenced are sometimes updated based on evolving toxicity information. Therefore, the screening criteria may change. The latest screening criteria for vapor intrusion will be used to monitor sub-slab and indoor air quality over time at CRPDC and EQP.

DESCRIPTION OF THE ALTERNATIVES

Section 121(b)(1) of CERCLA, 42 U.S.C. § 9621(b)(1), mandates that remedial actions must be protective of human health and the environment, be cost-effective, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) of CERCLA also establishes a preference for remedial actions that employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, mobility of the hazardous substances, pollutants, and contaminants at a site. Section 121(b)(1) of CERCLA, 42 U.S.C. § 9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants that at least attains ARARs under federal and Commonwealth laws, unless a waiver of the ARAR can be justified pursuant to Section 121(d)(4) of CERCLA, 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 timeframes for Alternatives 2 and 3 are estimated to be 2 to 5 years for construction, 5 years for O&M, and 30 years for monitoring.

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 (CEs) that are included in remedial alternatives 2 and 3. The common elements listed below do not apply to the No Action alternative.

Pre-Design Investigation (PDI) and Pilot Study

The nature and extent of soil contamination in the vadose zone associated with the CRPDC source area would be further refined in a PDI. At CRPDC, the vadose zone is approximately 12 feet thick; soil samples would be collected from ground surface to a few feet below the water table and analyzed for VOCs. Groundwater samples would be collected at different depths to determine the potential of residual sources for groundwater contamination.

It may be difficult to delineate the nature and extent of vadose zone contamination at EQP because it is an active facility and the building has a low ceiling. It will likely be necessary to use unconventional, small-scale, or manual drilling methods to obtain soil samples below the building foundation. The specific methods that will be used to delineate contamination below the building foundation will be defined during the remedial design.

Design parameters for SVE/DPE would be obtained through the performance of a pilot study.

For Alternatives 2 and 3, a pilot study of DPE would be conducted to determine flow rates, required vacuum, and radius of influence (ROI) of a DPE well. The pilot study also would evaluate treatment requirements of the collected vapors and extracted groundwater.

Long Term Monitoring and MNA at Plume 1

Annual sampling of the existing monitoring well network in Plume 1 would be conducted. It is assumed that PRASA will not conduct routine quarterly monitoring at the Ana Maria supply well because it is no longer active and will not be returned to service. The Ana Maria well will be sampled during the Remedial Action (RA) as part of the Plume 1 monitoring well network. Annual monitoring well network samples would be analyzed for VOCs and MNA parameters. As mentioned above, the reducing conditions seem to vary on a temporal basis. Additional rounds of data will allow for a better understanding of how biodegradation potential in the aquifer may vary with time. Contaminant migration and concentration trends would continue to be evaluated. The monitoring program would proceed until concentrations are in compliance with the RGs for several monitoring rounds, consistent with EPA's Groundwater Remedy Completion Strategy (EPA 2014). The remediation timeframe is estimated to be 30 years.

Based on the CSM, the alluvium is localized between wells MW-4 and MW-15. Contaminated groundwater originating from CRPDC in the alluvium would travel north toward the area of MW-15 then migrate into the overburden and the highly fractured bedrock zone observed in the Pozo Escuela bedrock well (this well that formerly supplied a school, was taken out of service and was converted to monitoring well and sampled during the RI, see Figure 2). Contaminant concentrations in MW-2 and MW-1 were below 10 ug/L during Round 2 sampling in 2017, and the detection of cis-1,2-DCE and vinyl chloride indicated the occurrence of reductive dechlorination in the overburden near the source area. Contaminant concentrations in Pozo Escuela were also relatively low (highest PCE concentration was 5.1 ug/L in Round 2). However, increased concentrations of COCs in MW-4 and MW-15 from Round 2 (2017) to Post-Maria (2018) sampling events indicate that the source area at CRPDC continues to contribute to groundwater contamination in the alluvium (See Figure 3).

Because the highly fractured bedrock is very transmissive, concentrations of contaminants entering this zone are expected to decrease through dilution and dispersion. This was observed in bedrock well MW-4R (at CRPDC) where COC concentrations decreased slightly from Round 2 (2017) to Post-Hurricane Maria sampling in 2018. Contaminated groundwater originating from EQP was also detected in the highly fractured bedrock zone where dilution and dispersion may also play a role in decreasing contaminant concentrations. As additional rounds of groundwater monitoring data are collected as part of the long-term monitoring program, the data would be used to assess the ongoing attenuation of the groundwater contamination, mechanisms contributing to the attenuation of Site contaminants, and progress toward meeting the RGs.

Long Term Monitoring and MNA at Plume 2

Annual sampling of the existing monitoring well network in Plume 2 would be conducted. 1,1-DCE in Plume 2 can degrade under aerobic or anaerobic conditions but is dependent on the presence of the appropriate microbes and substrates to enhance the degradation. Data on VOCs and MNA parameters will be collected from Plume 2 wells to continue to assess MNA. The monitoring program would continue until contaminant concentrations show several consecutive rounds of compliance with the RGs according to EPA's Groundwater Remedy

Completion Strategy (EPA 2014).

Monitoring of Active PRASA Supply Wells

Analytical data and operational data for Club de Leones and Cabo Rojo 1 through 3 public supply wells would be obtained from PRASA. These supply wells are currently active and operating but have not historically been impacted by Site-related contamination. PRASA is expected to continue routine quarterly sampling of these wells to ensure they continue to meet drinking water standards.

Site Restoration

After the completion of all remedial actions, associated equipment and infrastructure would be properly removed or demobilized. The Site would be restored to pre-remedial action conditions as much as possible. Site restoration activities may include but are not limited to repairing the building slabs and pavement.

Institutional Controls

Institutional Controls (ICs) are non-engineered controls, such as property or groundwater use restrictions placed on real property by recorded instrument, by a governmental body by law or regulatory activity, or through informational devices such as public notices, that reduce or limit the potential for human exposure to contamination and/or protect the integrity of a remedy.

While groundwater contamination is still present, institutional controls will be implemented to help control and limit exposure to hazardous substances in the groundwater at the Site. The types of institutional controls which will be relied upon for the groundwater at the Site are: 1) existing local laws that limit installation of drinking water wells without a permit; 2) informational devices will be used to prevent well installation and prohibit occupancy, use, or new construction in the source areas unless appropriate vapor-intrusion investigations are conducted and/or mitigation measures (including periodic monitoring, as necessary) are implemented; and 3) advisories published in newspapers, periodic letters sent to local government authorities informing them of the need to prevent well installation, and inspection of local and/or Commonwealth health department records to insure that no wells are installed that could impact the groundwater plume or result in exposure to contaminated groundwater.

Five-Year Reviews

All the active alternatives assume that five-year reviews would be conducted for the Site. Although this remedy will not result in hazardous substances, pollutants, or contaminants remaining at the Cabo Rojo Groundwater Contamination Superfund Site above levels that would allow for unlimited use and unrestricted exposure, it may take more than five years to attain the remediation goals. Pursuant to Section 121(c) of CERCLA, 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.

EPA Region 2 Clean and Green Policy

The environmental benefits of the active alternatives 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. This would 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.[1]

REMEDIAL ALTERNATIVES

The following alternatives were considered for the Site:

Alternative 1 – No Action

The No Action Alternative is required by the NCP to provide an environmental baseline against which impacts of various other remedial alternatives can be compared. Under this alternative, no remedial activities would be initiated at the Site to address contaminated soil and groundwater above remediation goals or otherwise mitigate the associated risks to human health from exposure to groundwater contamination.

Alternative 2 – Soil Vapor Extraction/Dual Phase Extraction (SVE/DPE), Monitored Natural Attenuation (MNA), a Contingency Remedy of In-Situ Groundwater Treatment and Institutional Controls

This alternative would provide active treatment SVE/DPE to the target soil remediation zones and potentially underlying groundwater at CRPDC and EQP (Figures 4 and 5). The plumes would be managed through the implementation of MNA and long-term monitoring as described previously.

<u>SVE/DPE Installation, Operation, and Maintenance at Source Areas</u>

At the CRPDC property, DPE wells would be installed to address the vadose zone within the target soil remediation zone to be defined based on the PDI results. Groundwater extraction would be a component of DPE to remove groundwater contamination at shallow depths also within the target soil remediation zone. At EQP, SVE wells and groundwater extraction wells would be installed separately to address the vadose zone and the shallow groundwater contamination since the groundwater aquifer is a confined unit. The existing building slab and pavements would be inspected, improved, and sealed if necessary and would serve as a cap for the DPE and SVE systems. The SVE/DPE remedy would serve to mitigate potential vapor intrusion into the CRPDC and EQP buildings.

The vapor treatment system would likely consist of compressors, piping, an air-water separator, as necessary, and vapor-phase activated carbon units. Vapor discharged would meet Puerto Rico discharge requirements. The air flow rate (vacuum) and concentrations of contaminants, oxygen, and carbon dioxide in the extracted vapor would be monitored regularly.

The water treatment system would be installed in the same area/building as the vapor treatment system and would treat extracted water using air strippers or liquid-phase activated carbon units to be determined during the RD. Depending on the groundwater extraction rate of the DPE

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

system, the treated water might be discharged to on-Site drainage systems or be re-injected into the subsurface. Additional sampling and analysis would be conducted on the vapor and water effluent streams to ensure substantive discharge requirements for each medium are met.

SVE/DPE Performance Evaluation at Source Areas

The effectiveness of SVE and/or DPE in the vadose zone soil would be evaluated by collecting soil gas samples. An evaluation will be conducted prior to shut down of the system in the event that VOC concentrations in extracted vapor are reduced to an asymptotic level such that continued operation of the system is no longer effective or in-situ concentrations meet the soil RGs.

The effectiveness of SVE/DPE in minimizing soil contamination from serving as sources of groundwater and soil vapor contamination would be evaluated in conjunction with groundwater and sub-slab vapor sample results. Plume 2 and the dilute portion of Plume 1 would be managed through the implementation of MNA and long-term monitoring. The RGs for soil and groundwater, along with the vapor intrusion screening levels will be used to determine the effectiveness of the SVE/DPE.

Sub-Slab and Indoor Air Monitoring

Sub-slab and indoor air samples at the CRPDC and EQP properties would be collected periodically to monitor the potential or presence of vapor intrusion. Results of vapor samples would be compared to the sub-slab and indoor air VISLs. Monitoring would help inform the progress and effectiveness of the active source remedy (SVE or DPE) and would be conducted until the vadose zone source areas are remediated to levels that eliminate the need to mitigate vapor intrusion at the point of exposure. Post treatment vapor monitoring would be conducted to confirm the sources have been remediated and no longer contribute to vapor intrusion.

Potential contributions of COCs from sources within the buildings would be considered during the vapor intrusion monitoring, especially at the EQP facility where active business operations (printing) may utilize VOCs.

Triggers for In-situ Groundwater Treatment for Plume 1

Active groundwater treatment beyond that which will occur as part of DPE is not expected to be required. However, if needed, Alternative 3 is a contingency in-situ groundwater remedy. As additional data from the PDI and groundwater monitoring become available, especially in the vicinities of the two source areas, considerations and/or conditions that may indicate the need to trigger the contingency remedy include the following:

- Detection of NAPL in the vadose zone soil, or PCE/TCE concentrations indicative of NAPL at the water table, indicating a continuing source of groundwater contamination;
- Significant increase of contaminant concentrations in MW-15 and/or MW-3R/MW-3RS to greater than one order of magnitude above the RGs and/or an increasing trend of contaminant concentration in Plume 1 wells, such as Ana Maria, MW-2, and MW-1;
- Detections of PCE and/or TCE in sentinel wells, such as MW-16, USGS-OW-1 (for PCE or TCE), and PRASA-1; and
- Detections of PCE and/or TCE in the public supply wells.

Alternative 3 – SVE/DPE, In-Situ Groundwater Treatment, MNA and Institutional Controls

This alternative would provide active treatment (SVE/DPE) to the target soil remediation zones and shallow contaminated groundwater at CRPDC and EQP. SVE/DPE installation, operation, and maintenance at source areas; SVE/DPE performance evaluation at source areas; and sub-slab and indoor air monitoring would be conducted as described in Alternative 2. In addition, under this alternative, in-situ treatment would be part of the alternative. Plume 2 and the dilute portion of Plume 1 would be managed through the implementation of MNA and long-term monitoring.

<u>Pilot Study for Contaminated Groundwater at the Source Areas</u>

During the PDI at CRPDC, groundwater screening borings would be installed within the target treatment zone to obtain the vertical profile of groundwater contamination. The data would be used for the design of *in-situ* treatment. A pilot study would be conducted to collect site specific design parameters and groundwater extraction rate.

This alternative assumes that the PDI results from the source area at EQP indicate that groundwater contamination at EQP requires treatment. A well may be installed to the north of EQP building for a pilot study. The pilot study may be conducted by releasing amendment (additives to promote reduction by biological degradation) from the well to the east of EQP building) and monitored in wells to the north and west of the EQP building. Wells may also be installed at an angle to reach below the EQP building for the pilot study.

<u>In-Situ Groundwater Treatment at CRPDC and EQP</u>

Under this alternative, it is assumed that the full depth of contaminated groundwater one order of magnitude above the RGs will be treated at both the CRPDC and EQP properties. The actual treatment zone would be refined during the remedial design and/or the remedial action. Groundwater concentrations less than one order of magnitude above the RG would be addressed through MNA and periodic monitoring.

Enhanced Anaerobic Biodegradation (EAB) is assumed to be the technology for in-situ treatment. During the remedial design, based on additional investigation results, other in-situ treatment technologies may be considered.

For the CRPDC source area, a grid of direct push injection points would be drilled at the CRPDC property. A groundwater extraction well would be installed to provide water for the injections. Two clusters of monitoring wells would be installed to monitor the progress of EAB treatment. An additive that has the characteristics of being easy to distribute and long lasting would be preferred at CRPDC.

For the EQP source area, a recirculation system consisting of one injection well screened in shallow weathered bedrock would be installed along the east side of the EQP building. An extraction well would be installed west of the injection well to induce a hydraulic gradient to facilitate the additive distribution. Two monitoring wells screened in shallow bedrock would be installed to assess in-situ treatment progress. An additive that would migrate with groundwater flow and has a high retention capacity in a highly weathered bedrock zone would be preferred at EQP.

Methane generated during the EAB treatment could be extracted by the SVE system, or it may travel with groundwater downgradient and would need to be managed and monitored. Monitoring of vertical migration of soil vapor from groundwater to the vadose zone would be considered during RD and may be implemented during EAB treatment.

The effectiveness of in-situ treatment would be evaluated by collecting groundwater samples from monitoring wells installed in the target groundwater remediation zones. Sample results from these wells will be reviewed together with monitoring well data from the plume downgradient of the treatment zone in Plume 1 for evaluation of the long-term effectiveness. It is assumed that only one round of EAB treatment would be performed. Following the first round of treatment, the need for additional rounds of treatment would be assessed based on the results of the post-treatment groundwater monitoring results.

EVALUATION OF REMEDIAL ALTERNATIVES

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

1. **Overall protection of human health and the environment** addresses whether or not 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 Commonwealth environmental statutes and regulations or provide grounds for invoking a waiver. Other federal or Commonwealth advisories, criteria, or guidance are "To Be Considered" (TBC). While TBCs are not required to be adhered to by the NCP, the NCP recognizes that they may be very useful in determining what is protective of a site or how to carry out certain actions or requirements.

The following **"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 remediation

goals 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 of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation of the remedy.

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 preferred remedy that was presented in the Proposed Plan:

8. **Commonwealth (State) acceptance** indicates whether, based on its review of the RI/FS report, HHRA, and Proposed Plan, the Commonwealth concurs with, opposes, or has no comments on the proposed remedy.

9. **Community acceptance** refers to the public's general response to the alternatives described in the RI/FS report, HHRA, and Proposed Plan.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

All COCs are currently present above the RGs in at least one medium (soil, vapor, and groundwater). Contaminated groundwater in Plume 1 poses unacceptable human health risks to future residents and workers. Contaminated vapor has the potential to pose human health risks at CRPDC and EQP buildings due to vapor intrusion. Cancer risks estimated for Plume 2 were equal to the upper bound limit (1×10^{-4}) and within the acceptable risk range established by the NCP, respectively, with 1×10^{-6} being the point of departure. 1,1-DCE was, however, detected within Plume 2 at concentrations above the Puerto Rico Water Quality Standard and Federal MCL (7 ug/L)

The No Action alternative would not be protective of human health and the environment at the source areas because no action would be taken to remediate or monitor contamination. The No Action alternative would not meet the RAOs.

Alternatives 2 and 3 would be protective of human health and the environment because they involve active treatment of the source areas in Plume 1 and monitoring of the natural attenuation of groundwater contaminates in both Plumes 1 and 2 until the RAOs and RGs are met. Institutional controls would be implemented to restrict future residential use of groundwater at the Site until RGs are met.

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

COCs are currently present in groundwater at concentrations exceeding RGs and thus are not currently in compliance with chemical-specific ARARs. Alternative 1 would not take any active measures to ensure compliance with ARARs.

Alternatives 2 and 3 would achieve compliance with chemical-specific ARARs for groundwater through active treatment, natural attenuation, and monitoring. Alternatives 2 and 3 would meet RGs for groundwater and would also achieve risk-based RGs for soil and vapor.

LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternative 1 would not be considered a permanent remedy because no action would be implemented to reduce the level of contamination to below RGs or verify any naturally occurring reduction. Alternative 1 does not provide long-term effectiveness.

Both Alternatives 2 and 3 would permanently reduce contaminant concentrations in the source zones through active treatment. Consequently, contamination in groundwater and vapor would be reduced or eliminated. Alternative 2 would be used to address shallow groundwater. If the PDI or long-term monitoring results reveal higher levels of contamination than expected in groundwater (more than an order of magnitude above the RGs), active groundwater treatment (Alternative 3) would be triggered. As a result, residual risks are expected to be within EPA's acceptable risk range for Alternatives 2 and 3. Alternatives 2 and 3 would have similar long-term effectiveness and permanence.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Alternative 1 would not reduce contaminant Toxicity, Mobility, or Volume (T/M/V) through treatment. Alternatives 2 and 3 would reduce T/M/V through treatment in the source areas and would achieve the soil and groundwater RGs. Alternatives 2 and 3 would reduce T/M/V through SVE, DPE, and/or in-situ treatment in the source areas, especially the soil contamination that serves as a source of groundwater contamination. Active treatment in the source areas under both alternatives also is expected to reduce contamination in Plume 1 at the source areas. Alternatives 2 and 3 would achieve the RGs for groundwater over time. For both Plume 1 and Plume 2, natural attenuation would reduce T/M/V under both Alternatives 2 and 3.

SHORT-TERM EFFECTIVENESS

There would be no short-term impact to the community and environment from Alternative 1 as no remedial action would occur. However, this alternative would not meet RAOs within a reasonable time frame. There would be moderate short-term impacts to the local community and workers under Alternative 2 due to the PDI activities and the RA construction and operation at the CRPDC and EQP buildings within the source areas. Both Alternatives 2 and 3 would require that equipment be brought inside buildings to install the SVE and/or DPE system. For both alternatives, a pilot study would be needed to evaluate the zone of influence of SVE/DPE wells. The CRPDC building may need to be modified, and the operation of EQP may need to be shut down temporarily. Alternative 3 would have the greatest short-term impact to the community, impacting the same areas as Alternative 2 in addition to potential disruptions to nearby traffic for injection/extraction/monitoring well installations. For Alternative 3, a pilot study would need to be conducted to obtain design parameters for in-situ treatment. Following removal of the sources, the time frames for Alternatives 2 and 3 to meet the RAOs would be controlled by the rate of natural attenuation of the plumes. In other words, the RAOs in groundwater will be met once the COCs have degraded and/or been dispersed/diluted to concentrations below their respective criteria. Therefore, the overall time frames for Alternatives 2 and 3 are expected to be similar.

IMPLEMENTABILITY

While all alternatives are implementable, both Alternatives 2 and 3 would need to overcome the challenge of drilling inside the building at the CRPDC property, which may require modification of the building wall to install a rig. There are locations that may not be accessible for any drilling equipment. There is also the possibility of collecting samples under the building using angled drilling. Drilling at EQP could temporarily interrupt the business. The area surrounding the EQP property is highly developed with minimal space between above ground structures. For this reason, Alternative 3 would be somewhat more difficult to implement since in-situ treatment would require installation of additional injection and performance monitoring wells. Additionally, these wells could interfere with utilities and traffic controls. While horizontal wells are a more innovative technology that could overcome the limitations of installing vertical wells, given the dilute nature of Plume 1 it may be difficult to successfully implement this technology in this setting. Alternative 2 is also more in line with the current conceptual site model for the Site, with a contingency for additional in-situ treatment if new information becomes available during the PDI.

For both Alternatives 2 and 3, services and materials are readily available. However, specialized equipment would need to be shipped from the U.S. mainland for both alternatives, increasing the cost. For Alternative 3, amendments (additives) for in-situ treatment would also need to be shipped from the U.S. mainland.

COST

The cost estimates for all three alternatives are provided below.

Groundwater Alternative	Capital Costs	Present Worth O&M Costs	Total Present Worth
1	$0	$0	$0
2	$2,780,000	$2,511,000	$5,300,000
3	$4,866,000	$2,732,000	$7,598,000

COMMONWEALTH/SUPPORT AGENCY ACCEPTANCE

The Puerto Rico Environmental Quality Board concurs with the selected remedy.

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 (August 2, 2018, to September 3, 2018) was established to allow the community to review and comment on all the alternatives and the proposed alternative. In addition, a public meeting was held on August 9, 2018. EPA extended the public comment period after the public meeting to October 5, 2018. EPA's response to all public comments received during the comment period, including during the public meeting, is presented in the Responsiveness Summary of this ROD.

PRINCIPAL THREAT WASTE

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a Site whenever practicable (40 CFR Section 300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that 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 environment human health or the environment should exposure occur.

No principal threat waste has been identified at the Site.

SELECTED REMEDY

EPA, in consultation with PREQB, selects the remedy summarized in this document to address soil, vapor and groundwater contamination detected at the Site. The selected remedy, Alternative 2 (SVE/DPE, MNA of Groundwater, a Contingency of In-Situ Groundwater Treatment, and Institutional Controls), includes the following major components:

- SVE/DPE to the target soil remediation zones and underlying groundwater at the CRPDC and EQP source areas;
- Installation of vapor monitoring points to assess removal of vapor-phase contamination;
- MNA and long-term monitoring of Plume 2 and the portion of plume 1 outside of the source area;
- Institutional controls; and
- A contingency remedy of in-situ treatment of groundwater in Plume 1 (Alternative 3) if certain conditions are met (e.g., detection of NAPL, contaminant concentration increases in key monitoring wells, detections in sentinel wells, detections in supply wells).

SVE/DPE Installation, Operation, and Maintenance at Source Areas - At CRPDC property, DPE wells will be installed to address the vadose zone within the target soil remediation zone to be defined based on PDI results. Groundwater extraction will be a component of DPE to remove groundwater contamination at shallow depths also within the target soil remediation zone. At the EQP property, SVE wells and groundwater extraction wells will be installed separately to address the vadose zone and the shallow groundwater contamination since the groundwater aquifer is a confined unit. Vapor monitoring points will be installed to track the progress of removing vapor-phase contamination. The existing building slab and pavements will be inspected, improved, and sealed if necessary and will serve as a cap for the DPE and

SVE systems. The SVE/DPE remedy will also serve to mitigate potential vapor intrusion into the buildings at the CRPDC and EQP properties. Construction is estimated at 2 to 5 years, and O&M of the SVE/DPE system is estimated to take approximately 5 years. The long-term groundwater monitoring period is assumed to be 30 years.

SVE/DPE Performance Evaluation at Source Areas – The effectiveness of SVE and/or DPE in the vadose zone soil will be evaluated by collecting soil gas samples. An evaluation will be conducted prior to shut down of the system when VOC concentrations in extracted vapor are reduced to an asymptotic level such that continued operation of the system is no longer effective or in-situ concentrations meet the RGs.

The effectiveness of SVE and/or DPE in minimizing soil contamination from serving as sources to groundwater contamination and soil vapor contamination will be evaluated in conjunction with groundwater and sub-slab vapor sample results. Plume 2 and the portion of Plume 1 outside the target remediation zone will be managed through the implementation of MNA and long-term monitoring. The RGs for soil and groundwater, along with the vapor intrusion screening levels will be used to determine the effectiveness of the SVE/DPE.

Sub-Slab and Indoor Air Monitoring - Sub-slab and indoor air samples at the CRPDC and EQP properties would be collected periodically to monitor the potential or presence of vapor intrusion. Results of vapor samples would be compared to the sub-slab and indoor air VISLs. Monitoring will help inform the progress and effectiveness of the active source remedy (SVE or DPE) and will be conducted until the vadose zone source areas are remediated to levels that eliminate the need to mitigate vapor intrusion at the point of exposure. Post-treatment vapor monitoring will be conducted to confirm the sources have been remediated and no longer contribute to vapor intrusion.

Potential contributions of COCs from sources inside the buildings at the CCRPDC and EQP properties will be considered during the vapor intrusion monitoring, especially at the EQP facility where active business operations (printing) may utilize products containing VOCs.

Triggers for In-Situ Groundwater Treatment for Plume 1 - Additional groundwater treatment beyond that which will occur as part of DPE is not expected to be required. However, this remedy also includes in-situ groundwater remediation as a contingency remedy, as described in Alternative 3. As additional data from the PDI and groundwater monitoring become available, especially in the vicinities of the two source areas, considerations and/or conditions that may indicate the need to trigger the contingency remedy include the following:

- Detection of NAPL in the vadose zone soil or PCE/TCE concentrations indicative of NAPL (e.g., 1% solubility) at the water table, indicating a continuing source of groundwater contamination;
- Significant increase of contaminant concentrations in MW-15 and/or MW-3R/MW-3RS to greater than one order of magnitude above the any RG and/or an increasing trend of contaminant concentration in plume wells, such as Ana Maria, MW-2, and MW-1;
- Detections of PCE and/or TCE in sentinel wells, such as MW-16, USGS-OW-1 (for PCE or TCE), and PRASA-1; and
- Consistent detections of PCE and/or TCE in the supply wells.

Institutional Controls - While groundwater contamination is still present, institutional controls will be implemented to help control and limit exposure to hazardous substances in the groundwater at the Site. The types of institutional controls which will be relied upon for the groundwater at the Site are: 1) existing local laws that limit installation of drinking water wells without a permit; 2) informational devices will be used to prevent well installation and prohibit occupancy, use, or new construction in the source areas unless appropriate vapor-intrusion investigations are conducted and/or mitigation measures (including periodic monitoring, as necessary) are implemented; and 3) advisories published in newspapers, periodic letters sent to local government authorities informing them of the need to prevent well installation, and inspection of local and/or Commonwealth health department records to insure that no wells are installed that could impact the groundwater plume or result in exposure to contaminated groundwater.

Green Remediation - The environmental benefits of the selected remedy may be enhanced by employing design technologies and practices that are sustainable in accordance with the EPA Region 2's Clean and Green Energy Policy.[2]

SUMMARY OF THE RATIONALE FOR THE SELECTED REMEDY

Based upon the requirements of CERCLA, the results of the RI, the detailed analysis of the alternatives, and public comments, EPA has determined that the selected remedy best satisfies the requirements of Section 121 of CERCLA, 42 U.S.C. § 9621, and provides the best balance of tradeoffs among the remedial alternatives with respect to the NCP's nine evaluation criteria, as set forth in Section 300.430(e)(9) of the NCP. This remedy was selected because it will achieve the RAOs and RGs in a similar timeframe compared to the other active alternatives.

SUMMARY OF THE ESTIMATED SELECTED REMEDY COSTS

The estimated capital, present worth O&M, and total present worth costs of the selected remedy are discussed in detail in the FS Report and are $2,780,000, $2,511,000, and $5,300,000, respectively. 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. A cost estimate summary for the selected remedy is presented in Table 13 in Appendix II.

ESTIMATED OUTCOMES OF SELECTED REMEDY

The principal outcomes of the selected remedy are: 1) prevention of human exposure to contaminant concentrations in groundwater above levels that are protective of drinking water; 2) restoration of contaminated groundwater as a potential source of drinking water in a reasonable time period by reducing contaminant levels to the federal MCLs or more stringent Commonwealth standards; 3) prevention of contaminated soil from serving as sources of groundwater contamination; and 4) prevention/minimization of contaminated soil and groundwater from serving as sources of current and future vapor intrusion.

STATUTORY DETERMINATIONS

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

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

Protection of Human Health and the Environment

The selected remedy will protect human health and the environment because it will involve active treatment of the vadose zone source areas and monitoring the natural attenuation of groundwater until cleanup standards are met. Institutional controls will further protect human health by restricting future use of groundwater at the Site until cleanup standards are met.

Compliance with ARARs

The selected remedy for will comply with chemical-specific, location-specific, and action-specific ARARs for soil, vapor and groundwater. Tables 10, 11, and 12 of Appendix II summarized the location specific, action-specific and chemical ARARs, TBC and other guidance.

Cost Effectiveness

Under the NCP, a cost-effective remedy is one which has costs that are proportional to its overall effectiveness (40 CFR Section 300.430(f)(1)(ii)(D)). EPA evaluated the "overall effectiveness" of those alternatives that satisfied the threshold criteria (*i.e.*, were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was further evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume though treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness.

Each of the active 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 $5,300,000. 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))

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 40 CFR 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 permanently reducing the mass of contaminants in the soil and groundwater at the Site, thereby reducing the toxicity, mobility, and volume of contamination.

Preference for Treatment as a Principal Element

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

FIVE YEAR REVIEW REQUIREMENTS

This remedy will not result in hazardous substances, pollutants, or contaminants remaining at the Cabo Rojo Groundwater Contamination Superfund Site above levels that would allow for unlimited use and unrestricted exposure. However, because it may take more than five years to attain the remediation goals, pursuant to Section 121(c) of CERCLA, 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.

DOCUMENTATION OF SIGNIFICANT CHANGES FROM PREFERRED ALTERNATIVE OF PROPOSED PLAN

The Proposed Plan for the Site was released for public comment on August 2, 2018, and the public comment period ran from that date through October 5, 2018. The Proposed Plan identified 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. Upon review of these comments, EPA has determined that no significant changes to the remedy, as it was originally proposed in the Proposed Plan, are necessary.

Appendix I

Figures

Figure 1. Overview of Site Area, including the three source areas: Cabo Rojo Professional Dry Cleaners (source to Plume 1), Extasy Q Prints (Source of Plume 1) and Pridco East (historical source to Plume 2).

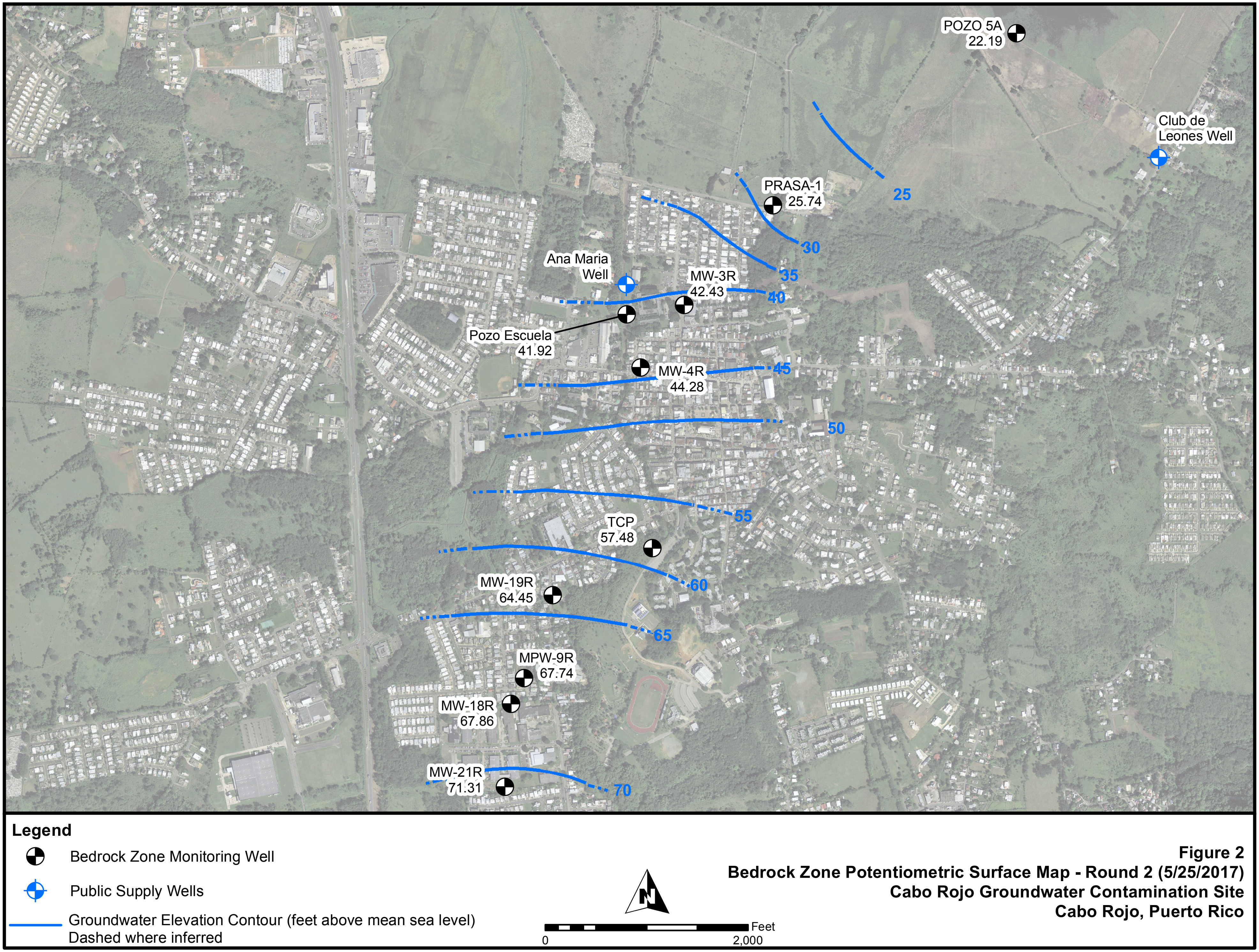
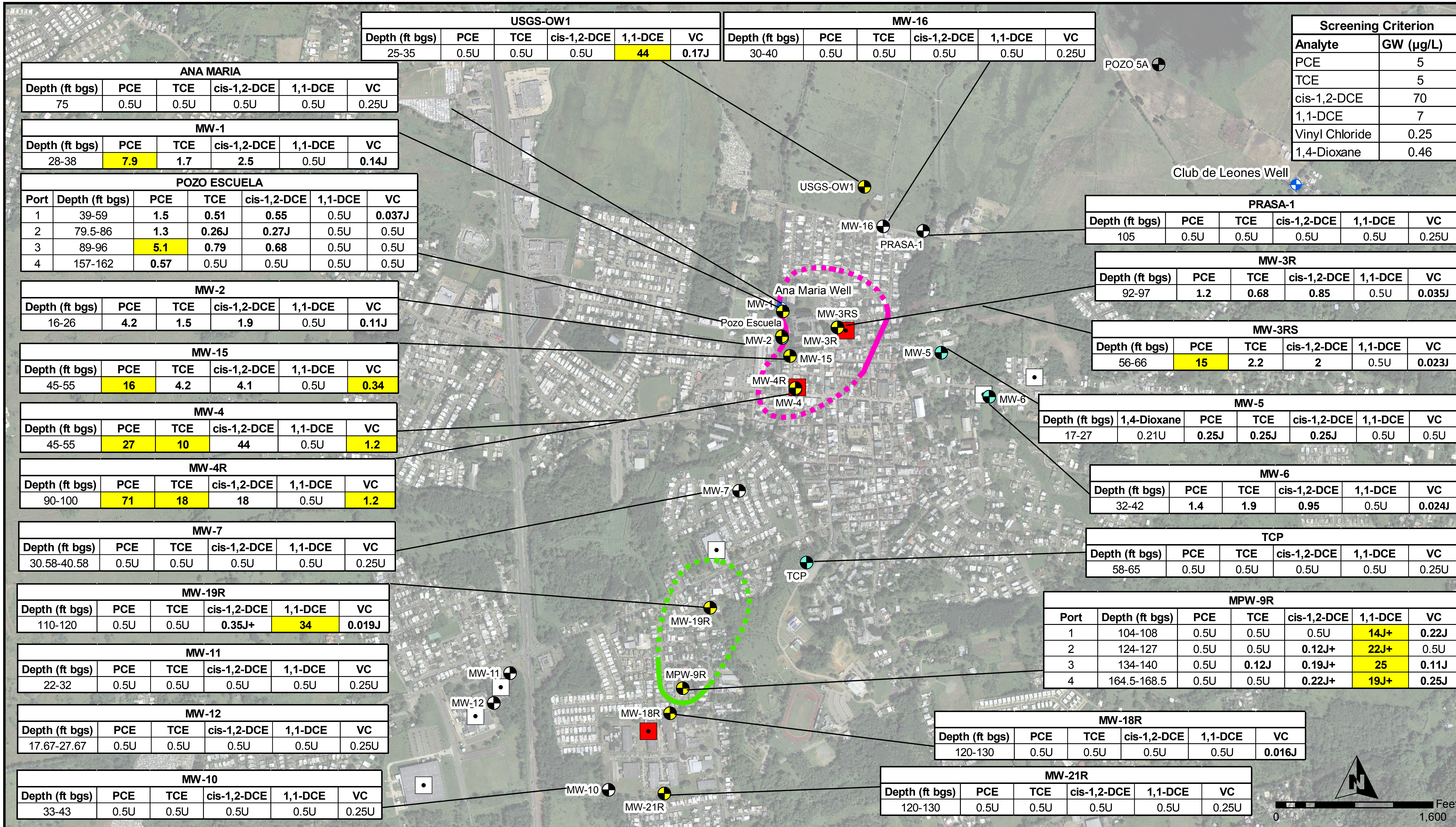


Figure 2. Direction of groundwater flow in the bedrock during Round 2 data collection.



USGS-OW1

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
25-35	0.5U	0.5U	0.5U	**44**	**0.17J**

MW-16

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
30-40	0.5U	0.5U	0.5U	0.5U	0.25U

Screening Criterion

Analyte	GW (µg/L)
PCE	5
TCE	5
cis-1,2-DCE	70
1,1-DCE	7
Vinyl Chloride	0.25
1,4-Dioxane	0.46

ANA MARIA

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
75	0.5U	0.5U	0.5U	0.5U	0.25U

MW-1

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
28-38	**7.9**	**1.7**	**2.5**	0.5U	**0.14J**

POZO ESCUELA

Port	Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
1	39-59	**1.5**	**0.51**	**0.55**	0.5U	**0.037J**
2	79.5-86	**1.3**	**0.26J**	**0.27J**	0.5U	0.5U
3	89-96	**5.1**	**0.79**	**0.68**	0.5U	0.5U
4	157-162	**0.57**	0.5U	0.5U	0.5U	0.5U

PRASA-1

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
105	0.5U	0.5U	0.5U	0.5U	0.25U

MW-3R

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
92-97	**1.2**	**0.68**	**0.85**	0.5U	**0.035J**

MW-2

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
16-26	**4.2**	**1.5**	**1.9**	0.5U	**0.11J**

MW-3RS

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
56-66	**15**	**2.2**	**2**	0.5U	**0.023J**

MW-15

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
45-55	**16**	**4.2**	**4.1**	0.5U	**0.34**

MW-5

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
17-27	0.21U	**0.25J**	**0.25J**	**0.25J**	0.5U	0.5U

MW-4

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
45-55	**27**	**10**	**44**	0.5U	**1.2**

MW-4R

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
90-100	**71**	**18**	**18**	0.5U	**1.2**

MW-6

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
32-42	**1.4**	**1.9**	**0.95**	0.5U	**0.024J**

MW-7

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
30.58-40.58	0.5U	0.5U	0.5U	0.5U	0.25U

TCP

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
58-65	0.5U	0.5U	0.5U	0.5U	0.25U

MW-19R

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
110-120	0.5U	0.5U	**0.35J+**	**34**	**0.019J**

MPW-9R

Port	Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
1	104-108	0.5U	0.5U	0.5U	**14J+**	**0.22J**
2	124-127	0.5U	0.5U	**0.12J+**	**22J+**	0.5U
3	134-140	0.5U	**0.12J**	**0.19J+**	**25**	**0.11J**
4	164.5-168.5	0.5U	0.5U	**0.22J+**	**19J+**	**0.25J**

MW-11

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
22-32	0.5U	0.5U	0.5U	0.5U	0.25U

MW-12

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
17.67-27.67	0.5U	0.5U	0.5U	0.5U	0.25U

MW-18R

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
120-130	0.5U	0.5U	0.5U	0.5U	**0.016J**

MW-10

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
33-43	0.5U	0.5U	0.5U	0.5U	0.25U

MW-21R

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
120-130	0.5U	0.5U	0.5U	0.5U	0.25U

Public Supply Wells
Confirmed Source Area
Former Potential Source Area
PCE plume contour (5 µg/L)
1,1-DCE plume contour (5 µg/L)

Groundwater Sample Results
Detection
Exceedance
Non-Detect
Not Sampled

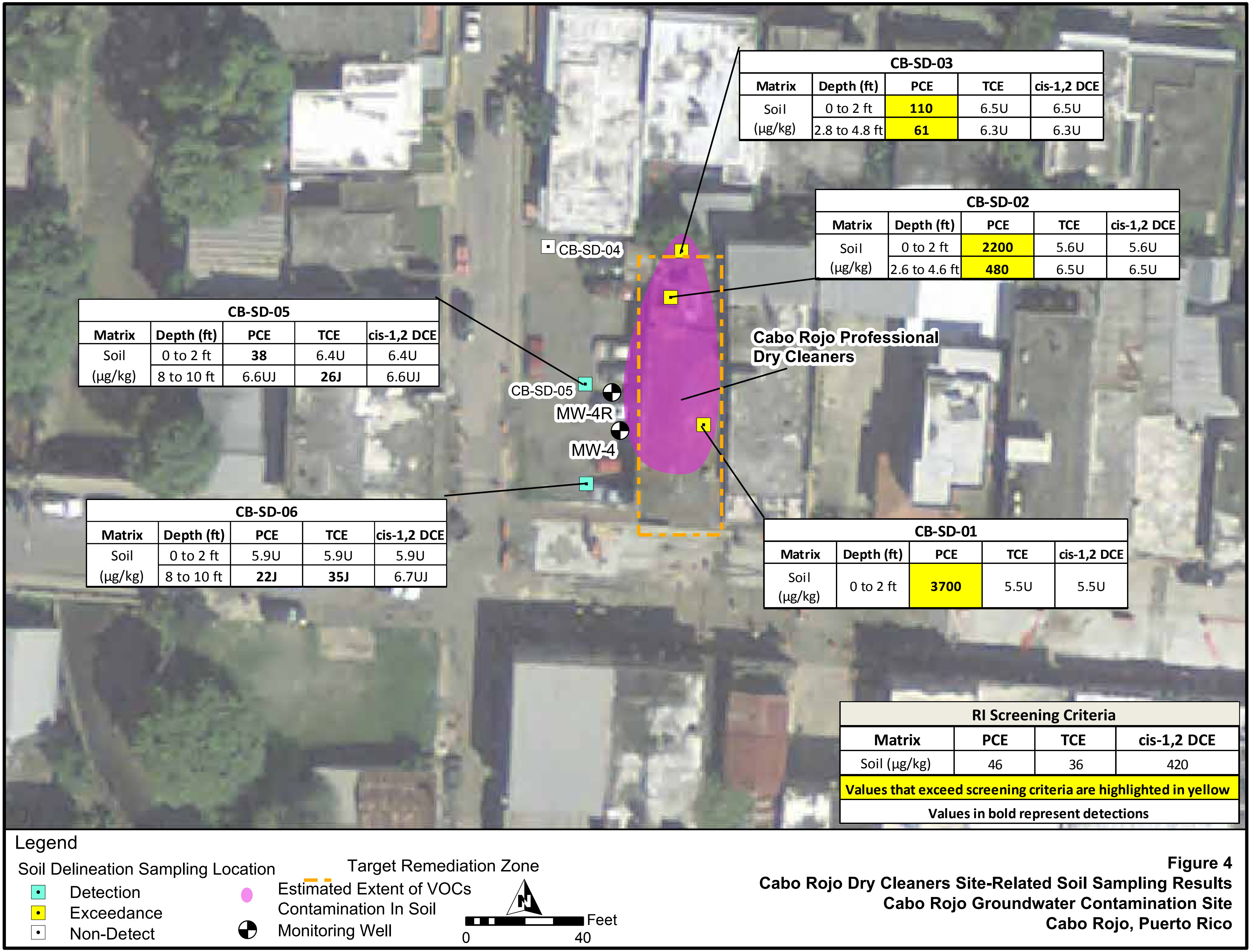
Acronyms:
PCE - tetrachloroethene
DCE - dichloroethene
TCE - trichloroethene
VC - vinyl chloride
NR - no result

µg/L - micrograms per liter
ft bgs - feet below ground surface
GW - groundwater
DUP - duplicate sample
J+ - estimated value, bias high
J- - estimated value, bias low

U - not detected; value shown is detection limit
Bolded text indicates a detection below screening criteria.
Bolded and yellow highlight indicates a detection at or above screening criteria.
Plume lines are dashed where inferred.

Figure 3
Site-Related Monitoring Well Sampling Results - Round 2
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Figure 3. Round 2 groundwater data showing an outline of Plume 1 (pink) and Plume 2 (green).



CB-SD-03

Matrix	Depth (ft)	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	0 to 2 ft	**110**	6.5U	6.5U
	2.8 to 4.8 ft	**61**	6.3U	6.3U

CB-SD-02

Matrix	Depth (ft)	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	0 to 2 ft	**2200**	5.6U	5.6U
	2.6 to 4.6 ft	**480**	6.5U	6.5U

CB-SD-05

Matrix	Depth (ft)	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	0 to 2 ft	**38**	6.4U	6.4U
	8 to 10 ft	6.6UJ	**26J**	6.6UJ

CB-SD-06

Matrix	Depth (ft)	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	0 to 2 ft	5.9U	5.9U	5.9U
	8 to 10 ft	**22J**	**35J**	6.7UJ

CB-SD-01

Matrix	Depth (ft)	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	0 to 2 ft	**3700**	5.5U	5.5U

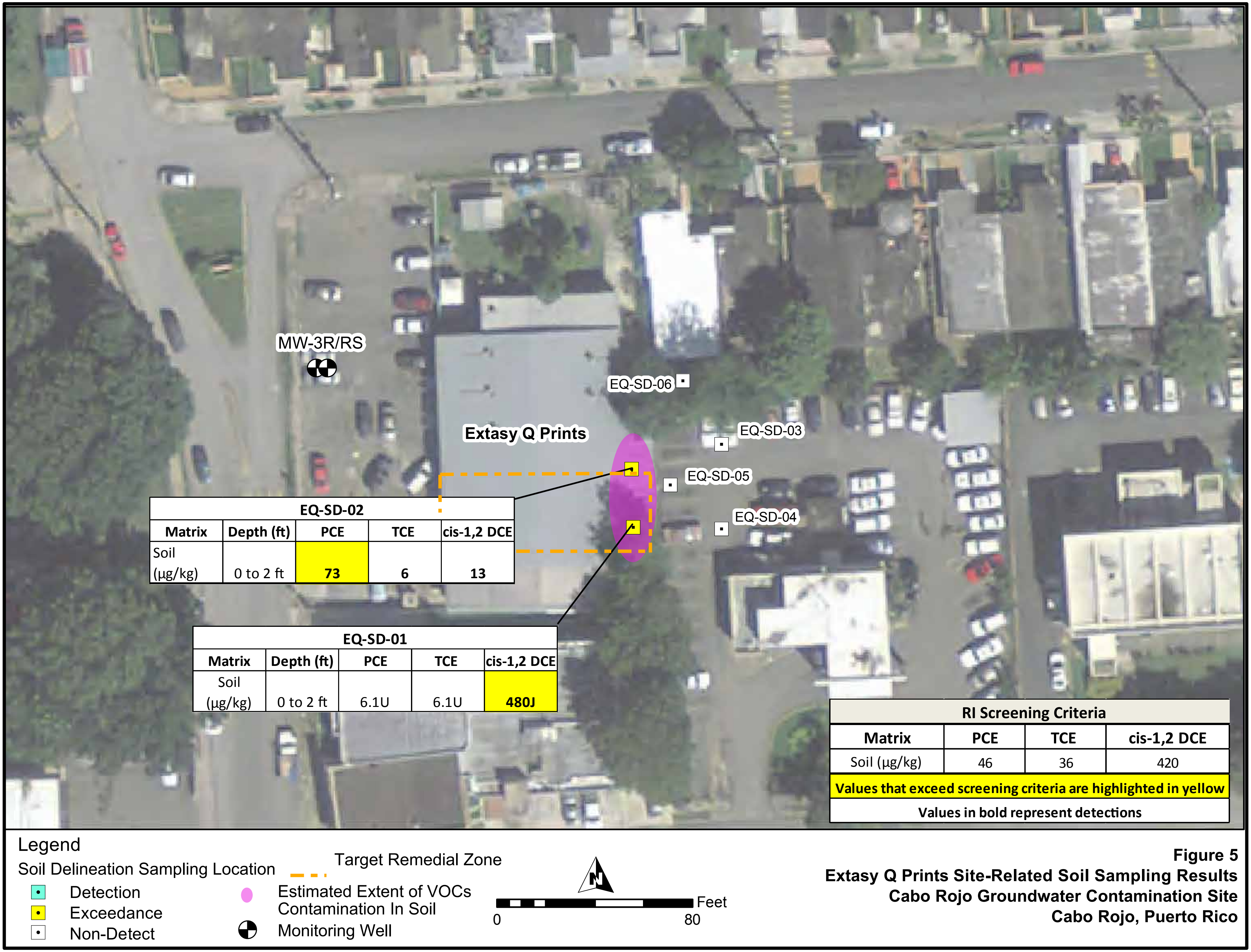
RI Screening Criteria

Matrix	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	46	36	420

Values that exceed screening criteria are highlighted in yellow

Values in bold represent detections

Figure 4. Soil sampling results at CRPDC.



EQ-SD-02				
Matrix	Depth (ft)	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	0 to 2 ft	**73**	**6**	**13**

EQ-SD-01				
Matrix	Depth (ft)	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	0 to 2 ft	6.1U	6.1U	**480J**

RI Screening Criteria			
Matrix	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	46	36	420
Values that exceed screening criteria are highlighted in yellow			
Values in bold represent detections			

Figure 5. Soil sampling results at EQP.

APPENDIX II

Tables

Table 1
Indoor Air Sample Results
Cabo Rojo Groundwater
Contamination Site Cabo Rojo,
Puerto Rico

Location	Sample ID	Sample Type	PCE	TCE	cis-1,2-DCE	Vinyl Chloride	1,1-DCE	1,4-Dioxane
Indoor Air Screening Criteria ($\mu g/m^3$)		**Residential**	10.80	0.48	NL	0.17	208.57	0.56
		Commercial	47.17	2.99	NL	2.79	876.00	2.45
VI-2	SI-IA-2-1	Indoor Air	**0.14 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-3	SI-IA-3-1	Indoor Air	**0.14 J**	**0.27**	0.16 U	0.2 U	0.16 U	0.14 U
VI-4	SI-IA-4-1	Indoor Air	0.27 U	**0.27**	0.16 U	0.2 U	0.16 U	0.14 U
VI-5	SI-IA-5-1	Indoor Air	**0.61**	**0.11 J**	**0.12 J**	0.2 U	0.16 U	0.14 U
VI-7	SI-IA-7-1	Indoor Air	**0.68**	**0.16 J**	0.16 U	0.2 U	0.16 U	0.14 U
VI-8	SI-IA-8-1	Indoor Air	**0.068 J**	**3.4**	0.16 U	0.2 U	0.16 U	0.14 U
VI-10	SI-IA-10-1	Indoor Air	**0.068 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-11	SI-IA-11-1	Indoor Air	0.27 U	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-12	SI-IA-12-1	Indoor Air	**0.54**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-13	SI-IA-13-1	Indoor Air	0.27 U	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-14	SI-IA-14-1	Indoor Air	**1.2**	**0.054 J**	0.16 U	0.2 U	0.16 U	0.14 U
VI-15	SI-IA-15-1	Indoor Air	**0.068 J**	**0.21**	0.16 U	0.2 U	0.16 U	0.14 U
VI-16	SI-IA-16-1	Indoor Air	**0.2 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-17	SI-IA-17-1	Indoor Air	**0.41**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-18	SI-IA-18-1	Indoor Air	**7.3**	**0.75**	0.16 U	0.2 U	0.16 U	0.14 U
VI-20	SI-IA-20-1	Indoor Air	**0.068 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-21	SI-IA-21-1	Indoor Air	**0.27**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-22	SI-IA-22-1	Indoor Air	**0.14 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-23	SI-IA-23-1	Indoor Air	0.54 U	0.42 U	0.31 U	0.41 U	0.31 U	0.28 U
VI-24	SI-IA-24-1	Indoor Air	**0.14 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-26	SI-IA-26-1	Indoor Air	0.27 U	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-26	SI-IA-900-2	Indoor Air	0.27 U	**0.11 J**	0.16 U	0.2 U	0.16 U	0.14 U
VI-27	SI-IA-27-1	Indoor Air	**0.068 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-28	SI-IA-28-1	Indoor Air	**0.27**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-29	SI-IA-29-1	Indoor Air	**2.5**	0.21 U	**0.12 J**	0.2 U	0.16 U	0.14 U
VI-29	SI-IA-29-2	Indoor Air	**0.41**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-30	SI-IA-30-1	Indoor Air	**0.2 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-30	SI-IA-30-2	Indoor Air	**0.34**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-31	SI-EQP-IA-1	Indoor Air	**0.75**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-31	SI-EQP-IA-2	Indoor Air	**1.6**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-31	SI-EQP-IA-3	Indoor Air	**0.27**	**0.64**	0.16 U	0.2 U	0.16 U	0.14 U
VI-31	SI-EQP-IA-4	Indoor Air	**0.27**	**0.054 J**	0.16 U	0.2 U	0.16 U	0.14 U
VI-31	SI-EQP-IA-6	Indoor Air	**16**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-31	SI-EQP-IA-7	Indoor Air	**19**	0.21 U	0.16 U	0.2 U	0.16 U	**0.11 J**
VI-32	SI-CRPDC-IA-32-1	Indoor Air	**1.8**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-32	SI-CRPDC-IA-32-2	Indoor Air	**1.7**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-33	SI-IA-33-1	Indoor Air	**0.41**	0.21 U	0.16 U	0.2 U	**0.079 J**	0.14 U
VI-33	SI-IA-33-2	Indoor Air	**0.068 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-34	SI-IA-34-1	Indoor Air	**0.14 J**	**0.11 J**	0.16 U	0.2 U	0.16 U	0.14 U
VI-AA-1	SI-EQP-AA-1	Ambient Air	**0.14 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-AA-2	SI-AA-2-1	Ambient Air	**4.4**	**0.43**	0.16 U	0.2 U	0.16 U	0.14 U
VI-AA-3	SI-AA-3-1	Ambient Air	**0.27**	**0.11 J**	0.16 U	0.2 U	0.16 U	0.14 U
VI-AA-4	SI-AA-4-1	Ambient Air	**0.54**	**0.16 J**	**0.28**	0.2 U	0.16 U	0.14 U

Abbreviations: **Compound detected**
PCE - tetrachloroethene **Compound exceeds one or both of its screening criteria**
TCE - trichloroethene NL - not listed
DCE - dichloroethene $\mu g/m^3$ - microgram per cubic meter
U - not detected ID - identification
J - estimated concentration

Table 2
Subslab Sample Results
Cabo Rojo Groundwater
Contamination Site Cabo Rojo,
Puerto Rico

Location	Sample ID	Sample Type	PCE	TCE	cis-1,2-DCE	Vinyl Chloride	1,1-DCE	1,4-Dioxane
Subslab Screening Criteria (μg/m³)		Residential	359.96	15.95	NL	5.59	6952.38	18.72
		Commercial	1572.31	99.71	NL	92.91	29200.00	81.76
VI-2	SI-SS-2-1	Subslab	**9.2**	**0.38 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-3	SI-SS-3-1	Subslab	**7.1**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-4	SI-SS-4-1	Subslab	**0.41 J**	**0.86 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-5	SI-SS-5-1	Subslab	68 U	54 U	40 U	26 U	40 U	90 U
VI-6	SI-SS-6-1	Subslab	**53**	**0.16 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-7	SI-SS-7-1	Subslab	68 U	54 U	40 U	26 U	40 U	90 U
VI-8	SI-SS-8-1	Subslab	**7**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-10	SI-SS-10-1	Subslab	**1.8**	1.1 U	0.79 U	0.51 U	0.79 U	**0.36 J**
VI-11	SI-SS-11-1	Subslab	**0.68 J**	**3.4**	0.79 U	0.51 U	0.79 U	1.8 U
VI-12	SI-SS-12-1	Subslab	**77**	**0.48 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-13	SI-SS-13-1	Subslab	**1,000**	**3.3**	0.79 U	0.51 U	0.79 U	1.8 U
VI-14	SI-SS-14-1	Subslab	**67**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-15	SI-SS-15-1	Subslab	**90**	**0.21 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-16	SI-SS-16-1	Subslab	**26**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-17	SI-SS-17-1	Subslab	**9.7**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-18	SI-SS-18-1	Subslab	**9.5 J**	21 U	16 U	10 U	16 U	36 U
VI-20	SI-SS-20-1	Subslab	**0.54 J**	**0.16 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-21	SI-SS-21-1	Subslab	**1.2 J**	1.1 U	0.79 U	0.51 U	0.79 U	**0.32 J**
VI-22	SI-SS-22-1	Subslab	**0.47 J**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-23	SI-SS-23-1	Subslab	**7.5**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-24	SI-SS-24-1	Subslab	**6**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-26	SI-SS-26-1	Subslab	**15**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-27	SI-SS-27-1	Subslab	**0.61 J**	**0.11 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-28	SI-SS-28-1	Subslab	**1 J**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-29	SI-SS-29-1	Subslab	**340**	**0.81 J**	4 U	2.6 U	4 U	9 U
VI-29	SI-SS-29-2	Subslab	**4.7 J**	**7 J**	**2.8 J**	5.1 UJ	7.9 UJ	18 U
VI-29	SI-SS-29-3	Subslab	**1400**	**4.8 J**	7.9 U	5.1 UJ	7.9 UJ	18 U
VI-30	SI-SS-30-1	Subslab	**0.27 J**	1.1 U	0.79 U	0.51 U	0.79 U	**0.65 J**
VI-30	SI-SS-30-2	Subslab	**2**	1.1 U	0.79 U	0.51 U	0.79 U	**0.79 J**
VI-31	SI-EQP-SS-1	Subslab	**2,900**	**11 J**	40 U	26 U	40 U	90 U
VI-31	SI-EQP-SS-2	Subslab	**2,600**	**0.64 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-31	SI-EQP-SS-3	Subslab	**2,300**	**0.54 J**	0.79 U	0.51 U	0.79 U	**0.18 J**
VI-31	SI-EQP-SS-4	Subslab	**6,600**	**1.2**	0.79 U	0.51 U	0.79 U	1.8 U
VI-31	SI-EQP-SS-5	Subslab	**1,500**	**3.7**	0.79 U	0.51 U	0.79 U	1.8 U
VI-31	SI-EQP-SS-6	Subslab	**9,400**	**110 J**	**0.36 J**	0.51 U	0.79 U	1.8 U
VI-31	SI-EQP-SS-7	Subslab	**9,000**	**7.6**	0.79 U	0.51 U	0.79 U	**0.43 J**
VI-32	SI-CRPDC-SS-32-1	Subslab	**240,000**	**83**	40 U	26 U	40 U	90 U
VI-32	SI-CRPDC-SS-32-2	Subslab	**40,000**	**40 J**	40 U	26 U	40 U	90 U
VI-32	SI-CRPDC-SS-32-3	Subslab	**8,800**	**32 J**	40 U	26 U	40 U	90 U
VI-32	SI-CRPDC-SS-32-4	Subslab	**600**	11 U	7.9 U	5.1 U	7.9 U	18 U
VI-33	SI-SS-33-1	Subslab	**15**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-33	SI-SS-33-2	Subslab	**97**	1.1 U	0.79 U	0.51 U	0.79 U	**3.6**
VI-34	SI-SS-34-1	Subslab	**250**	**0.21 J**	0.79 U	0.51 U	0.79 U	**0.14 J**

Abbreviations: **Compound detected**
PCE - tetrachloroethene **Compound exceeds one or both of its screening criteria**
TCE - trichloroethene NL - not listed
DCE - dichloroethene μg/m³ - microgram per cubic meter
U - not detected ID - identification
J - estimated concentration

Table 3
Summary of Chemicals of Concern and
Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point[2]	Chemical of Concern	Concentration Detected		Concentration Units	Frequency of Detection	Exposure Point Concentration (EPC)[1]	EPC Units	Statistical Measure
		Minimum	Maximum					
Tap Water - Plume 1	cis-1,2-dichloroethylene	1.5	410	µg/l	12 / 12	377	µg/l	99% Chebyshev (Mean, Sd) UCL
	Tetrachloroethylene	1.2	530	µg/l	12 / 12	248	µg/l	95% Chebyshev (Mean, Sd) UCL
	Trichloroethylene	0.79	140	µg/l	12 / 12	65	µg/l	95% Chebyshev (Mean, Sd) UCL
	Vinyl chloride	0.023 (J)	65	µg/l	8 / 12	61	µg/l	99% KM (Chebyshev) UCL

Footnotes:
(1) 95% UCLs were calculated using ProUCL version 5.1 for constituent data sets with a sample size greater than or equal to 10 samples and 5 or more detects.
(2) Although risks were quantitatively evaluated for Plume 2 receptors, the resulting risks were within or below the target risk range ($1x10^{-6}$ to $1x10^{-4}$) and below the noncancer hazard index threshold of 1. However, 1,1-dichloroethene is also considered a chemical of concern since it was detected above the Puerto Rico Water Quality Standard and Federal MCL (7 µg/L) in this exposure area.

Definitions:
EPC = exposure point concentration
J = estimated value (qualifier)
UCL = upper confidence limit
µg/l = microgram per liter

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 4
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor (Age)	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/ Future	Soil	Surface Soil	EQP, CRPDC, DEFDC, Serrano II, PRIDCO East, PRIDCO West	Worker	Adult	Dermal	None	Workers may contact surface soil through incidental ingestion, dermal contact, and inhalation of particulates and/or volatiles while working at the site. Concentrations detected in surface soil were below risk-based screening criteria.
						Ingestion	None	
						Inhalation	None	
				Trespassers	Adolescent (12 to <18 yrs)	Dermal	None	Trespassers may contact surface soil through incidental ingestion, dermal contact, and inhalation of particulates and/or volatiles while working at the site. Concentrations detected in surface soil were below risk-based screening criteria.
						Ingestion	None	
						Inhalation	None	
	Surface Water	Surface Water	Drainage Ways	Recreational User	Adolescent (12 to <18 yrs)	Dermal	None	Recreational users may contact surface water through incidental ingestion and dermal contact. Concentrations detected in surface water were, however, below risk-based screening criteria.
						Ingestion	None	
	Sediment	Sediment	Drainage Ways	Recreational User	Adolescent (12 to <18 yrs)	Dermal	None	Recreational users may contact sediment through incidental ingestion and dermal contact. Concentrations detected in sediment were, however, below risk-based screening criteria.
						Ingestion	None	
	Groundwater	Indoor Air	Indoor Air	Worker	Adult	Inhalation	Qualitative	Workers may be exposed to contaminants in indoor air via vapor intrusion. Indoor air and sub-slab concentrations were screened against commercial vapor intrusion screening levels in the risk assessment.
Future	Groundwater	Groundwater[1]	Tap Water	Resident	Adult and Child (birth to <6 yrs)	Dermal	Quantitative	Residents are currently using groundwater from the public water supply for all their household needs. If wells are installed within the plume(s) of site contamination, or if the public water treatment systems fail or are otherwise bypassed, residents may be exposed to contaminants in groundwater used as tapwater.
						Ingestion	Quantitative	
						Inhalation	Quantitative	
				Worker	Adult	Ingestion	Quantitative	Businesses are currently using groundwater from the public water supply. If wells are installed within the plume(s) of site contamination, or if the public water treatment systems fail or are otherwise bypassed, workers may be exposed to contaminants in groundwater used as tapwater at work.
		Indoor Air	Indoor Air	Resident	Adult and Child (birth to <6 yrs)	Inhalation	Qualitative	If commercial properties are redeveloped for residential use, residents may be exposed to contaminants in indoor air via vapor intrusion. Current sub-slab and indoor air concentrations were screened against residential vapor intrusion screening levels in the risk assessment.
	Soil	Surface and Subsurface Soil	EQP, CRPDC, DEFDC, Serrano II, PRIDCO East, PRIDCO West	Construction Worker	Adult	Dermal	None	If construction occurs in the future, construction workers may contact surface and subsurface soil while working at the site. Concentrations detected in soil were, however, below risk-based screening criteria.
						Ingestion	None	
						Inhalation	None	
		Surface Soil	EQP, CRPDC, DEFPDC, Serrano II, PRIDCO East, PRIDCO West	Resident	Adult and Child (birth to <6 yrs)	Dermal	None	If commercial properties are redeveloped for residential use, residents may contact surface soil through incidental ingestion, dermal contact, and inhalation of airborne particulates while at their residence. Concentrations detected in surface soil were, however, below risk-based screening criteria.
						Ingestion	None	
						Inhalation	None	

Footnotes:
(1) Two plumes of contamination were identified at the Site. Exposures and risks were estimated separately for each plume assuming future supply wells may be installed within the core of each plume.

Definitions:
EQP = Extasy Q Prints
CRPDC = Cabo Rojo Professional Dry Cleaners
PRIDCO = Puerto Rico Industrial Development Company
DEFDC = D'Elegant Fantastic Dry Cleaners

Summary of Selection of Exposure Pathways

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

Table 5
Non-Carcinogenic Toxicity Data Summary

Pathway: Ingestion/Dermal

Chemicals of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Absorp. Efficiency (Dermal)[1]	Adjusted RfD (Dermal)	Adjusted Dermal RfD Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD Target Organ	Dates of RfD[2]
cis-1,2-dichloroethylene	Chronic	0.002	mg/kg-day	1	0.002	mg/kg-day	Kidney	3,000	IRIS	12/15/2017
Tetrachloroethylene	Chronic	0.006	mg/kg-day	1	0.006	mg/kg-day	Neurological/Liver/ Kidney	1,000	IRIS	12/15/2017
Trichloroethylene	Chronic	0.0005	mg/kg-day	1	0.0005	mg/kg-day	Heart/Immunological/ Developmental/Kidney	10 to 1,000	IRIS	12/15/2017
Vinyl chloride	Chronic	0.003	mg/kg-day	1	0.003	mg/kg-day	Liver	30	IRIS	12/15/2017

Pathway: Inhalation

Chemicals of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfC Target Organ	Dates of RfC[2]
cis-1,2-dichloroethylene	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethylene	Chronic	0.04	mg/m^3	Neurological/Liver/Kidney	1,000	IRIS	12/15/2017
Trichloroethylene	Chronic	0.002	mg/m^3	Heart/Immunological/Liver	10 to 100	IRIS	12/15/2017
Vinyl chloride	Chronic	0.1	mg/m^3	Liver	30	IRIS	12/15/2017

Footnotes:
(1) Source: Risk Assessments Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part E). Section 4.2 and Exhibit 4-1.
(2) Dates reflect when the source was searched and not the publication date.

Definitions:
IRIS = Integrated Risk Information System
mg/kg-day = milligram per kilogram per day
mg/m^3 = milligram per cubic meter
NA = not available
RfC = reference concentration
RfD = reference dose

Summary of Toxicity Assessment

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

Table 6
Cancer Toxicity Data Summary

Pathway: Ingestion/ Dermal

Chemical of Concern	Oral Cancer Slope Factor	Units	Adjusted Cancer Slope Factor (for Dermal)	Slope Factor Units	Weight of Evidence/Cancer Guideline[1]	Source	Date[2]
cis-1,2-dichloroethylene	NA	NA	NA	NA	Inadequate information to assess carcinogenic potential	IRIS	12/15/2017
Tetrachloroethylene	2.1E-03	$(mg/kg\text{-}day)^{-1}$	2.1E-03	$(mg/kg\text{-}day)^{-1}$	likely to be carcinogenic to humans	IRIS	12/15/2017
Trichloroethylene[3]	4.6E-02	$(mg/kg\text{-}day)^{-1}$	4.6E-02	$(mg/kg\text{-}day)^{-1}$	carcinogenic to humans	IRIS	12/15/2017
Vinyl chloride	7.2E-01	$(mg/kg\text{-}day)^{-1}$	7.2E-01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	12/15/2017

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline[1]	Source	Date[2]
cis-1,2-dichloroethylene	NA	NA	NA	NA	Inadequate information to assess carcinogenic potential	NA	NA
Tetrachloroethylene	2.60E-07	$(mg/kg\text{-}day)^{-1}$	NA	NA	likely to be carcinogenic to humans	IRIS	12/15/2017
Trichloroethylene[4]	4.10E-06	$(mg/kg\text{-}day)^{-1}$	NA	NA	carcinogenic to humans	IRIS	12/15/2017
Vinyl chloride	4.4E-06	$(mg/kg\text{-}day)^{-1}$	NA	NA	A	IRIS	12/15/2017

Footnotes:

(1) Weight of evidence information obtained from IRIS. Categories are as follows:

A=Known human carcinogen

B2=Probable human carcinogen based on sufficient evidence of carcinogenicity in animals

C=Possible human carcinogen

D=Not classifiable due to lack of animal bioassays and human studies

(2) Dates reflect when the source was searched and not the publication date.

(3) The slope factor is adult-based. TCE is carcinogenic by a mutagenic mode of action for induction of kidney tumors. The kidney lifetime oral slope factor is 9.3×10^{-3} per mg/kg-day.

(4) The inhalation unit risk is adult-based. TCE is carcinogenic by a mutagenic mode of action for induction of kidney tumors. The kidney lifetime unit risk is 1.0×10^{-6} per $\mu g/m^3$.

Definitions:

IRIS = Integrated Risk Information System

IUR = inhalation unit risk

NA = not available

(mg/kg-day)-1 = per milligrams per kilogram per day

$(\mu g/m^3)^{-1}$ = per micrograms per cubic meter

Summary of Toxicity Assessment

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

Table 7
Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident (Plume 1)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Primary Target Organ(s)	Non-Carcinogenic Hazard Quotient			
					Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater[2]	Groundwater	Tap Water	cis-1,2-dichloroethylene	Kidney	9.4	NA	NA	9.4
			Tetrachloroethylene	Neurological/Liver/ Kidney	2.1	1.2	3.7	6.9
			Trichloroethylene	Heart/Immunological/ Developmental/Kidney/Liver	6.5	1.1	2.3	27.9
			Vinyl chloride	Liver	1.0	0.1	0.4	1.5
							Groundwater Hazard Index Total[1]=	**48**
							Receptor Hazard Index[1]=	**48**
							Neurological HI =	**7**
							Developmental HI =	**28**
							Heart HI =	**28**
							Immune System HI =	**28**
							Kidney HI =	**44**
							Liver HI =	**36**
							Lung HI =	**1**

Scenario Timeframe: Future
Receptor Population: Worker (Plume 1)
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Primary Target Organ(s)	Non-Carcinogenic Hazard Quotient	
					Ingestion	Exposure Routes Total
Groundwater[2]	Groundwater	Tap Water	cis-1,2-dichloroethylene	Kidney	4	4
			Trichloroethylene	Heart/Immunological/ Developmental/Kidney/Liver	2.8	2.8
					Groundwater Hazard Index Total[1]=	**9**
					Receptor Hazard Index[1]=	**9**
					Neurological HI =	**1**
					Developmental HI =	**3**
					Heart HI =	**3**
					Immune System HI =	**3**
					Kidney HI =	**8**
					Liver HI =	**4**

Footnotes:
(1) The HI represents the summed HQs for all chemicals of potential concern at the site, not just those requiring remedial action (i.e., the chemicals of concern [COCs]) which are shown in this table.
(2) Noncarcinogenic hazards were also evaluated for the resident and worker within Plume 2, however, the resulting hazards were below the target HI of 1. 1,1-Dichloroethene is still considered a COC since it was detected above the Puerto Rico Water Quality Standard and Federal MCL (7 µg/L).

Definitions:
HI = Hazard Index
HQ = Hazard Quotient
MCL = Maximum Contaminant Level
NA = not available
µg/L = microgram per liter

Table 8
Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident (Plume 1)
Receptor Age: Child and Adult

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Carcinogenic Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater[2]	Groundwater	Tap Water	Trichloroethylene	6.E-05	9.E-06	1.E-04	2.E-04
			Vinyl chloride	3.E-03	1.E-04	9.E-03	1.E-02
						Exposure Medium Total=	**1.E-02**
						Total Risk[1]=	**1.E-02**

Scenario Timeframe: Future
Receptor Population: Worker (Plume 1)
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Carcinogenic Risk	
				Ingestion	Exposure Routes Total
Groundwater[2]	Groundwater	Tap Water	Vinyl chloride	3.E-04	3.E-04
				Exposure Medium Total=	**4.E-04**
				Total Risk[1]=	**4.E-04**

Footnotes:
(1) Total Risk values represent cumulative estimates from exposure to all chemicals of potential concern at the site, not just those requiring remedial action (*i.e.*, the chemicals of concern [COCs]) which are shown in this table.
(2) Cancer risks were also evaluated for the resident and worker within Plume 2, however, the resulting risks were below or within the target risk range. 1,1-Dichloroethene is still considered a COC since it was detected above the Puerto Rico Water Quality Standard and Federal MCL (7 µg/L).

Definitions:
MCL = Maximum Contaminant Level
NA = not available
µg/L = microgram per liter

Table 9
Risk Screening Summary - Vapor Intrusion

Chemical of Concern[1]	Unit	Sub-slab Vapor VISL[2]	Indoor Air VISL[2]	Sub-slab Vapor Results[3]	Indoor Air Results[3]
cis-1,2-dichloroethylene[4]	µg/m^3	NL	NL	2.8 (J)	0.28
Tetrachloroethylene	µg/m^3	1,572	47	240,000	19
Trichloroethylene	µg/m^3	100	3	110 (J)	3.4
Vinyl chloride	µg/m^3	93	2.8	ND	ND
1,1-dichloroethene	µg/m^3	29,200	876	ND	0.07 (J)

Footnotes:
(1) Although results of the data collected indicate that elevated sub-slab vapor and indoor air concentrations were primarily associated with tetrachloroethylene and trichloroethylene, results for each of the chemicals of concern in groundwater are presented.
(2) Since elevated sub-slab vapor and indoor air concentrations were predominantly observed at the CRPDC and EQP source areas, the EPA Vapor Intrusion Screening Levels for sub-slab and indoor air displayed are based on future commercial exposure at a target risk of $1x10^{-6}$ for carcinogens and a target hazard quotient of 1 for noncarcinogens, as calculated using the online EPA VISL calculator.
(3) Sub-slab and indoor air samples were collected by EPA in 2012, 2013 and 2017. The results presented include the maximum detections identified from the most recent round of sampling.
(4) No VISLs have been established for cis-1,2-dichloroethylene in sub-slab vapor or indoor air.

Definitions:
CRPDC = Cabo Rojo Professional Dry Cleaners
EPA = Environmental Protection Agency
EQP = Extasy Q Prints
J = estimated value (qualifier)
ND = not detected in any sample above the reporting limit
NL = not listed
µg/m^3 = microgram per cubic meter
VISL = Vapor Intrusion Screening Level

Table 10, Remediation Goals for Soil

Contaminant of Concern	Soil Protective of Groundwater	PRG	Maximum Detected Concentration
	µg/kg	µg/kg	µg/kg
cis-1,2-DCE	417	417	480J
PCE	132	132	3,700
TCE	141	141	35J

J - Estimated result

Table 11, Remediation Goals for Groundwater

Contaminant of Concern	EPA MCLs (µg/L)	PR Water Quality Standard (µg/L)	PRG (µg/L)	MDC Plume 1 (µg/L)	MDC Plume 2 (µg/L)
1,1-DCE	7	7	7	0.54	40
cis-1,2-DCE	70	NL	70	93	0.27J
PCE	5	5	5	96	ND
TCE	5	5	5	35	0.79
Vinyl chloride	2	0.25	0.25	0.28	0.28

ND - Not detected
NL - Not Listed
MCL - Maximum Contaminant Levels
MDC - Maximum Detected Concentration

Table 12 - Screening Levels for Vapor Intrusion		
Contaminant of Concern	**Commercial Screening Level**	**Maximum Detected Concentrations**
	µg/m³	**µg/m³**
Sub-Slab		
1,1-DCE	29,200	ND
Vinyl chloride	93	ND
Cis 1,2-DCE	NL	2.8J
PCE	1,572	240,000
TCE	100	110J
Indoor Air		
1,1-DCE	876	0.079J
Vinyl chloride	2.8	ND
Cis-1,2-DCE	NL	0.28
PCE	47	19
TCE	3	3.4

Table 13
Cost Estimate Summary
Selected Remedy
Cabo Rojo Groundwater
Contamination Site
Cabo Rojo, Puerto Rico

	Description	Cost
CAPITAL COSTS		
1	General Requirements	$738,000
2&3	DPE System Construction and Startup	$957,000
4	First Year DPE Operation and Maintenance	$354,000
	Subtotal	*$2,049,000*
	Contingency 20%	$410,000
	Subtotal	*$2,459,000*
	Administrative	$330,000
	Total Remedial Action Capital Costs	**$2,789,000**
OPERATION AND MAINTENANCE COSTS		
5	Annual O&M for DPE System Operating Intermittently	$279,000
	Present worth of O&M Years 2-5 Operation	$884,000
6	Present worth of DPE Performance Evaluation (Year 5)	$63,000
7	Annual Monitoring Cost for Plume #1 and Plume #2	$126,000
	Present worth of Monitoring (30 Years)	$1,564,000
PRESENT WORTH		
	Total Capital Cost	$2,789,000
	Total O&M Cost	$2,511,000
	Total Present Worth	**$5,300,000**

Note: The project cost presented above represent a Feasibility Study-level estimate. Costs are subject to change pending the results of the pre-design investigation. Expected accuracy range of the cost estimate is -30% to +50%. Present worth calculation assumes 7% discount rate after inflation is considered.

Table 14
Chemical-specific ARARs, TBCs, Other Criteria, and Guidance
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Regulatory Level	Name	Synopsis
Federal	EPA Regional Screening Levels (RSLs) (November 2017)	Establishes risk-based screening levels for the protection of human health.
Federal	National Primary Drinking Water Standards (40 CFR Part 141), Maximum Contaminant Levels (MCLs)	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.
Federal	Clean Water Act, Ambient Water Quality Criteria (40 CFR Part 131)	Sets criteria for water quality based on protection of human health and protection of aquatic life.
Federal	OSWER Vapor Intrusion Assessment: Vapor Intrusion Screening Level (VISL) Calculator Version 3.0, November 2012 RSLs	Along with RSLs, provides screening values that can be used to address vapor intrusion concerns using groundwater, soil gas (exterior to buildings and sub-slab), and indoor air concentrations.
Commonwealth of Puerto Rico	Puerto Rico Water Quality Standards (PRWQS) Regulation, August 2014	This regulation exists 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, surface, estuarine, wetlands, and ground waters of Puerto Rico.

ARARs - Applicable or relevant and Appropriate Requirements
TBC- To be Considered Criteria
CFR - Code of Federal Regulations
PRGs - Preliminary Remediation Goals
OSWER - Office of Solid Waste and Emergency Response
MCLs - Maximum Contaminant Levels

Table 15
Location-specific ARARs, TBCs, Other Criteria, and Guidance
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Regulatory Level	Name	Synopsis
Federal	National Historic Preservation Act Regulations (36 C.F.R. Part 800)	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.

ARARs - Applicable or relevant and Appropriate Requirements
TBC- To be Considered Criteria
CFR - Code of Federal Regulations
PRGs - Preliminary Remediation Goals
OSWER - Office of Solid Waste and Emergency Response
MCLs - Maximum Contaminant Levels

Table 16
Action-specific ARARs, TBCs, Other Criteria, and Guidance
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Regulatory Level	Name	Synopsis
Federal	OSHA Recording and Reporting Occupational Injuries and Illnesses (29 CFR 1904)	This regulation outlines the record keeping and reporting requirements for an employer under OSHA.
Federal	OSHA Occupational Safety and Health Standards (29 CFR Part 1910)	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.
Federal	OSHA Safety and Health Regulations for Construction (29 CFR Part 1926)	This regulation specifies the type of safety equipment and procedures to be followed during site remediation.
Federal	RCRA Identification and Listing of Hazardous Wastes (40 CFR Part 261)	This regulation describes methods for identifying hazardous wastes and lists known hazardous wastes.
Federal	RCRA Standards Applicable to Generators of Hazardous Wastes (40 CFR Part 262)	Describes standards applicable to generators of hazardous wastes.
Federal	RCRA Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities – General Facility Standards (40 CFR Parts 264.10–264.19)	This regulation lists general facility requirements including general waste analysis, security measures, inspections, and training requirements.
Commonwealth of Puerto Rico	Regulation of the Puerto Rico Environmental Quality Board (PREQB) for the Prevention and Control of Noise Pollution	This standard provides the standards and requirements for noise control.
Commonwealth of Puerto Rico	Puerto Rico's Anti-degradation Policy set forth in Puerto Rico’s Water Quality Standards	Conserve, maintain and protect the designated and existing uses of the waters of Puerto Rico. The water quality necessary to protect existing uses, including threatened and endangered species shall be maintained and protected.

ARARs - Applicable or relevant and Appropriate Requirements
TBC- To be Considered Criteria
CFR - Code of Federal Regulations
PRGs - Preliminary Remediation Goals
OSWER - Office of Solid Waste and Emergency Response
MCLs - Maximum Contaminant Levels

Table 16 (continued)
Action-specific ARARs, TBC, Other Criteria, and Guidance
Cabo Rojo Groudwater Contamination Site
Cabo Rojo, Puerto Rico

Regulatory Level	Name	Synopsis
General - Site Remediation		
Federal	Department of Transportation (DOT) Rules for Transportation of Hazardous Materials (49 CFR Parts 107, 171, 172, 177 to 179)	This regulation outlines procedures for the packaging, labeling, manifesting, and transporting hazardous materials.
Federal	RCRA Standards Applicable to Transporters of Hazardous Waste (40 CFR Part 263)	Establishes standards for hazardous waste transporters.
Federal	RCRA Land Disposal Restrictions (40 CFR Part 268)	This regulation identifies hazardous wastes restricted for land disposal and provides treatment standards for land disposal.
Federal	RCRA Hazardous Waste Permit Program (40 CFR Part 270)	This regulation establishes provisions covering basic EPA permitting requirements.
Commonwealth of Puerto Rico	PREQB Regulation for the Control of Non-Hazardous Solid Waste (November 1997)	This regulation establishes standards for the generation, management, transportation, recovery, disposal and management of non- hazardous solid waste.
Commonwealth of Puerto Rico	PREQB Regulation for the Control of Hazardous Solid Waste (September 1998)	This regulation establishes standards for management and disposal of hazardous wastes.

ARARs - Applicable or relevant and Appropriate Requirements
TBC- To be Considered Criteria
CFR - Code of Federal Regulations
PRGs - Preliminary Remediation Goals
OSWER - Office of Solid Waste and Emergency Response
MCLs - Maximum Contaminant Levels

Table 16 (continued)
Action-specific ARARs, TBCs, Other Criteria, and Guidance
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Regulatory Level	Name	Synopsis
Federal	National Pollutant Discharge Elimination System (NPDES) (40 CFR Parts 100, *et seq.*)	NPDES permit requirements for point source discharges must be met, including the NPDES Best Management Practice (BMP) Program. These regulations include, but are not limited to, requirements for compliance with water quality standards, a discharge monitoring system, and records maintenance.
Federal	Safe Drinking Water Act – Underground Injection Control (UIC) Program (40 CFR Parts 144 and 146)	Establish performance standards, well requirements, and permitting requirements for groundwater re-injection wells.
Commonwealth of Puerto Rico	Puerto Rico Water Quality Standards (PRWQS) Regulation, August 2014	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, surface, estuarine, wetlands, and ground waters of Puerto Rico.

ARARs - Applicable or relevant and Appropriate Requirements
TBC- To be Considered Criteria
CFR - Code of Federal Regulations
PRGs - Preliminary Remediation Goals
OSWER - Office of Solid Waste and Emergency Response
MCLs - Maximum Contaminant Levels

Table 16 (continued)
Action-specific ARARs, TBCs, Other Criteria, and Guidance
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Regulatory Level	ARARs	Synopsis
Federal	Clean Air Act (CAA)—National Ambient Air Quality Standards (NAAQs) (40 CFR Part 50-52, 60, and 40)	These provide air quality standards for particulate matter, lead, NO_2, SO_2, CO, and volatile organic matter.
Federal	Standards of Performance for New Stationary Sources (40 CFR Part 60)	Set the general requirements for air quality.
Federal	National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61)	These provide air quality standards for hazardous air pollutants.
Federal	Federal Directive - Control of Air Emissions from Superfund Air Strippers (OSWER Directive 9355.0-28)	Provides guidance on control of air emissions from air strippers used at Superfund Sites for groundwater treatment.
Commonwealth of Puerto Rico	PREQB Regulation for the Control of Atmospheric Pollution (2012)	Describes requirements and procedures for obtaining air permits and certificates; rules that govern the emission of contaminants into the ambient atmosphere.

ARARs - Applicable or relevant and Appropriate Requirements
TBC- To be Considered Criteria
CFR - Code of Federal Regulations
PRGs - Preliminary Remediation Goals
OSWER - Office of Solid Waste and Emergency Response
MCLs - Maximum Contaminant Levels

APPENDIX II

Tables

Table 1
Indoor Air Sample Results
Cabo Rojo Groundwater
Contamination Site Cabo Rojo,
Puerto Rico

Location	Sample ID	Sample Type	PCE	TCE	cis-1,2-DCE	Vinyl Chloride	1,1-DCE	1,4-Dioxane
Indoor Air Screening Criteria (µg/m³)		**Residential**	10.80	0.48	NL	0.17	208.57	0.56
		Commercial	47.17	2.99	NL	2.79	876.00	2.45
VI-2	SI-IA-2-1	Indoor Air	**0.14 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-3	SI-IA-3-1	Indoor Air	**0.14 J**	**0.27**	0.16 U	0.2 U	0.16 U	0.14 U
VI-4	SI-IA-4-1	Indoor Air	0.27 U	**0.27**	0.16 U	0.2 U	0.16 U	0.14 U
VI-5	SI-IA-5-1	Indoor Air	**0.61**	**0.11 J**	**0.12 J**	0.2 U	0.16 U	0.14 U
VI-7	SI-IA-7-1	Indoor Air	**0.68**	**0.16 J**	0.16 U	0.2 U	0.16 U	0.14 U
VI-8	SI-IA-8-1	Indoor Air	**0.068 J**	**3.4**	0.16 U	0.2 U	0.16 U	0.14 U
VI-10	SI-IA-10-1	Indoor Air	**0.068 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-11	SI-IA-11-1	Indoor Air	0.27 U	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-12	SI-IA-12-1	Indoor Air	**0.54**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-13	SI-IA-13-1	Indoor Air	0.27 U	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-14	SI-IA-14-1	Indoor Air	**1.2**	**0.054 J**	0.16 U	0.2 U	0.16 U	0.14 U
VI-15	SI-IA-15-1	Indoor Air	**0.068 J**	**0.21**	0.16 U	0.2 U	0.16 U	0.14 U
VI-16	SI-IA-16-1	Indoor Air	**0.2 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-17	SI-IA-17-1	Indoor Air	**0.41**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-18	SI-IA-18-1	Indoor Air	**7.3**	**0.75**	0.16 U	0.2 U	0.16 U	0.14 U
VI-20	SI-IA-20-1	Indoor Air	**0.068 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-21	SI-IA-21-1	Indoor Air	**0.27**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-22	SI-IA-22-1	Indoor Air	**0.14 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-23	SI-IA-23-1	Indoor Air	0.54 U	0.42 U	0.31 U	0.41 U	0.31 U	0.28 U
VI-24	SI-IA-24-1	Indoor Air	**0.14 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-26	SI-IA-26-1	Indoor Air	0.27 U	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-26	SI-IA-900-2	Indoor Air	0.27 U	**0.11 J**	0.16 U	0.2 U	0.16 U	0.14 U
VI-27	SI-IA-27-1	Indoor Air	**0.068 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-28	SI-IA-28-1	Indoor Air	**0.27**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-29	SI-IA-29-1	Indoor Air	**2.5**	0.21 U	**0.12 J**	0.2 U	0.16 U	0.14 U
VI-29	SI-IA-29-2	Indoor Air	**0.41**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-30	SI-IA-30-1	Indoor Air	**0.2 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-30	SI-IA-30-2	Indoor Air	**0.34**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-31	SI-EQP-IA-1	Indoor Air	**0.75**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-31	SI-EQP-IA-2	Indoor Air	**1.6**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-31	SI-EQP-IA-3	Indoor Air	**0.27**	**0.64**	0.16 U	0.2 U	0.16 U	0.14 U
VI-31	SI-EQP-IA-4	Indoor Air	**0.27**	**0.054 J**	0.16 U	0.2 U	0.16 U	0.14 U
VI-31	SI-EQP-IA-6	Indoor Air	**16**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-31	SI-EQP-IA-7	Indoor Air	**19**	0.21 U	0.16 U	0.2 U	0.16 U	**0.11 J**
VI-32	SI-CRPDC-IA-32-1	Indoor Air	**1.8**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-32	SI-CRPDC-IA-32-2	Indoor Air	**1.7**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-33	SI-IA-33-1	Indoor Air	**0.41**	0.21 U	0.16 U	0.2 U	**0.079 J**	0.14 U
VI-33	SI-IA-33-2	Indoor Air	**0.068 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-34	SI-IA-34-1	Indoor Air	**0.14 J**	**0.11 J**	0.16 U	0.2 U	0.16 U	0.14 U
VI-AA-1	SI-EQP-AA-1	Ambient Air	**0.14 J**	0.21 U	0.16 U	0.2 U	0.16 U	0.14 U
VI-AA-2	SI-AA-2-1	Ambient Air	**4.4**	**0.43**	0.16 U	0.2 U	0.16 U	0.14 U
VI-AA-3	SI-AA-3-1	Ambient Air	**0.27**	**0.11 J**	0.16 U	0.2 U	0.16 U	0.14 U
VI-AA-4	SI-AA-4-1	Ambient Air	**0.54**	**0.16 J**	**0.28**	0.2 U	0.16 U	0.14 U

Abbreviations: **Compound detected**
PCE - tetrachloroethene **Compound exceeds one or both of its screening criteria**
TCE - trichloroethene NL - not listed
DCE - dichloroethene µg/m³ - microgram per cubic meter
U - not detected ID - identification
J - estimated concentration

Table 2
Subslab Sample Results
Cabo Rojo Groundwater
Contamination Site Cabo Rojo,
Puerto Rico

Location	Sample ID	Sample Type	PCE	TCE	cis-1,2-DCE	Vinyl Chloride	1,1-DCE	1,4-Dioxane
Subslab Screening Criteria (µg/m³)		Residential	359.96	15.95	NL	5.59	6952.38	18.72
		Commercial	1572.31	99.71	NL	92.91	29200.00	81.76
VI-2	SI-SS-2-1	Subslab	**9.2**	**0.38 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-3	SI-SS-3-1	Subslab	**7.1**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-4	SI-SS-4-1	Subslab	**0.41 J**	**0.86 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-5	SI-SS-5-1	Subslab	68 U	54 U	40 U	26 U	40 U	90 U
VI-6	SI-SS-6-1	Subslab	**53**	**0.16 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-7	SI-SS-7-1	Subslab	68 U	54 U	40 U	26 U	40 U	90 U
VI-8	SI-SS-8-1	Subslab	**7**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-10	SI-SS-10-1	Subslab	**1.8**	1.1 U	0.79 U	0.51 U	0.79 U	**0.36 J**
VI-11	SI-SS-11-1	Subslab	**0.68 J**	**3.4**	0.79 U	0.51 U	0.79 U	1.8 U
VI-12	SI-SS-12-1	Subslab	**77**	**0.48 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-13	SI-SS-13-1	Subslab	**1,000**	**3.3**	0.79 U	0.51 U	0.79 U	1.8 U
VI-14	SI-SS-14-1	Subslab	**67**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-15	SI-SS-15-1	Subslab	**90**	**0.21 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-16	SI-SS-16-1	Subslab	**26**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-17	SI-SS-17-1	Subslab	**9.7**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-18	SI-SS-18-1	Subslab	**9.5 J**	21 U	16 U	10 U	16 U	36 U
VI-20	SI-SS-20-1	Subslab	**0.54 J**	**0.16 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-21	SI-SS-21-1	Subslab	**1.2 J**	1.1 U	0.79 U	0.51 U	0.79 U	**0.32 J**
VI-22	SI-SS-22-1	Subslab	**0.47 J**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-23	SI-SS-23-1	Subslab	**7.5**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-24	SI-SS-24-1	Subslab	**6**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-26	SI-SS-26-1	Subslab	**15**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-27	SI-SS-27-1	Subslab	**0.61 J**	**0.11 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-28	SI-SS-28-1	Subslab	**1 J**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-29	SI-SS-29-1	Subslab	**340**	**0.81 J**	4 U	2.6 U	4 U	9 U
VI-29	SI-SS-29-2	Subslab	**4.7 J**	**7 J**	**2.8 J**	5.1 UJ	7.9 UJ	18 U
VI-29	SI-SS-29-3	Subslab	**1400**	**4.8 J**	7.9 U	5.1 UJ	7.9 UJ	18 U
VI-30	SI-SS-30-1	Subslab	**0.27 J**	1.1 U	0.79 U	0.51 U	0.79 U	**0.65 J**
VI-30	SI-SS-30-2	Subslab	**2**	1.1 U	0.79 U	0.51 U	0.79 U	**0.79 J**
VI-31	SI-EQP-SS-1	Subslab	**2,900**	**11 J**	40 U	26 U	40 U	90 U
VI-31	SI-EQP-SS-2	Subslab	**2,600**	**0.64 J**	0.79 U	0.51 U	0.79 U	1.8 U
VI-31	SI-EQP-SS-3	Subslab	**2,300**	**0.54 J**	0.79 U	0.51 U	0.79 U	**0.18 J**
VI-31	SI-EQP-SS-4	Subslab	**6,600**	**1.2**	0.79 U	0.51 U	0.79 U	1.8 U
VI-31	SI-EQP-SS-5	Subslab	**1,500**	**3.7**	0.79 U	0.51 U	0.79 U	1.8 U
VI-31	SI-EQP-SS-6	Subslab	**9,400**	**110 J**	**0.36 J**	0.51 U	0.79 U	1.8 U
VI-31	SI-EQP-SS-7	Subslab	**9,000**	**7.6**	0.79 U	0.51 U	0.79 U	**0.43 J**
VI-32	SI-CRPDC-SS-32-1	Subslab	**240,000**	**83**	40 U	26 U	40 U	90 U
VI-32	SI-CRPDC-SS-32-2	Subslab	**40,000**	**40 J**	40 U	26 U	40 U	90 U
VI-32	SI-CRPDC-SS-32-3	Subslab	**8,800**	**32 J**	40 U	26 U	40 U	90 U
VI-32	SI-CRPDC-SS-32-4	Subslab	**600**	11 U	7.9 U	5.1 U	7.9 U	18 U
VI-33	SI-SS-33-1	Subslab	**15**	1.1 U	0.79 U	0.51 U	0.79 U	1.8 U
VI-33	SI-SS-33-2	Subslab	**97**	1.1 U	0.79 U	0.51 U	0.79 U	**3.6**
VI-34	SI-SS-34-1	Subslab	**250**	**0.21 J**	0.79 U	0.51 U	0.79 U	**0.14 J**

Abbreviations: **Compound detected**
PCE - tetrachloroethene **Compound exceeds one or both of its screening criteria**
TCE - trichloroethene NL - not listed
DCE - dichloroethene µg/m³ - microgram per cubic meter
U - not detected ID - identification
J - estimated concentration

Table 3
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point[2]	Chemical of Concern	Concentration Detected		Concentration Units	Frequency of Detection	Exposure Point Concentration (EPC)[1]	EPC Units	Statistical Measure
		Minimum	Maximum					
Tap Water - Plume 1	cis-1,2-dichloroethylene	1.5	410	µg/l	12 / 12	377	µg/l	99% Chebyshev (Mean, Sd) UCL
	Tetrachloroethylene	1.2	530	µg/l	12 / 12	248	µg/l	95% Chebyshev (Mean, Sd) UCL
	Trichloroethylene	0.79	140	µg/l	12 / 12	65	µg/l	95% Chebyshev (Mean, Sd) UCL
	Vinyl chloride	0.023 (J)	65	µg/l	8 / 12	61	µg/l	99% KM (Chebyshev) UCL

Footnotes:
(1) 95% UCLs were calculated using ProUCL version 5.1 for constituent data sets with a sample size greater than or equal to 10 samples and 5 or more detects.
(2) Although risks were quantitatively evaluated for Plume 2 receptors, the resulting risks were within or below the target risk range ($1x10^{-6}$ to $1x10^{-4}$) and below the noncancer hazard index threshold of 1. However, 1,1-dichloroethene is also considered a chemical of concern since it was detected above the Puerto Rico Water Quality Standard and Federal MCL (7 µg/L) in this exposure area.

Definitions:
EPC = exposure point concentration
J = estimated value (qualifier)
UCL = upper confidence limit
µg/l = microgram per liter

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 4
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor (Age)	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/ Future	Soil	Surface Soil	EQP, CRPDC, DEFDC, Serrano II, PRIDCO East, PRIDCO West	Worker	Adult	Dermal	None	Workers may contact surface soil through incidental ingestion, dermal contact, and inhalation of particulates and/or volatiles while working at the site. Concentrations detected in surface soil were below risk-based screening criteria.
						Ingestion	None	
						Inhalation	None	
				Trespassers	Adolescent (12 to <18 yrs)	Dermal	None	Trespassers may contact surface soil through incidental ingestion, dermal contact, and inhalation of particulates and/or volatiles while working at the site. Concentrations detected in surface soil were below risk-based screening criteria.
						Ingestion	None	
						Inhalation	None	
	Surface Water	Surface Water	Drainage Ways	Recreational User	Adolescent (12 to <18 yrs)	Dermal	None	Recreational users may contact surface water through incidental ingestion and dermal contact. Concentrations detected in surface water were, however, below risk-based screening criteria.
						Ingestion	None	
	Sediment	Sediment	Drainage Ways	Recreational User	Adolescent (12 to <18 yrs)	Dermal	None	Recreational users may contact sediment through incidental ingestion and dermal contact. Concentrations detected in sediment were, however, below risk-based screening criteria.
						Ingestion	None	
	Groundwater	Indoor Air	Indoor Air	Worker	Adult	Inhalation	Qualitative	Workers may be exposed to contaminants in indoor air via vapor intrusion. Indoor air and sub-slab concentrations were screened against commercial vapor intrusion screening levels in the risk assessment.
Future	Groundwater	Groundwater[1]	Tap Water	Resident	Adult and Child (birth to <6 yrs)	Dermal	Quantitative	Residents are currently using groundwater from the public water supply for all their household needs. If wells are installed within the plume(s) of site contamination, or if the public water treatment systems fail or are otherwise bypassed, residents may be exposed to contaminants in groundwater used as tapwater.
						Ingestion	Quantitative	
						Inhalation	Quantitative	
				Worker	Adult	Ingestion	Quantitative	Businesses are currently using groundwater from the public water supply. If wells are installed within the plume(s) of site contamination, or if the public water treatment systems fail or are otherwise bypassed, workers may be exposed to contaminants in groundwater used as tapwater at work.
		Indoor Air	Indoor Air	Resident	Adult and Child (birth to <6 yrs)	Inhalation	Qualitative	If commercial properties are redeveloped for residential use, residents may be exposed to contaminants in indoor air via vapor intrusion. Current sub-slab and indoor air concentrations were screened against residential vapor intrusion screening levels in the risk assessment.
	Soil	Surface and Subsurface Soil	EQP, CRPDC, DEFDC, Serrano II, PRIDCO East, PRIDCO West	Construction Worker	Adult	Dermal	None	If construction occurs in the future, construction workers may contact surface and subsurface soil while working at the site. Concentrations detected in soil were, however, below risk-based screening criteria.
						Ingestion	None	
						Inhalation	None	
		Surface Soil	EQP, CRPDC, DEFPDC, Serrano II, PRIDCO East, PRIDCO West	Resident	Adult and Child (birth to <6 yrs)	Dermal	None	If commercial properties are redeveloped for residential use, residents may contact surface soil through incidental ingestion, dermal contact, and inhalation of airborne particulates while at their residence. Concentrations detected in surface soil were, however, below risk-based screening criteria.
						Ingestion	None	
						Inhalation	None	

Footnotes:
(1) Two plumes of contamination were identified at the Site. Exposures and risks were estimated separately for each plume assuming future supply wells may be installed within the core of each plume.

Definitions:
EQP = Extasy Q Prints
CRPDC = Cabo Rojo Professional Dry Cleaners
PRIDCO = Puerto Rico Industrial Development Company
DEFDC = D'Elegant Fantastic Dry Cleaners

Summary of Selection of Exposure Pathways

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

Table 5
Non-Carcinogenic Toxicity Data Summary

Pathway: Ingestion/Dermal

Chemicals of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Absorp. Efficiency (Dermal)[1]	Adjusted RfD (Dermal)	Adjusted Dermal RfD Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD Target Organ	Dates of RfD[2]
cis-1,2-dichloroethylene	Chronic	0.002	mg/kg-day	1	0.002	mg/kg-day	Kidney	3,000	IRIS	12/15/2017
Tetrachloroethylene	Chronic	0.006	mg/kg-day	1	0.006	mg/kg-day	Neurological/Liver/ Kidney	1,000	IRIS	12/15/2017
Trichloroethylene	Chronic	0.0005	mg/kg-day	1	0.0005	mg/kg-day	Heart/Immunological/ Developmental/Kidney	10 to 1,000	IRIS	12/15/2017
Vinyl chloride	Chronic	0.003	mg/kg-day	1	0.003	mg/kg-day	Liver	30	IRIS	12/15/2017

Pathway: Inhalation

Chemicals of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfC Target Organ	Dates of RfC[2]
cis-1,2-dichloroethylene	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethylene	Chronic	0.04	mg/m^3	Neurological/Liver/Kidney	1,000	IRIS	12/15/2017
Trichloroethylene	Chronic	0.002	mg/m^3	Heart/Immunological/Liver	10 to 100	IRIS	12/15/2017
Vinyl chloride	Chronic	0.1	mg/m^3	Liver	30	IRIS	12/15/2017

Footnotes:
(1) Source: Risk Assessments Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part E). Section 4.2 and Exhibit 4-1.
(2) Dates reflect when the source was searched and not the publication date.

Definitions:
IRIS = Integrated Risk Information System
mg/kg-day = milligram per kilogram per day
mg/m^3 = milligram per cubic meter
NA = not available
RfC = reference concentration
RfD = reference dose

Summary of Toxicity Assessment

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

Table 6
Cancer Toxicity Data Summary

Pathway: Ingestion/ Dermal

Chemical of Concern	Oral Cancer Slope Factor	Units	Adjusted Cancer Slope Factor (for Dermal)	Slope Factor Units	Weight of Evidence/Cancer Guideline[1]	Source	Date[2]
cis-1,2-dichloroethylene	NA	NA	NA	NA	Inadequate information to assess carcinogenic potential	IRIS	12/15/2017
Tetrachloroethylene	2.1E-03	$(mg/kg\text{-}day)^{-1}$	2.1E-03	$(mg/kg\text{-}day)^{-1}$	likely to be carcinogenic to humans	IRIS	12/15/2017
Trichloroethylene[3]	4.6E-02	$(mg/kg\text{-}day)^{-1}$	4.6E-02	$(mg/kg\text{-}day)^{-1}$	carcinogenic to humans	IRIS	12/15/2017
Vinyl chloride	7.2E-01	$(mg/kg\text{-}day)^{-1}$	7.2E-01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	12/15/2017

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline[1]	Source	Date[2]
cis-1,2-dichloroethylene	NA	NA	NA	NA	Inadequate information to assess carcinogenic potential	NA	NA
Tetrachloroethylene	2.60E-07	$(mg/kg\text{-}day)^{-1}$	NA	NA	likely to be carcinogenic to humans	IRIS	12/15/2017
Trichloroethylene[4]	4.10E-06	$(mg/kg\text{-}day)^{-1}$	NA	NA	carcinogenic to humans	IRIS	12/15/2017
Vinyl chloride	4.4E-06	$(mg/kg\text{-}day)^{-1}$	NA	NA	A	IRIS	12/15/2017

Footnotes:

(1) Weight of evidence information obtained from IRIS. Categories are as follows:

A=Known human carcinogen

B2=Probable human carcinogen based on sufficient evidence of carcinogenicity in animals

C=Possible human carcinogen

D=Not classifiable due to lack of animal bioassays and human studies

(2) Dates reflect when the source was searched and not the publication date.

(3) The slope factor is adult-based. TCE is carcinogenic by a mutagenic mode of action for induction of kidney tumors. The kidney lifetime oral slope factor is $9.3x10^{-3}$ per mg/kg-day.

(4) The inhalation unit risk is adult-based. TCE is carcinogenic by a mutagenic mode of action for induction of kidney tumors. The kidney lifetime unit risk is $1.0x10^{-6}$ per $\mu g/m^3$.

Definitions:

IRIS = Integrated Risk Information System

IUR = inhalation unit risk

NA = not available

(mg/kg-day)-1 = per milligrams per kilogram per day

$(\mu g/m^3)^{-1}$ = per micrograms per cubic meter

Summary of Toxicity Assessment

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

Table 7
Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident (Plume 1)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Primary Target Organ(s)	Non-Carcinogenic Hazard Quotient			
					Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater[2]	Groundwater	Tap Water	cis-1,2-dichloroethylene	Kidney	9.4	NA	NA	9.4
			Tetrachloroethylene	Neurological/Liver/ Kidney	2.1	1.2	3.7	6.9
			Trichloroethylene	Heart/Immunological/ Developmental/Kidney/Liver	6.5	1.1	2.3	27.9
			Vinyl chloride	Liver	1.0	0.1	0.4	1.5
Groundwater Hazard Index Total[1]=								**48**
Receptor Hazard Index[1]=								**48**
Neurological HI =								**7**
Developmental HI =								**28**
Heart HI =								**28**
Immune System HI =								**28**
Kidney HI =								**44**
Liver HI =								**36**
Lung HI =								**1**

Scenario Timeframe: Future
Receptor Population: Worker (Plume 1)
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Primary Target Organ(s)	Non-Carcinogenic Hazard Quotient	
					Ingestion	Exposure Routes Total
Groundwater[2]	Groundwater	Tap Water	cis-1,2-dichloroethylene	Kidney	4	4
			Trichloroethylene	Heart/Immunological/ Developmental/Kidney/Liver	2.8	2.8
Groundwater Hazard Index Total[1]=						**9**
Receptor Hazard Index[1]=						**9**
Neurological HI =						**1**
Developmental HI =						**3**
Heart HI =						**3**
Immune System HI =						**3**
Kidney HI =						**8**
Liver HI =						**4**

Footnotes:
(1) The HI represents the summed HQs for all chemicals of potential concern at the site, not just those requiring remedial action (i.e., the chemicals of concern [COCs]) which are shown in this table.
(2) Noncarcinogenic hazards were also evaluated for the resident and worker within Plume 2, however, the resulting hazards were below the target HI of 1. 1,1-Dichloroethene is still considered a COC since it was detected above the Puerto Rico Water Quality Standard and Federal MCL (7 µg/L).

Definitions:
HI = Hazard Index
HQ = Hazard Quotient
MCL = Maximum Contaminant Level
NA = not available
µg/L = microgram per liter

Table 8
Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident (Plume 1)
Receptor Age: Child and Adult

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Carcinogenic Risk			
				Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater[2]	Groundwater	Tap Water	Trichloroethylene	6.E-05	9.E-06	1.E-04	2.E-04
			Vinyl chloride	3.E-03	1.E-04	9.E-03	1.E-02
						Exposure Medium Total=	**1.E-02**
						Total Risk[1]=	**1.E-02**

Scenario Timeframe: Future
Receptor Population: Worker (Plume 1)
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Carcinogenic Risk	
				Ingestion	Exposure Routes Total
Groundwater[2]	Groundwater	Tap Water	Vinyl chloride	3.E-04	3.E-04
				Exposure Medium Total=	**4.E-04**
				Total Risk[1]=	**4.E-04**

Footnotes:
(1) Total Risk values represent cumulative estimates from exposure to all chemicals of potential concern at the site, not just those requiring remedial action (*i.e.*, the chemicals of concern [COCs]) which are shown in this table.
(2) Cancer risks were also evaluated for the resident and worker within Plume 2, however, the resulting risks were below or within the target risk range. 1,1-Dichloroethene is still considered a COC since it was detected above the Puerto Rico Water Quality Standard and Federal MCL (7 µg/L).

Definitions:
MCL = Maximum Contaminant Level
NA = not available
µg/L = microgram per liter

Table 9
Risk Screening Summary - Vapor Intrusion

Chemical of Concern[1]	Unit	Sub-slab Vapor VISL[2]	Indoor Air VISL[2]	Sub-slab Vapor Results[3]	Indoor Air Results[3]
cis-1,2-dichloroethylene[4]	$\mu g/m^3$	NL	NL	2.8 (J)	0.28
Tetrachloroethylene	$\mu g/m^3$	1,572	47	240,000	19
Trichloroethylene	$\mu g/m^3$	100	3	110 (J)	3.4
Vinyl chloride	$\mu g/m^3$	93	2.8	ND	ND
1,1-dichloroethene	$\mu g/m^3$	29,200	876	ND	0.07 (J)

Footnotes:
(1) Although results of the data collected indicate that elevated sub-slab vapor and indoor air concentrations were primarily associated with tetrachloroethylene and trichloroethylene, results for each of the chemicals of concern in groundwater are presented.
(2) Since elevated sub-slab vapor and indoor air concentrations were predominantly observed at the CRPDC and EQP source areas, the EPA Vapor Intrusion Screening Levels for sub-slab and indoor air displayed are based on future commercial exposure at a target risk of $1x10^{-6}$ for carcinogens and a target hazard quotient of 1 for noncarcinogens, as calculated using the online EPA VISL calculator.
(3) Sub-slab and indoor air samples were collected by EPA in 2012, 2013 and 2017. The results presented include the maximum detections identified from the most recent round of sampling.
(4) No VISLs have been established for cis-1,2-dichloroethylene in sub-slab vapor or indoor air.

Definitions:
CRPDC = Cabo Rojo Professional Dry Cleaners
EPA = Environmental Protection Agency
EQP = Extasy Q Prints
J = estimated value (qualifier)
ND = not detected in any sample above the reporting limit
NL = not listed
$\mu g/m^3$ = microgram per cubic meter
VISL = Vapor Intrusion Screening Level

Table 10, Remediation Goals for Soil

Contaminant of Concern	Soil Protective of Groundwater	PRG	Maximum Detected Concentration
	µg/kg	µg/kg	µg/kg
cis-1,2-DCE	417	417	480J
PCE	132	132	3,700
TCE	141	141	35J

J - Estimated result

Table 11, Remediation Goals for Groundwater

Contaminant of Concern	EPA MCLs (µg/L)	PR Water Quality Standard (µg/L)	PRG (µg/L)	MDC Plume 1 (µg/L)	MDC Plume 2 (µg/L)
1,1-DCE	7	7	7	0.54	40
cis-1,2-DCE	70	NL	70	93	0.27J
PCE	5	5	5	96	ND
TCE	5	5	5	35	0.79
Vinyl chloride	2	0.25	0.25	0.28	0.28

ND - Not detected
NL - Not Listed
MCL - Maximum Contaminant Levels
MDC - Maximum Detected Concentration

Table 12 - Screening Levels for Vapor Intrusion		
Contaminant of Concern	Commercial Screening Level	Maximum Detected Concentrations
	µg/m³	µg/m³
Sub-Slab		
1,1-DCE	29,200	ND
Vinyl chloride	93	ND
Cis 1,2-DCE	NL	2.8J
PCE	1,572	240,000
TCE	100	110J
Indoor Air		
1,1-DCE	876	0.079J
Vinyl chloride	2.8	ND
Cis-1,2-DCE	NL	0.28
PCE	47	19
TCE	3	3.4

Table 13
Cost Estimate Summary
Selected Remedy
Cabo Rojo Groundwater
Contamination Site
Cabo Rojo, Puerto Rico

	Description	Cost
CAPITAL COSTS		
1	General Requirements	$738,000
2&3	DPE System Construction and Startup	$957,000
4	First Year DPE Operation and Maintenance	$354,000
	Subtotal	*$2,049,000*
	Contingency 20%	$410,000
	Subtotal	*$2,459,000*
	Administrative	$330,000
	Total Remedial Action Capital Costs	**$2,789,000**
OPERATION AND MAINTENANCE COSTS		
5	Annual O&M for DPE System Operating Intermittently	$279,000
	Present worth of O&M Years 2-5 Operation	$884,000
6	Present worth of DPE Performance Evaluation (Year 5)	$63,000
7	Annual Monitoring Cost for Plume #1 and Plume #2	$126,000
	Present worth of Monitoring (30 Years)	$1,564,000
PRESENT WORTH		
	Total Capital Cost	$2,789,000
	Total O&M Cost	$2,511,000
	Total Present Worth	**$5,300,000**

Note: The project cost presented above represent a Feasibility Study-level estimate. Costs are subject to change pending the results of the pre-design investigation. Expected accuracy range of the cost estimate is -30% to +50%. Present worth calculation assumes 7% discount rate after inflation is considered.

Table 14
Chemical-specific ARARs, TBCs, Other Criteria, and Guidance
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Regulatory Level	Name	Synopsis
Federal	EPA Regional Screening Levels (RSLs) (November 2017)	Establishes risk-based screening levels for the protection of human health.
Federal	National Primary Drinking Water Standards (40 CFR Part 141), Maximum Contaminant Levels (MCLs)	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.
Federal	Clean Water Act, Ambient Water Quality Criteria (40 CFR Part 131)	Sets criteria for water quality based on protection of human health and protection of aquatic life.
Federal	OSWER Vapor Intrusion Assessment: Vapor Intrusion Screening Level (VISL) Calculator Version 3.0, November 2012 RSLs	Along with RSLs, provides screening values that can be used to address vapor intrusion concerns using groundwater, soil gas (exterior to buildings and sub-slab), and indoor air concentrations.
Commonwealth of Puerto Rico	Puerto Rico Water Quality Standards (PRWQS) Regulation, August 2014	This regulation exists 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, surface, estuarine, wetlands, and ground waters of Puerto Rico.

ARARs - Applicable or relevant and Appropriate Requirements
TBC- To be Considered Criteria
CFR - Code of Federal Regulations
PRGs - Preliminary Remediation Goals
OSWER - Office of Solid Waste and Emergency Response
MCLs - Maximum Contaminant Levels

Table 15
Location-specific ARARs, TBCs, Other Criteria, and Guidance
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Regulatory Level	Name	Synopsis
Federal	National Historic Preservation Act Regulations (36 C.F.R. Part 800)	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.

ARARs - Applicable or relevant and Appropriate Requirements
TBC- To be Considered Criteria
CFR - Code of Federal Regulations
PRGs - Preliminary Remediation Goals
OSWER - Office of Solid Waste and Emergency Response
MCLs - Maximum Contaminant Levels

Table 16
Action-specific ARARs, TBCs, Other Criteria, and Guidance
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Regulatory Level	Name	Synopsis
Federal	OSHA Recording and Reporting Occupational Injuries and Illnesses (29 CFR 1904)	This regulation outlines the record keeping and reporting requirements for an employer under OSHA.
Federal	OSHA Occupational Safety and Health Standards (29 CFR Part 1910)	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.
Federal	OSHA Safety and Health Regulations for Construction (29 CFR Part 1926)	This regulation specifies the type of safety equipment and procedures to be followed during site remediation.
Federal	RCRA Identification and Listing of Hazardous Wastes (40 CFR Part 261)	This regulation describes methods for identifying hazardous wastes and lists known hazardous wastes.
Federal	RCRA Standards Applicable to Generators of Hazardous Wastes (40 CFR Part 262)	Describes standards applicable to generators of hazardous wastes.
Federal	RCRA Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities – General Facility Standards (40 CFR Parts 264.10–264.19)	This regulation lists general facility requirements including general waste analysis, security measures, inspections, and training requirements.
Commonwealth of Puerto Rico	Regulation of the Puerto Rico Environmental Quality Board (PREQB) for the Prevention and Control of Noise Pollution	This standard provides the standards and requirements for noise control.
Commonwealth of Puerto Rico	Puerto Rico's Anti-degradation Policy set forth in Puerto Rico’s Water Quality Standards	Conserve, maintain and protect the designated and existing uses of the waters of Puerto Rico. The water quality necessary to protect existing uses, including threatened and endangered species shall be maintained and protected.

ARARs - Applicable or relevant and Appropriate Requirements
TBC- To be Considered Criteria
CFR - Code of Federal Regulations
PRGs - Preliminary Remediation Goals
OSWER - Office of Solid Waste and Emergency Response
MCLs - Maximum Contaminant Levels

Table 16 (continued)
Action-specific ARARs, TBC, Other Criteria, and Guidance
Cabo Rojo Groudwater Contamination Site
Cabo Rojo, Puerto Rico

Regulatory Level	Name	Synopsis
General - Site Remediation		
Federal	Department of Transportation (DOT) Rules for Transportation of Hazardous Materials (49 CFR Parts 107, 171, 172, 177 to 179)	This regulation outlines procedures for the packaging, labeling, manifesting, and transporting hazardous materials.
Federal	RCRA Standards Applicable to Transporters of Hazardous Waste (40 CFR Part 263)	Establishes standards for hazardous waste transporters.
Federal	RCRA Land Disposal Restrictions (40 CFR Part 268)	This regulation identifies hazardous wastes restricted for land disposal and provides treatment standards for land disposal.
Federal	RCRA Hazardous Waste Permit Program (40 CFR Part 270)	This regulation establishes provisions covering basic EPA permitting requirements.
Commonwealth of Puerto Rico	PREQB Regulation for the Control of Non-Hazardous Solid Waste (November 1997)	This regulation establishes standards for the generation, management, transportation, recovery, disposal and management of non- hazardous solid waste.
Commonwealth of Puerto Rico	PREQB Regulation for the Control of Hazardous Solid Waste (September 1998)	This regulation establishes standards for management and disposal of hazardous wastes.

ARARs - Applicable or relevant and Appropriate Requirements
TBC- To be Considered Criteria
CFR - Code of Federal Regulations
PRGs - Preliminary Remediation Goals
OSWER - Office of Solid Waste and Emergency Response
MCLs - Maximum Contaminant Levels

Table 16 (continued)
Action-specific ARARs, TBCs, Other Criteria, and Guidance
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Regulatory Level	Name	Synopsis
Federal	National Pollutant Discharge Elimination System (NPDES) (40 CFR Parts 100, *et seq.*)	NPDES permit requirements for point source discharges must be met, including the NPDES Best Management Practice (BMP) Program. These regulations include, but are not limited to, requirements for compliance with water quality standards, a discharge monitoring system, and records maintenance.
Federal	Safe Drinking Water Act – Underground Injection Control (UIC) Program (40 CFR Parts 144 and 146)	Establish performance standards, well requirements, and permitting requirements for groundwater re-injection wells.
Commonwealth of Puerto Rico	Puerto Rico Water Quality Standards (PRWQS) Regulation, August 2014	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, surface, estuarine, wetlands, and ground waters of Puerto Rico.

ARARs - Applicable or relevant and Appropriate Requirements
TBC- To be Considered Criteria
CFR - Code of Federal Regulations
PRGs - Preliminary Remediation Goals
OSWER - Office of Solid Waste and Emergency Response
MCLs - Maximum Contaminant Levels

Table 16 (continued)
Action-specific ARARs, TBCs, Other Criteria, and Guidance
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Regulatory Level	ARARs	Synopsis
Federal	Clean Air Act (CAA)—National Ambient Air Quality Standards (NAAQs) (40 CFR Part 50-52, 60, and 40)	These provide air quality standards for particulate matter, lead, NO_2, SO_2, CO, and volatile organic matter.
Federal	Standards of Performance for New Stationary Sources (40 CFR Part 60)	Set the general requirements for air quality.
Federal	National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61)	These provide air quality standards for hazardous air pollutants.
Federal	Federal Directive - Control of Air Emissions from Superfund Air Strippers (OSWER Directive 9355.0-28)	Provides guidance on control of air emissions from air strippers used at Superfund Sites for groundwater treatment.
Commonwealth of Puerto Rico	PREQB Regulation for the Control of Atmospheric Pollution (2012)	Describes requirements and procedures for obtaining air permits and certificates; rules that govern the emission of contaminants into the ambient atmosphere.

ARARs - Applicable or relevant and Appropriate Requirements
TBC- To be Considered Criteria
CFR - Code of Federal Regulations
PRGs - Preliminary Remediation Goals
OSWER - Office of Solid Waste and Emergency Response
MCLs - Maximum Contaminant Levels

APPENDIX III

Administrative Record Index

ADMINISTRATIVE RECORD INDEX OF DOCUMENTS

FINAL

05/09/2019

REGION ID: 02

Site Name: CABO ROJO GROUND WATER CONTAMINATION
CERCLIS ID: PRN000206319
OUID: 01
SSID: A244
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
538299	5/9/2019	ADMINISTRATIVE RECORD INDEX FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	8	Administrative Record Index		(US ENVIRONMENTAL PROTECTION AGENCY)
357225	Undated	INDOOR AND AMBIENT AIR SAMPLING ANALYSIS FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	16	Report		
260235	12/31/1996	HYDROGEOLOGY AND GROUND WATER / SURFACE WATER RELATIONS IN THE BAJURA AREA OF THE MUNICIPO OF CABO ROJO, SOUTHWESTERN PUERTO RICO, U.S. GEOLOGICAL SURVEY WATER RESOURCES INVESTIGATION REPORT 95-4159 FOR CABO ROJO GROUND WATER CONTAMINATION SITE	36	Report		RODRIGUEZ-MARTINEZ,JESUS (US GEOLOGICAL SURVEY (USGS))
152258	10/01/2010	HAZARD RANKING SYSTEM (HRS) PACKAGE FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	39	Report		(US ENVIRONMENTAL PROTECTION AGENCY)
152259	10/01/2010	HAZARD RANKING SYSTEM (HRS) REFERENCE 1 THROUGH 31 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	1317	Report		(US ENVIRONMENTAL PROTECTION AGENCY)
152260	10/01/2010	HAZARD RANKING SYSTEM (HRS) REFERENCE 32 THROUGH 61 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	2543	Report		(US ENVIRONMENTAL PROTECTION AGENCY)
255354	05/02/2011	WORK PLAN FOR WORK ASSIGNMENT NO. SERAS-130 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	7	Report	(US ENVIRONMENTAL PROTECTION AGENCY)	(LOCKHEED MARTIN INCORPORATED)

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DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
255349	06/06/2011	QUALITY ASSURANCE PROJECT PLAN FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	98	Work Plan	(US ENVIRONMENTAL PROTECTION AGENCY)	(LOCKHEED MARTIN INCORPORATED)
255343	06/10/2011	HEALTH AND SAFETY PLAN FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	32	Work Plan		MCBURNEY,JON (LOCKHEED MARTIN INC)
255348	07/05/2011	PRELIMINARY RESULTS OF VOCS IN AIR ANALYSIS USING SERAS SOP NO. 1814 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	4	Report	CATANZARITA,JEFF (US ENVIRONMENTAL PROTECTION AGENCY)|PRINCE,GEORGE (US ENVIRONMENTAL PROTECTION AGENCY)	KANSAL,VINOD (LOCKHEED MARTIN TECHNOLOGY SERVICES)
260236	01/27/2012	WELL LOGS AND ANY ADDITIONAL INFORMATION GATHERED DURING THE EARLY 1990'S TO COMPLETE THE U.S. GEOLOGICAL SURVEY REPORT FOR THE BAJURA AREA FOR CABO ROJO GROUND WATER CONTAMINATION SITE	109	Report	ZENO,DENISE (US ENVIRONMENTAL PROTECTION AGENCY)	RODRIGUEZ-MARTINEZ,JESUS (US GEOLOGICAL SURVEY (USGS))
219217	02/16/2012	SOIL GAS INVESTIGATION TRIP REPORT JUNE 13 TO JUNE 17, 2011 - WORK ASSIGNMENT NO.: SERAS-130 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	77	Report	CATANZARITA,JEFF (US ENVIRONMENTAL PROTECTION AGENCY)|MILLER,DENNIS,A (LOCKHEED MARTIN/REAC)	MCBURNEY,JON (LOCKHEED MARTIN INC)
123984	02/16/2012	TRIP REPORT SOIL AND GAS INVESTIGATION SERAS-WA#0-130 FOR CABO ROJO GROUND WATER CONTAMINATION SITE	82	Report	CATANZARITA,JEFF (US ENVIRONMENTAL PROTECTION AGENCY)	MCBURNEY,JON (LOCKHEED MARTIN INC)
283763	02/21/2012	WORK PLAN VOLUME 1 PART 1 - SECTION 1 - 3 TEXT FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	85	Work Plan	(US ENVIRONMENTAL PROTECTION AGENCY)	(CDM FEDERAL PROGRAMS CORPORATION)
260256	02/24/2012	LETTER HEALTH CONSULTATION FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	8	Report		(US DEPT OF HEALTH AND HUMAN SERVICES)

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219089	03/02/2012	NATIONAL PRIORITIES LIST (NPL) SITE NARRATIVE FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	2	Report		
219102	03/05/2012	EQP BUILDING SAMPLING LOCATIONS FIGURE AND PRELIMINARY RESULTS OF VOCS IN AIR ANALYSIS FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	17	Report		
219108	03/05/2012	PRELIMINARY RESULTS OF VOCS IN AIR ANALYSIS FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	69	Report		
283744	03/05/2012	PRELIMINARY RESULTS OF VOCS FOR TO-15 ANALYSIS OF 23 AIR SAMPLES - WORK ASSIGNMENT NO. 0-130 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	16	Report	CATANZARITA,JEFF (US ENVIRONMENTAL PROTECTION AGENCY)	KANSAL,VINOD (LOCKHEED MARTIN TECHNOLOGY SERVICES)
260250	03/09/2012	PRELIMINARY RESULTS OF VOCS IN AIR SAMPLING USING SERAS SOP NO. 1814 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	136	Report	CATANZARITA,JEFF (US ENVIRONMENTAL PROTECTION AGENCY)	KANSAL,VINOD (LOCKHEED MARTIN TECHNOLOGY SERVICES)
283499	03/09/2012	PRELIMINARY RESULTS OF VOCS FOR TO-15 ANALYSIS OF 34 AIR SAMPLES - WORK ASSIGNMENT NO. 0-130 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	24	Report	CATANZARITA,JEFF (US ENVIRONMENTAL PROTECTION AGENCY)	KANSAL,VINOD (LOCKHEED MARTIN TECHNOLOGY SERVICES)
255417	03/13/2012	SITE ACTION PLAN FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	2	Work Plan		(US ENVIRONMENTAL PROTECTION AGENCY)

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DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
283769	03/30/2012	PRELIMINARY RESULTS OF VOCS FOR TO-15 ANALYSIS OF 68 INDOOR AIR SAMPLES - WORK ASSIGNMENT NO. 0-130 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	47	Report	CATANZARITA,JEFF (US ENVIRONMENTAL PROTECTION AGENCY)	KANSAL,VINOD (LOCKHEED MARTIN TECHNOLOGY SERVICES)
219126	04/03/2012	PRELIMINARY RESULTS OF VOCS IN AIR FOR TO-15 ANALYSIS OF 51 SOIL GAS SAMPLES - WORK ASSIGNMENT NO. 0-130 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	39	Report	CATANZARITA,JEFF (US ENVIRONMENTAL PROTECTION AGENCY)	KANSAL,VINOD (LOCKHEED MARTIN TECHNOLOGY SERVICES)
241406	04/16/2012	US EPA 104E REQUEST FOR INFORMATION SENT TO THE PUERTO RICO INDUSTRIAL DEVELOPMENT COMPANY FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	12	Letter	(PUERTO RICO INDUSTRIAL DEVELOPMENT COMPANY)	DIFORTE,NICOLETTA (US ENVIRONMENTAL PROTECTION AGENCY)
219218	05/07/2012	FINAL FEBRUARY AND MARCH 2012 SUB-SLAB SOIL GAS AND INDOOR AIR SAMPLING TRIP REPORT - WORK ASSIGNMENT NO.: SER00130 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	326	Report	CATANZARITA,JEFF (US ENVIRONMENTAL PROTECTION AGENCY)|MILLER,DENNIS,A (LOCKHEED MARTIN/REAC)	CARTWRIGHT,MICHAEL (LOCKHEED MARTIN TECHNOLOGY SERVICES)
255352	05/07/2012	TRIP REPORT - SUB-SLAB SOIL GAS AND INDOOR AIR SAMPLING FOR 02/2012 AND 03/20112 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	172	Report	CATANZARITA,JEFF (US ENVIRONMENTAL PROTECTION AGENCY)	CARTWRIGHT,MICHAEL (LOCKHEED MARTIN TECHNOLOGY SERVICES)|MILLER,DENNIS,A (LOCKHEED MARTIN/REAC)
284283	05/22/2012	FINAL HEALTH CONSULTATION - EVALUATION OF INDOOR AIR SAMPLING FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	32	Report		(AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY)

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05/09/2019

REGION ID: 02

Site Name: CABO ROJO GROUND WATER CONTAMINATION
CERCLIS ID: PRN000206319
OUID: 01
SSID: A244
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
219088	07/12/2012	POLLUTION REPORT NO. 1 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	5	Report	PANE,MARK (US ENVIRONMENTAL PROTECTION AGENCY)|ROTOLA,JOSEPH (US ENVIRONMENTAL PROTECTION AGENCY)|VELAZQUEZ,PASQUAL (PUERTO RICO ENVIRONMENTAL QUALITY BOARD)	ANDERSON,ARLENE,R (US ENVIRONMENTAL PROTECTION AGENCY)
219090	07/17/2012	US EPA OSC WEBPAGE: SITE PROFILE REGARDING THE CABO ROJO GROUND WATER CONTAMINATION SITE	2	Publication		
462674	09/27/2012	PUBLIC HEALTH ASSESSMENT FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	86	Report		(DEPARTMENT OF HEALTH & HUMAN SERVICES)
266045	10/15/2012	CDM SMITH - RAC2 - CONTRACT NO. EP-W-09-002 - WA NO. 045-RICO-A244 - REVISED FINAL WORK PLAN VOLUME 1 REMEDIAL INVESTIGATION / FEASIBILITY STUDY FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	119	Work Plan		(CDM FEDERAL PROGRAMS CORPORATION)
241420	10/16/2012	PUERTO RICO INDUSTRIAL DEVELOPMENT COMPANY'S (PRIDCO) RESPONSE (PART 1 OF 2) TO US EPA 104E REQUEST FOR INFORMATION FOR CABO ROJO GROUND WATER CONTAMINATION SITE	88	Letter	WIEDER,MARLA,E (US ENVIRONMENTAL PROTECTION AGENCY)	GREENTHAL,JOHN,L (NIXON PEABODY LLP)
241422	10/16/2012	PUERTO RICO INDUSTRIAL DEVELOPMENT COMPANY'S (PRIDCO) RESPONSE (PART 2 OF 2 APPENDICES) TO US EPA 104E REQUEST FOR INFORMATION FOR CABO ROJO GROUND WATER CONTAMINATION SITE	1401	Letter	WIEDER,MARLA,E (US ENVIRONMENTAL PROTECTION AGENCY)	GREENTHAL,JOHN,L (NIXON PEABODY LLP)

ADMINISTRATIVE RECORD INDEX OF DOCUMENTS

FINAL

05/09/2019

REGION ID: 02

Site Name: CABO ROJO GROUND WATER CONTAMINATION
CERCLIS ID: PRN000206319
OUID: 01
SSID: A244
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
241421	10/18/2012	TRANSMITTAL OF THE CERTIFICATION OF ANSWERS TO THE US EPA 104E REQUEST FOR INFORMATION FOR CABO ROJO GROUND WATER CONTAMINATION SITE	1	Letter	WIEDER,MARLA,E (US ENVIRONMENTAL PROTECTION AGENCY)	GREENTHAL,JOHN,L (NIXON PEABODY LLP)
219091	11/19/2012	NATIONAL PRIORITIES LIST (NPL) REMOVAL SITE EVALUATION (RSE) FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	11	Report	ROTOLA,JOSEPH (US ENVIRONMENTAL PROTECTION AGENCY)	MAGRIPLES,NICHOLAS (US ENVIRONMENTAL PROTECTION AGENCY)
283786	04/10/2013	PRELIMINARY RESULTS FOR TO-15 SIM - WORK ASSIGNMENT NO. 0-130 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	45	Report	SINGHVI,RAJESHMAL (US ENVIRONMENTAL PROTECTION AGENCY)	BARKLEY,MISTY (LOCKHEED MARTIN INFORMATION SYSTEMS & GLOBAL SOLUTIONS)
283811	04/24/2013	FINAL ANALYTICAL REPORT FOR WORK ASSIGNMENT NO. SERAS-045 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	33	Report	MICKUNAS,DAVID (US ENVIRONMENTAL PROTECTION AGENCY)	KANSAL,VINOD (LOCKHEED MARTIN TECHNOLOGY SERVICES)
255353	05/17/2013	FINAL TRIP REPORT - SUB-SLAB SOIL GAS AND INDOOR AIR SAMPLING FOR 03/20113 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	40	Report	CATANZARITA,JEFF (US ENVIRONMENTAL PROTECTION AGENCY)	MILLER,DENNIS,A (LOCKHEED MARTIN/REAC)|SOLINSKI,PHILIP (LOCKHEED MARTIN INCORPORATED)
284328	05/21/2013	PENUELAS LANDFILL COMPLIANCE NOTIFICATION FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	1	Publication	RODRIGUEZ,RENE,R (PENUELAS VALLEY LANDFILL INCORPORATED)	GREALISH,BECKETT (US ENVIRONMENTAL PROTECTION AGENCY)
266145	08/13/2013	TECHNICAL EVALUATION FOR WORK PLAN LETTER DATED 07/29/2013 FOR WORK ASSIGNMENT 045-RICO-A244 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	2	Report		(CDM FEDERAL PROGRAMS CORPORATION)

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REGION ID: 02

Site Name: CABO ROJO GROUND WATER CONTAMINATION
CERCLIS ID: PRN000206319
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SSID: A244
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
283421	11/01/2013	BOREHOLE GEOPHYSICAL LOGGING REPORT FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	58	Report	(CDM SMITH)	(HAGER-RICHTER GEOSCIENCE)
284336	11/07/2013	DESA LABORATORY FINAL REPORT FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	57	Report	KIRCHNER,SCOTT (CDM FEDERAL PROGRAMS CORPORATION)	BOURBON,JOHN (US ENVIRONMENTAL PROTECTION AGENCY)
538164	05/18/2017	US EPA 104E REQUEST FOR INFORMATION SENT TO MULTIPLE DRY CLEANER COMPANIES FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	14	Letter	CABAZZA-SOTO,CANDIDA (BORINCANO DRY CLEANING)|FLORES,LIZA,ORTIZ (D'ELEGANT FANTASTIC DRY CLEANERS)|MATOS,LYDIA (SERRANO DRY CLEANERS I)|MATOS,LYDIA (SERRANO DRY CLEANERS II)|RAMIREZ,ROBERTO,LUGO (ROBERT'S CLEANERS)|RAMIREZ,ROBERTO,LUGO (ROBERT'S STEAM LAUNDRY)|RONDA,HECTOR (ACEVEDO CLEANERS)|ROSADO-MEDINA,RAMON (CABO ROJO PROFESSIONAL DRY CLEANERS)	WILSON,ERIC,J (US ENVIRONMENTAL PROTECTION AGENCY)
537337	01/22/2018	FINAL SCREENING LEVEL ECOLOGICAL ASSESSMENT FOR RI/FS STUDY WORK ASSIGNMENT 045-RICO-A244, CONTRACT EP-W-09-002 FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	57	Report		(CDM SMITH)
537845	04/09/2018	FINAL HUMAN HEALTH RISK ASSESSMENT FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	255	Report		(CDM SMITH)

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Site Name: CABO ROJO GROUND WATER CONTAMINATION
CERCLIS ID: PRN000206319
OUID: 01
SSID: A244
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
538296	04/10/2018	REMEDIAL INVESTIGATION REPORT FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	966	Report		(CDM SMITH)
541885	06/01/2018	FINAL FEASIBILITY STUDY REPORT FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	162	Report		(CDM SMITH)
538320	07/31/2018	PUERTO RICO LAWS REGARDING DRINKING WATER WITHDRAWAL REGULATIONS	17	Other		
550160	08/02/2018	US EPA NOTICE OF POTENTIAL LIABILITY SENT TO PUERTO RICO INDUSTRIAL DEVELOPMENT COMPANY (PRIDCO) FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	2	Letter	RIVERA,MANUEL,LABOY (PUERTO RICO INDUSTRIAL DEVELOPMENT COMPANY)	WILSON,ERIC,J (US ENVIRONMENTAL PROTECTION AGENCY)
550161	08/02/2018	US EPA NOTICE OF POTENTIAL LIABILITY SENT TO EXTASY Q PRINTS FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	2	Letter	SIERRA,JOSE,LUIS (EXTASY Q PRINTS)	WILSON,ERIC,J (US ENVIRONMENTAL PROTECTION AGENCY)
538298	08/02/2018	PROPOSED PLAN FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	27	Publication		(US ENVIRONMENTAL PROTECTION AGENCY)
538408	4/1/2019	LONG-TERM MONITORING COST FOR PLUME 2 DOWNGRADIENT OF PRIDCO EAST FOR THE CABO ROJO GROUND WATER CONTAMINATION SITE	1	Chart/Table		

APPENDIX IV

Public Notices

La Agencia Federal de Protección Ambiental
Anuncia el Plan Propuesto y Periodo de Comentarios
Para el Lugar de Superfondo Contaminación del Agua Subterránea de Cabo Rojo
Cabo Rojo, Puerto Rico

Aviso Público

La Agencia Federal de Protección Ambiental (EPA, por sus siglas en inglés) en colaboración con la Junta de Calidad Ambiental de Puerto Rico, anuncia el comienzo de un período de treinta (30) días de comentario público comenzando el 2 de agosto de 2018 y extendiéndose hasta el 3 de septiembre de 2018 para la evaluación del Plan Propuesto para el lugar conocido como el Lugar de Superfondo Contaminación del Agua Subterránea de Cabo Rojo, localizado en el municipio de Cabo Rojo, Puerto Rico. El Plan Propuesto describe la acción preferida de la EPA (Alternativa #2) y la razón para esta recomendación. La Alternativa 2 consiste en la instalación y operación de un sistema SVE/DPE, monitoreo de atenuación natural, como contingencia tratamiento in-situ y controles institucionales. Antes de finalizar este proceso, la EPA tomará en consideración comentarios escritos y verbales recibidos sobre la acción preferida presentada en el Plan Propuesto. El periodo de comentarios públicos comenzara el 2 de agosto de 2018, todos los comentarios deben ser recibidos en o antes del 3 de septiembre de 2018. La EPA proveerá un resumen de todos los comentarios y sus respuestas en el Récord de Decisión para este Lugar.

La EPA llevará a cabo una reunión pública el 9 de agosto de 2018, de 6:00 pm a 8:00 pm en la sala de conferencias de la Biblioteca Pública Blanca E. Colberg localizada en la calle José de Diego #312 en Cabo Rojo, Puerto Rico. El propósito de esta reunión es informarle a la comunidad sobre los hallazgos, conclusiones y recomendaciones de la investigación remedial realizada en el Lugar. Además, se discutirá la acción preferida de la EPA para el Lugar. Durante esta reunión pública, la EPA contestará preguntas o comentarios que los participantes puedan tener con relación a la investigación realizada y la acción preferida propuesta por la EPA.

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

Biblioteca Pública Blanca E. Colberg
Calle José de Diego #312
Cabo Rojo, PR 00641
(787) 851-2284
Horario: Lunes – Viernes 7:30am a 4:30 pm

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
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 al (787) 977-5870
Comentarios escritos del Plan Propuesto deben ser enviados a:

Ing. Daniel Rodríguez
Gerente de Proyectos
U.S Environmental Protection Agency, Region 2
División de Protección Ambiental del Caribe
City View Plaza II- Suite 7000
48 RD, 165 Km. 1.2
Guaynabo, PR 00968-8069
Internet: rodriguez.daniel@epa.gov
Tel. (787) 664-8523

Anuncio de Extensión de Periodo de Comentario Público
Para el Lugar de Superfondo Contaminación del Agua Subterránea de Cabo Rojo

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 de Cabo Rojo ubicado en el municipio de Cabo Rojo en Puerto Rico. La Agencia ha extendido el periodo de comentario que terminaba el 3 de septiembre de 2018. El nuevo periodo de comentario comenzará el martes 4 de septiembre de 2018 y terminará el viernes 5 de octubre de 2018.

La EPA llevó a cabo una reunión con la comunidad el 9 de agosto de 2018 para explicar el Plan Propuesto. La EPA está proponiendo un sistema SVE/DPE, monitoreo de atenuación natural, como contingencia tratamiento in-situ y controles institucionales (alternativa #2) como la alternativa preferida para el lugar 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/superfund/cabo-rojo-groundwater**. También los documentos relacionados a la investigación del lugar pueden ser encontrados en la biblioteca Blanca E. Colberg.

Los comentarios sobre este Plan Propuesto deben ser enviados a:

Ing. Daniel Rodríguez
Gerente de Proyectos
U.S Environmental Protection Agency, Region 2
División de Protección Ambiental del Caribe
City View Plaza II- Suite 7000
48 RD, 165 Km. 1.2
Guaynabo, PR 00968-8069
Internet: **rodriguez.daniel@epa.gov**
Tel. (787) 664-8523

APPENDIX V

Proposed Plan and Fact Sheet (Spanish)

Superfund Program Proposed Plan

Cabo Rojo Groundwater Contamination Superfund Site

Cabo Rojo, Puerto Rico
August 2018

EPA Region 2

EPA ANNOUNCES PROPOSED CLEANUP PLAN

This Proposed Plan describes the remedial alternatives developed for the Cabo Rojo Groundwater Contamination Superfund Site (the Site) in Cabo Rojo, 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 Remedial Investigation (RI) and Feasibility Study (FS) reports.

EPA's preferred remedy for the Site consists of the following FS alternative to address groundwater contamination at the Site:

- **Soil Vapor Extraction/Dual Phase Extraction (SVE/DPE), Monitored Natural Attenuation (MNA), a Contingency for In-Situ Treatment and Institutional Controls**

COMMUNITY ROLE IN SELECTION PROCESS

EPA relies on public input to ensure that the concerns of the community are considered in selecting an appropriate remedy for each Superfund site. To this end, this Proposed Plan has been made available to the public for a 30-day public comment period, which

MARK YOUR CALENDAR

PUBLIC MEETING
August 9, 2018 at 6:00 pm
Biblioteca Pública Blanca E. Colberg
Calle José de Diego #312
Cabo Rojo, PR 00641

PUBLIC COMMENT PERIOD
August 2, 2018 – September 3, 2018

INFORMATION REPOSITORY
The administrative record file, which contains copies of the Proposed Plan and supporting documentation, is available at the following locations:

Biblioteca Pública Blanca E. Colberg
Calle José de Diego #312
Cabo Rojo, PR 00641
(787) 894-1040
Hours: Monday – Friday 8:00am to 4:30pm

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 9:00am to 4:30pm
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 9:00am to 3:00pm
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 9:00am to 5:00pm
By appointment.
Site Profile Page:
www.epa.gov/superfund/cabo-rojo-groundwater

begins with the issuance of this Proposed Plan and concludes on September 3, 2018.

EPA is providing information to the public regarding the investigation and cleanup of the Site 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 held during the comment period is designed 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 Record of Decision (ROD), the document that formalizes the selection of the remedy.

Written comments on this Proposed Plan should be addressed to:

Daniel Rodríguez
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) 664-8523
E-mail: rodriguez.daniel@epa.gov

SCOPE AND ROLE OF ACTION

EPA is addressing the cleanup of this Site by implementing a single, comprehensive remedial action to address the soil and the groundwater contamination at the Site.

SITE BACKGROUND

Site Description

The Site is in the Bajura ward in the municipality of Cabo Rojo in southwestern Puerto Rico and consists of three source areas with two groundwater plumes. Cabo Rojo Professional Dry Cleaners (CRPDC) is located in the northern area of Cabo Rojo and is no longer operating. Located approximately 700 feet northeast of CRPDC is another source area, Extasy Q Prints (EQP), which is an active print shop (Figure 1). Approximately 0.7 miles southwest of both CRPDC and EQP is the third source area, Puerto Rico Industrial Development Company (PRIDCO) East, a complex of 10 separate, mostly vacant buildings with a long history of industrial and commercial operations.

Site History

Routine groundwater sampling from the Cabo Rojo Urbano public water supply system from 2002 through 2011 revealed chlorinated volatile organic compounds (VOCs), tetrachloroethene (PCE) and trichloroethene (TCE), in several of the wells below federal maximum contaminant levels. This sparked additional investigations by EPA at potential source areas (PSAs) throughout Cabo Rojo from 2006 to 2012. Soil, groundwater, and soil vapor sampling at several facilities revealed detections of chlorinated VOCs. Based on the data collected, a hazard ranking system package was prepared and the Site was added to the National Priorities List (NPL) on March 10, 2011.

Topography and Drainage

The Site is within the Río Guanajibo alluvial valley. Surface drainage from the Site may either flow north-northeast into the Ciénaga de Cuevas swamp and eventually to the Río Guanajibo (located approximately 2 miles northeast of the Site) or recharge the bedrock aquifer.

Geology and Hydrology

The soil in the Site vicinity generally consists of an unconsolidated overburden unit consisting of silty clay underlain by a saprolite zone composed of hard sandy to silty clay with angular rock fragments transitioning to a sand/gravel matrix with cobble-sized rock fragments. Below the saprolite is the Sabana Grande formation, which consists of a shallow highly fractured, transmissive bedrock zone underlain by a low-transmissivity bedrock zone. A localized zone of alluvium replaces the shallow overburden unit around the CRPDC source area (dark brown clay, fine and medium sand, and brown silt and sand).

Within the unconsolidated zone (alluvium, overburden, and saprolite), the alluvium, where present, provides a preferential flow path for groundwater contamination to move from the unconsolidated deposits into the underlying bedrock. Little groundwater was encountered in the overburden silty clay unit, which, where present, acts as a semi-confining unit overlying the saprolite. The saprolite is a significant water-bearing unit that stores water and provides recharge to the underlying bedrock aquifer. The lateral direction of groundwater flow in the overburden is predominantly to the north in Plume 1 and to the north-northeast in the Plume 2 area.

Groundwater in the bedrock unit is confined, or semi-confined, based on observations during drilling and subsequent water level observations. Overall, the fractured bedrock is very transmissive with a higher hydraulic conductivity compared to the saprolite and alluvium, especially in the shallow bedrock. Site-wide groundwater flow in bedrock is to the north and in Plume 1 it was previously influenced by pumping in the former Ana Maria public supply well. In the northern portion of the Site the flow is directed to the northeast due to a combination of natural groundwater discharge toward the Bajura area and the long-term pumping influence of active public supply wells farther downgradient (Figure 2). There is an upward vertical gradient from the deepest monitoring zones in the deep bedrock toward the higher transmissivity shallow zone. The vertical gradient is larger in the northern site area, than in the southern site area because it is closer to natural groundwater discharge in the Bajura area, and the water supply wells are completed in the limestone.

Land Use

The Cabo Rojo municipality is 72 square miles in size, with a population of 50,917; the Bajura ward has a population of 2,423 (U.S. Census 2010). The primary land uses near the Site are agricultural, residential, and commercial development.

Ecology

In general, the Site is heavily developed and consists of a downtown commercial district, residential areas, warehouse complexes, and various other developments. Undeveloped land is limited to the immediate corridor of an unnamed stream that flows from the south through the center of town northward to the Ciénaga de Cuevas swamp. Although United States Fish and Wildlife Service records indicate that the Site is located within the range of the federally (threatened or endangered) listed yellow-shouldered blackbird (*Agelaius xanthomus*) and the Puerto Rican boa (*Epicrates inornartus*), threatened, endangered, and rare species and sensitive environments were not observed during the site reconnaissance. This is likely due to the highly urbanized nature of the Site

EARLY SITE INVESTIGATIONS

In 2006, EPA collected groundwater samples from active public and private supply wells in and around Cabo Rojo and began investigating 68 PSAs. Data from EPA and PRASA sampling indicated VOCs were detected most frequently in the Ana Maria (PCE, TCE, and cis-1,2-dichloroethene [cis-1,2-DCE]) and Club de Leones (1,1-dichloroethene [1,1-DCE]) wells.

From 2010 to 2012, EPA continued to investigate PSAs with soil, groundwater, and soil vapor testing and identified the following five facilities (Figure 1) where chlorinated solvents were detected:

- **EQP** – This facility was identified as an active printing business that printed designs onto t-shirts, towels, and bags. Cleaning solutions used at the facility contained VOCs, including PCE. An outdoor screen washing area was identified that discharged wash solutions to a floor drainage trench. Soil vapor samples revealed the presence of PCE, TCE, and cis-1,2-DCE at and near the facility.

- **CRPDC** – This facility consisted of a closed laundering and dry-cleaning business. Operations reportedly used PCE, which was contained in waste sludge stored at the facility. Soil vapor samples revealed the presence of PCE and TCE.

- **D'Elegant Fantastic Dry Cleaners** – This facility consisted of a dry-cleaning business that used solvents containing VOCs, including

TCE. The facility closed in 2009 and has since been replaced with a Walgreens store. Soil vapor samples revealed the presence of PCE, TCE, and cis-1,2-DCE.

- **Serrano II Dry Cleaners** – This facility consisted of a dry-cleaning business. Soil vapor samples revealed the presence of PCE and TCE.
- **PRIDCO East** – This facility is a complex consisting of 10 buildings. Although various commercial and industrial operations (including electrical products manufacturing and textile manufacturing) have occupied different buildings in the past, most buildings are now empty. Soil vapor samples revealed the presence of 1,1-DCE. 1,4-dioxane was also found in low concentrations in the groundwater.

NATURE AND EXTENT OF CONTAMINATION

PCE, TCE, cis-1,2-DCE, vinyl chloride, and 1,1-DCE were selected as the Site-related contaminants (SRCs) based on known past uses at the identified PSAs, the frequency and magnitude of detections in Site media during the RI investigation, and exceedances of their respective screening criteria. Although 1,4-dioxane was selected preliminarily as a SRC based on the groundwater concentrations relative to its groundwater screening criterion, results of the HHRA and SLERA indicate that the concentrations observed do not yield risks above EPA thresholds to human health or the environment. Therefore, 1,4-dioxane was not the focus of the RI Report or remedial alternatives evaluated in the FS.

Additional RI soil and groundwater sampling was conducted in 2017 at PRIDCO East. Although the soil samples from this recent sampling event did not exhibit detections of VOCs, previous soil vapor investigations in 2011 revealed detections of 1,1-DCE at two vacant facilities in the northern portion of the PRIDCO East property. Furthermore, 1,1-DCE was detected in one soil screening sample in the far northeast corner of the property during the 2013 field investigation. These results indicate a historical source area of 1,1-DCE in PRIDCO East soils. Additionally, site-related VOCs were not detected in upgradient wells MW-10 and MW-21R but were present in groundwater screening samples at PRIDCO East (during the 2017 RI sampling event) and in monitoring wells downgradient from PRIDCO East.

Results from groundwater screening and two rounds of monitoring well samples revealed two distinct areas of groundwater contamination, designated as Plume 1 and Plume 2, as described below (See Figure 3). Plume 1 is near the CRPDC and EQP source areas, and Plume 2 is in the southern area of Cabo Rojo, downgradient of the PRIDCO East source area.

Following Hurricane Maria, an additional round of groundwater samples was collected to confirm that pre-hurricane conditions remained the same (see Table 1 for a compilation of the 3 rounds of data).

Summary of Soil Contamination

Soil delineation samples were collected from five PSAs for laboratory analysis and validation. The soil analytical results revealed elevated concentrations of PCE and cis-1,2-DCE at EQP and PCE at CRPDC (Figures 4 and 5). The other three PSAs (D'Elegant Fantastic Dry Cleaners, Serrano II Dry Cleaners, PRIDCO East) exhibited either low detections or no detections of VOCs in the soil delineation samples. The soil analytical results and known prior uses established EQP and CRPDC as source areas.

As discussed above, additional RI soil and groundwater sampling was conducted in 2017 at PRIDCO East. These and prior results helped identify PRIDCO East as a source area.

Summary of Groundwater Contamination

Two distinct areas of groundwater contamination have been identified.

Plume 1, the groundwater plume to the north, encompasses the CRPDC and EQP source areas and the Ana Maria well. At CRPDC, PCE, TCE, cis-1,2-DCE, and vinyl chloride are present in the shallow alluvium (MW-4 well) and in the upper bedrock aquifer (MW-4R well), where the alluvium well is situated about 30 ft above the bedrock well screen. Both wells are hydraulically upgradient of the Ana Maria well. The highest concentrations of PCE (530 ug/L), TCE (140 ug/L), cis-1,2-DCE (410 ug/L), and vinyl chloride (65 ug/L) occurred in an alluvial well (MW-4) at CRPDC during Round 1 (Feb 2014). Round 2 (May 2017) data showed an order of magnitude decrease of PCE (27 ug/L), TCE (10 ug/l), cis-1,2-DCE (44 ug/L), and vinyl chloride (1.2 ug/L) in this alluvial well, MW-4. While VOCs concentrations are lower in Round 2, they remain above screening criteria, with the exception of cis-1,2-DCE. The EQP facility is also a source area contributing to Plume 1. PCE, TCE, and cis-1,2-DCE were detected in soil and groundwater at EQP at lower concentrations than at CRPDC. VOCs in the unconsolidated zone of Plume 1 extend to the Ana Maria well area but do not extend into the Bajura area. Historical pumping at the Ana Maria well likely drew contaminated groundwater from EQP and CRPDC toward the Ana Maria well. The Ana Maria former supply well has been sampled by PRASA and EPA since 2002. From 2002 to 2017, PCE and TCE concentrations detected in the Ana Maria well range from non-detect to a maximum PCE concentration of 4.0 ug/L in 2002, below the EPA MCL of 5 ug/L.

In general, Plume 1 is primarily in the alluvium, the lower portion of the overburden/saprolite zone, and the upper portion of the bedrock zone. Concentrations of site-related contaminants generally decreased in samples from the CRPDC wells from Round 1 to Round 2, due to a combination of natural attenuation and lack of ongoing releases from CRPDC. The one exception is Pozo Escuela, a former supply well for a school converted to a multi-port bedrock monitoring well, which showed a slight increase of PCE from Round 1 (1.3 ug/L) to Round 2 (5.1 ug/L) A third round of post-Maria hurricane data were collected in 2018 and concentrations were relatively consistent with some slight increases most notably in MW-4. This suggests that large storm events may support release of residual contamination into groundwater until the source is removed from the vadose zone and shallow groundwater at CRPDC and EQP.

Plume 2, the groundwater plume in the south consists of a 1,1-DCE plume near PRIDCO East. A series of 3 shallow groundwater transects were collected (a total of 19 locations) across the PRIDCO East site. These samples were collected in the saprolite zone and exhibited concentrations of 1,4-dioxane and 1,1-DCE at concentrations up to 12 µg/L and 1.3 µg/L, respectively, below their respective criteria. The presence of these constituents in the saprolite groundwater at the PRIDCO east facility suggest a historical source of groundwater contamination that can be linked to downgradient bedrock detections of 1,4-dioxane and 1,1-DCE through fractures in bedrock, allowing contamination to migrate through preferential pathways. The contaminants were detected in bedrock wells downgradient of PRIDCO East at concentrations up to 58 µg/L for 1,1-DCE (MW-18R, Round 1) and up to 9.3 µg/L for 1,4-dioxane (MPW-9R, Round 2). However, 1,4-dioxane concentrations observed at the Site did not yield any risk or hazard above EPA's thresholds to human health or the environment. Therefore, Plume 2 is regarded mainly as a 1,1-DCE plume. Round 2 data shows an overall decrease in 1,1-DCE concentrations with MW-18R showing non-detect levels of 1,1-DCE and a reduction of 1,1-DCE in MPW-9R with a decrease from Round 1 to Round 2 in all four bedrock ports. The maximum concentration of 1,1-DCE during Round 2 was found in the new bedrock monitoring well MW-19R with a concentration of 34 ug/L (Figure 3). The third round of data collected after Hurricane Maria in Plume 2 monitoring wells were consistent with Round 2 data.

During the RI investigation, MNA indicator parameters of biotic and abiotic degradation were collected from monitoring wells to evaluate whether subsurface conditions are conducive to in situ natural degradation of chlorinated VOCs. MNA parameters included the following:

> Field parameters: pH, specific conductivity, dissolved oxygen (DO), temperature, ferrous iron and Oxidation reduction potential (ORP) as Eh Laboratory analysis: nitrate/nitrite, sulfate, sulfide, alkalinity, chloride, total organic content (TOC), methane, ethane, ethene, acetylene, and propane.

The MNA data were collected for Rounds 1 and 2 and used to evaluate which MNA mechanisms are occurring in Plumes 1 and 2. Plume 1 was found to show some evidence that natural attenuation has been occurring. While there is limited evidence of ongoing anaerobic biodegradation occurring in the plumes (*e.g.,* low organic carbon levels, lack of electronic receptors), the presence of degradation products (showing degradation to vinyl chloride) in Plume 1 is suggestive that they were generated during the early life of the plume, potentially in the vadose zone or shallow groundwater in and around the release point. The elevated chloride found in Plume 1 monitoring wells is indicative of the dechlorination of PCE. The redox conditions were variable between Rounds 1 and Round 2, indicating reducing conditions may be temporally variable in the aquifer. Additionally, the pH and temperature ranges were shown to be optimal for the growth of bacteria, further supporting a potential for biodegradation.

The order of magnitude decreases in concentrations of PCE and its three daughter products between Round 1 and Round 2 in MW-4 are indicative of a pattern of reduced discharge from the vadose zone to the saturated zone or dilution/dispersion. Additionally, the 2002 peak in PCE concentrations in the Ana Maria well has shown an overall reduction in VOC concentrations and most recently non-detect levels in 2017 providing further evidence of an overall decrease in concentrations in Plume 1 groundwater.

Plume 2 primarily consists of 1,1-DCE with a maximum concentration of 34 ug/L. While organic carbon levels are higher in Plume 2 compared to Plume 1, suggesting a higher potential for biodegradation activity, the levels were still rather low. However, the pH and temperature ranges are supportive for bacterial growth and dissolved oxygen levels range, similar to Plume 1, suggesting certain temporal conditions may be more supportive of biodegradation. Trace concentrations of vinyl chloride in Round 2 suggest localized reduced dechlorination of 1,1-DCE under methanogenic conditions.

Lastly, given the high transmissivity in the upper fractured bedrock, and even the shallow groundwater in both the saprolite and alluvium, the MNA mechanisms of dilution and dispersion will have considerable influence in this aquifer for both Plumes 1 and 2.

Summary of Surface Water/Sediment Contamination

No Site related contaminants were detected in surface water or sediment samples collected from drainage features near the potential source areas.

SUMMARY OF SITE RISKS

As part of the RI/FS, a baseline human health risk assessment (HHRA) was conducted to estimate the risks and hazards associated with the current and future effects of contaminants on human health and the environment. A screening-level ecological risk assessment (SLERA) was also conducted to assess the risk posed to ecological receptors due to Site-related contamination. The purpose of the baseline risk assessment is to identify potential cancer risks and noncancer health hazards and ecological effects caused by hazardous substance exposure in the absence of any actions to control or mitigate these exposures under current and future site uses. The Site is located in a densely populated area that has both commercial and residential uses. This is not expected to change in the future.

In the HHRA, cancer risk and noncancer health hazard estimates are based on current reasonable maximum exposure (RME) scenarios. The estimates were developed by taking into account various health protective estimates about the concentrations, frequency and duration of an individual's exposure to chemicals selected as contaminants of potential concerns (COPCs), as well as the toxicity of these contaminants.

Human Health Risk Assessment

EPA conducted a four-step baseline HHRA to assess Site-related cancer risks and non-cancer health hazards in the absence of any remedial action. The four-step process is comprised of: Hazard Identification, Exposure Assessment, Toxicity Assessment, and Risk Characterization (see adjoining box "What is Risk and How is it Calculated").

The HHRA began with selecting COPCs in the various media (*i.e.,* soil, groundwater, surface water, and sediment) that could potentially cause adverse effects in exposed populations. COPCs are selected by comparing the maximum detected concentrations of each chemical identified with state and federal risk-based screening values. While potential exposures to soil, sediment and surface water were considered, the chemical concentrations detected in these media were below the applicable screening values. As a result, direct exposure to these media are not expected to result in elevated cancer risk or noncancer health hazard. Therefore, COPCs were only selected for groundwater. Although site groundwater is not currently used for drinking water purposes, the HHRA assumed this groundwater could be used as a source of drinking water in the future. Therefore, the current and future exposure pathways and populations evaluated in the HHRA were limited to the following:

- Site Worker (adult): ingestion of groundwater used as tap water (future) and inhalation of indoor air via vapor intrusion (current and future).

- Resident (child and adult): ingestion, dermal contact, and inhalation of groundwater chemical contaminants while showering/bathing (future), and inhalation of indoor air via vapor intrusion (current and future).

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 more detailed discussion of the exposure pathways can be found in the baseline risk human health risk assessment.

Summary of the Human Health Risk Assessment

Groundwater

As previously stated, two separate plumes of groundwater contamination were identified at the Site. The risks and hazards for these plumes were evaluated separately using the EPCs and chronic daily intakes calculated for each. The populations of interest included future child/adult residents and adult workers. Cancer risks were evaluated for the resident throughout a lifetime of exposure. Noncancer hazards were evaluated for the child only as the most sensitive residential receptor. Hazards to the child are considered representative of any hazards to the adult resident. For each of these receptors, exposure to Site-related contaminants in groundwater from Plume 1 results in excess lifetime cancer risk that exceeds EPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$ and a noncancer HI above the acceptable level of 1. Risk and hazard thresholds were exceeded by PCE, TCE, cis-1,2-DCE, vinyl chloride and chromium. However, it is likely that the risk due to chromium is overestimated because it was assumed that all the chromium present is in the more toxic hexavalent form. This is conservative since chromium in the environment is generally dominated by the less toxic, trivalent form. In addition, chromium was not detected at levels exceeding the Puerto Rico Water Quality Standard and Federal MCL in groundwater. Historical information does not indicate the use of hexavalent chromium in source area processes as well. Therefore, chromium is not considered a Site-related contaminant.

For Plume 2, the resulting risks and hazards are below the EPA target risk range and noncancer threshold of unity. However, although 1,1-DCE was unassociated with elevated risk, this chemical was detected within Plume 2 at concentrations above the Puerto Rico Water Quality Standard and Federal MCL (7 μg/L).

Summary of risks and hazards associated with groundwater

Receptor	Hazard Index	Cancer Risk
Plume 1		
Resident – future	48	$1x10^{-2}$
Site Worker – future	9	$4x10^{-4}$
Plume 2		
Resident – future	0.9	$1x10^{-4}$
Site Worker – future	0.2	$1x10^{-5}$

Vapor Intrusion

During the RI, a vapor intrusion investigation was conducted to assess the potential migration of VOC-contaminated vapors into structures in Cabo Rojo and to assess impacts on indoor air. The indoor air and sub-slab vapor results were compared to EPA vapor intrusion screening levels (VISLs) based on a cancer risk of $1x10^{-6}$ and hazard quotient of 1 for both residential and commercial use.

Results of the data collected indicate that elevated sub-slab vapor and indoor air concentrations predominantly consisted of site-related PCE and TCE, which were primarily associated with the CRPDC and EQP source areas. CRPDC is currently an inactive facility, and EQP is still in use as a commercial facility. Although indoor air concentrations at EQP exceed residential VISLs, the detected concentrations do not exceed commercial VISLs. Indoor air concentrations of site-related contaminants at CRPDC do not exceed either residential or commercial VISLs. However, elevated sub-slab concentrations indicate there is a potential risk from vapors migrating into the structure in the future (see Table 4).

Ecological Risk Assessment

A screening-level ecological risk assessment (SLERA) was conducted to evaluate the potential for ecological risks from the presence contaminants in soil, sediment, surface water, and pore water. The SLERA focused on evaluating the potential for impacts to sensitive ecological receptors to site-related chemicals through exposure to soil, sediment, surface water, and porewater on the Site. Concentrations in the media listed above 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.

SLERA results indicate that although two site-related chemicals were identified in surface soil (cis-1,2-DCE and TCE), there is no suitable habitat for ecological receptors due to the urban nature of the area and the fact that the sample location is in a small area of mowed turf between a parking lot and a building, posing no exposure risk to wildlife receptors. Only non-Site-related contaminants were detected near sediment sample location SD-02 (near CRPDC) and upstream source areas. There is no risk to ecological receptors from exposure to the Site-related chemicals.

WHAT IS RISK AND HOW IS IT CALCULATED?

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

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

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

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other noncancer 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 noncancer 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 noncancer 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 noncancer health effects, a "hazard index" (HI) is calculated. The key concept for a noncancer HI is that a "threshold" (measured as an HI of less than or equal to 1) exists below which noncancer health hazards are not expected to occur. The goal of protection is 10^{-6} for cancer risk and an HI of 1 for a noncancer 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.

Conclusion

Residential and worker exposure to contaminated groundwater within Plume 1, in the absence of any current or ongoing remedial action, yields risks and hazards that exceed EPA's acceptable cancer risk range ($1x10^{-4}$ to $1x10^{-6}$) and noncancer hazard threshold (HI of 1). Although unassociated with elevated risk, 1,1-DCE was detected above Puerto Rico and Federal standards in groundwater within Plume 2 as well. Based on these results, the contaminants of concern (COCs) identified include PCE, TCE, cis-1,2-DCE, vinyl chloride, and 1,1-DCE. Elevated sub-slab vapor and indoor air concentrations predominantly consisted of PCE and TCE, which were primarily associated with the CRPDC and EQP source areas. Although indoor air levels do not currently pose significant risk, elevated sub-slab concentrations indicate a potential risk from vapors migrating into these structures in the future.

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.

EPA has established expectations 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 or the environment should exposure occur. The contamination at the Cabo Rojo is not considered principal threat waste.

WHAT IS A "PRINCIPAL THREAT"?

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever 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. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water or air, or acts as a source for direct exposure. Contaminated ground water generally is not considered to be a source material; however, Non-Aqueous Phase Liquids (NAPLs) in ground water may be viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria. This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

The Site consists of the following media that are impacted by COCs:

- Soil
- Groundwater
- Soil vapor

High concentrations of COCs detected in soil samples at CRPDC (PCE up to 3,700 µg/kg) and EQP (PCE up to 73 µg/kg and cis-1,2-DCE up to 480J µg/kg) indicated contaminated soil could serve as a continuing source for Plume 1 and serve as the source for contaminated soil vapor at the CRPDC and EQP. As a result, soil is a medium of concern, and RAOs have been developed for the Site soils.

PCE and its daughter products and 1,1-DCE were detected above RI screening criteria in groundwater at both plumes. The HHRA demonstrated that contaminated groundwater poses human health risks. Therefore, groundwater is a medium of concern and RAOs have been developed for groundwater.

Surface water and sediment samples were collocated. No COCs were detected in surface water and sediment samples collected from drainage features near source areas. As a result, both surface water and sediment are not considered media of concern, and no RAOs have been developed for either medium.

Based on the results of indoor air and sub-slab vapor sampling collected in the RI, vapor containing PCE (and to a lesser degree, TCE) in sub-slab has been detected at several buildings, including the CRPDC and EQP buildings. The HHRA report indicates there is a potential risk from vapors migrating into the CRPDC building in the future, but vapor intrusion would not currently pose a risk to workers were it to be occupied. At EQP, the HHRA indicated that vapor intrusion may be occurring but not at levels currently causing a risk to workers. By addressing the soil and groundwater contamination at CRPDC and EQP, soil vapor contamination at these two areas would also be addressed.

To protect human health and the environment, RAOs have been identified.

The RAOs for soil are:

- Prevent contaminated soil from serving as sources of groundwater contamination;
- Prevent/Minimize contaminated soil from serving as sources of current and future vapor intrusion.

The RAOs for groundwater are:

- Prevent human exposure to contaminated groundwater with concentrations above the PRGs;
- Restore the groundwater to drinking water quality;
- Prevent/Minimize contaminated groundwater from serving as sources of current and future vapor intrusion.

PRELIMINARY REMEDIATION GOALS

To meet the RAOs, remediation goals were developed to aid in defining the extent of contaminated groundwater requiring remedial action. Remediation goals are chemical-specific measures for each media and/or exposure route that are expected to be protective of human health and the environment. 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.

Preliminary Remediation Goals for Soil

There are no promulgated federal or commonwealth chemical-specific ARARs for soil. To meet the RAOs for protection of groundwater, site-specific impact to groundwater soil cleanup levels were developed. The Preliminary Remedial Goals (PRGs) for soil are shown in Table 2.

Table 2, Preliminary Remediation Goals for Soil

Contaminant of Concern	Soil Protective of Groundwater	PRG	Maximum Detected Concentration
	µg/kg	µg/kg	µg/kg
cis-1,2-DCE	417	417	480J
PCE	132	132	3,700
TCE	141	141	35J

J – Estimated result

Preliminary Remediation Goals for Groundwater

Groundwater at the site is classified as Class SG (which includes all groundwater as defined in Puerto Rico's Water Quality Standards [PRWQS] regulation [Puerto Rico Environmental Quality Board [PREQB 2014]), suitable for drinking water use and for use as a source of potable water supply in the Commonwealth of Puerto Rico. To restore groundwater quality to accommodate any future uses of site groundwater as drinking water, PRWQS and federal drinking water standards are used. The lower of these two standards is selected as the groundwater PRG for each contaminant. Table 3 presents the PRGs for groundwater.

Table 3, Preliminary Remediation Goals for Groundwater

Contaminant of Concern	EPA MCLs (µg/L)	PR Water Quality Standard (µg/L)	PRG (µg/L)	MDC Plume 1 (µg/L)	MDC Plume 2 (µg/L)
1,1-DCE	7	7	7	0.54	40
cis-1,2-DCE	70	NL	70	93	0.27J
PCE	5	5	5	96	ND
TCE	5	5	5	35	0.79
Vinyl chloride	2	0.25	0.25	0.28	0.28

ND - Not detected
NL - Not Listed
MCL - Maximum Contaminant Levels
MDC - Maximum Detected Concentration

Screening Criteria for Vapor Intrusion

The suitable sub-slab contaminant-screening criteria and indoor air concentration requiring mitigation were based on EPA VISLs guidance for commercial properties and are presented in Table 4. However, the VISLs referenced are frequently updated based on evolving toxicity information. Therefore, the screening criteria may be subject to change. The latest screening criteria for vapor intrusion will be used to monitor sub-slab and indoor air quality over time at CRPDC and EQP.

Table 4, Screening Levels for Vapor Intrusion

Contaminant of Concern	Commercial Screening Level	Maximum Detected Concentrations
	µg/m³	µg/m³
Sub-Slab		
1,1-DCE	29,200	ND
Vinyl chloride	93	ND
Cis 1,2-DCE	NL	2.8J
PCE	1,572	240,000
TCE	100	110J
Indoor Air		
1,1-DCE	876	0.079J
Vinyl chloride	2.8	ND
Cis-1,2-DCE	NL	0.28
PCE	47	19
TCE	3	3.4

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 Section 121(d)(4) of CERCLA, 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 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. With the exception of five-year reviews, the common elements do not apply to the 'No Action' alternatives. The active alternatives include a pre-design investigation (PDI) and a pilot study at the Plume 1 source area. Data obtained during the RI, PDI, and Pilot Study would be used to develop the detailed approach for the Site remediation during the Remedial Design (RD). All aspects necessary for implementing the remedial action would be considered, including but not limited to the detailed layout of the SVE/DPE system, in-situ treatment system, and construction sequence, regulatory requirements, and estimated remedial action cost. Additionally, a common element of the two active alternatives is Long Term Monitoring and MNA for Plumes 1 and 2 and Institutional Controls. A description of these evaluations is provided below.

Similarly, the nature and extent of contamination in the vadose zone associated with EQP source area would be further delineated in a PDI. The depth of the vadose zone may be 45 feet in this area. While there are more challenges associated with an investigation at EQP, measures can be taken to collect soil data underlying and adjacent to the building.

Long Term Monitoring and MNA at Plume 1

Annual sampling of the existing monitoring well network in Plume 1 would be conducted. It is assumed that PRASA will not conduct routine quarterly monitoring at the Ana Maria supply well because it is no longer active and will not be returned to service. The Ana Maria well will be sampled during the Remedial Action (RA) as part of the Plume 1 monitoring well network. Annual monitoring well network samples would be analyzed for VOCs and MNA parameters. As mentioned above, the reducing conditions seem to vary on a temporal basis. Additional rounds of data will allow for a better understanding of how biodegradation potential in the aquifer may vary with time. Contaminant migration and concentration trends would continue to be evaluated. The monitoring program would proceed until concentrations show at least eight consecutive rounds of compliance with the PRGs, according to EPA's Groundwater Remedy Completion Strategy (EPA 2014). The remediation timeframe is estimated to be 30 years.

Based on the CSM presented in the RI Report, the alluvium is localized between wells MW-4 and MW-15. Contaminated groundwater originating from CRPDC in the alluvium would travel north toward the area of MW-15 then migrate into the overburden and the highly fractured bedrock zone observed in the Pozo Escuela bedrock well (this well that formerly supplied a school, was taken out of service and was converted to monitoring well and sampled during the RI, see Figure 2). Contaminant concentrations in MW-2 and MW-1 were below 10 µg/L during Round 2 sampling in 2017, and the detection of cis-1,2-DCE and vinyl chloride indicated the occurrence of reductive dechlorination in the overburden. Contaminant concentrations in Pozo Escuela were also relatively low (highest PCE concentration was 5.1 µg/L in Round 2). However, increased concentrations of COCs in MW-4 and MW-15 from Round 2 (2017) to Post-Maria (2018) sampling events indicate that the source area at CRPDC continues to contribute to groundwater contamination in the alluvium (See Figure 3).

Because the highly fractured bedrock is very transmissive, concentrations of contaminants entering this zone are expected to decrease through dilution and dispersion. This was observed in bedrock well MW-4R (at CRPDC) where COC concentrations decreased slightly from Round 2 (2017) to Post-Hurricane Maria sampling in 2018. Contaminated groundwater originating from EQP was also detected in the highly fractured bedrock zone where dilution and dispersion may play an important role in decreasing contaminant concentrations. As additional rounds of groundwater monitoring data are collected as part of the long-term monitoring program, the data would be used to assess the ongoing attenuation of the groundwater contamination, mechanisms contributing to the attenuation of Site contaminants, and progress toward meeting the PRGs.

Long Term Monitoring and MNA at Plume 2

Annual sampling of the existing monitoring well network in Plume 2 would be conducted. 1,1-DCE in Plume 2 can degrade under aerobic or anaerobic conditions but is dependent on the presence of the appropriate microbes and substrates to enhance the degradation. VOCs and MNA parameters will be collected from Plume 2 wells to continue to assess MNA. The monitoring program would continue until contaminant concentrations show several consecutive rounds of compliance (preferably eight rounds) with the PRGs according to EPA's Groundwater Remedy Completion Strategy (EPA 2014).

Monitoring of Active PRASA Supply Wells

Analytical data and operational data for Club De Leones and Cabo Rojo 1 through 3 public supply wells would be obtained from PRASA. These supply wells are currently active and operating, but have not historically been impacted by Site-related contamination. PRASA is expected to continue routine quarterly sampling of these wells to ensure they continue to meet drinking water standards.

Site Restoration

After the completion of all remedial actions, associated equipment and infrastructure would be properly removed or demobilized. The Site would be restored to pre-remedial action conditions as much as possible. Site restoration activities may include but are not limited to repairing the building slabs and pavement.

Institutional Controls

Institutional Controls (ICs) are non-engineered controls, such as property or groundwater use restrictions placed on real property by recorded instrument, by a governmental body by law or regulatory activity, or through informational devices such as public notices, that reduce or limit the potential for human exposure to contamination and/or protect the integrity of a remedy.

Government controls, such as local laws, will be employed to limit the installation of groundwater extraction wells at the source areas and in the plume areas until the cleanup is complete. Local laws currently exist in Puerto Rico that limit the installation of any groundwater extraction wells in the absence of a permit.

Informational devices will be used to prevent well installation and prohibit occupancy, use, or new construction in the source areas unless appropriate vapor-intrusion investigations are conducted and/or mitigation measures (including periodic monitoring, as necessary) are implemented. Advisories published in local newspapers and periodic notices sent to local government authorities informing them of the ICs will be issued on a periodic basis until the remedy is complete.

More information about ICs can be found at: www2.epa.gov/sites/production/files/documents/ic_ctzns_guide.pdf

Five-Year Reviews

Per CERCLA, alternatives where it will take longer than five years to achieve cleanup levels under all of the alternatives, CERCLA requires that a review of conditions at the site be conducted no less often than once every five years until such time as cleanup levels are achieved. If justified by the review, additional remedial actions may be implemented to remove, treat, or contain the contamination. The Site review would include evaluation of data collected from the long-term monitoring, a Site-wide visual inspection, and a report prepared by EPA.

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. 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 consider beneficial reuse and/or recycling of materials, among others.

Remedial Alternatives

The remedial alternatives to address soil and groundwater contamination at the Site are summarized below.

Alternative 1 – No Action

Capital Cost	$0
Present Worth O&M Cost	$0
Total Present Worth	$0
Construction Time Frame	0 years
Timeframe to meet RAOs	0 years

The No Action alternative is required to be considered pursuant to the NCP. The No Action alternative would include no action being taken and serves as a baseline for comparison of remedial alternatives.

Alternative 2 – SVE/DPE, MNA, Contingency for In-Situ Groundwater Treatment and Institutional Controls

Capital Cost	$2,789,000
Present Worth O&M Cost	$2,511,000
Total Present Worth Cost	$5,300,000
Construction Time Frame	2.5 year
Timeframe to meet RAOs	30 years

This alternative would provide active treatment (soil vapor extraction/dual phase extraction [SVE/DPE]) to the target soil remediation zones and potentially underlying groundwater at CRPDC and EQP (Figures 4 and 5). The Plumes would be managed through the implementation of MNA and long-term monitoring as described previously.

SVE/DPE Installation, Operation, and Maintenance at Source Areas

At CRPDC, DPE wells would be installed to address the vadose zone within the target soil remediation zone defined based on the PDI results. Groundwater extraction would be a component of DPE to remove groundwater contamination at shallow depths also within the target soil remediation zone. At EQP, SVE wells and groundwater extraction wells would be installed separately to address the vadose zone and the shallow groundwater contamination since the groundwater aquifer is a confined unit. The existing building slab and pavements would be inspected, improved, and sealed if necessary and would serve as a cap for the DPE and SVE systems. The SVE/DPE remedy would serve to mitigate potential vapor intrusion into the CRPDC and EQP buildings.

The vapor treatment system would likely consist of compressors, piping, an air-water separator, as necessary, and vapor-phase activated carbon units. Vapor discharged would meet Puerto Rico discharge requirements. The air flow rate (vacuum) and concentrations of contaminants, oxygen, and carbon dioxide in the extracted vapor would be monitored regularly.

The water treatment system would be installed in the same area/building as the vapor treatment system and would treat extracted water using air strippers or liquid-phase activated carbon units per the RD. Depending on the groundwater extraction rate of the DPE system, the treated water might be discharged to the on-site drainage system with appropriate permits or be re-injected into the subsurface. Additional sampling and analysis would be conducted on the vapor and water effluent streams to ensure discharge permit requirements for each medium are met.

SVE/DPE Performance Evaluation at Source Areas

The effectiveness of SVE and/or DPE in the vadose zone soil would be evaluated by collecting soil gas samples. An evaluation would be conducted prior to shut down of the system when the VOC concentrations in extracted vapor are reduced to an asymptotic level and/or the in-situ contaminant concentrations reach one magnitude greater than the PRGs or less, and/or the relative changes in contaminant mass removal decline to a level that continued operation of the system becomes not cost-effective.

The effectiveness of SVE/DPE in minimizing soil contamination from serving as sources to groundwater contamination and soil vapor contamination would be evaluated in conjunction with groundwater and sub-slab vapor sample results. Plume 2 and the dilute portion of Plume 1 would be managed through the implementation of MNA and long-term monitoring. The PRGs for soil and groundwater, along with the vapor intrusion screening levels will be used to determine the effectiveness of the SVE/DPE. It is expected that multiple rounds of sampling will be needed to ensure that this technology has achieved remediation goals.

Sub-Slab and Indoor Air Monitoring

Sub-slab and indoor air samples at the CRPDC and EQP areas would be collected periodically to monitor the potential or presence of vapor intrusion. Results of vapor samples would be compared to the sub-slab and indoor air VISLs. Monitoring would help inform the progress and effectiveness of the active source remedy (SVE or DPE) and would be conducted until the vadose zone source area is remediated to levels that eliminate the need to mitigate vapor intrusion at the point of exposure. Post treatment vapor monitoring would be conducted to confirm the source has been remediated and no longer contributes to vapor intrusion

Potential contributions of COCs from indoor background sources would be considered during the vapor intrusion monitoring, especially at the EQP facility where active business practices (printing) may utilize VOCs.

<u>Triggers for In-situ Groundwater Treatment for Plume 1</u>

Additional groundwater treatment is not considered as part of this alternative. However, as part of this alternative, the following considerations can be incorporated into the decision document that trigger the need for in-situ groundwater remediation as described in Alternative 3. As additional data from the PDI and groundwater monitoring become available, conditions may indicate the need for active treatment of contaminated groundwater in Plume 1, especially in the vicinities of the two source areas. The considerations include:

- Detection of NAPL in the vadose zone soil, or PCE/TCE concentrations indicative of NAPL (*e.g.,* 1% solubility) at the water table, indicating a continuing source of groundwater contamination;
- Significant increase of contaminant concentrations in MW-15 and/or MW-3R/MW-3RS to greater than one order of magnitude above the PRGs and/or an increasing trend of contaminant concentration in plume wells, such as Ana Maria, MW-2, and MW-1;
- Consistent detections of PCE and/or TCE in sentinel wells, such as MW-16, USGS-OW-1 (for PCE or TCE), and PRASA-1; and
- Consistent detections of PCE and/or TCE in the supply wells.

Alternative 3: SVE/DPE, In-Situ Groundwater Treatment, MNA and Institutional Controls

Capital Cost	$4,866,000
Present Worth O&M Cost	$2,732,000
Total Present Worth	$7,598,000
Construction Time Frame	4-5 years
Timeframe to meet RAOs	30 years

This alternative would provide active treatment (SVE/DPE) to the target soil remediation zones and shallow contaminated groundwater at CRPDC and EQP. SVE/DPE installation, operation, and maintenance at source areas; SVE/DPE performance evaluation at source areas; and sub-slab and indoor air monitoring would be conducted as described in Alternative 2. In addition, under this alternative, the in-situ treatment described as a contingency in Alternative 2 would be part of the alternative. Plume 2 and the dilute portion of Plume 1 would be managed through the implementation of MNA and long-term monitoring.

<u>Pilot Study for Contaminated Groundwater at the Source Areas</u>

At CRPDC, PCE groundwater contamination was detected in MW-4 and MW-4R. During the PDI at CRPDC, groundwater screening borings would be installed within the target treatment zone to obtain the vertical profile of groundwater contamination. The data would be used for the design of in-situ treatment. A pilot study would be conducted to collect site-specific design parameters and groundwater extraction rate.

This alternative assumes that the PDI results from the source area at EQP indicate that groundwater contamination at EQP requires treatment. A well may be installed to the north of EQP building for a pilot study. The pilot study may be conducted by releasing amendment from the well to the east of EQP building (to be installed during the PDI at source areas) and monitored in wells to the north and west of the EQP building. Wells may also be installed at an angle to reach below the EQP building for the pilot study.

<u>In-Situ Treatment at CRPDC and EQP</u>

Under this alternative, it is assumed that the full depth of contaminated groundwater one order of magnitude above the PRGs will be treated at both the CRPDC and EQP properties. The actual treatment zone would be refined during the remedial design or the remedial action.

Enhanced Anaerobic Biodegradation (EAB) is assumed to be the technology for in-situ treatment. During the remedial design, based on additional investigation results, other treatment technologies may be considered.

The direct push injections at the CRPDC source area would cover the entire CRPDC property to 65 feet bgs. A groundwater extraction well would be installed at the northern boundary of the property to provide water for the injections. Two clusters of monitoring wells would be installed at the northern portion of the property to monitor the progress of EAB treatment. An amendment that has the characteristics of being easy to distribute and long-lasting would be preferred at CRPDC. At the EQP source area, the recirculation system would consist of one injection well screened in shallow weathered bedrock along the east side of the EQP building within the adjacent police department property parking lot. An extraction well would be installed west of the injection well within the EQP parking lot. The groundwater recirculation would induce a hydraulic gradient to facilitate amendment distribution toward the west. Two monitoring wells screened in shallow bedrock would be installed at the northeast and northwest downgradient edges of the EQP property to assess in situ treatment progress. An amendment that would migrate with groundwater flow and has a high retention capacity in highly weathered bedrock zone would be preferred at EQP. It is assumed that only one round of EAB treatment would be performed.

Methane generated during the EAB treatment could be extracted by the SVE system, or it may travel with groundwater downgradient and would need to be managed and monitored. Monitoring of vertical migration of soil vapor from groundwater to the vadose zone would be considered during RD and EAB treatment.

The effectiveness of in situ treatment would be evaluated by collecting groundwater samples from monitoring wells installed in the target groundwater remediation zones. Sample results from these wells will be reviewed together with monitoring well data from the dilute plume downgradient of the treatment zone in Plume 1 for evaluation of the long-term effectiveness.

EVALUATION OF REMEDIAL ALTERNATIVES

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy. This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are discussed below. A detailed analysis of alternatives can be found in the FS.

A comparative analysis of these alternatives based upon the evaluation criteria noted is presented below.

Comparative Analysis of Alternatives

Overall Protection of Human Health and the Environment

All COCs are currently present above the PRGs in at least one medium (soil, vapor, and groundwater). Contaminated groundwater in Plume 1 poses unacceptable human health risks to future residents and workers. Contaminated vapor has the potential to pose human health risks at CRPDC and EQP buildings due to vapor intrusion. Plume 2 does not currently pose an unacceptable risk to human health; however, the No Action alternative would not be protective of human health and the environment in at the source areas because no action would be taken to remediate or monitor contamination and risk. The No

Action alternative would not meet the RAOs.

Alternatives 2 and 3 would be protective of human health and the environment because they involve active treatment of the vadose zone source areas and monitoring of the natural attenuation of Plume 1 until the RAOs and PRGs are met. Institutional controls would be implemented to restrict future residential use of groundwater at the site until PRGs are met.

Compliance with ARARs

COCs are currently present in groundwater and soils at concentrations exceeding PRGs and thus are not currently in compliance with chemical-specific ARARs. Alternative 1 would not take any active measures to evaluate future compliance with ARARs.

Alternatives 2 and 3 would reach compliance with chemical-specific ARARs through active treatment, natural attenuation, and monitoring. Alternatives 2 and 3 would meet PRGs.

Long-Term Effectiveness and Permanence

Alternative 1 would not be considered a permanent remedy because no action would be implemented to reduce the level of contamination to below PRGs or verify any naturally occurring reduction. Alternative 1 does not provide long-term effectiveness.

Both Alternatives 2 and 3 would permanently reduce contaminant concentrations in the source zones through active treatment. Consequently, contamination in groundwater and vapor would be reduced or eliminated. Alternative 2 would be used to address shallow groundwater. If the PDI or long-term monitoring results reveal higher levels of contamination than expected in groundwater (more than an order of magnitude above the PRGs), active groundwater treatment (Alternative 3) would be triggered. As a result, residual risks are expected to be within EPA's acceptable risk range for Alternatives 2 and 3. Alternatives 2 and 3 would have long-term effectiveness and permanence.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 1 would not reduce contaminant Toxicity, Mobility, or Volume (T/M/V) through treatment. Alternatives 2 and 3 would reduce T/M/V through treatment in the source areas and would achieve the

NINE EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES
Overall protection of human health and the environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative would meet all of the applicable or relevant and appropriate requirements of federal and state environmental statutes and other requirements that pertain to the site, or provide grounds for invoking a waiver.
Long-term effectiveness and permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies an alternative may employ.
Short-term effectiveness considers the period of time needed to implement an alternative and the risks the alternative may pose to workers, residents, and the environment during implementation.
Implementability is the technical and administrative feasibility of implementing the alternative, including the availability of materials and services.
Cost includes estimated capital and annual operation and maintenance costs, as well as present-worth costs. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
Commonwealth acceptance considers whether the Commonwealth (the support agency) concurs with, opposes, or has no comments on the preferred remedy.
Community acceptance will be assessed in the ROD and refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports. Comments received on the Proposed Plan are an important indicator of community acceptance.

PRGs. Alternatives 2 and 3 would reduce T/M/V through SVE, DPE, and/or in situ treatment in the source areas, especially the soil contamination that could serve as a source of groundwater contamination. Active treatment in the source areas under both alternatives also is expected to reduce contamination in Plume 1 at the source areas. Alternatives 2 and 3 would achieve the PRGs for groundwater over time. For both Plume 1 and Plume 2, natural attenuation would reduce T/M/V under both Alternatives 2 and 3.

Short-Term Effectiveness

There would be no short-term impact to the community and environment from Alternative 1 as no remedial action would occur. However, this alternative would not meet RAOs within a reasonable time frame. There would be moderate short-term impacts to the local community and workers under Alternative 2 due to the PDI activities and the RA construction and operation at the CRPDC and EQP buildings within the source areas. Both Alternatives 2 and 3 would require that equipment be brought inside buildings to install the SVE and/or DPE system. For both alternatives, a pilot study would be needed to evaluate the zone of influence of SVE/DPE wells. The CRPDC building may need to be modified, and the operation of EQP may need to be shut down temporarily. Alternative 3 would have the greatest short-term impact to the community, impacting the same areas as Alternative 2 in addition to potential disruptions to nearby traffic for injection/extraction/monitoring well installations. For Alternative 3, a pilot study would need to be conducted to obtain design parameters for in-situ treatment. Following removal of the sources, the time frames for Alternatives 2 and 3 to meet the RAOs would be controlled by the rate of natural attenuation of the plumes. In other words, the RAOs in groundwater will be met once the COCs have degraded and/or been dispersed/diluted to concentrations below their respective criteria. Therefore, the overall time frames for Alternatives 2 and 3 are expected to be similar.

Implementability

While all alternatives are implementable, both Alternatives 2 and 3 would need to overcome the challenge of drilling inside CRPDC, which may require modification of the building wall to install a rig. There are locations that may not be accessible for any drilling equipment. There is also the possibility of collecting samples under the building using angled drilling. Drilling at EQP could interrupt the business. . The area surrounding the Site is highly developed with minimal space between above ground structures. For this reason, Alternative 3 would be more difficult to implement since in-situ treatment would require installation of additional injection and performance monitoring wells. Additionally, these wells could interfere with utilities and traffic controls. While horizontal wells are a more innovative technology that could overcome the limitations of installing vertical wells, given the dilute nature of Plume #1 it would be difficult to successfully implement this technology in this setting. Alternative 2 is also more in line with the current conceptual site model for the Site, with a contingency for additional in-situ treatment if new information becomes available during the PDI.

For both Alternatives 2 and 3, services and materials are readily available. However, specialized equipment would be shipped from the U.S. mainland at additional costs. For Alternative 3, amendments for in-situ treatment would also need to be shipped from the U.S. mainland.

Cost

The cost estimates for all three alternatives are provided below.

Groundwater Alternative	Capital Costs	Present Worth O&M Costs	Total Present Worth
1	$0	$0	$0
2	$2,789,000	$ 2,511,000	$ 5,300,000
3	$4,866,000	$ 2,732,000	$ 7,598,000

Commonwealth/Support Agency Acceptance

The PREQB agrees 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.

PREFERRED REMEDY

EPA, in consultation with PREQB, agrees that the preferred alternative for the Site groundwater is Alternative 2, SVE/DPE, MNA, Long-term Monitoring, Institutional Controls and Contingency for In-Situ Treatment. Based on the evaluation of the data, information currently available, and the comparative analysis, the preferred alternative meets the statutory requirements of CERCLA for protection of human health and the environment under current and projected future land use.

Based on information currently available, the lead agency believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The (name of lead agency) expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA §121(b): 1) be protective of human health and the environment; 2) comply with ARARs (or justify a waiver); 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 (or justify not meeting the preference).

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 and PREQB believe that the preferred remedy would 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. The preferred remedy also would meet the statutory preference for the use of 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.

Figure 1. Overview of Site Area, including the three source areas: Cabo Rojo Professional Dry Cleaners (source to Plume 1), Extasy Q Prints (Source of Plume 1) and Pridco East (historical source to Plume 2).

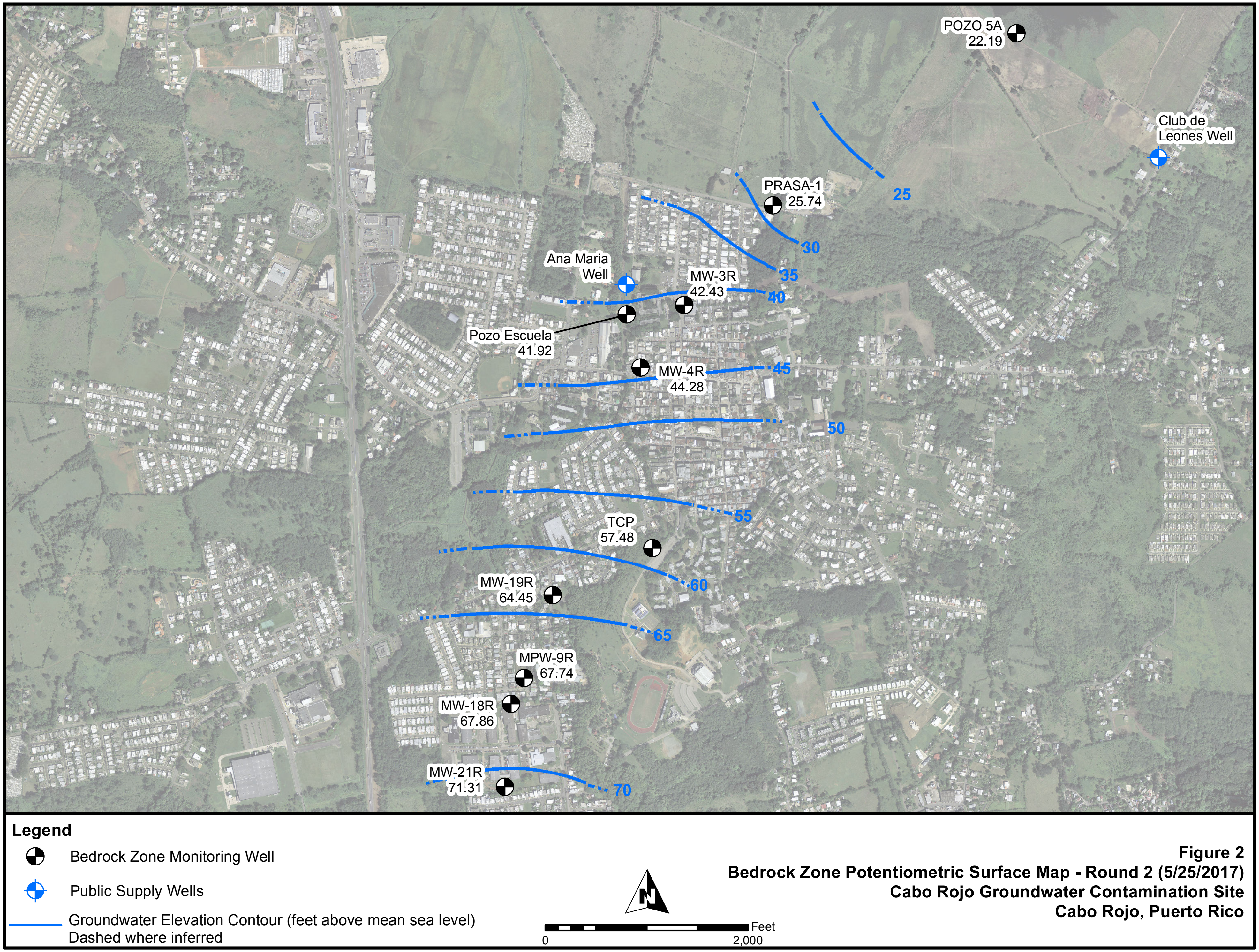
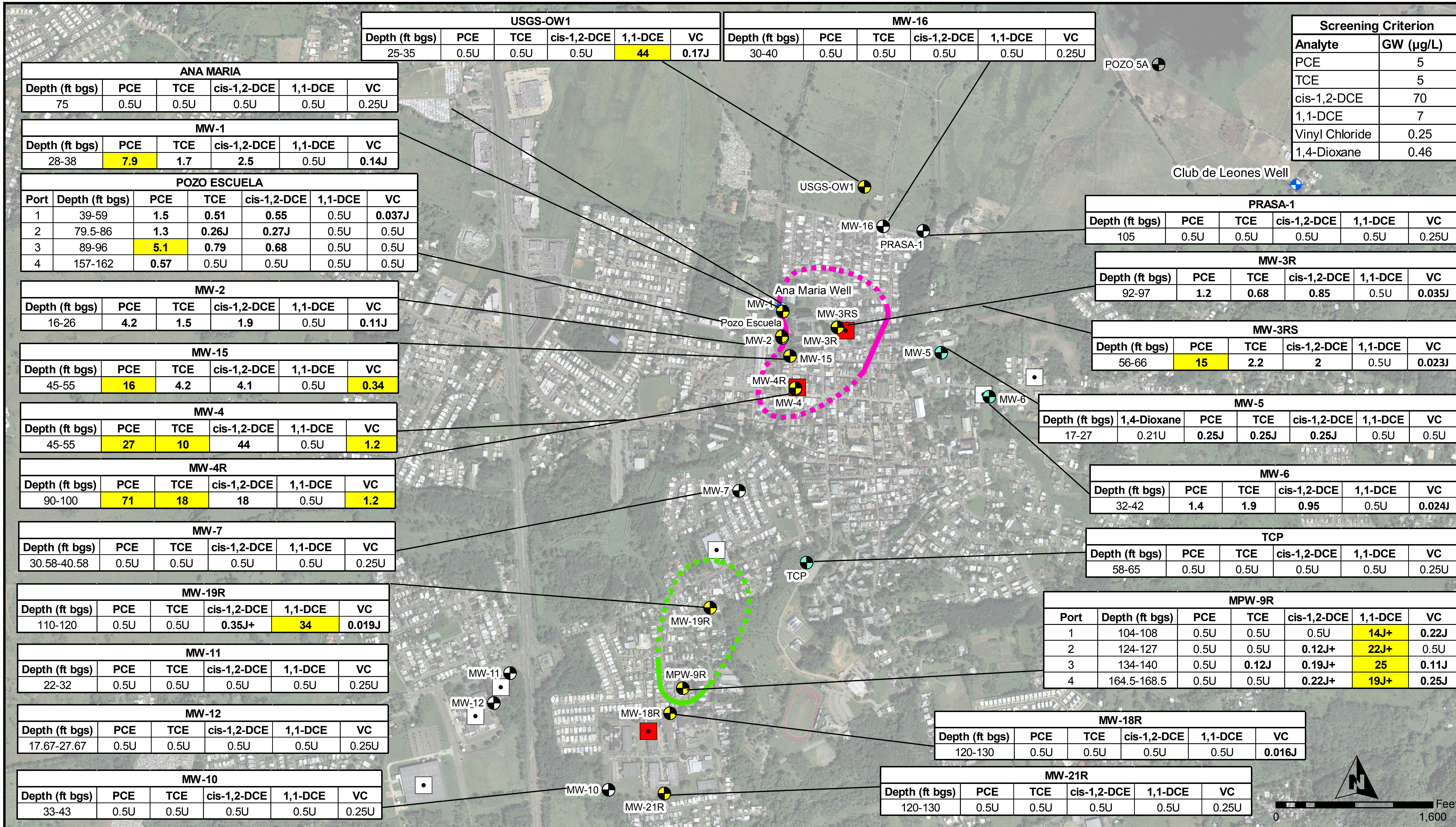


Figure 2. Direction of groundwater flow in the bedrock during Round 2 data collection.



USGS-OW1

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
25-35	0.5U	0.5U	0.5U	**44**	**0.17J**

MW-16

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
30-40	0.5U	0.5U	0.5U	0.5U	0.25U

Screening Criterion

Analyte	GW (µg/L)
PCE	5
TCE	5
cis-1,2-DCE	70
1,1-DCE	7
Vinyl Chloride	0.25
1,4-Dioxane	0.46

ANA MARIA

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
75	0.5U	0.5U	0.5U	0.5U	0.25U

MW-1

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
28-38	**7.9**	**1.7**	**2.5**	0.5U	**0.14J**

POZO ESCUELA

Port	Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
1	39-59	**1.5**	**0.51**	**0.55**	0.5U	**0.037J**
2	79.5-86	**1.3**	**0.26J**	**0.27J**	0.5U	0.5U
3	89-96	**5.1**	**0.79**	**0.68**	0.5U	0.5U
4	157-162	**0.57**	0.5U	0.5U	0.5U	0.5U

PRASA-1

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
105	0.5U	0.5U	0.5U	0.5U	0.25U

MW-3R

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
92-97	**1.2**	**0.68**	**0.85**	0.5U	**0.035J**

MW-2

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
16-26	**4.2**	**1.5**	**1.9**	0.5U	**0.11J**

MW-3RS

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
56-66	**15**	**2.2**	**2**	0.5U	**0.023J**

MW-15

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
45-55	**16**	**4.2**	**4.1**	0.5U	**0.34**

MW-5

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
17-27	0.21U	**0.25J**	**0.25J**	**0.25J**	0.5U	0.5U

MW-4

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
45-55	**27**	**10**	**44**	0.5U	**1.2**

MW-4R

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
90-100	**71**	**18**	**18**	0.5U	**1.2**

MW-6

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
32-42	**1.4**	**1.9**	**0.95**	0.5U	**0.024J**

MW-7

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
30.58-40.58	0.5U	0.5U	0.5U	0.5U	0.25U

TCP

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
58-65	0.5U	0.5U	0.5U	0.5U	0.25U

MW-19R

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
110-120	0.5U	0.5U	**0.35J+**	**34**	**0.019J**

MPW-9R

Port	Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
1	104-108	0.5U	0.5U	0.5U	**14J+**	**0.22J**
2	124-127	0.5U	0.5U	**0.12J+**	**22J+**	0.5U
3	134-140	0.5U	**0.12J**	**0.19J+**	**25**	**0.11J**
4	164.5-168.5	0.5U	0.5U	**0.22J+**	**19J+**	**0.25J**

MW-11

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
22-32	0.5U	0.5U	0.5U	0.5U	0.25U

MW-12

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
17.67-27.67	0.5U	0.5U	0.5U	0.5U	0.25U

MW-18R

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
120-130	0.5U	0.5U	0.5U	0.5U	**0.016J**

MW-10

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
33-43	0.5U	0.5U	0.5U	0.5U	0.25U

MW-21R

Depth (ft bgs)	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
120-130	0.5U	0.5U	0.5U	0.5U	0.25U

Public Supply Wells
Confirmed Source Area
Former Potential Source Area
PCE plume contour (5 µg/L)
1,1-DCE plume contour (5 µg/L)

Groundwater Sample Results
Detection
Exceedance
Non-Detect
Not Sampled

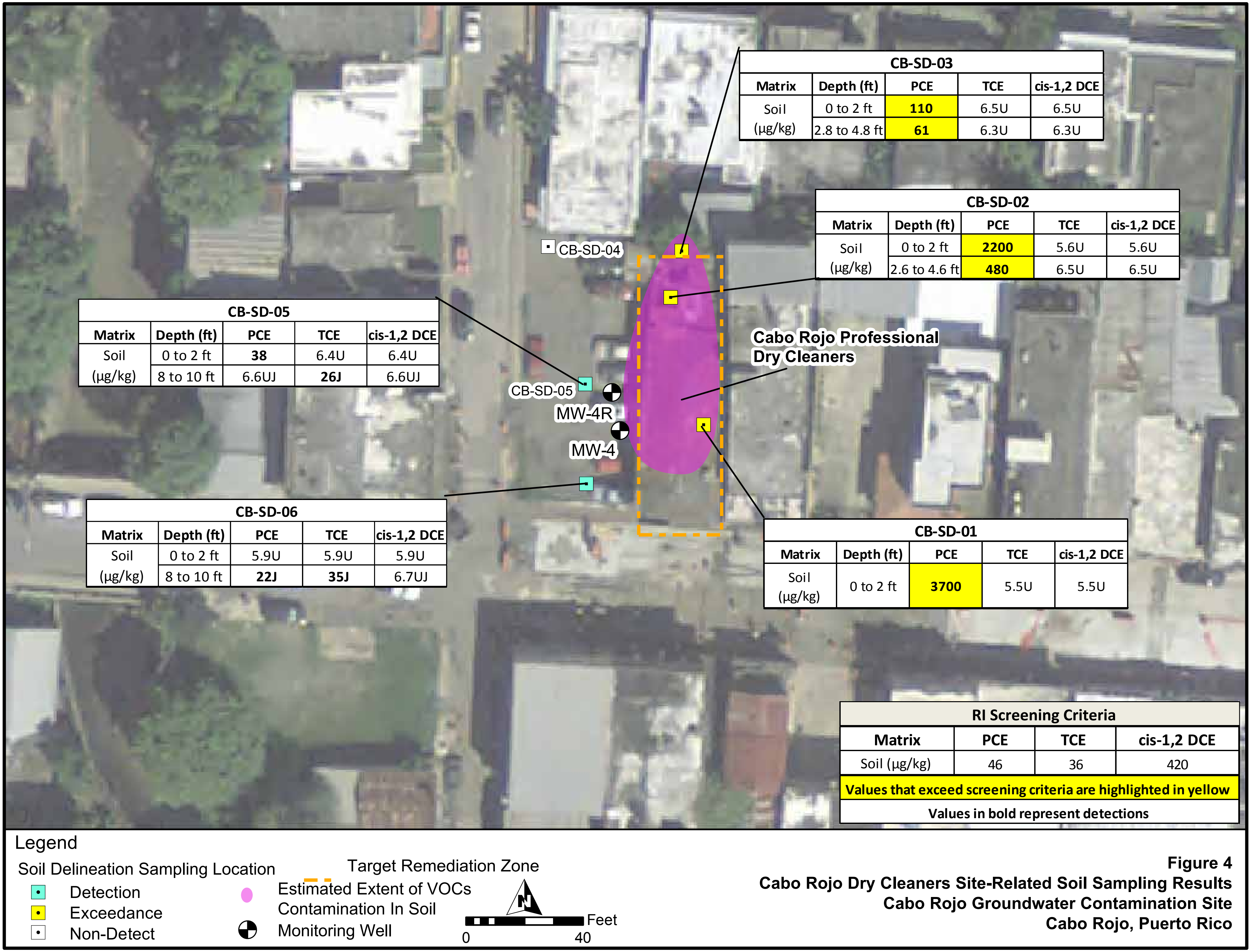
Acronyms:
PCE - tetrachloroethene
DCE - dichloroethene
TCE - trichloroethene
VC - vinyl chloride
NR - no result

µg/L - micrograms per liter
ft bgs - feet below ground surface
GW - groundwater
DUP - duplicate sample
J+ - estimated value, bias high
J- - estimated value, bias low

U - not detected; value shown is detection limit
Bolded text indicates a detection below screening criteria.
Bolded and yellow highlight indicates a detection at or above screening criteria.
Plume lines are dashed where inferred.

Figure 3
Site-Related Monitoring Well Sampling Results - Round 2
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Figure 3. Round 2 groundwater data showing an outline of Plume 1 (pink) and Plume 2 (green).



CB-SD-03

Matrix	Depth (ft)	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	0 to 2 ft	**110**	6.5U	6.5U
	2.8 to 4.8 ft	**61**	6.3U	6.3U

CB-SD-02

Matrix	Depth (ft)	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	0 to 2 ft	**2200**	5.6U	5.6U
	2.6 to 4.6 ft	**480**	6.5U	6.5U

CB-SD-05

Matrix	Depth (ft)	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	0 to 2 ft	**38**	6.4U	6.4U
	8 to 10 ft	6.6UJ	**26J**	6.6UJ

CB-SD-06

Matrix	Depth (ft)	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	0 to 2 ft	5.9U	5.9U	5.9U
	8 to 10 ft	**22J**	**35J**	6.7UJ

CB-SD-01

Matrix	Depth (ft)	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	0 to 2 ft	**3700**	5.5U	5.5U

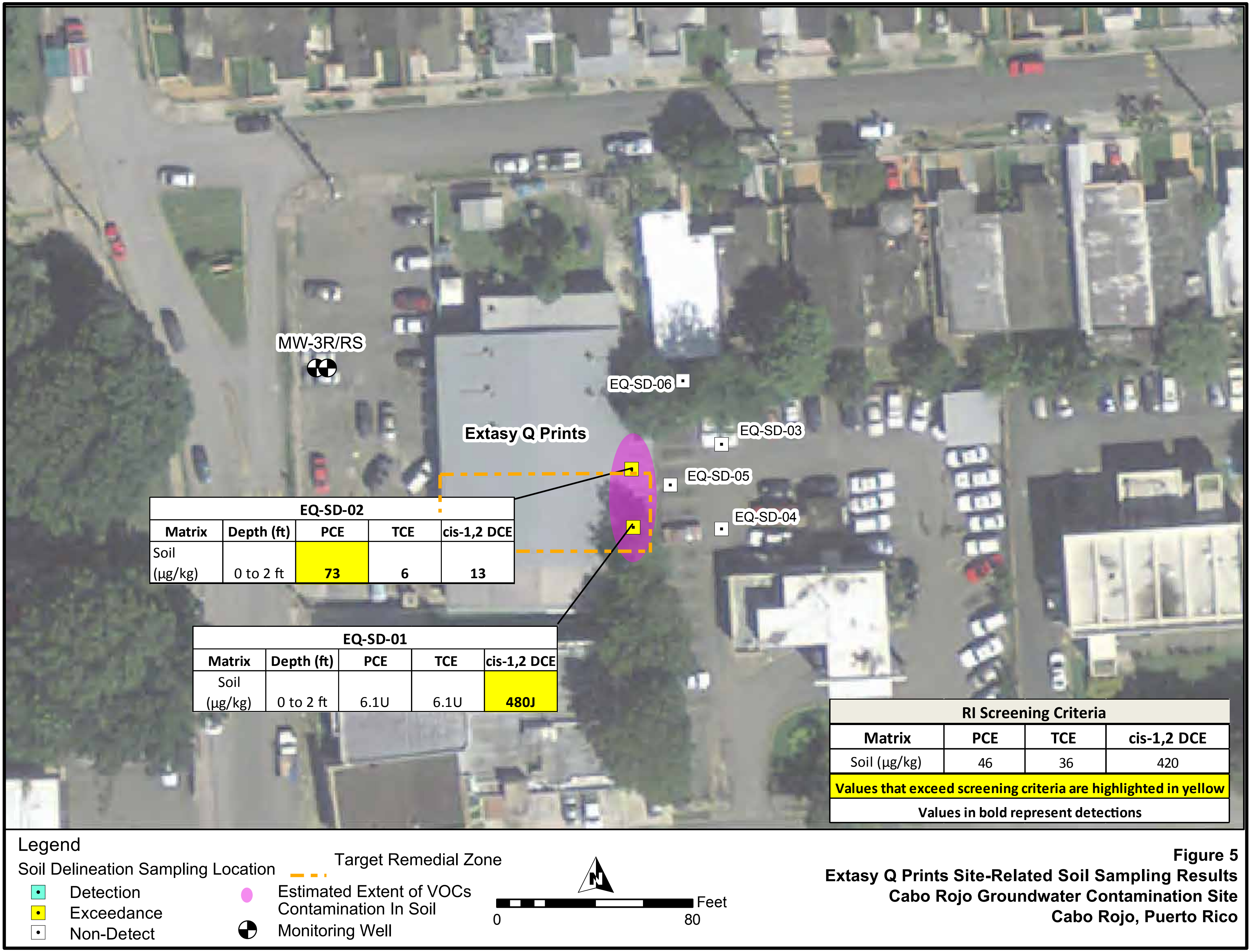
RI Screening Criteria

Matrix	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	46	36	420

Values that exceed screening criteria are highlighted in yellow

Values in bold represent detections

Figure 4. Soil sampling results at CRPDC.



EQ-SD-02				
Matrix	Depth (ft)	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	0 to 2 ft	**73**	**6**	**13**

EQ-SD-01				
Matrix	Depth (ft)	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	0 to 2 ft	6.1U	6.1U	**480J**

RI Screening Criteria			
Matrix	PCE	TCE	cis-1,2 DCE
Soil (µg/kg)	46	36	420
Values that exceed screening criteria are highlighted in yellow			
Values in bold represent detections			

Figure 5. Soil sampling results at EQP.

Table 1
Comparison of Round 1, Round 2 and Post Maria Round 1 Groundwater/Monitoring Well Sample Detections
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Well ID	Screen or Open Hole Interval (feet bgs)	Sampling Round	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	Vinyl Chloride (µg/L)	1,1-DCE (µg/L)	1,4-Dioxane (µg/L)
Screening Criteria			5	5	70	0.25	7	0.46
Unconsolidated Zone								
MW-1	28-38	Round 1	27	5.8	5.7	0.83	0.5 U	2.1 U
		Round 2	7.9	1.7	2.5	0.14 J	0.5 U	0.2 U
		Post-Maria	6.1	1.1	2	0.096 J	0.5 U	0.4 U
MW-2	16-26	Round 1	5.1	1.8	2.4	0.5 U	0.5 U	2.0 U
		Round 2	4.2	1.5	1.9	0.11 J	0.5 U	0.38
		Post-Maria	3.9	1.2	1.3	0.54 U	0.28 J	0.3 U
MW-4	45-55	Round 1	530	140	410	65	1.4	2.0 U
		Round 2	27	10	44	1.2	0.5 U	0.20 U
		Post-Maria	96	35	93	4.1	0.54	0.3 U
MW-5	17-27	Round 1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.1 U
		Round 2	0.25 J	0.25 J	0.25 J	0.25 U	0.5 U	0.21 U
		Post-Maria	NS	NS	NS	NS	NS	NS
MW-6	32-42	Round 1	3.1	5.0	6.6	0.5 U	0.5 U	2.1 U
		Round 2	1.4	1.9	0.95	0.024 J	0.5 U	0.28
		Post-Maria	NS	NS	NS	NS	NS	NS
MW-7	30.58-40.58	Round 1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U
		Round 2	0.5 U	0.5 U	0.5 U	0.25 U	0.5 U	0.21 UJ
		Post-Maria	NS	NS	NS	NS	NS	NS
MW-10	33-43	Round 1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U
		Round 2	0.5 U	0.5 U	0.5 U	0.25 U	0.5 U	0.20 U
		Post-Maria	0.5 U	0.5 U	0.5 U	0.25 U	0.5 U	0.34 U
MW-11	22-32	Round 1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.1 U
		Round 2	0.5 U	0.5 U	0.5 U	0.25 U	0.5 U	0.21 UJ
		Post-Maria	NS	NS	NS	NS	NS	NS
MW-12	17.67-27.67	Round 1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U
		Round 2	0.5 U	0.5 U	0.5 U	0.25 U	0.5 U	0.20 UJ
		Post-Maria	NS	NS	NS	NS	NS	NS
MW-15	45-55	Round 2	16	4.2	4.1	0.34	0.5 U	0.21 UJ
		Post-Maria	20	5.0	4.7	0.38	0.28 J	
MW-16	30-40	Round 2	0.5 U	0.5 U	0.5 U	0.25 U	0.5 U	0.2 U
		Post-Maria	0.5 U	0.5 U	0.5 U	0.25 U	0.5 U	
Bedrock Wells								
MW-3RS	56-66	Round 1	17	2.4	2.1	0.5 U	0.5 U	2.1 U
		Round 2	15	2.2	2	0.023 J	0.5 U	0.21 U
		Post-Maria	17	2.6	2.1	0.032 J	0.23 U	0.3 U
MW-3R (1)	OH 92-97.5	Round 1	1.1	0.78	0.97	0.5 U	0.5 U	2.1 U
		Round 2	1.2	0.68	0.85	0.035 J	0.5 U	0.20 U
		Post-Maria	0.99	0.59	0.62	0.032 J	0.5 U	0.4 U
MW-4R	90-100	Round 2	71	18	18	1.2	0.5 U	0.2 UJ
		Post-Maria	56	14	12	0.034 J	0.5 U	0.1 U
MW-18R	120-130	Round 2	0.5 U	0.5 U	0.5 U	0.016 J	0.5 U	2.5 J
		Post-Maria	0.5 U	0.5 U	0.5 U	0.5 U	0.57	0.78
MW-19R	110-120	Round 2	0.5 U	0.5 U	0.35 J+	0.019 J	34	8.4
		Post-Maria	0.5 U	0.5 U	0.32 J+	0.25 U	40	4.9

Table 1
Comparison of Round 1, Round 2 and Post Maria Round 1 Groundwater/Monitoring Well Sample Detections
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Well ID		Screen or Open Hole Interval (feet bgs)	Sampling Round	PCE (µg/L)		TCE (µg/L)		cis-1,2-DCE (µg/L)		Vinyl Chloride (µg/L)		1,1-DCE (µg/L)		1,4-Dioxane (µg/L)	
Screening Criteria				**5**		**5**		**70**		**0.25**		**7**		**0.46**	
MW-21R		120-130	Round 2	0.5	U	0.5	U	0.5	U	0.25	U	0.5	U	**0.53**	
			Post-Maria	0.5	U	0.5	U	0.5	U	0.25	U	0.5	U	0.4	U
MPW-9R	Port 1	104-108	Round 1	0.5	U	0.5	U	0.5	U	0.5	U	**34**		**4.6**	
			Round 2	0.5	U	0.5	U	0.5	U	**0.22**	J	**14**	J+	**5.00**	J-
			Post-Maria	0.5	U	0.5	U	0.5	U	**0.15**	J	**16**	J+	**7.0**	
	Port 2	124-127	Round 1	0.5	U	0.5	U	0.5	U	0.5	U	**53**		**4.8**	
			Round 2	0.5	U	0.5	U	**0.12**	J+	0.5	U	**22**	J+	**7.90**	
			Post-Maria	0.5	U	0.5	U	0.5	U	**0.087**	J	**21**		**5.7**	
	Port 3	134-140	Round 1	0.5	U	0.5	U	0.5	U	0.5	U	**58**		**4.4**	
			Round 2	0.5	U	**0.12**	J	**0.19**	J+			**25**		**9.30**	
			Post-Maria	0.5	U	**0.13**	J	0.5	U	**0.059**	J	**25**		**6.6**	
	Port 4	164.5-168.5	Round 1	0.5	U	0.5	U	0.5	U	0.5	U	**47**		**3.1**	
			Round 2	0.5	U	0.5	U	**0.22**	J+	**0.25**	J	**19**	J+	**5.80**	
			Post-Maria	0.5	U	0.5	U	**0.21**	J+	**0.28**		**30**	J+	**4.7**	
Pozo Escuela	Port 1	39-59	Round 1	**1.2**		0.5	U	0.5	U	0.5	U	0.5	U	2.0	U
			Round 2	**1.5**		**0.51**		**0.55**				0.5	U	**0.63**	
			Post-Maria	**1**		**0.33**	J	**0.35**	J	**0.023**	J	**0.31**	J	**0.13**	J
	Port 2	79.5-86	Round 1	**4.1**		**1.4**		**1.5**		0.5	U	0.5	U	2.0	U
			Round 2	**1.3**		**0.26**	J	**0.27**	J	0.5	U	0.5	U	**0.65**	
			Post-Maria	**0.61**		**0.15**	J	0.5	U	0.25	U	**0.25**	J	**0.27**	J
	Port 3	89-96	Round 1	**1.3**		0.5	U	0.5	U	0.5	U	0.5	U	2.0	U
			Round 2	**5.1**		**0.79**		**0.68**		0.5	U	0.5	U	**0.30**	
			Post-Maria	**0.57**		**0.16**	J	**0.14**	J	0.25	U	**0.23**	J	**0.17**	J
	Port 4	157-162	Round 1	**1.7**		0.5	U	0.5	U	0.5	U	0.5	U	2.1	U
			Round 2	**0.57**		0.5	U	0.5	U	0.5	U	0.5	U	**1.20**	
			Post-Maria	**0.83**		**0.17**	J	0.5	U	0.25	U	0.5	U	**0.14**	J
Other Wells															
PRASA-1 (2)		OH 112.5	Round 1	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	NA	
			Round 2	0.5	U	0.5	U	0.5	U	0.25	U	0.5	U	0.20	U
			Post-Maria	NS		NS		NS		NS		NS		NS	
Ana María (3)		OH 40-105	Round 1	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	NA	
			Round 2	0.5	U	0.5	U	0.5	U	0.25	U	0.5	U	**0.93**	
			Post-Maria	**0.43**	J	**0.11**	J	**0.17**	J	**0.012**	J	**0.4**	J	0.34	UJ
TCP		OH 58-65	Round 1	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	NA	
			Round 2	0.5	U	0.5	U	0.5	U	0.25	U	0.5	U	**0.18**	J
			Post-Maria	NS		NS		NS		NS		NS		NS	
Pozo 5A		unk; 163	Round 1	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	NA	
			Round 2	NS		NS		NS		NS		NS		NS	
			Post-Maria	NS		NS		NS		NS		NS		NS	

Table 1

Comparison of Round 1, Round 2 and Post Maria Round 1 Groundwater/Monitoring Well Sample Detections

Cabo Rojo Groundwater Contamination Site

Cabo Rojo, Puerto Rico

Well ID		Screen or Open Hole Interval (feet bgs)	Sampling Round	PCE (µg/L)		TCE (µg/L)		cis-1,2-DCE (µg/L)		Vinyl Chloride (µg/L)		1,1-DCE (µg/L)		1,4-Dioxane (µg/L)	
Screening Criteria				**5**		**5**		**70**		**0.25**		**7**		**0.46**	
USGS-OW-1		25-35	Round 1	0.5	U	0.5	U	0.5	U	0.5	U	**29**		NA	
			Round 2	0.5	U	0.5	U	0.5	U	**0.17**	J	**44**		**0.86**	
			Post-Maria	NS		NS		NS		NS		NS		NS	

(1) MW-3R has surface casing set at 92 feet bgs. The borehole collapsed back to 97.5 the day after drilling and has remained stable.

(2) open hole interval unknown

(3) Drilled to 200 feet bgs; collapsed to 105 feet bgs

Compound detected

Compound exceeds screening criterion

Abbreviations:

DCE - dichloroethene

NA - not applicable

NS - not sampled

OH - open hole

unk - unknown

µg/L - microgram per liter

PCE - tetrachloroethene

TCE - trichloroethene

TCP - Terminal de Carros Públicos

U - not detected

J - estimated

J+ - estimated, biased high

PUBLIC MEETING
CABO ROJO GROUNDWATER CONTAMINATION SITE
CABO ROJO, PUERTO RICO
AUGUST 9, 2018
CABO ROJO, PUERTO RICO

Transcript Notes:
Time Scheduled: 6:00 pm
Place: Rebeca [sic] E. Colberg Library

The record was opened at 6:00 pm.

Brenda Reyes: Good evening. For purposes of this meeting, we are preparing a transcript. So, we're going to open the meeting. My name is Brenda Reyes Tomassini, public affairs specialist with the United States Environmental Protection Agency. With me tonight are Daniel Rodríguez, an engineer, who is the project manager; and Frances Delano, from CDM; and Brendan MacDonald, who is about to come in, also from CDM. Tonight, we're here, at the Blanca Colberg Library in the town of Cabo Rojo, to present the Proposed Plan to remedy the groundwater contamination at the Superfund Site known as the Cabo Rojo Groundwater Wells. This Proposed Plan describes the remedial alternatives for the Superfund Site and identifies the preferred alternative and the rationale for the chosen alternative. The United States Environmental Protection Agency has an Information Repository with the Site documentation here, at the Blanca Colberg Library. It has one at the Region 2 EPA office in New York. It has one at our Caribbean office in Guaynabo; the United States Environmental Protection Agency, Caribbean Division, has an Information Repository there. We're in the public comment period. The announcement was published in the Primera Hora Newspaper; I believe the announcement was published last week, on August 2nd. It was published in the Primera

Hora Newspaper. So, tonight, my colleague Daniel Rodríguez will be making a presentation. We're going to wait 15 minutes to see if anyone else comes in. Tonight, you can submit your comments in writing. We have maps for you to see. The meetings are extremely interactive, so, we'd like to give you a warm welcome.

A 15-minute break was taken at 6:03 pm.

The record was reopened at 6:15 pm to officially start the meeting.

Brenda Reyes: Ok, now we're really starting. Good night to those who've just come in. My name is Brenda Reyes, public affairs specialist of the United States Environmental Protection Agency, the EPA. With me tonight is my colleague, the engineer Daniel Rodríguez, who is the project manager for the Cabo Rojo Groundwater Wells Superfund Site. Tonight, we'll be presenting the Proposed Plan and the alternatives that were developed for this Superfund Site and the preferred alternative to remedy the contamination at the site. With me tonight are Brendan MacDonald, from CDM; Frances Delano, from CDM, who are the contractors; [and] Ms. Gloria Toro, from the Environmental Quality Board/Department of Natural Resources. With that, we begin the meeting. I would like to remind you that we're in the public comment period. The documents are here at the Blanca Colberg Library. They're at the United States Environmental Protection Agency, our office, the EPA, in Guaynabo, [and] at the Records Center of the Superfund Program in New York, in Region 2 in New York, for those who live outside Puerto Rico. Public participation is really important. The EPA Superfund Program largely depends on your... the public's participation. We offer these spaces for participation. You come in, review the documents, [and] you can submit comments. These meetings tend to be quite interactive after the presentation. We have maps. If you would like to make your comments here verbally, we'll also give you the microphone, we have transcription. So, well, you can submit your comments and any other concern through the microphone or in writing. We're in the public comment period. So, without any further ado, Danny, it's all yours.

Daniel Rodríguez: Good evening, everyone. Tonight, we're going to be talking about the plan we developed to remedy the groundwater contamination in Cabo Rojo.

(Stenographer's Note – Switched to Slide 2: Agenda)

As my colleague said, my name is Daniel Rodríguez. I'm the project manager. Ms. Brenda Reyes is the community affairs... community involvement coordinator, and we also have—although I don't know if he has come tonight—the project manager Pascual Velázquez García, who works for what was once the Environmental Quality Board and, I believe, is now the Department of Natural and Environmental Resources.

(Stenographer's Note – Switched to Slide 3: Agenda)

Tonight, we're going to present the process of the Superfund Program, which is the one that is governing or is being followed for the cleanup, investigation, and remediation of the contamination that was found in the groundwater. We're going to talk about the results of the remedial investigation and we're going to present the remedial alternatives and the preferred remedy chosen to address the contamination in Cabo Rojo.

(Stenographer's Note – Switched to Slide 4: Superfund Process)

What the Superfund Program does is address contamination, contaminants that leak into groundwater... to address the threat to human health and the environment posed by such contamination. It has two aspects, two components. One is removal actions, which are short-term. These immediately address the problem that the contamination presents. They are intended to reduce or eliminate the contamination. The other component, which is the component I work on, is remedial action. That's more long-term. That's where we do the investigations, we form an idea of what the problem is, what the nature of the contamination is, and we find a solution to the contamination that is present.

(Stenographer's Note – Switched to Slide 5: Site Assessment Phase)

Here, you see the various phases. The site was discovered. In Cabo Rojo, the Puerto Rico Aqueduct and Sewer Authority found, during their sampling of their water sources, that there was contamination with chlorinated volatile organic compounds in the water, in the wells they were using. They presented that problem to us. The EPA and the Environmental Quality Board started the process of the preliminary assessment of the site. We went and gathered all available information to identify what could be the possible and potential sources of contamination. After that, we conducted the site investigation. This investigation was conducted with the information we already gathered, a... we went and investigated those sources and started reducing the area, trying to define the extent of the contamination. After that step, we made a mathematical calculation, which is the Hazard Ranking System, the instrument we used to propose it for inclusion on the Superfund list. If the site has a classification or score over 26 or 28, it is then eligible for the Superfund list. In the case of Cabo Rojo, it was listed on March 10, 2011. Once it was listed on the Superfund Program, my program came in and we started the remedial investigation and the studies to determine the extent... the nature of the contamination and the extent of that nature [of the contamination] to develop a plan or remedy that will address the contamination. The goal is always the same: reducing or eliminating the risk to human health and the environment.

(Stenographer's Note – Switched to Slide 6: Remedial Investigation/Feasibility Study)

This is more of what I've already explained.

(Stenographer's Note – Switched to Slide 7: Site Description)

The site is located here in the Bajura Ward, but rather close to the town center of the Municipality of Cabo Rojo. It consists of the Puerto Rico Aqueduct and Sewer Authority (PRASA) system, which is six wells that they had, that are in operation, that were active at the time, from 2002 to 2006—and I believe they removed the well, one of the wells that was in use—and they found contamination in three of them. One is Hacienda Margarita, the other one is Club de Leones, and the Ana María Well that is close to the school. They did not detect contamination in the other four [sic] wells, Cabo Rojo 1, 2, and 3. I would like to add a caveat here; I would like to clarify that, although PRASA found contamination in those wells, none of the wells showed contamination above the levels of the Puerto Rico and federal governments, what we call the MCL, "Maximum Contaminant Level."

(Stenographer's Note – Switched to Slide 8: Location Map)

That's the area. The wells that appear in, like, orange, those are the wells where chlorinated volatile organic compounds were detected. They were not detected in the other ones.

(Stenographer's Note – Switched to Slide 9: Location Map)

The site is defined by the possible sources that contributed to the contamination present in the groundwater. From 68 sources that we started investigating, it was reduced to five before the remedial investigation began; and after conducting the remedial investigation, it was reduced to three. These are: Cabo Rojo Professional Dry Cleaners, which is nearby, in the town center; Extasy Q Print, which is over there behind the library, right near here; and Puerto Rico Industrial Development Company (PRIDCO), their industrial complex... their industrial park east of PR-100.

(Stenographer's Note – Switched to Slide 10: Historical Background)

To give you a little more information about the historical background, even though I've been touching upon it while I've been discussing the other sites, as I said before, PRASA, during their regular monitoring, detected those volatile organic compounds in the water. In 2006, the EPA started conducting the preliminary investigation of the site and we started looking for these potential sources that could have contributed to the contamination. Like I said, we started out with 68 sites. Samples were taken at all of them; the investigation work was carried out: soil gas samples, soil samples, groundwater samples of what already existed at the site. It was included on the National Priorities List in 2011. From 2013 to 2017, we started doing the remedial investigation work—that's the part in which I participated more actively—and in 2018, we completed the remedial investigation and the feasibility study. The feasibility study presents the alternatives to remedy the contamination in the body of water.

(Stenographer's Note – Switched to Slide 11: Fieldwork during RI)

The bulk of the investigation work, of the fieldwork, was conducted from 2013 to 2014. We collected soil gas samples, we collected soil samples around these factories we had identified as possible sources, which were five. In addition to the three that I've already mentioned—Cabo Rojo Professional Dry Cleaners, Extasy Q Print, and PRIDCO East—there was also D'Elegant Dry Cleaner, which was a commercial complex. It was where Walgreens is now. There used to be a Chinese restaurant, a bakery, a video club, a beauty and nails salon, etc., etc., there, but that building was torn down, it was destroyed, and they built what is there now, which is the Walgreens and two commercial units at the back. One is vacant and the other one is the Chinese restaurant. Samples were collected at those sites, for these parameters. The groundwater was investigated. Wells were installed, samples were collected, the water levels were measured to determine the groundwater flow [direction] in the area under investigation. In addition to that, we took surface water and sediment samples from the streams around the site where the contamination was found. In 2017, we went back out to the field because we detected there was data that we did not have and we had to complete it in order to further define and refine the extent of the contamination. We repeated a vapor intrusion study that had been conducted... had been carried out in 2011 in 29 residential and commercial structures in the area around where we are right now, in the town center. It was repeated to see if there had been any change since 2011. Soil samples were collected. Other wells were installed close to the area where we determined we didn't have data to define the plumes of contamination that might be in the area.

(Stenographer's Note – Switched to Slide 12: Photos)

This is part of the work that was carried out. One of the wells that was installed close to Cabo Rojo Professional Dry Cleaners, on a lot, like, for car parking. The photo on the right is of one of the canisters that was placed close to Extasy Q Print to collect the concentration of any volatile organic compound in the air, environmental. The other one is the well that was installed in the small park close to the school and the stream. The one on the right is one of the houses where we placed the container to sample the gases that are underground. We perforated the floor, placed a tube, and collected the sample. And inside the house, environmental. This is part of the work that was done.

(Stenographer's Note – Switched to Slide 13: Remedial Investigation (RI))

The remedial investigation detected PCE in soil, which is tetrachloroethene, trichloroethene (TCE), and cis-1, 2 dichloroethene (DCE) at Extasy Q Print and Cabo Rojo Professional Dry Cleaners. They were detected in the soil, in the soil samples taken around the building. At Cabo Rojo Professional Dry Cleaners, it was PCE, which is tetrachloroethene, which was above the agencies' screening levels. We found concentrations from 22—which is below the number—to 3700 micrograms per kilogram. At Extasy Q Print, PCE was in the 73 range, above the screening levels, and DCE was at 480. At PRIDCO, we didn't find... we didn't detect contaminants above the screening levels in the soil when we did the investigation.

(Stenographer's Note – Switched to Slide 14: Map)

This is the area surrounding Cabo Rojo Professional Dry Cleaners. The small squares—and I know you can't read the numbers, even though we gave you a copy or you can obtain a copy of the Proposed Plan—are the numbers that exceeded the [screening] criteria levels that we have, that we had established for the site. The magenta-colored area is what we believe could be the area of concern underneath the building, because of leaks that occurred. That hasn't been defined yet. It'll be done in the future.

(Stenographer's Note – Switched to Slide 15: Map)

At Extasy Q Print, there were two areas where the employees, when we did the preliminary investigation of the site, told us they washed the screens they use to print t-shirts and towels and things they're hired to do, and they exceeded the [screening] criteria numbers we had established for that site.

(Stenographer's Note – Switched to Slide 16: Remedial Investigation)

Regarding soil vapors, TCE was detected above [the levels], from .27 micrograms per cubic meter to 240,000 micrograms per cubic meter in that area between Cabo Rojo Professional Dry Cleaners and Extasy Q Print. The highest detection was at Cabo Rojo Professional Dry Cleaners. The highest detection of tetrachloroethene was at Extasy Q Print, with a concentration of 110 micrograms per cubic meter.

(Stenographer's Note – Switched to Slide 17: Remedial Investigation)

Basically, the results of the groundwater. The data showed that there are two plumes. Instead of just one area, there are two areas where contamination was found in the groundwater. Plume 1 consists mostly of PCE, TCE, and DCE, and vinyl chloride. It's the one that's close to this area where we are right now, between Extasy Q Print, Cabo Rojo Professional Dry Cleaners, and the Ana María Well. Plume 2 consists of 1,1-DCE and 1,4-dioxane, and it's to the north of the PRIDCO facility in the east.

(Stenographer's Note – Switched to Slide 18: Map)

Basically, the two areas are outlined here. What we believe could be the two plumes. You have the data in the report. You can find this information in the remedial investigation report and in the feasibility study report. All this is included in great detail in those documents.

(Stenographer's Note – Switched to Slide 19: Remedial Investigation)

No contamination was detected in the bodies of surface water or in the sediments in relation to the site. We investigated to follow-up on those chemicals, which are the ones that are related to the contamination of groundwater because of the leak that occurred in those potential sources of contamination.

(Stenographer's Note – Switched to Slide 20: Ecological Risk Assessment)

A preliminary risk assessment was conducted and we did not find that there was any risk on return [sic] because of the contamination that was leaked into the groundwater. So, we did not find an ecological risk.

(Stenographer's Note – Switched to Slide 21: Human Health Risk Assessment)

In the human health risk assessment, we assessed the risk of the two plumes. it was determined that plume number 1, which is the one in this area, exceeds all acceptable EPA ranges for exposure for people working in these buildings... at these sites where the contaminant high concentration is found, and the homes surrounding the site where the plume is located. That's for cancer risk. For non-cancer risk, we have a value of 1, and it was determined that the value was much higher, the calculated one. The numbers are in the table. They're also included in the documents that are part of the repository and the administrative record for the site. For plume 2, we found no risks that were above the range established by the EPA either for carcinogen or non-carcinogen. But the detected value of 1,1-DCE was above the values of the water quality levels of the Puerto Rico and federal governments. Therefore, it was decided that action must also be taken in relation to that plume, to plume number 2.

(Stenographer's Note – Switched to Slide 22: Proposed Plan)

What is the Proposed Plan? In the Proposed Plan, we identified the actions to address that contamination. We are providing this forum for people to make comments, to find out about the work that assisted [sic] and where we're going with the work that has been done. We opened a public comment period that began on August 2nd and will be in effect until September 3, 2018. We are presenting the alternative that the environmental agencies—in this case the EPA and the [Puerto Rico] Environmental Quality Board—are presenting to address the contamination.

(Stenographer's Note – Switched to Slide 23: Remedial Action Objectives)

From the remedial investigation, it was determined that we must take action in relation to the soil and groundwater [contamination]. This is done to address the risk to human health and the environment. Certain remedial action objectives are established, which are the ones that guide the work that will be carried out. In relation to the soil, a remedial action objective was established to prevent the contaminated soil from serving as a source of contamination for the groundwater; in other words, from continuing to contribute contaminants to the groundwater. To prevent and/or minimize the contaminated soil from serving as a source of vapor intrusion now or in the future. The first, groundwater, is more for the future. In relation to the groundwater, the objective is to prevent human exposure to groundwater that is contaminated in concentrations higher than the preliminary remediation goals, than the levels that were established to discern whether or not there is contamination and whether it poses a risk to human health. To restore groundwater to drinking water quality. In other words, superior to [sic] the maximum contaminant levels established by the regulations of the Puerto Rico and federal government agencies. To prevent and minimize contaminated groundwater from serving as a source of vapor intrusion now and in the future; in other words, [preventing] the groundwater from being used as a means to transport the contamination and, in turn, through vapor intrusion, from reaching us and affecting our health, in our homes and in our workplaces.

(Stenographer's Note – Switched to Slide 24: Summary of Remedial Alternatives)

There are common elements to all remedial programs, which we identify because they'll be the same for all the remedial actions that we'll take, except for one, the one of no action. No action means that we do absolutely nothing.

- In all of them, we have a component of investigation, pre-design, and pilot study, where we gather more data to refine the proposed remedy in order to implement it.
- Institutional controls, which are the mechanisms we use, not in terms of engineering but rather regulatory, to prevent people from being able to extract and use the water where the contamination is found.
- Long-term monitoring. We'll be doing monitoring during the remediation that is established to make sure that the contamination in the groundwater is being addressed, whether by reducing the concentrations or eliminating the contamination so that it will reach levels that do not pose a health risk.
- Site restoration.

These are some of the most significant components. There are also other components, such as using green remedies, remedies that are more environmentally friendly, doing the five-year reviews to see if the remedy is meeting its objectives.

(Stenographer's Note – Switched to Slide 25: Remedial Alternative No. 1)

Remedial alternative 1—we have this at all sites—is something that the National Contingency Plan of the Superfund Program requires, which is no action. No action—to see if it's a feasible option. We do absolutely nothing. In this case, it's not, because the risk assessment studies already determined that there's a risk and we have to address it, but it's always considered.

(Stenographer's Note – Switched to Slide 26: Remedial Alternative No. 2)

Alternative number 2 is soil vapor extraction and dual-phase extraction, monitored natural attenuation, and a contingency for in-situ treatment, if necessary, and institutional controls. That's alternative number two. There, the Proposed Plan is to extract very aggressively and impact both phases: the soil phase and the groundwater phase adjacent to where the contamination was found. Do you remember that figure with the two structures that have contamination and were identified in magenta? This kind of remedy will be implemented in those areas to address the contamination there and prevent it from continuing to spread in the groundwater. It also provides for long-term monitoring to see if what we're implementing is being effective, that it's not changing, that the levels of contaminants in the groundwater are decreasing as projected. It doesn't actively include the contingency plan, the in situ-treatment. When the pre-design investigation phase and the part of the pilot project, the pilot study, are carried out, that's when we'll have a better idea of whether this remedy by itself will be able to address the contamination. If it does not address it, we'll then have to activate the in situ-treatment contingency plan. Another possibility is that we implement this and don't see a significant reduction in the contaminant levels. We'll then have to modify it and activate the contingency plan, and the institutional controls, which are placed at the site and aren't removed until the contaminant levels fall below the levels for drinking water of the Puerto Rico and federal governments.

(Stenographer's Note – Switched to Slide 27: Remedial Alternative No. 2)

I didn't tell you the cost of alternative number one. The cost is zero because we don't do anything. In alternative number 2, we estimate that the cost will be around 5.3 million. The implementation will take about two and a half years, and we expect to meet the remedial objectives in 30 years or less.

(Stenographer's Note – Switched to Slide 28: Remedial Alternative No. 3)

Alternative number three is basically the same thing we were saying in relation to soil vapor and dual-phase extraction, but this alternative does contemplate active, in-situ treatment, not only of the areas close to the sources, but of the entire plume that's contaminated. It assumes that the technology that will be used is enhanced anaerobic biodegradation. This is what we're assuming at this time. It could happen that, when we do the investigative pre-design study and run the pilot study, we have to use a different technology. For this purpose, evaluating this alternative, we assumed that one.

(Stenographer's Note – Switched to Slide 29: Remedial Alternative No. 3)

The same thing. It's a long-term monitoring program to make sure that it shows a reduction trend and institutional controls. The estimated cost of this alternative 3 is approximately 7.6 million. Implementing it will take 4-5 years. And the same objective: we expect to reach the site remediation objective in 30 years or less.

(Stenographer's Note – Switched to Slide 30: Evaluation of Remedial Alternatives)

All these alternatives, while we're evaluating them, have to meet these criteria. They're these nine criteria:

- Overall protection of human health and the environment, which is the foundation of the program
- Compliance with state, federal, and local regulations, if any
- Long-term effectiveness and permanence; in other words, that it was reduced... the risk was eliminated or the risk was reduced to acceptable levels
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost
- State acceptance; in this case, the Commonwealth of Puerto Rico
- Community acceptance; that's why the community is given the opportunity to evaluate the Proposed Plan for the remediation of the site

(Stenographer's Note – Switched to Slide 31: EPA Preferred Remedy)

The remedy preferred by both regulatory agencies—in this case, the EPA and the newly created agency, the Department of Natural and Environmental Resources/Environmental Quality Board—agree that alternative 2 will meet the objective. This is the one we're presenting to this group tonight and the one we're identifying in the Proposed Plan that was published in the various repositories that we have so that the public can review it.

(Stenographer's Note – Switched to Slide 32: EPA Preferred Remedy)

We believe that:

- It protects human health and the environment
- It meets all applicable or relevant and appropriate requirements (ARARs)
- It's cost-effective

(Stenographer's Note – Switched to Slide 33: Next Steps)

Next steps:

- We're asking the public for comments.
- We're going to prepare a Record of Decision (ROD), but not before we can review all the comments we receive and address them. We're going to answer them. They'll be part of the administrative record.
- The public has until September 3rd to send us those comments.

All this information is on the page that the EPA posted for the Cabo Rojo site. I'm trying to see if we can... *(Stenographer's Note – Daniel Rodríguez tried to access the EPA webpage)* Let me stop the presentation here for a minute to jump over to the other one, so that you can see.

Person from the audience: Do we send the comments to that email address?

Daniel Rodríguez: No, I'm going to show you where you can send the comments in a bit. Let me see if I can jump over to the other one. This is the page for the site where you can find all the information related to the contamination here, in Cabo Rojo. You can find the Proposed Plan here. Just click here and you'll find it. All the documents are here. They're in the administrative record, all the studies that have been conducted so far, the reports, the documents... they're all here. If you want more information, you can find it here directly. You'll see all the data that has been gathered and all the studies that existed, all the studies we used to reach the conclusion of the design of that remedy or to propose the remedy. I'm going to go back to where I was. *(Stenographer's Note – He is referring to the presentation slide, as he left the presentation to show the webpage)*

(Stenographer's Note – Switched to Slide 34: Send Comments)

Here's where you can send the comments. You can send them to my email. You can also send them by regular mail to the address on the screen. If you have any questions, you can also call me. All this information is included in the Proposed Plan, and I believe there are copies outside that you can take.

That's all I have for tonight. You may come up if you want to make any comments. We have the people who will be keeping the record of the meeting here, and the comments will be part of the administrative record.

Yes. We have a microphone here up front.

Manuel Sepúlveda: Good afternoon; actually, good evening, everyone. My name is Manuel Sepúlveda. I'm a resident and I work in the town center, very close to one of the places that have been identified as impacted by the contamination. Beyond that, I'm a layman when it comes to science. I believe we have to rely on the information you've been collecting for years and your conclusions. I'm not here to question that and, as a citizen, I'm not going to make any comments because I don't have the competence or standing to question what you've gathered as scientific evidence. But, as a citizen, what would I have to take into consideration to make a specific comment about this plan? Based on my cursory reading, you say that you have to impact the structures to build the facilities to do the extraction of gases, subsoil, etc. etc. How would we be affected by that kind of operation beyond the movement of traffic, which I see will be blocked for a period of time? But, how would the building of these facilities harm the citizens? That's what I would like to know, so that I can express an opinion about it. Because, as I said, I'm not going to question the science and the conclusions you have presented this afternoon are shocking.

Daniel Rodríguez: Thank you, thank you very much. As you very well mentioned, the impact will be minimal, because we have to meet all the requirements of the regulations for the control of atmospheric quality. It'll have its controls. There won't be gas emissions that will be harmful to the citizens because the purpose of this is to reduce and eliminate the risk, not add the risk from one environment to another. There will be an impact, yes, when they're installing the equipment on the various structures to address the contamination. Traffic may be affected, whether it be vehicle or pedestrian traffic. The operation of these businesses where we're going to place the equipment will be impacted, but I believe there won't be an impact on public health because we're going to include measures to prevent that from happening.

Elaine Rivera: Good evening, my name is Elaine Rivera. I'm a resident here in Joyuda. I have a number of questions like, for example, you say that there's an imminent risk of cancer. Based on what you're saying, if we look at the diagram, it's a very broad population that they have there. Then, I see that it's 30 years to implement all these measures. I know that at a certain point you mentioned that you would do certain things, like perhaps give guidance to the community, prevent people from drinking from the groundwater, but I, like, don't see very clearly, maybe I need more time to read it, but what will be the measures to mitigate the exposure of the people around the area of the plume? I have other questions, but I don't know if you could answer [this one].

Daniel Rodríguez: Let me answer that one quickly. Right now, there's no risk to human health because short-term measures were taken, in which the wells... As I mentioned at the beginning, none of the wells that the Puerto Rico Aqueduct and Sewer Authority uses presented contamination above the maximum water quality levels. It was only detected and that was enough for them to alert the environmental protection regulatory agencies for us to take action, instead of us taking action after it got to the consumers. The

Department of Health establishes certain parameters and the Aqueduct and Sewer Authority has to meet them. So, they alerted us. So, the only well that was very close to reaching the maximum number was removed from the system. We have been monitoring that well over time and the contamination levels presented in the extraction wells don't even reach half of the minimum number established in the regulations. Let me go one step further. In terms of contamination from soil vapors, the vapor intrusion studies we conducted did not determine that any of the structures we visited and took samples from exceeded the numbers that pose a health risk, except for two sites where the contamination is found, where we believe it originated, where one of the sources is located. At those sites, it was indeed determined that the contamination was above the [screening] criteria for residential use, yet below the criteria for workers. So, if it's used for that purpose, it does not pose a risk to public health. In that case, we make some time estimates. A person living in a home [in that area] spends more time [there] and is therefore more exposed to those gases than a person who works there for eight hours, five days a week. So, we believe that the contamination, the problem, is under control. There shouldn't be any exposure right now. This is long-term, for the future. We can't leave it like that because the levels are above what we call the screening levels. We therefore have to take action to lower it and prevent that from posing an unacceptable health problem for the population.

Elaine Rivera: Another question. In your plume, it was really very specific where you found levels, not all the people who are in the plume are at that risk.

Daniel Rodríguez: Exactly.

Elaine Rivera: Rather, it's where you determine that the contamination may be and where you have to act.

Daniel Rodríguez: Exactly, that's what we estimate to be the extent of that plume.

Elaine Rivera: Then, I have another question and it's that you're mentioning certain businesses, right? In this case, you mention some and then others, and I was wondering, what restrictions or controls—if those businesses are operating—are you taking against these operations to prevent it from continuing, or certain practices to prevent this contamination from happening again or to control it?

Daniel Rodríguez: The controls are established by the regulatory agencies in this case, as to how they must manage the materials and manage the waste they produce. There were leaks at those two businesses. What caused the leak? One of them closed down, it's no longer there, it shut down, which was the laundry. Extasy Q Print is still operating, but we haven't seen an increase in the contamination. So, we believe that they—perhaps when they saw the regulatory agencies taking action, collecting samples—well, became concerned and appropriately and adequately managed how they handled that waste. That's what I believe. There are mechanisms that exist in the regulatory field—not in this one where I work—to prevent those things from happening, but it largely depends on the operators of these businesses.

Elaine Rivera: At the same time, we're wondering what those [mechanisms] really are. Because we see all the work this will take; well, at the same time, you mentioned that a first phase would perhaps be controlling as such, preventing. It's kind of not clear in the plan, the measures that were taken to stop the source are kind of never documented. But from what you're saying, it seems like it was one event, it's not something that's recurrent; rather, it was something that was one event of a leak or something, but I think we're clearer on this. It's good that you've shared the plan because I believe it's important that we read it to be able to submit any comments later on. Thank you.

Daniel Rodríguez: Any other comments?

José Luis Sierra Ruiz: Good evening, everyone. My name is José Luis Sierra. I'm a representative of Extasy Print, one of the places where one of the toxic faults was found. My question is, you've been conducting these studies for some time. You did soil tests. You did tests on all the chemicals we have. You did gas tests in which you spent several days with some pumps. What else did you do? You used, through the sewer system of the Aqueduct... Because our discharge... The discharge happens when we wash a frame; it doesn't go down to the soil, it goes down the sewer. PRASA came and certified that it went... because they opened the sewer drain on the street, and the product, since it has a dye, was going down through there. Simply, in all these years, the only recommendation given to us by one of the people who went there was to install another extractor. All of the products we use... There are sprays that could perhaps have the chemicals presented. But none of those chemicals go to the soil. Let me explain. This is a spray can; this is a frame, which is what we use. We spray it on the frame, we wipe it with a washcloth, and the washcloth goes in the trash. It's not that there's a hose turned on and the product is flowing on the ground. The gas... The liquid form, not propane gas—the gas form—the liquid form. We use it to clean the frames because it's paint, water-based paints. In the same way, we remove the excess paint; it's stored in the can—it doesn't go bad; if it doesn't go over a certain temperature, it won't dry up. To clean it, we use a washcloth with gas; we clean it, the washcloth goes in the trash. In other words, there's never any discharge on the ground. What products or what was there in the building previously? Because here in Cabo Rojo, there are more than six companies that do the same work we do. We've been in this building for 26 years and the products have always been the same and the product never falls on the ground. Or the gas. Or the spray, and the spray may be the only one that has one of the components. According to what you investigated at that time, two years ago, we were told that you were looking for a product like the ones that mechanics used to use before to wash carburetors. The meta... meta... oh, I don't know, I don't remember. But we don't use that product. Cabo Rojo—I'm not justifying anything—but Cabo Rojo is full of good mechanics, the products they use to wash engines and their cars, no one knows where they dispose of that waste. As a representative of Extasy [Q] Print, I am requesting and asking you to come back again. I can give you the paint cans so that you can see the components, the sprays, and so that you can see again how they're used. Because I believe that, even though we're there, we're not the ones who are contaminating the soil. If that had been the case, perhaps some agency would have told us, "Look, you can't use this product because of this, this, and this." And we would look for alternatives to fix it with the companies. The only thing they said to me was "Install another extractor." About a week ago, a gentleman came, an environmental quality inspector, Mr. Javier Mercado. He visited us. He's not here? And he said, "Where's the chimney?" I went to show him the extractor. "But this doesn't emit smoke." We don't burn anything nor do we have any vapors to expel. We use the extractor we have to remove the heat that becomes trapped in the structure and perhaps also when the shirt—when the paint fuses with the t-shirt fiber, it gives off a bit of a smell—to remove the smell, so that we're not absorbing it all the time. And he said to me, "But there's no smoke here." And I [said], "No, there's no smoke." "And where's the smoke chimney?" We would like you to come back and visit us at the premises somehow. Redo... In fact, there's an open well on the premises that you go and monitor frequently that has nothing to do with the workshop because it's far away. Inside the premises you conducted more than 16 tests, on the land, even where we clean, which is exactly around here. *(Stenographer's Note – He is referring to one of the maps displayed in front of the stage.)* It's in this little part here.

Daniel Rodríguez: Let me see if I can get the graphic for you so that you can see it on the screen and everyone else can see it. *(Stenographer's Note – Daniel finds slide number 15 of the presentation.)*

José Luis Sierra Ruiz: Exactly. In that area. But we would like to know what specific product is the one that creates that supposed contamination. Going back to what was explained to us about a year and a half ago, by one of the people who was doing the tests... Well, I'm just going to speak at random as if it were the map... He explained to us that the contamination is in several points in the area of Cabo Rojo. I don't understand how, if the underground flow of water runs all over the geography of Cabo Rojo, how it just so happens that two specific points contaminate, when the other one is here, the other one is over there. Albeit in small amounts. We don't know if it's because in the past, 20, 30, 40 years ago, [there was] a large discharge from steel drums or whatever at a specific site and that was what contaminated the entire vein of water that is running. I, as representative of Extasy Q Print, would like you to visit us—our door is always open for any kind of study—and for you to tell us what specific product is similar to the product that's contaminating the vein of water in order to remedy or eliminate whatever it is.

Daniel Rodríguez: The comment has been noted. We'll answer the comment you've just made tonight. This will be part of the record.

José Luis Sierra Ruiz: Thank you.

Daniel Rodríguez: Are there any other comments?

Manuel Portela: My name is Manuel Portela. I'm a resident of Cabo Rojo, specifically the Buyé area. My question deviates a bit from what we're specifically addressing here and now regarding the town center of Cabo Rojo, but, for the record, I would like, number one, to let you know that we're very willing to help you in any way because we want to protect the environment and we're willing to help you in that way. My question is, is there some study in progress or some study planned to address the situation of the treatment plant in the Buyé area? It contaminates that whole area and that whole beach, specifically the two buildings that are there, which discharge into that treatment plant. Whenever it rains, it contaminates the whole area, even the beach. Is there a study planned to address the situation with the treatment plant in Villa Taína? Which also, whenever it overflows, whenever it rains, contaminates that whole area, because the pipe that drains the supposedly treated water from the treatment plant that usually, for many years, discharged it into the middle of the bay is broken right there where the Villa Taína ramp is located and, whenever it rains, there's wastewater all over the place. Well, I wanted to bring this up for the record. My question is, will that be addressed as this is being addressed in the town center? Because the residents of the Buyé and Villa Taína areas are concerned about that. Those treatment plants definitely do not comply with treating the water correctly. That's why we have... there's always a red contamination flag at Buyé Beach. It looks so pretty, but we bathe there in water with feces from those treatment plants that are no good.

Daniel Rodríguez: We'll be forwarding these comments to people within the Agency who deal with those programs, who work with those programs, so that they can address the concern you're presenting tonight, because this is beyond the scope of the work I've been tasked with.

Manuel Portela: Thank you, and I'd like to take this opportunity because we're representatives of the community here and, since you're representatives of the EPA, well... But what you're doing is really good. I would like that to also happen in an area where there's such a big source of contamination like the one in Buyé and Villa Taína.

Daniel Rodríguez: Thank you for your comment.

Randy Toro: Good evening, everyone. My name is Randy Toro. I live in the area of Bajura, close to one of the wells that's identified there. My concern and my presence is due to the situation we're currently having with the contamination. I think there has to be more somewhere else. I don't think it's only one specific area, like the one shown here. But it's like the opinion of one of my fellow [residents] here, the first opinion. We don't have the knowledge to say for sure, only by taking a water sample and taking it to a lab. But if we believe that, at this time, it's drinkable, that you can drink it, one can run into the normal and ordinary situation in those... it's not a situation that's adverse to that. The schools located behind there, a preschool that was there as well, didn't they run any risk from the contamination that's there, quote, unquote? Well, as it can be understood here. In my opinion, I don't think it's the only place that's contaminated, because, here, these veins run all over Cabo Rojo. So, there must be more places. The fact that it's present in this area is a different thing.

Daniel Rodríguez: I would like to emphasize again that the contaminant levels of chlorinated volatile organic compounds detected by PRASA were below the levels of the Puerto Rico government and the federal levels. At no time does the source of water pose a public health problem to the community that uses the system of urban wells in Cabo Rojo. We believe that one of the wells had the highest concentration, but, even so, it was below the levels and it was removed from the system because we believed it could be moving the plume of contamination in that direction, because of the aggressive extraction in that well. Therefore, the water in Cabo Rojo, I believe, is not being affected by this contamination problem. These are future actions. We can't leave the contamination at the site, because it poses a risk if we don't take action. That's what we're proposing, taking action against that source to reduce or eliminate that risk. In many of the structures surrounding the site where the contamination was found, we conducted vapor intrusion studies inside the structures, inside the homes. In 2011, we investigated 29 structures, 29 businesses, offices, homes, and we didn't find that there was an air quality problem caused by the contamination in the groundwater that's running underneath the place where those people live and work. The only place where it was detected that it could be a problem was where we identified the two potential sources, which are Extasy Q Print and Cabo Rojo Professional Dry Cleaners. Cabo Rojo Professional Dry Cleaners is vacant. At Extasy Q Print, the risk that was shown to exceed [the levels] was for residents, not for business, and nobody lives there. It's a commercial activity. Therefore, we believe, based on the information that we have, that there's no risk at this time to public health from the contamination in the groundwater. But that's not going to stop us from doing something. We're going to take action. That's the action we're proposing tonight.

Daniel Rodríguez: Are there any other comments?

Cinthia Martínez: Good evening, my name is Cinthia Martínez. I represent the [Puerto Rico] Industrial Development [Company] and I wanted to know if those remedial alternatives you're presenting also include the plume near PRIDCO.

Daniel Rodríguez: The plume near PRIDCO, near the industrial development facilities is to the north. What we are proposing is monitoring that plume. It doesn't include the more aggressive remedy that we're proposing for the town center.

Cinthia Martínez: Ok, thank you.

Celys Irizarry: Hello, my name is Celys Irizarry, a former resident of Cabo Rojo and a student as well, for many years, master's degree in environmental engineering. My question is addressed at knowing if there is any kind of educational campaign for the people in those businesses who handle this kind of chemical, so that they can do those management controls with the various kinds of chemicals they have in order to prevent these contamination problems from occurring from the outset. Perhaps there may be lack of knowledge among the general public, which doesn't exempt you from compliance, but which perhaps could prevent certain problems of this kind in the future.

Daniel Rodríguez: I don't know if there's a campaign to provide assistance in terms of knowledge, but I do believe the various industries have their organizations, which bring these issues to the people who belong to that kind of industry. I also believe that regulatory agencies also have assistance programs for the various kinds of industries regarding the waste they generate. We have information on the webpage of the agency I work for, the United States Environmental Protection Agency, where, depending on the sector you work in, you can find information about the typical waste that kind of industry would generate. So, there's information out there that they can use to increase their knowledge about how to handle their materials, their products, and their waste.

Celys Irizarry: Thank you.

Daniel Rodríguez: Are there any other comments?

Roberto Ramirez: Good evening. My name is Roberto Ramírez. I'm the mayor of Cabo Rojo. I would like to thank the EPA for coming to this talk. The municipality has been working since before 2011 or 2012, when this situation began. When I became mayor in 2013, the EPA ordered us to move the adjacent childcare or Head Start [center] that we had right near here. We moved it to what had been built for the Central American Games on the Relin Sosa Track. The kids are in a separate area there in a structure. It was a recommendation made by the New York EPA itself, which contacted us. After that, a company came in to do the sampling and build the wells. The trailer was in the industrial zone for a long time working on all the data. The municipality upheld, along with PRASA—that the well that's near here was also, as you said, the one that had the highest volumes of the chlorinated solvents—and we've been watching over the citizens. I believe that... I know PRASA has done it, but people give a lot of credibility to the EPA. You should publish frequent bulletins about what the sampling is showing so that the community, as the citizen very well said—it was you *(Stenographer's note: Points at a woman in the public)* or someone who spoke—about how the citizens could be kept informed about what's happening with that monitoring. I think it would be appropriate... a recommendation... that it be sent. If you send it to us at city hall, we'd be glad do it through the media that we have available, both radio, radio shows, the Facebook network, and our municipality webpage, for people to be kept informed. She was the one who was here *(Stenographer's note: Points at Frances Delano in the public)* since 2013 more or less working with the Superfund. So, we've always collaborated with what the investigation is looking for, which is finding out who caused this situation for the citizens of Cabo Rojo. The water, as you very well said... and PRASA, even during the emergency we were facing distributing water using the tanks that are certified by the Department of Health. But before a single drop of water is poured, the Department of Health or PRASA has to do a water analysis on it before it's distributed to the people, so that it's drinkable, [so] that it's water that's safe, so that people can drink it. So, we would like to thank you for being here tonight. The municipality is completely willing to continue collaborating so that we can solve [this] once and for all, given the situation that this area of our town depends on those deep wells. I don't know if he said it, but there are 16,000 homes that receive this service. Cabo Rojo has three sources where water comes from. It comes from Mayagüez, which is the part of Guanajibo, 1,700 residents who get water from that area. And for 7,000, it comes from the Lucchetti Lake, through the irrigation channels, and it's treated there in the Betances area. So, it's here in the middle of the city that receives water from the deep water wells. Thank you, thank you for being here.

Daniel Rodríguez: Thank you, Mr. Mayor. I would like to thank the Municipality of Cabo Rojo because they have been a great help during the investigation phase, providing us with places for meetings, helping us with traffic control when we were installing the wells and taking the samples. So, we'd like to thank you for all the help you gave us during that time and for allowing us to use this library to keep one of the repositories and hold tonight's meeting. Thank you very much.

Elaine Rivera: I'm Elaine Rivera, a resident here in Joyuda. I have a comment. It's to thank you, because maybe you didn't mention it at the beginning, but the Superfund are federal funds that everyone fights for. Everyone wants their contaminated sites to meet these criteria; let me explain, to meet the criteria to receive funds for this. I know it's a struggle you go through, because everyone wants their sites to be [in the] Superfund and have this. So, thank you for sharing all this information with us and for listing this as a Superfund site so that all that money will come in to help with the cleanup.

Daniel Rodríguez: Thank you for your comment. Are there any other comments? Thank you very much for participating in this meeting tonight. I'm bringing the meeting to a close. Thank you.

The meeting is brought to a close and the record is closed at 7:29 pm.

STENOGRAPHER'S CERTIFICATION

I, Aledawi Figueroa Martínez, stenographer for Smile Again Learning Center, Corp., hereby CERTIFY that:

The foregoing is the true and accurate transcript of the recording taken during the meeting held at the place and on the date indicated on the first page of this transcript.

I furthermore certify that I have no interest in the outcome of this matter and that I am not related to the parties involved in the same within any degree of consanguinity.

In Isabela, Puerto Rico, on August 15, 2018.

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CERTIFICATE OF TRANSLATION INTO ENGLISH

I, Miriam R. García, of legal age, married, a resident of Valladolid, Spain, and a federally-certified court interpreter and professional translator, do HEREBY CERTIFY that I have personally translated the foregoing document and that it is a true and accurate translation to the best of my knowledge and abilities.

In Valladolid, Spain, today, August 29, 2018.

Miriam R. García
ATABEX TRANSLATION SPECIALISTS, Inc.
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APPENDIX VI

Puerto Rico Environmental Quality Board's Concurrence Letter

APPENDIX VII

Public Meeting Attendance Sheet

Cabo Rojo Groundwater Contamination Superfund Site
Cabo Rojo, Puerto Rico

Attendance Sheet

Name	Address	Phone	Email
Ebdiel Esach	San Germán	U.S. Privacy Act (b)(6) [redacted]	[redacted]
Ing. Augusto H. Ortiz	Mayagüez	[redacted]	[redacted]
Cynthia M. Martinez	San Juan	[redacted]	[redacted]
BRENDAN MacDONALD	U.S. Privacy Act (b)(6) [redacted]	[redacted]	[redacted]
Elaine Rivera	[redacted]	[redacted]	[redacted]
Ana M Román	[redacted]	[redacted]	[redacted]
Aubrey Rodríguez Ortiz	Cabo Rojo	[redacted]	[redacted]
Frances Delano	San Juan	[redacted]	[redacted]
Mirza Acosta Wiswanth	Cabo Rojo PR	[redacted]	[redacted]
Milton R Toro Nazario	Cabo Rojo	[redacted]	[redacted]
Martin G. Toro Toro	Cabo Rojo	[redacted]	[redacted]
Fernando L. Sepúlveda	Cabo Rojo	[redacted]	[redacted]
Fernando L. Sepúlveda	Cabo Rojo	[redacted]	[redacted]
Gloria M. Toro	Cabo Rojo	[redacted]	[redacted]
Nilsa O. Lora	Mayagüez.	[redacted]	[redacted]
Glorymar Cortés	MOCA	[redacted]	[redacted]
Juan Cruz	SJ	[redacted]	[redacted]
Jose A Duran	San Juan	[redacted]	[redacted]
Pascual E. Velazquez	San Juan	[redacted]	[redacted]
Melvin Menendez Figueroa	San Juan	[redacted]	[redacted]

Cabo Rojo Groundwater Contamination Superfund Site
Cabo Rojo, Puerto Rico

Attendance Sheet

Name	Address	Phone	Email
Omar Santiago Santiago	JCA	U.S. Privacy Act (b)(6) [redacted]	[redacted]
José L. Sierra	Cabo Rojo [illegible]	[redacted]	[redacted]
Manuel Portela		[redacted]	[redacted]
Fatima Camacho		[redacted]	[redacted]
Celys Irizarry		[redacted]	[redacted]
Gerardo Ortiz Colón	MACR	[redacted]	[redacted]
Melinda Collazo Rodríguez		[redacted]	[redacted]
José Reyes	C	[redacted]	[redacted]
Gabriel López	MACA	[redacted]	[redacted]
Aledawi Figueroa		[redacted]	[redacted]

APPENDIX VIII

Transcript of the Public Meeting and Written Comments

REUNIÓN PÚBLICA
CABO ROJO GROUNDWATER CONTAMINATION SITE
CABO ROJO, PUERTO RICO
9 DE AGOSTO DE 2018
CABO ROJO, PUERTO RICO

Notas de transcripción:
Hora pautada de reunión: 6:00pm
Lugar: Biblioteca Rebeca E. Colberg

Se abre record a las 6:00pm

Brenda Reyes: Buenas noches, para propósitos de esta reunión se hace una transcripción así que vamos a dar por abierta la reunión. Mi nombre es Brenda Reyes Tomassini, oficial de asuntos públicos de la Agencia Federal de Protección Ambiental. En la noche de hoy se encuentra conmigo Daniel Rodríguez, ingeniero, que es el gerente de proyecto, y se encuentra Frances Delano de CDM y Brendan MacDonald que está presto a entrar de CDM también. En la noche de hoy estamos aquí en la biblioteca Blanca Colberg del pueblo de Cabo Rojo, para presentar el Plan Propuesto, para remediar la contaminación del agua subterránea, en el lugar de Superfondo conocido como Pozos de Cabo Rojo. Este Plan Propuesto describe las alternativas de remediación para el lugar de Superfondo e identifica cuál es la alternativa preferida y el racional o el racionamiento tras esta alternativa seleccionada. La Agencia de Protección Ambiental Federal tiene un repositorio de información, con los documentos del lugar aquí en la biblioteca Blanca Colberg. Tiene en la oficina de la EPA región 2 en Nueva York. Tiene en nuestra oficina del Caribe en Guaynabo, la Agencia de Protección Ambiental Federal, División del Caribe, ahí tiene un repositorio de información. Estamos en periodo de comentario público. El anuncio salió en el periódico primera hora, entiendo que la semana pasada, salió el anuncio, el 2 de agosto. Salió publicado en el periódico Primera Hora. Así que en la noche de hoy, mi compañero Daniel Rodríguez va a estar haciendo una presentación. Vamos a darle 15 minutos por si llega alguien más. En la noche de hoy ustedes pueden someter sus comentarios por escrito. Tenemos mapas para que ustedes puedan ver. Las reuniones son sumamente interactivas, así que le damos la más cordial bienvenida.

Se hace un receso de 15 minutos a las 6:03pm

Se reabre record a las 6:15pm para comenzar oficialmente la reunión.

Brenda Reyes: Ok, ahora sí arrancamos. Buenas noches para los que acaban de llegar. Mi nombre es Brenda Reyes, oficial de asuntos públicos de la Agencia de Protección Ambiental Federal, la EPA por sus siglas en inglés. En la noche de hoy me acompaña mi compañero, el ingeniero Daniel Rodríguez, quien es el gerente de proyecto, para el lugar de Superfondo Pozos de Cabo Rojo. En la noche de hoy vamos a estar presentando el Plan Propuesto y las alternativas que fueron desarrolladas para este lugar de Superfondo y la alternativa que ha sido preferida para la remediación de contaminación en el lugar. Me acompañan esta noche Brendan MacDonald de CDM, Frances Delano de CDM - quienes son los contratistas - la Sra. Gloria Toro de la Junta de Calidad Ambiental/Departamento de Recursos Naturales. Con eso damos por iniciada la reunión. Les recuerdo que estamos en periodo de comentario público. Los documentos están aquí en la Biblioteca Blanca Colberg. Están en la Agencia Federal de Protección Ambiental, nuestra oficina, la EPA, en Guaynabo. En el centro de expedientes del programa de Superfondo en Nueva York, en la región 2 de Nueva York, para las personas que viven fuera. Es bien importante la participación del público. El programa de Superfondo de la EPA depende mucho de la participación de ustedes, el público. Se ofrecen estos espacios de participación. Ustedes vienen, revisan los documentos, pueden someter comentarios. Estas reuniones tienden a hacer bastante interactivas luego de la presentación. Tenemos mapas. Si ustedes quieren hacer su comentario aquí por la vía oral, también le damos el micrófono, tenemos transcripción. Así que pues ustedes pueden someter sus comentarios, y cualquier otra preocupación, a través del micrófono, sino por escrito. Estamos en periodo de comentarios públicos. Así que sin más preámbulos, Danny, todo tuyo.

Daniel Rodríguez: Muy buenas noches a todos. En esta noche le vamos a estar hablando sobre el plan que desarrollamos para la remediación de la contaminación del agua subterránea en Cabo Rojo.

(Nota de la transcriptora - Se pasa a la laminilla 2: Agenda)

Como ya les dijo la compañera, mi nombre es Daniel Rodríguez, soy el gerente del proyecto. La señora Brenda Reyes es la coordinadora de asuntos comunitarios - de participación comunitaria - y tenemos también - aunque no sé si llegó en esta noche - es el gerente de proyecto Pascual Velázquez García, que trabaja para lo que en un momento fue la Junta de Calidad Ambiental, ahora entiendo que es el Departamento de Recursos Naturales y Ambientales.

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

En esta noche le vamos a estar presentando el proceso del programa de Superfondo, que es el que está rigiendo, o está llevando a cabo, la limpieza, la investigación y remediación de la contaminación que se encontró en el agua subterránea. Le vamos a estar hablando sobre los resultados de la investigación remediativa y le vamos a estar presentando las alternativas de remediación y cuál fue el remedio preferido para atender la contaminación en Cabo Rojo.

(Nota de la transcriptora - Se pasa a la laminilla 4: Proceso Súper Fondo)

El programa de Superfondo lo que hace es que atiende la contaminación, escapes de contaminantes que llegan al agua subterránea, para atender la amenaza que esa contaminación presenta a la salud humana y al medio ambiente. Tiene dos vertientes, dos tractos, una es acciones de remoción que son a corto plazo, atiende el problema que presenta esa contaminación, de una forma inmediata. La intención es reducir o eliminar la contaminación. El otro tracto, que es el tracto que yo trabajo, es el de la acción de remediación. Esa es más a largo plazo. Ahí se hacen las investigaciones, se toma una idea de cuál es el problema, cuál es la naturaleza de la contaminación, y se le busca una solución a esa contaminación que está presente.

(Nota de la transcriptora - Se pasa a la laminilla 5: Fase de Evaluación de Lugares)

Aquí se le enseña en las diferentes etapas. Se descubre el lugar. En Cabo Rojo la Autoridad de Acueductos y Alcantarillados encontró, durante el muestreo que ellos realizan a las fuentes de agua que ellos tienen, que había contaminación con orgánicos volátiles clorinados en el agua, en los pozos que ellos estaban usando. Nos presentó ese problema. EPA y la Junta de Calidad Ambiental empieza el proceso de estudios preliminar del lugar. Se va y se recoge toda la información que está disponible para identificar cuáles pueden ser las posibles y potenciales fuentes de contaminación. Después de esto se hace la investigación del sitio. Esta investigación se hace con la información que ya recogimos, un vamos investigamos esas fuentes y vamos reduciendo el área, tratando de definir cuál es la extensión de la contaminación. Después de ese paso se hace un cálculo matemático, que es el Hazard Ranking System, que es el instrumento que nosotros utilizamos para proponerlo, para inclusión en la lista de Superfondo. Si el sitio tiene una clasificación, o un puntaje, mayor de 26 o 28, entonces es elegible a la lista de Superfondo. En el caso de Cabo Rojo se incluyó el 10 de marzo de 2011. Una vez incluido en el programa de Superfondo, mi programa entra, y comenzamos la investigación de remediación y los estudios para determinar la extensión - la naturaleza de la contaminación - y cuál es la extensión de esa naturaleza para poder desarrollar un plan o un remedio que va a atender esa contaminación. El objetivo siempre es el mismo, reducir o eliminar el riesgo a la salud humana y al medio ambiente.

(Nota de la transcriptora - Se pasa a la laminilla 6: Investigación de Remediación/Estudio de Viabilidad)

Esto es más de lo que ya le expliqué.

(Nota de la transcriptora - Se pasa a la laminilla 7: Descripción del Lugar)

el lugar está ubicado aquí en el Barrio Bajura, pero más bien cerca del área urbana del municipio de Cabo Rojo. Consiste del sistema de acueductos, que son seis pozos, que ellos tenían, que están operando, que estaban activos en aquel tiempo, del 2002 hasta el 2006 — que entiendo que fue que sacaron el pozo, uno de los pozos que estaba en uso — y encontraron contaminación en tres de ellos. Uno es Hacienda Margarita el otro es Club de Leones y el pozo de Ana María que está cerca de la escuela. Los otros cuatro pozos Cabo Rojo 1, 2 y 3 no detectaron contaminación. Aquí yo quiero hacer la salvedad quiero aclarar que, aunque acueductos encontró contaminación en esos pozos, ninguno de los pozos exhibió contaminación por encima de los estándares del gobierno de Puerto Rico y los federales, lo que le llamamos nosotros el MCL “Maximum Contaminant Level”.

(Nota de la transcriptora - Se pasa a la laminilla 8: Mapa de Localización)

Ésa es el área, los pozos que aparecen como en anaranjados, esos son los pozos que se detectó que tenían volátiles orgánicos clorinados. Los otros no tuvieron detección.

(Nota de la transcriptora - Se pasa a la laminilla 9: Mapa de Localización)

El sitio lo define las posibles fuentes que contribuyeron a la contaminación que se encuentra en el agua subterránea. De 68 fuentes que comenzamos investigando se redujo a 5 antes de empezar la investigación remediativa y después de hacer la investigación remediativa se redujo a tres. Estos son Cabo Rojo Professional Dry Cleaners, que está aquí cerca en el pueblo, Extasy Q Print, que está allá en la parte de atrás de la biblioteca, aquí al ladito, y Fomento Industrial, el complejo industrial que ellos tienen, el parque industrial que ellos tienen, al este de la 100.

(Nota de la transcriptora - Se pasa a la laminilla 10: Trasfondo Histórico)

Para dar un poquito más de información del trasfondo histórico. Aunque he ido tocándolo mientras voy discutiendo los otros sitios. Como ya les dije, la Autoridad de Acueductos, durante su monitoreo regular, detectaron esos volátiles orgánicos en el agua. En el 2006 la EPA comienza a hacer la investigación preliminar del lugar y empezamos a buscar estas fuentes potenciales que pudieron haber contribuido a la contaminación. Como ya les dije, empezamos con 68 lugares. En todas se recogieron muestras, se hicieron los trabajos de investigación. Las muestras de gases de suelo, muestras de suelo, muestras de agua subterránea, de lo que ya existía en el sitio. En el 2011 se incluyó en la lista de prioridades nacionales. Del 2013 al 2017 comenzamos a hacer los trabajos de investigación para la remediación, que esa es la parte en la que yo participé más activamente, y en el 2018 completamos la investigación de remediación y el estudio de viabilidad. El estudio de viabilidad nos presenta cuáles son las alternativas para remediar la contaminación que está en el cuerpo de agua.

(Nota de la transcriptora - Se pasa a la laminilla 11: Trabajos de Campo durante la RI)

El grosor del trabajo de investigación, del trabajo de campo, se hizo del 2013 al 2014. Cogimos muestras de gases de suelo, cogimos muestras de suelo, alrededor de estas industrias que nosotros habíamos identificado como posibles fuentes, que eran cinco. A esas tres que ya les dije Cabo Rojo Professional Dry Cleaners, Extasy Q Print, y Fomento Industrial Este, también estaba D'Elegant Dry Cleaner que era un complejo comercial. Estaba donde ahora está Walgreens, que ahí había un restaurante chino, una panadería, un club de vídeo, un sitio de recorte y hacer uñas, etc, etc. Pero ese edificio se eliminó, se destruyó y construyeron lo que tenemos ahora, que es el Walgreens y 2 unidades comerciales en la parte de atrás, uno está vacante y el otro que es el restaurante chino. Se recogieron muestras en esos sitios, para estos parámetros. Se investigó el agua subterránea. Se instalaron pozos, se cogieron muestras, se midieron los niveles de agua para ver el flujo del agua subterránea, en el área que estamos investigando. En adición a eso, se tomaron muestras de aguas superficiales y sedimento en las quebradas aledañas a donde se encontraba la contaminación. En el 2017 volvimos al campo porque detectamos que había data que no teníamos, y teníamos que completarlo para poder definir y afinar más la extensión de la contaminación. Se repitió un estudio de intrusión de vapor que se había conducido, se había llevado a cabo en el 2011, en 29 estructuras, que eran residenciales y comerciales en el área aledaña a donde estamos ahora mismo. En el casco urbano. Se repitió para ver si hubo un cambio desde el 2011 a ahora. Se cogieron muestras de suelo. Se instalaron otros pozos cerca de donde determinamos que no teníamos data para definir los plumachos de contaminación que pudieran haber en el área.

(Nota de la transcriptora - Se pasa a la laminilla 12: Fotos)

Estos son parte de los trabajos que se llevaron a cabo. Uno de los pozos que se instaló cerca de Cabo Rojo Professional Dry Cleaners, en un lote como de estacionamientos de carros. La foto que está a la derecha es uno de los “canisters” que se colocó cerca de Extasy Q Print para recoger la concentración de cualquier volátil orgánico en el aire, ambiental. El otro es el pozo que se instaló en el parquecito que está cerca de la escuela y de la quebrada. La que está a la derecha es una de las casas donde colocamos el contenedor para muestrear los gases que están debajo del piso. Se perforó el piso, se le puso un tubo y se recogió la muestra. Y ambiental dentro de la casa. esto es parte de los trabajos que se hacen.

(Nota de la transcriptora - Se pasa a la laminilla 13: Investigación Remediativa(RI))

De la investigación remediativa para el suelo se detectó en Extasy Q Print y en Cabo Rojo Professional Dry Cleaners PCE, que es tetracloroeteno, tricloroeteno (TCE) y cis-1, 2 dicloroeteno (DCE). Se detectó en los suelos, en la muestras de suelos que se tomó alrededor del edificio. En Cabo Rojo Professional Dry Cleaners el PCE que es el tetracloroeteno fue el que estaba por encima de los niveles de cernimiento de las agencias. Se encontraron concentraciones desde 22 — que eso está por debajo del número — hasta 3700 microgramos por kilogramo. En Extasy Q Print el PCE estaba en el rango 73, por encima de los niveles de escrutinio, y el DCE en 480. En fomento industrial no se encontró, no se detectó contaminantes por encima de los niveles de cernimiento, en el suelo cuando investigamos.

(Nota de la transcriptora - Se pasa a la laminilla 14: Mapa)

Esta es el área aledaña a Cabo Rojo Professional Dry Cleaners. Los cuadritos — que sé que no pueden leer los números, aunque le dimos copia, o pueden obtener copia del Plan Propuesto — son los números que excedieron los niveles de criterio que tenemos, que habíamos establecido, para el lugar. El área magenta es lo que nosotros entendemos pudiera ser el área de preocupación debajo del edificio, por escapes que ocurrieron. Eso no se ha definido aún. Eso se va a hacer en el futuro.

(Nota de la transcriptora - Se pasa a la laminilla 15: Mapa)

En Extasy Q Print hubo 2 áreas donde los empleados cuando hicimos la investigación preliminar del sitio nos indicaron que ellos lavaban los “screens” que ellos usan para imprimir las camisetas y las toallas, y las cosas que a ellos se le contrata hacer, y excedieron los números de criterio que habíamos establecido para ese sitio.

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

De vapores de suelo se detectó TCE por encima, desde .27 microgramos por metro cúbico, hasta 240,000 microgramos por metro cúbico, en esa área entre Cabo Rojo

Professional Dry Cleaners y Extasy Q Print. La detección mayor fue en Cabo Rojo Professional Dry Cleaners. La detección mayor de tetracloroeteno fue en Extasy Q Print, con una concentración de 110 microgramos por metro cúbico.

(Nota de la transcriptora - Se pasa a la laminilla 17: Investigación Remediativa)

Los resultados del agua subterránea, básicamente. La data demostró que hay 2 plumachos. En vez de una sola área, hay 2 áreas donde se encontró contaminación en el agua subterránea. El plumacho 1 consiste en su mayoría de PCE, TCE y DCE y cloruro de vinilo. Es la que está cerca de esta área que estamos nosotros ahora mismito, entre Extasy Q Print, Cabo Rojo Professional Dry Cleaners y el pozo de Ana María. El plumacho 2 consista de 1,1 DCE y 1,4 dioxano. Y esta al norte de la instalación de Fomento en el este.

(Nota de la transcriptora - Se pasa a la laminilla 18: Mapa)

Básicamente, aquí están las dos áreas delineadas. Lo que nosotros entendemos pueden ser los dos plumachos. La data ustedes la tienen en el reporte. Esta información la pueden conseguir en el reporte de la investigación de remediación, y en el reporte del estudio de viabilidad. Todo esto está contenido con lujo de detalle en esos documentos.

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

No se detectó contaminación en los cuerpos de agua superficial ni en los sedimentos, relacionado con el sitio. Nosotros investigamos para darle seguimiento a esos químicos que son los que están relacionados con la contaminación de agua subterránea por el escape que ocurrió en esas potenciales fuentes de contaminación.

(Nota de la transcriptora - Se pasa a la laminilla 20: Evaluación de riesgo ecológico)

Se hizo una evaluación de riesgo preliminar, y no se encontró que hubiese un riesgo al regreso por la contaminación que se escapó al agua subterránea. Así que no encontramos un riesgo ecológico.

(Nota de la transcriptora - Se pasa a la laminilla 21: Evaluación de riesgo a la salud humana)

En la evaluación de riesgo a la salud humana, evaluamos el riesgo de los dos plumachos. Para el plumacho número 1, que es el que está en esta área, se determinó que excede todos los rangos aceptables de la EPA, para exposición a personas que trabajan en estos edificios, en estos sitios donde está la concentración alta de los contaminantes, y las residencias aledañas al sitio, donde está el plumacho, eso es para el riesgo de cáncer. Para el riesgo de no cáncer nosotros tenemos un valor de 1 unidad y se determinó que el valor era mucho más alto, el calculado. En la tabla están los números. También están incluidos en los documentos que son parte del repositorio y del récord administrativo del sitio. Para el plumacho 2 no se encontraron riesgos que estuviesen por encima del rango que la EPA establece, ni para el carcinógeno, ni para el no carcinógeno. Pero la detección de 1,1-DCE estaba por encima de los valores de los estándares de calidad de agua del gobierno de Puerto Rico y del gobierno federal. Por lo tanto se decidió que se tiene que tomar una acción también con ese plumacho, con el plumacho número 2.

(Nota de la transcriptora - Se pasa a la laminilla 22: Plan Propuesto)

¿Cuál es el Plan Propuesto? En el Plan Propuesto nosotros identificamos las acciones para atender esa contaminación. Proveemos este foro para que las personas puedan proveer comentarios, puedan enterarse de las labores que asistieron y hacia dónde es que vamos con los trabajos que se hicieron. Se abrió un periodo de comentarios públicos que comenzó el día 2 de agosto, y va a estar vigente hasta el 3 de septiembre de 2018. Se les presenta la alternativa que las agencias ambientales, en este caso la EPA y la Junta de Calidad Ambiental, presenta para atender el problema de la contaminación.

(Nota de la transcriptora - Se pasa a la laminilla 23: Objetivos de la Acción Remedial)

De la investigación remediativa se determinó que tenemos que tomar acción en los suelos y en el agua subterránea. Esto se hace para atender el riesgo a la salud humana y al medio ambiente. Se establece unos objetivos de acciones de remediación, que son los que guían estos trabajos que se van a llevar a cabo. En suelo se estableció un objetivo de acción de remediación para evitar que el suelo contaminado sirva como una fuente de contaminación al agua subterránea. O sea, que siga contribuyendo contaminantes al agua subterránea. Para prevenir y/o minimizar que el suelo contaminado sirva como una fuente de la intrusión de vapores en el momento actual o en el futuro. La primera, agua subterránea, es más bien hacia el futuro. En agua subterránea el objetivo es prevenir la exposición humana al agua subterránea contaminada en concentraciones superiores a los objetivos preliminares de la remediación. A los estándares que se establecieron para discernir si hay o no hay contaminación, y si presenta un riesgo a la salud humana. Restaurar el agua subterránea a la calidad de agua potable. O sea, por encima de los niveles máximos de contaminación que las regulaciones de las agencias del gobierno de Puerto Rico y las federales establecen. Prevenir y minimizar que el agua subterránea contaminada sirva como fuente de intrusión de vapor actual y futura. O sea, que el agua subterránea se use como un medio para transportar la contaminación y que a su vez, a través de intrusión de vapor, nos llegue y nos afecte la salud de nosotros, en nuestras residencias y en nuestro sitio de trabajo.

(Nota de la transcriptora - Se pasa a la laminilla 24: Resumen de las Alternativas de Remediación)

Como en todos los programas de remediación hay elementos comunes, que nosotros los identificamos porque van a ser lo mismo para todas las acciones remediativas que vamos a hacer, excepto por uno, la de no acción. La de no acción es que no hacemos absolutamente nada.

- En todas tenemos un componente de investigación, pre-diseño y estudio piloto. Donde cogemos más data para afinar el remedio propuesto para implementarlo.
- Los controles institucionales que son los mecanismos que utilizamos, no de ingeniería sino más bien regulatorios, para evitar que donde se encuentra la contaminación, las personas puedan extraer esa agua y utilizarla.
- Monitoreo a largo plazo. Durante el tiempo de remediación que se establece vamos a estar monitoreando para asegurarnos que la contaminación que está en el agua subterránea está siendo atendida, ya sea mediante una reducción en las concentraciones o en la eliminación de la contaminación, para que llegue a niveles que no presente riesgo a la salud.
- Restauración del lugar.

Estos son algunos de los componentes más significativos. También hay otros componentes como utilizar remedios verdes, más amigables al medio ambiente, hacer la investigación de cada 5 años, para ver si en el remedio está cumpliendo con sus objetivos.

(Nota de la transcriptora - Se pasa a la laminilla 25: Alternativa de Remediación Número Uno)

En la alternativa de remediación 1 — esto lo tenemos en todos los sitios — es algo que el plan de contingencia nacional, del programa de Superfondo, nos requiere, que es no acción. No acción – para ver si eso es una opción viable. No se hace absolutamente nada. En este caso no lo es, porque ya los estudios de evaluación de riesgo nos determinó que hay un riesgo, y tenemos que atenderlo. Pero siempre se considera.

(Nota de la transcriptora - Se pasa a la laminilla 26: Alternativa de Remediación Número Dos)

La Alternativa número 2, es la extracción de vapor de suelo y la extracción de doble fase, monitoreo de la atenuación natural, y una contingencia para el tratamiento in-situ, de ser necesarios, y controles institucionales. Esa es la alternativa número dos. Ahí el Plan Propuesto es extraer de una forma bien agresiva e impactar las dos fases, la fase de suelo y la fase de agua subterránea contigua a donde se encontró la contaminación. ¿Se acuerdan de aquella figura donde están las dos estructuras que tienen contaminación identificadas con magenta? En esas áreas se va a implementar este tipo de remedio para atender la contaminación ahí y evitar que siga propagándose en el agua subterránea. También provee un monitoreo a largo plazo para ver si eso que estamos implementando está siendo efectivo, no nos está cambiando que están bajando los niveles de contaminantes en el agua subterránea, como se proyectó. No incluye activamente el plan de contingencia, el “in-situ treatment”. Cuando se lleva a cabo la fase de prediseño, de investigación, y la parte del proyecto piloto, del estudio piloto, ahí vamos a tener una idea más completa si este remedio por sí solo va a poder atender el problema de la contaminación. De no atenderlo pues entonces tenemos que ir a activar el plan de contingencia para “in-situ treatment”. Otra posibilidad es que implementamos esto y no veamos una reducción significativa en los niveles de contaminantes. Pues tenemos que entonces modificarlo y activar el plan de contingencia. Y los controles institucionales, que eso se ponen en el sitio y eso no se quita hasta tanto los niveles de contaminantes bajen por debajo de los estándares de Puerto Rico y del gobierno federal, para el agua potable.

(Nota de la transcriptora - Se pasa a la laminilla 27: Alternativa de Remediación Número 2)

De la alternativa número uno, no le dije el costo. El costo es cero porque no se hace nada. En la alternativa #2 se estima que el costo va a estar en 5.3 millones, va a tomar como dos años y medio en ser implementado y esperamos cumplir con los objetivos de la remediación en 30 años o menos.

(Nota de la transcriptora - Se pasa a la laminilla 28: Alternativa de Remediación Número tres)

La alternativa número tres es básicamente lo mismo que estábamos hablando con relación a la extracción de vapor de suelo y la de doble fase. Pero esta alternativa sí contempla el tratamiento activo, in-situ, de no solamente de las zonas cercanas a donde están las fuentes, sino de todo el plumacho que está contaminado. Se asume que la tecnología que se va a utilizar es la de biodegradación anaeróbica aumentada. Esto es lo que nosotros asumimos en este momento. Puede que cuando hagamos el estudio de prediseño investigativo y corramos el estudio piloto tengamos que utilizar otra tecnología. Para propósito de esto, de la evaluación de esta alternativa, se asumió esa.

(Nota de la transcriptora - Se pasa a la laminilla 29: Alternativa de Remediación Número tres)

Lo mismo. Es un programa de monitoreo a largo plazo, para asegurarse que es una tendencia de reducción y controles institucionales. El costo estimado de esta alternativa 3 es de 7.6 millones aproximadamente. Va a tomar de 4-5 años implementarla. Y el mismo objetivo, se espera en 30 años o menos alcanzar el objetivo de la remediación del sitio.

(Nota de la transcriptora - Se pasa a la laminilla 30: Evaluación de las Alternativas de Remediación)

Todas estas alternativas, cuando nosotros las estamos evaluando, tienen que cumplir con estos criterios. Son estos nueve criterios:

- Protección General de la Salud Humana y el Medio Ambiente. Que es la base del programa.
- Cumplimiento de las regulaciones estatales, federales, y locales, de haberlas.

- Permanencia y efectividad a largo plazo. O sea, que se reduce, se eliminó riesgo o se redujo el riesgo a niveles aceptables.
- Reducción de toxicidad, movilidad o volumen a través del tratamiento
- Efectividad a corto plazo
- Implementabilidad
- Costo
- Aceptación del Estado. En este caso del Estado Libre Asociado
- Aceptación de la comunidad. Para eso se le da la oportunidad para evaluar el Plan Propuesto de remediación para el sitio, a la comunidad.

(Nota de la transcriptora - Se pasa a la laminilla 31: EPA Remedio Preferido)

El remedio que es el preferido por ambas agencias reguladoras — en este caso por la EPA y la agencia recién creada, Departamento de Recursos Naturales y Ambientales/ Junta de Calidad Ambiental — están de acuerdo de que la alternativa 2 va a cumplir con el objetivo. Esta es la que le estamos presentando en esta noche a este grupo y es la que estamos identificando el Plan Propuesto que se publicó en los diferentes repositorios que tenemos para que el público lo pueda revisar.

(Nota de la transcriptora - Se pasa a la laminilla 32: EPA Remedio Preferido)

Entendemos que:

- Protege la salud humana y el medio ambiente

- Cumple con todos los requisitos relevantes y aplicables (ARARs)
- Es Costo Efectivo

(Nota de la transcriptora - Se pasa a la laminilla 33: Próximos Pasos)

Los próximos pasos:

- Estamos Solicitando Comentarios del Publico
- Nosotros vamos a preparar un Record de Decisión (ROD). Pero no hasta que podamos revisar todos los comentarios que recibamos y atenderlos. Los vamos a contestar. Van a ser parte del récord administrativo.
- El público tiene hasta el 3 de septiembre para hacernos llegar esos comentarios

Toda esta información está en la página que la EPA posteó para el sitio de Cabo Rojo. Estoy viendo si podemos…*(Nota de transcriptora – Daniel Rodríguez trata de acceder a la página web de la EPA)* Déjame parar la presentación aquí un minuto para brincar a la otra. Para que puedan ver.

Persona del público: ¿Los comentarios se envían a ese email?

Daniel Rodríguez: No, yo te voy a enseñar horita donde vas a enviar los comentarios. Déjame ver si puedo brincar a la otra. Esta es la página del sitio donde ustedes pueden conseguir toda la información relacionada a la contaminación de aquí de Cabo Rojo. El plan propuesto lo pueden conseguir aquí. Solamente presionen ahí y lo van a conseguir. Aquí están todos los documentos. Está en el Récord Administrativo, todos los estudios que se han hecho hasta el momento, reportes, documentos, están todos aquí. Si quieren más información los pueden obtener directamente aquí. Van a ver toda la data que se ha recogido, y todos los estudios que existieron, todos los estudios que nosotros utilizamos para llegar a la conclusión del diseño de ese remedio o proponer el remedio. Voy a volver a donde estaba. *(Nota de la transcriptora: se refiere a la laminilla de la presentación, ya que salió de ella para enseñar la página de internet)*

(Nota de la transcriptora - Se pasa a la laminilla 34: Enviar comentarios)

Aquí es donde pueden enviar los comentarios. Me los pueden enviar a mi correo electrónico. Los pueden enviar también por correo regular a la dirección que aparece en pantalla. Cualquier pregunta que tengan me pueden llamar a mi teléfono también. Toda esta información está incluida en el Plan Propuesto, que entiendo hay copias afuera, que pueden llevarse.

Eso es todo lo que le tengo para esta noche. Pueden pasar si quieren hacer algún comentario. Tenemos aquí a las personas que van a estar llevando el récord de la reunión, y van a ser parte del récord administrativo.

Sí. Tenemos un micrófono acá al frente.

Manuel Sepúlveda: Buenas tardes, ya buenas noches a todos. Mi nombre es Manuel Sepúlveda, yo soy residente y trabajo en el centro urbano, allí bien cerca de uno de los sitios que han identificado que está impactado con la contaminación. Más allá yo soy un lego en el punto de vista científico. Yo entiendo que hay que descansar en la información que ustedes llevan por años acumulando y llegando a las conclusiones. Yo no estoy aquí para cuestionar eso, y como ciudadano no voy a hacer ningún comentario, porque no tengo la capacidad ni el "standing" para cuestionar lo que ustedes han acumulado como evidencia científica. Pero como ciudadano, ¿qué yo tendría que tomar en consideración para hacer un comentario específico a este plan? De la lectura somera que le he dado ustedes indican que hay que impactar las estructuras, para poder construir las facilidades para hacer la extracción de los gases, el subsuelo, etc. etc. ¿En qué nos veríamos afectados nosotros en ese tipo de operación, más allá del movimiento de tránsito que veo que se va a impedir por algún periodo de tiempo? Pero, ¿en qué seria nocivo para la Ciudadanía la construcción de estas facilidades? Eso es lo que yo quisiera saber, para poderme expresar al respecto. Porque como les dije científicamente no voy a cuestionar nada y es impactante las conclusiones que ustedes han presentado en la tarde de hoy.

Daniel Rodríguez: Gracias, muchas gracias. Como bien mencionaste, el impacto va a ser mínimo, porque tenemos que cumplir con todas las exigencias de los reglamentos para el control de calidad atmosférica. Va a tener sus controles. No va a haber emisiones de gases que sean nocivos a la ciudadanía. Porque el propósito de esto es reducir y eliminar el riesgo, no añadirle de un medio a otro el riesgo. Va a haber impacto, sí, cuando estén instalando los equipos en las diferentes estructuras para atender la contaminación. Puede ser que el tráfico se afecte, ya sea el vehicular o el de las personas que van caminando por esas áreas. La operación de estos negocios dónde vamos a colocar los equipos se va a impactar. Pero entiendo que no va a haber un impacto a la salud pública porque se van a incluir las medidas para que eso no ocurra.

Elaine Rivera: Buenas noches mi nombre es Elaine Rivera, soy vecina de aquí en Joyuda. Yo tengo una serie de preguntas, como por ejemplo que ustedes indican que hay un riesgo de cáncer inminente. En base a la que ustedes están indicando, si miramos el diagrama, es una población bien ancha lo que hay ahí. Entonces estoy viendo que son son 30 años para implementar todas estas medidas. Sé que en algún punto comentaron que iban hacer ciertas cosas, como quizás orientar a la comunidad, evitar que tomen del agua subterránea. Pero como que no veo muy claro, quizás necesito más tiempo para poder leerlo. Pero, ¿cuáles van a ser esas medidas para mitigar la exposición de las personas alrededor del área del plumacho? Yo tengo otras preguntas, pero no sé si me pudieran contestar.

Daniel Rodríguez: Déjame contestarte esa rapidito. Ahora mismo no hay un riesgo a la salud humana, porque se tomaron medidas a corto plazo, donde los pozos... Como les mencioné al principio, ninguno de los pozos que utiliza la Autoridad de Acueductos y Alcantarillados exhibieron contaminación por encima de los niveles máximos de Calidad de Agua. Solamente se detectó, y eso fue suficiente para que ellos alertaran a las agencias reguladoras de protección del ambiente para que tomásemos una acción, y no la tomásemos después que eso le llegara a los consumidores. El Departamento de Salud establece unos parámetros y la Autoridad de Acueductos y Alcantarillados tiene que cumplir con ellos. Pues ellos nos alertaron. Así que el único pozo que estuvo bien cercano a llegar al número máximo se sacó del sistema. Ese pozo durante el tiempo lo hemos estado monitoreando, y los niveles de contaminación que presenta en los pozos de extracción no llegan ni a la mitad del número mínimo establecido por los reglamentos. Déjame ir un poquito más allá. En cuestión de contaminación por los vapores de suelo, de estudios que hicimos de intrusión de vapor, no se determinó que ninguna de las estructuras que visitamos, y cogimos muestras excedían los números que presentaran riesgo a la salud, excepto 2 sitios donde está la contaminación. Donde entendemos se originó. Donde está una de las fuentes. En esos sitios sí se determinó que estaba por encima del criterio para uso residencial, pero estaba por debajo del criterio para trabajadores. Así que si se usa para ese propósito no presenta un riesgo a la salud pública. Ahí se hacen unos estimados de tiempo. Una persona que vive en una casa pasa más tiempo, por lo tanto está más expuesto a esos gases que una persona que trabaja ahí ocho horas, cinco días a la semana. Así que entendemos que la contaminación, el problema, está controlado. Ahora mismo no debería haber exposición. Esto es a largo tiempo, al futuro. No podemos dejarlo así porque los niveles están por encima de los niveles de cernimiento, de lo que llamamos "screening". Por lo tanto, tenemos que tomar acción para bajarlo y evitar que eso represente un problema de salud inaceptable a la población.

Elaine Rivera: Otra pregunta. En el plumacho que ustedes tienen en realidad fue bien puntual donde encontraron niveles, no toda la gente que está en el plumacho tiene ese riesgo.

Daniel Rodríguez: Exacto

Elaine Rivera: Si no que ese es donde ustedes determinan que puede estar la contaminación y que tienen que actuar.

Daniel Rodríguez: Exacto eso es lo que estimamos que pueda ser la extensión de ese plumacho

Elaine Rivera: Entonces yo tengo otra pregunta, es que están mencionando unas industrias. Verdad, en este caso, mencionan unas y mencionan otras. Y yo me pregunto

¿Cuáles son las restricciones o controles — si esas industrias están trabajando — que están tomando contra estas operaciones, para evitar que continúe, o que haya unas prácticas para evitar que, o recurra, o se controle esta contaminación?

Daniel Rodríguez: Los controles los establecen las agencias reguladoras en este caso, para cómo ellos tienen que manejar los materiales y tienen que manejar los desperdicios que ellos generan. En estas dos industrias hubo escapes. ¿Qué ocasionó el escape? Una de ellas cerro operaciones, ya no está, cerró, que es la lavandera. El Extasy Q Print sigue operando, pero no hemos visto aumento en la contaminación. Así que entendemos que ellos, quizás al ver las agencias reguladoras tomando acción, cogiendo muestras, pues se preocuparon y manejaron de una forma apropiada y adecuada cómo ellos manejaban esos desperdicios. Entiendo yo. Los mecanismos existen en el campo regulatorio, no en este que yo trabajo, para evitar que esas cosas ocurran. Pero depende grandemente de los operadores de estos comercios.

Elaine Rivera: Nos cuestionamos en paralelo en realidad cuáles son. Porque vemos todo el trabajo que va a tomar esto, pues paralelo, usted comentó que una primera fase quizás era controlar como tal, evitar. Como que no se ve en el plan cómo que no se documenta en ningún momento las medidas que se tomaron para frenar la fuente. Pero por lo que dicen, parece que fue un evento, no es algo que es recurrente, si no es algo que fue un evento de un escape, o algo, pero yo creo que estamos más claros. Que bueno que compartan el plan porque entiendo que es importante que lo leamos y poder someterle algún comentario más adelante. Gracias.

Daniel Rodríguez: ¿Algún otro comentario?

José Luis Sierra Ruiz: Buenas noches a todos. Mi nombre es Jose Luis Sierra. Soy representante de Extasy Print, uno de los lugares que encuentren una de las fallas tóxicas. La pregunta mía es, llevan tiempo haciendo estos estudios. Hicieron pruebas del suelo. Hicieron pruebas de todos los químicos que nosotros tenemos. Hicieron pruebas de gases, donde estuvieron días con unas bombas. ¿Qué otra cosa hicieron? Usaron a través del alcantarillado de Acueducto... Porque las descargas de nosotros… La descarga es cuando lavamos un marco, no va al suelo, va a la alcantarilla. Acueductos vino y certificó que eso iba, porque abrieron la alcantarilla de la calle, y el producto, como tiene un colorante, bajaba por ahí. Solamente, en todos estos años, la única recomendación que nos dio una de las personas que fue, era que pusiéramos otro extractor. Todos los productos que nosotros usamos… Hay espray que pueden tener tal vez los químicos que se presentan. Pero ninguno de estos químicos van al suelo. Me explico. Esto es un pote de "spray", esto es un marco que es lo que nosotros utilizamos. Le echamos al marco, le pasamos el paño, y el paño va al zafacón. No es que hay una manguera que esté echando y corriendo el producto por el suelo. El gas… El líquido, el gas propano no, el gaseoso, el líquido. Lo utilizamos para limpiar los marcos, porque es de pintura, pinturas a base de agua. De la misma manera, Se saca el exceso de la pintura, se guarda en el pote, no se daña, si no pasa de una temperatura no seca. Para limpiarlo se usa un paño con gas, se limpia, el paño va al zafacón. O sea, no hay una descarga nunca en el suelo. ¿Qué productos o qué había anteriormente en el edificio? Porque aquí en Cabo Rojo hay más de seis compañías que hacen la misma labor de nosotros. Nosotros llevamos en este edificio 26 años y los productos siempre han sido los mismos y nunca el producto cae al suelo. Ni el gas. Ni el spray, que puede ser el espray el único que tenga uno de los componentes. Según lo que investigaron en aquel momento, hace dos años, nos dijeron que estaban buscando un producto como los que usaban antes los mecánicos para lavar los carburadores. El meta…meta… ay no sé, no me acuerdo. Pero ese producto no se utiliza. Cabo Rojo, no estoy justificando nada, pero Cabo Rojo está lleno de buenos mecánicos, los productos que utilizan para lavar motores y sus carros, que no se sabe dónde echan esos desperdicios. Como representante de Extasy Print, le solicito y le pido que vuelvan de nuevo. Yo le puedo facilitar las latas de pinturas para que vean los componentes, los "sprays", y para que vean cómo es que se utilizan de nuevo. Porque entiendo que aunque nosotros estamos allí, no somos los que estamos contaminando el suelo. Si hubiera sido así, tal vez alguna agencia nos hubiera dicho "mira este producto no lo puede utilizar por esto, esto y esto" y buscamos en las compañías cuáles son las alternativas para remediarlo. Lo único que me dijeron fue "pon otro extractor". Hace como una semana fue un caballero, inspector de Calidad Ambiental, Sr. Javier Mercado. Nos visitó. ¿No está aquí? Y dijo: "¿dónde está la chimenea? Yo fui a enseñarle el extractor. "Pero esto no suelta humo". Nosotros no quemamos nada, ni tampoco tenemos vapores para expedir. El extractor que usamos nosotros lo usamos para sacar el calor que se encierra la estructura y tal vez también cuando la camisa, se funde la pintura con la fibra de "T-shirt", que suelta un poco de olor, para sacar el olor, para nosotros no absorberlo todo el tiempo. Y me dijo "pero aquí no hay humo". Y yo: "no si no hay humo". "¿Y dónde está la chimenea de humo?". Nos gustaría que de alguna forma nos volvieran a visitar en el local. Vuelvan a hacer - de hecho en el local hay un pozo abierto que a menudo van y monitorean, que no tiene que ver nada con el taller porque está alejado. Dentro del local hicieron más de 16 pruebas, en el terreno, aún donde se limpia, que es exactamente por aquí *(Nota de la transcriptora: se está refiriendo a uno de los mapas que tienen exhibidos en la parte del frente de la tarima)* Es en esta partecita aquí.

Daniel Rodríguez: Déjame ver si te consigo la gráfica para que la puedan ver en la pantalla, y todas las demás personas puedan verla. *(Nota de transcriptora: Daniel busca la laminilla número 15 de la presentación)*

José Luis Sierra Ruiz: Exacto. En esa área. Pero nos gustaría saber qué producto en específico es el que crea esa supuesta contaminación. Volviendo a lo que nos explicaron hace como año medio atrás, uno de los que estaba haciendo las pruebas… Nada voy a hablar al azar como si fuera el mapa… Él nos explicó de la contaminación está en varios puntos del área de Cabo Rojo. No entiendo de qué forma, si el "flow" subterráneo de agua va corriendo por toda la geografía de Cabo Rojo, que de la casualidad que en dos puntos en específico contaminan, cuando el otro está aquí, el otro está acá. Aunque en pequeñas cantidades. No sabemos si es que en el pasado, hacen 20, 30, 40 años una descarga grande de drones, o de lo que fuese, en algún sitio específico y eso haya contaminado toda la vena de agua que corre. Me gustaría, como representante de Extasy Q Print, que nos visitaran. Siempre las puertas están abiertas para todo tipo de estudios. Y que nos digan qué producto en específico es el que se asemeja a ese producto que está contaminando la vena de agua. Para poder remediar o eliminar lo que sea.

Daniel Rodríguez: Comentario notado. Vamos a estar contestando el comentario que acaba de hacer en esta noche. Esto va a ser parte del récord.

José Luis Sierra Ruiz: Gracias

Daniel Rodríguez: ¿Algún otro comentario?

Manuel Portela: Mi nombre es Manuel Portela. Yo soy residente de Cabo Rojo, del área específico de Buyé. Mi pregunta se desvía un poquito en específico de lo que estamos ateniendo aquí ahora del casco urbano de Cabo Rojo. Pero para efectos de récord, yo quiero, número uno hacerle saber que estamos en la mejor disposición para ayudarlos en lo que sea, porque queremos proteger el ambiente, y estamos en disposición de ayudarlos en esa dirección. Mi pregunta es ¿hay algún estudio en progreso o algún estudio proyectado para atender la situación de la planta de tratamiento que está en el área de Buyé? Que contamina toda aquella área y toda aquella playa en específico de los dos edificios que están allí, que descargan en esa planta de tratamiento. Que cada vez que llueve contamina toda el área, inclusive la playa. ¿Hay algún estudio proyectado para atender la situación con la planta de tratamiento que está en Villa Taína? que también siempre que se desborda, cada vez que llueve, contamina toda aquella área, porque el tubo que desagua las aguas, supuestamente tratadas de la planta de tratamientos, que usualmente, por muchos años, lo echaba al centro de la bahía, está roto ahí mismo donde está la rampa de Villa Taína y cada vez que llueve aquello se llena de aguas negras. pues yo quería traer esta para conocimiento del récord. Mi pregunta es ¿se va a atender eso como se está atendiendo esto en el casco urbano? Porque ese nos preocupa a los residentes del área de Buyé y del área de Villa Taína. Esas plantas de tratamiento no cumplen, definitivamente, con tratar el agua bien. Por eso es que tenemos que siempre hay bandera roja de contaminación en la playa de Buyé. Tan linda que se ve, pero ahí nos bañamos en agua de excremento de esas plantas de tratamiento que no sirven.

Daniel Rodríguez: Le estaremos pasando estos comentarios a personas dentro de la Agencia que bregan esos programas, que trabajan con esos programas, para que ellos te puedan atender la inquietud que tú estás presentando en esta noche. Porque esto está fuera del propósito del trabajo que yo tengo bajo encomienda.

Manuel Portela: Gracias y aprovecho porque somos representantes de la comunidad aquí y como ustedes son representantes de la EPA, pues. Pero está muy bien lo que están haciendo, me gustaría que eso ocurriese también en el área donde hay un foco de contaminación tan grande como el que hay en Buyé y Villa Taína.

Daniel Rodríguez: Gracias por el comentario.

Randy Toro: Buenas noches a todos yo me llamo Randy Toro resido en el área de la Bajura, cerca de uno de los pozos que está identificado ahí. Mi preocupación y mi presencia es por la situación que está habiendo de la contaminación actualmente. Que creo yo que tiene que ser más en otro lado. No entiendo que sea una sola área específica, como la que se está mostrando aquí. Pero es como la opinión que hizo un compañero, la primera opinión, no tenemos el conocimiento para uno irse a la segura. Solamente tomando un muestreo de agua y llevándolo a un laboratorio. Pero si entendemos que en este momento es potable, se puede tomar, uno puede incurrir en la situación normal y común y corriente en esas. Que no es una situación adversa a eso. Las escuelas que se encuentran al dorso, un pre-kinder que hubo aquí también, ¿no corrieron ningún riesgo de la contaminación que hay, entre comillas? Bueno, según se entiende aquí. Que para mí no creo que sea el único sitio que esté contaminando. Porque aquí estas venas corren por todo Cabo Rojo, así que deben de haber más sitios. Que se encuentre presente en esta área es otra cosa.

Daniel Rodríguez: Quiero volver a recalcar que los niveles de contaminantes de volátiles orgánicos clorinados que acueducto detectó estaban por debajo de los estándares del gobierno de Puerto Rico y de los estándares federales. En ningún momento la fuente de agua presenta un problema de salud pública a la comunidad que utiliza el sistema de pozos urbanos en Cabo Rojo. Entendemos que uno de los pozos tenía la concentración más alta pero con todo y eso estaba por debajo de los estándares y se sacó del sistema porque entendíamos que podía estar moviendo el plumacho de la contaminación en esa dirección, por la extracción agresiva que ese pozo tenía. Por lo tanto, el agua de Cabo Rojo, entiendo yo, por el problema de esta contaminación, no está siendo afectada. Estos son acciones futuras. No podemos dejar la contaminación que está en el sitio, porque presenta un riesgo si no tomamos acción. Eso es lo que estamos proponiendo, tomar acción contra esa fuente para reducir ese riesgo o eliminarlo. En muchas de las estructuras aledañas a donde se encontró esta contaminación hicimos estudios de vapor intrusivo dentro de las estructuras, dentro de casas. En el 2011 investigamos 29 estructuras, 29 comercios, oficinas, residencias, y no encontramos que hubiese un problema de calidad de aire ocasionado por la contaminación que está en el agua subterránea, que está pasando por debajo en donde esa gente trabaja y vive. El único sitio donde se detectó que pudiera ser un problema fue donde identificamos las dos fuentes potenciales que son Extasy Q Print y Cabo Rojo Professional Dry Cleaners. Cabo Rojo Professional Dry Cleaners está vacante. En Extasy Q Print el riesgo que se demostró que excedía era para el de Residentes, no para el de comercio, y ahí nadie reside, es una actividad comercial. Por lo tanto, entendemos, con la información que tenemos, que no existe en este momento, un riesgo a la salud pública por la contaminación que está en el agua subterránea. Pero no por eso no vamos a hacer absolutamente nada, vamos a tomar acción. Esa es la acción que estamos proponiendo en esta noche.

Daniel Rodríguez: ¿Algún otro comentario?

Cinthia Martinez: Buenas noches mi nombre es Cinthia Martínez, yo represento a Fomento Industrial, y quería saber si esas alternativas de remediación que ustedes están presentando incluyen también el plumacho que está cerca de PRIDCO.

Daniel Rodríguez: El plumacho que está cerca de PRIDCO, de las instalaciones de fomento industrial está al norte. Lo que se está proponiendo es monitoreo de ese plumacho. No incluye el remedio más agresivo que estamos proponiendo para las áreas en el casco urbano.

Cinthia Martínez: Ok gracias

Celys Irizarry: Buenas, mi nombre es Celys Irizarry, antigua residente en Cabo Rojo y estudiante también, muchos años, grado de maestría de Ingeniería Ambiental. La pregunta va dirigida a saber si existe algún tipo de campaña educativa para estas personas, de estos locales que manejan este tipo de químico, para que ellos puedan tener esos controles de manejo, en los diferentes tipos de químicos que tienen, para evitar que en principio ocurran estos problemas de contaminación. Que quizas pueda haber desconocimiento del público, que no te exime a lo que es el cumplimiento pero que quizas puede evitar ciertos problemas en el futuro de este tipo.

Daniel Rodríguez: Yo desconozco si hay una campaña para proveerle asistencia en conocimiento. Pero sí entiendo que las diferentes industrias tienen sus organizaciones que traen estos asuntos a los que pertenecen a ese tipo de industria. También entiendo que las agencias reguladoras también tienen programas de asistencia a los diferentes tipos de industrias por el desperdicio que genera. Tenemos información en la página de internet de la Agencia que yo trabajo, la Agencia de Protección Ambiental, de medio ambiente, Federal donde, dependiendo el sector que tú trabajas, tú puedes conseguir información para los desperdicios típicos que generarían ese tipo de industria. Así que hay información allá afuera que ellos pueden utilizar para aumentar el conocimiento de cómo manejar sus materiales, sus productos, y sus desperdicios.

Celys Irizarry: Gracias.

Daniel Rodríguez: ¿Algún otro comentario?

Roberto Ramirez: Buenas noches, mi nombre es Roberto Ramírez, soy el alcalde de Cabo Rojo. Quiero darle las gracias a la EPA por estar en esta charla. El municipio ha estado trabajando desde antes del 2011 o 2012 que empezó esta situación. Cuando llegué a la alcaldía en el 2013 la EPA ordenó mover el “child care” o el “Head Start” que teníamos contiguo, aquí al lado. Se movió a lo que se había construido para los Juegos Centroamericanos en la Pista Relin Sosa. Allí están los niños separados en una estructura. Fue recomendación que hizo la misma EPA de Nueva York que se comunicó con nosotros. Luego de eso entró una compañía a hacer el muestreo y a hacer los pozos.

Estuvo ubicado el vagón por mucho tiempo en la zona industrial, llevando a cabo toda la información. El municipio se mantuvo, tanto con acueductos — que el pozo que está cerca aquí también era, como usted dijo, el que tenía los volúmenes más altos de los solventes clorinados — y hemos estado pendiente a la ciudadanía. Entiendo que, sé que Acueducto lo ha hecho, pero la gente tiene mucha credibilidad en la EPA. Debiesen de sacar unos comunicados frecuentes de cómo está ese muestreo para que la comunidad, como bien trajo la ciudadana — usted fue, (*Nota de transcriptora: señala Señora en el público)* o alguien que habló — de cómo se podía mantener a la ciudadanía informada de qué está ocurriendo con este monitoreo. Creo que sería adecuado, una recomendación, que se envíe — si nos las envía al municipio, lo hacemos con mucho gusto, a través de los medios que tenemos, tanto de radio, de programas de radio, las redes de Facebook, y nuestra página del municipio — para que la gente se mantenga informada. Ella fue la que estuvo aquí *(Nota de transcriptora: señala a Frances Delano en el público)* desde el 2013 más o menos, trabajando con el Superfondo. Así que hemos estado en colaboración en todo momento para lo que se busca de la investigación, que es ver quién fue el que ocasionó esta situación ante la ciudadanía de Cabo Rojo. El agua, como usted bien dijo, y Acueducto, aún durante la emergencia en la que nosotros estábamos en repartición de agua, a través de los tanques que son certificados por el Departamento de Salud. Pero antes de que se le echara una gota de agua, el Departamento de Salud, o Acueductos, tiene que hacerle un análisis de agua. Antes de distribuirse a la gente, para que sea potable. Que sea un agua que sea segura, para que la gente pueda tomarla. Así que le damos las gracias por estar aquí en la noche de hoy. El municipio está en entera disposición de seguir colaborando para que podamos resolver, de una vez y por todas, dada la situación, de que esta área de nuestro pueblo, depende de esos pozos profundos. No sé si él lo dijo, pero son 16,000 residencias que se nutren de este servicio. Cabo Rojo tiene tres fuentes de donde llega el agua. Viene de Mayagüez que es la parte de Guanajibo, 1,700 residentes que toman agua del área. Y 7,000 que viene del Lago de Lucchetti, a través de los canales de riego, y es tratada allí en el área de Betances. Así que este medio de la ciudad es el que se nutre de los pozos profundos de agua. Gracias, gracias por estar aquí.

Daniel Rodríguez: Gracias señor alcalde. Quiero agradecer al Municipio de Cabo Rojo porque nos han brindado mucha ayuda durante la etapa de investigación. Facilitándonos sitios para reunión. Ayudándonos con el control del tráfico, cuando estábamos instalando los pozos y cogiendo las muestras. Así que se le agradece toda la ayuda que nos brindó durante esa época y permitiéndonos el uso de esta biblioteca, para mantener uno de los repositorios y para la reunión de esta noche. Muchas gracias.

Elaine Rivera: Yo soy Elaine Rivera, vecina de aquí de Joyuda. Yo tengo un comentario. Es para darle las gracias a ustedes, porque quizás no lo comentaron al principio, pero el Superfondo es unos fondos federales que todo el mundo lucha. Todo el mundo quiere que sus sitios contaminados cumplan con este criterio. Me explico, cumplan con el criterio de que le puedan dar fondos para esto. Yo sé que es una batalla que ustedes tienen. Porque todo el mundo quiere que sus sitios sean Superfondo, y tengan esto. Así que gracias por compartir con nosotros toda esta información, y el hecho de que hayan colocado esto como un sitio Superfondo, para que venga todo ese dinero, para ayudar con esta limpieza.

Daniel Rodríguez: Gracias por el comentario. ¿Algún otro comentario? Muchas gracias por participar esta noche de esta reunión. Doy la reunión por terminada. Gracias

Se dan por terminadas las labores y se cierra record a las 7:29pm.

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 15 de agosto de 2018.

Aledawi Figueroa Mtz

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MEMORANDUM

Prepared by: Raúl Colón, P.E., P.H.
Caribe Environmental Services

Subject: Technical Evaluation
Cabo Rojo Groundwater Contamination Superfund Site
Cabo Rojo, Puerto Rico
EPA Facility ID No. PRN000206319
CES Project No. 12-0021

Date: September 1, 2018

As requested by the Puerto Rico Industrial Development Company (PRIDCO) Caribe Environmental Services (CES) has evaluated the following reports prepared, on behalf of the Environmental Protection Agency (EPA) for the referenced site, by CDM-Smith:

- Final Remedial Investigation Report, Cabo Rojo Groundwater Contamination Site, Remedial Investigation/Feasibility Study, Cabo Rojo, Puerto Rico; CDM-Smith, April 10, 2018.
- Final Feasibility Study Report, Cabo Rojo Groundwater Contamination Site, Remedial Investigation/Feasibility Study, Cabo Rojo, Puerto Rico; CDM-Smith, June 1, 2018.
- Superfund Program Proposed Plan, Cabo Rojo Groundwater Contamination Superfund Site, Cabo Rojo, Puerto Rico; EPA August 2018

Following are CES's comments to the RI/FS reports:

- **Remedial Investigation (RI) Specific Comments**

  - The RI document presents the following two distinct contamination plumes, which are summarized in the 2018 EPA Proposed Plan Document (PPD), and depicted in ***Figures 4-5b and 4-6*** of the RI (attached):

    - ***Plume 1*** is the groundwater plume to the north, encompassing the Cabo Rojo Professional Dry Cleaners (CRPDC) and Extasy Q Prints (EQP) source areas and the Ana Maria well, consisting mainly of PCE, TCE, and cis-1,2-DCE. The highest concentrations of PCE, TCE, cis-1,2-DCE, and vinyl chloride were detected in an alluvial well at CRPDC in Round 1. VOC concentrations in the alluvium were lower in Round 2, but remained above screening criteria. In this plume sub-slab and soil samples showed high concentrations

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of the Chemicals of Concern (COC) and the EPA indicates that the presence of contaminant mass in both the vadose zone and groundwater indicate that CRPDC and EQP **are continuing sources of groundwater contamination.** As a matter of fact, both ***Figures 4-5b and 4-6*** show a direct connection between the plume and the CRPDC and EQP facilities.

- ***Plume 2*** is the groundwater plume identified in the south area which consists of a 1,1-DCE plume near PRIDCO East. The RI indicates that the presence of 1,4-dioxane and 1,1- DCE in the saprolite groundwater at the PRIDCO East facility suggest a historical source of groundwater contamination that can be linked to downgradient bedrock detections of 1,4-dioxane and 1,1-DCE through fractures in bedrock, allowing contamination to migrate through preferential pathways. However, the RI indicates that the observed 1,4-dioxane concentrations did not yield any risk or hazard above EPA's thresholds to human health or the environment, and was not considered as a COC for Plume 2.

  A review of both ***Figures 4-5b and 4-6*** do not show a direct connection between the Plume 2 and the PRIDCO East property. As a matter of fact, the southern limit of the plume, as shown on both figures, is located down-gradient of well MW-18R which is the closer down-gradient well to the PRIDCO property. As shown in ***Figure 4-5b***, the plume southern edge is located approximately 200 ft from the PRIDCO property.

- ***PRIDCO East as a source of the Plume 2 contamination***: The RI indicates in Section 7.1.2, that this property is the source area identified for Plume 2. It indicates that based on previous site uses and historical presence of DCE in soil vapor, PRIDCO East is also considered to be a source of the 1,1-DCE groundwater plume seen in wells MPW-9R and MW-19R located down-gradient of PRIDCO East. 1,1-DCE was not detected in the shallow background monitoring well MW-10 or in bedrock background well MW-21R. 1,1-DCE concentrations in downgradient bedrock monitoring wells MPW-9R and MW-19R range from 14J to 34 µg/L. This EPA's explanation does not consider the results obtained in well MW-18R.

  This EPA's explanation seems appropriate if only the results of the two down-gradient wells MPW-9R and MW-19R are considered. However, when considering the results obtained by the EPA at well MW-18R, this explanation does not seem accurate. MW-18R was installed by CDM Smith, in 2017, after the Round 1 sampling event in 2014. This well was installed just down-gradient of the PRIDCO East property buildings. According to the RI information, this well was installed and screened in the fracture bed rock at a similar depth as well MW-19R and within the depths of Ports 1 and 2 of well MPW-9R.

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The results presented in the RI for well MW-18R indicate that on Round 2, first time that it was sampled, 1,1 DCE was not detected. However, wells MPW-9R showed 1,1 DCE detections ranging from 14 to 25 ug/L and well MW-19R showed a 1,1 DCE concentration of 34 ug/l. 1,1 DCE was detected in wells MWP-9R and MW-19R at all depths sampled ranging from 104 to 168.5 ft-bgs. These data suggest that the 1,1 DCE contamination in the fracture rock is wide spread within the fracture zone. Therefore, if the PRIDCO East property is a source of the contamination and the fracture rock is widely impacted, as suggested by the collected data, it would be expected that MW-18R would show 1,1 DCE during the Round 2 sampling, when it did not.

Furthermore, when analyzing the Post-Maria results presented in Table 4-8 of the RI a similar behavior, as found during the Round 2 sampling event, is noticed. MPW-9R showed 1,1 DCE detections ranging from 16 to 30 ug/L and well MW-19R showed a 1,1 DCE concentration of 40 ug/l. 1,1 DCE was detected in wells MWP-9R and MW-19R at all depths sampled ranging from 104 to 168.5 ft-bgs. However, MW-18R showed a 1,1 DCE concentration of 0.57 ug/L. The data indicates that concentrations of 1,1 DCE increased down-gradient after the Maria Hurricane.

The bedrock wells sampling results down-gradient of the PRIDCO site, in conjunction with the fact that the highest concentration of 1,1 DCE detected at the groundwater underlying the site was 0.58 ug/L, suggest that the PRIDCO property does not appear to be the source of the contamination found by EPA in Plume 2. These data suggest that a potential source area exist down-gradient of the PRIDCO property that EPA has not identified yet.

- ***Dilution and Dispersion*** **–** In the discussion of the Conceptual Model (CM) presented in the RI for the fate and transport of Plume 2, it is indicated that dilution and dispersion is expected to be significant in the saprolite and highly fractured bedrock zones, and that dilution and dispersion are expected to be active mechanisms for reducing plume concentrations moving downgradient. The RI indicates that the highest concentrations in Plume 2 were found in the fractures in the competent bedrock. Ambient groundwater flow is relatively slow in these fractures; hence, contamination is expected to migrate slowly with minimal to moderate dilution and dispersion. Concentration reductions in Plume 2, however, are still more likely dominated by dilution and dispersion.

  This hydrogeologic model, as described by in RI, cannot explain why the fracture rock immediately downgradient of the PRIDCO site is not significantly impacted with 1,1 DCE and wells located further downgradient show 1,1 DCE concentrations orders of magnitude higher than those found at the PRIDCO site (and immediately

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down-gradient of the site) and increasing as moving down-gradient. If the PRIDCO site is the source of the contamination found in Plume 2, and dilution and dispersion is the main mechanism of contamination movement down-gradient, as indicated in the RI, and if no other source(s) are located down-gradient of the PRIDCO site, you would expect for the 1,1 DCE concentrations to be higher at the PRIDCO site area and showing a reduction trend as it moves down-gradient where the volume of water for the dilution process increases. This is not what the data collected down-gradient of the site suggest. As previously discussed, as you move down-gradient, the 1,1 DCE concentrations increase instead of being reduced.

By the same token, if groundwater flow is relatively slow in the component rock fractures and the contamination is expected to migrate slowly with minimal to moderate dilution and dispersion, concentrations at the PRIDCO site would be expected to be higher than those detected down-gradient and also would be showing a reduction trend as it moves down-gradient, which is not what the available data indicate.

Again, the conceptual model for the site, in our opinion, is missing a potential source area, down-gradient of the PRIDCO East site, that would explain why the well immediately down-gradient of the PRIDCO site show non-detect or very low concentrations of 1,1, DCE and how the 1,1 DCE concentrations are increasing down-gradient instead of being reduced by the dilution process.

- ***Site Historical Uses***: As part of the response to the Request for Information (RFI) provided by PRIDCO to the EPA in October 2012, a detailed evaluation of the PRIDCO files for the tenants that occupied the PRIDCO East property was conducted. The investigation included all the buildings located at this property identified by PRIDCO as L-122-0-58-00/L-122-1-64-00. This industrial park is composed of 12 industrial lots with buildings constructed in 11 of the lots at different times. Lot No. 12 is not developed and it has been used as a parking area. PRIDCO's evaluation included buildings: T-0445-1-58 and T-0445-1-68; T-0667-0-64-01 and T-0667-0-64-02 (which was sold to Ebanistería La Caborrojeña); S-0961-0-68 and S-0961-1-79; T-0636-0-63, T-0636-1-66, T-0636-2-67 and T-0636-3-68; S-1338-0-82; T-0819-0-69; T-0962-0-70 and T-0962-1-78; T-1286-0-80; S-1167-0-74; S-1105-0-73; and T-099500-70.

  PRIDCO files indicated the following uses for some of the buildings: T-0667-0-64-01 and T-0667-0-64-02 manufacturing of kitchen cabinets, wooden furniture and plastic bags; S-0961-0-68 & S-0961-0-79 for manufacturing of residential, commercial and industrial breakers and other electrical parts by Cutler Hammer; T-0962-0-70 & T-0962-1-78 manufacturing of electrical products by Westinghouse, manufacturing of circuit breakers by IVI Mfg. Inc. and manufacturing of circuit breakers and

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receptacles by Cutler Hammer; T-1286-0-80 low voltage switches manufacturing by ICO de PR, Inc; S-1167-0-74 manufacturing of circuit receptacles by Westinghouse, manufacturing of circuit receptacles by ICO P.R., Inc. and manufacturing of circuit receptacles by Cutler Hammer; S-1105-0-73 manufacturing of electric products by National Semiconductors de PR and voltage receptacles manufacturing by Cutler-Hammer; T-0995-0-70 manufacturing of electrical products by Westinghouse, ICO PR Inc. (a division of WPRI) apparently the same activity as Westinghouse, manufacturing of electrical products by Cutler Hammer.

The investigation conducted by PRIDCO for the October 2012 RFI response indicated that all the data available in the PRIDCO files did not indicate the historical usage of chlorinated solvents by any of the tenants that occupied the PRIDCO East buildings.

The PRIDCO East site was the subject of three investigations conducted by the EPA as follows:

- April 10-23, 2013 – this investigation shows detection of PCE in two of the samples collected between buildings S-1167 and T-0962. The concentrations detected were 49 and 52 ug/m^3 at depths between 7.5 to 9 ft-bgs.
- April 18 to May 9, 2013 – this investigation showed detection of 1,1 DCE in soil at a concentration of 620 ug/Kg. The sample was located to the north west of Building T-0995. In addition, at a sampling point to the north west of Building T-0995, 1,1 DCE was detected in groundwater at concentrations of 49 and 90 ug/L at the intervals of 20-24 and 13-17 ft-bgs, respectively.
- May 13-16, 2013 – three soil borings were drilled and no detection of VOCs was reported.
- January-February, 2017 – This investigation included the collection of soil and groundwater screening samples along two transects at the PRIDCO East property (Transects T1 and T2). Even though, no COC were detected in the soil samples, the ground water screening samples showed concentrations of 1,1 DCE; TCE; and cis 1,2 DCE.

The available data collected by EPA for the PRIDCO East site, during the RI process, suggest that it is likely that chlorinated solvents may have been used by some of the tenants that occupied the PRIDCO property. Also, the RI data suggest that apparently there are no sources of chlorinated solvents in the area up-gradient of the PRIDCO Property. The results of the wells located up-gradient of the PRIDCO property wells MW-10 and MW-21R, installed in the overburden and fracture bed rock, respectively, did not show detection of chlorinated solvents (including 1,1 DCE) during the sampling events.

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However, the low concentrations of this compound detected in the soil and groundwater underlying the PRIDCO site do not appear to be or to have been in the past, the source of the contamination detected at the Plume 2 area. In fact, the detected 1,1 DCE concentrations at the PRIDCO site are orders of magnitude lower than those detected farther down-gradient of the park. It appears that if releases of this compound occurred at the PRIDCO site, they were relatively small and not sufficient to produce the 1,1, DCE concentrations detected by the EPA in wells MPW-9R and MW-19R. The results reported in the RI for well MW-18R, which is the closest down-gradient well to the PRIDCO Site, in our opinion, support this conclusion. The available data do not establish a direct connection between the detections at the PRIDCO site and the detections in the down-gradient wells. The data suggest that a source(s) of contamination, down-gradient of the PRIDCO site appears likely.

- The risk assessment evaluation included in the RI indicates that the Reasonable Maximum Exposure (RME) cancer risks for future Plume 2 residents are at the upper end of EPA's acceptable cancer risk range when both rounds of data are used. The Central Tendency Exposure (CTE) cancer risks are within EPA's acceptable cancer risk range. Both RME and CTE cancer risks are within EPA's acceptable cancer risk range when only the most recent (Round 2) data are used. Estimated RME cancer risks for workers using Plume 2 groundwater are within EPA's acceptable cancer risk range. RME noncancer hazards for all future receptors using Plume 2 groundwater are below EPA thresholds.

  The risk assessment results indicate that the 1,1 DCE found at the Plume 2 area does not represent a risk to the human health and the environment.

- **Feasibility Study (FS) Specific Comments**

  - The FS evaluates two active remedial alternatives, in addition to the No Action alternative, described as:

    - Alternative 2: Soil Vapor Extraction (SVE)/Dual Phase Extraction (DPE), Monitored Natural Attenuation (MNA), Long-Term Monitoring, Contingency for In Situ Treatment – DPE and/or SVE wells would be installed at CRPDC and EQP to extract contaminated vapors from vadose zone and contaminated shallow groundwater. The contaminated vapors and groundwater would be treated aboveground to meet permit requirements prior to discharge. Vapor monitoring points would be installed in the treatment zone to monitor the performance of the remedy. Additionally, the SVE/DPE remedy would serve to mitigate potential vapor intrusion into the CRPDC and EQP buildings. The precise locations of the SVE/DPE wells would be confirmed during the remedial design. If PDI and/or groundwater monitoring results indicate the

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need for more active treatment of contaminated groundwater in Plume 1, Alternative 3 would be implemented.

- Alternative 3: SVE/DPE, In Situ Treatment, MNA, Long-Term Monitoring – This alternative would include every remedy component listed in Alternative 2, with the addition of in situ treatment of a broader and deeper zone of contaminated groundwater within the CRPDC and EQP source areas. The groundwater plume contaminated with COC concentrations over one magnitude above the PRGs would be remediated using in situ treatment. A pilot study of the in-situ remedy would be conducted prior to full-scale implementation.

We note that none of these two alternatives include the Plume 2 area. According to the FS no recent soil contamination that could serve as a continuing source for groundwater contamination was identified for Plume 2. Because groundwater contamination at Plume 2 is low, it is considered a dilute plume. Furthermore, the human health risk assessment indicated that risk from groundwater contamination in Plume 2 is within EPA's acceptable risk range; therefore, Plume 2 will not be considered for active treatment. Long-term monitoring of Plume 2 will be conducted to monitor groundwater concentration trends, evaluate natural attenuation, and ensure continued protection of human health and the environment.

We agree with the proposed approach for addressing the Plume 2 contamination.

- Section 1.8.2 of the FSA indicates that for Plume 2, in the saprolite zone, groundwater screening samples at PRIDCO East exhibited concentrations of 1,4-dioxane and 1,1-DCE at concentrations up to 12 µg/L and 1.3 µg/L, respectively. The saprolite contamination is likely linked to downgradient bedrock detections of 1,4-dioxane and 1,1-DCE through fractures in bedrock, allowing contamination to spread through preferential pathways. The contaminants were detected in bedrock wells downgradient of PRIDCO East at concentrations up to 58 µg/L for 1,1-DCE (MW-18R, Round 1) and up to 9.3 µg/L for 1,4-dioxane (MPW-9R, Round 2).

  The data included in the above paragraph for well MW-18R is not accurate. This well has never had a detection of 58 ug/L of DCE. This concentration was detected in well MPW-9R located further down-gradient of the MW-18R location, during the Round 1 sampling. MW-18R showed ND for 1,1 DCE in the Round 2 sampling event and a concentration of 0.57 ug/L during the Post Maria sampling event. The non-detection or very low concentrations of 1,1 DCE in well MW-18-R relative to the much higher concentrations detected in further down-gradient wells MPW-9R and MW-19R, is indicative of a source of chlorinated solvent down-gradient of the PRIDCO site not associated with the PRIDCO industrial park.

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- **Site Visit**

To investigate the potential location of source areas down-gradient of the PRIDCO East Park, Eng. Colón conducted a visit to the PRIDCO East site on August 31, 2008, with Mrs. Karen Fornes of PRIDCO. We visually inspected the areas up-gradient and down-gradient of the PRIDCO park and spoke to several neighbors of properties located down-gradient of the PRIDCO park. Our observations indicate that presently there are several mechanical shops, including auto body shops, located down-gradient of the Park (between the park and the PR-103 and PR-308 Roads intersection) and up-gradient of the park. According to the owner of an Agro-Centro located near the PR-103 and PR-308 intersection, three mechanical shops operated at the lot either adjacent or up-gradient of an abandoned gasoline station located along the PR-103 Road. For reference, well MW-19R, installed by the EPA, was observed located in the sidewalk to the west of this gasoline station. He indicated that these mechanical shops operated approximately from the 1960's to the 1980's and they were closed several years ago. He recalls the names of the shops as Maguiche, Rebelde and Nestor López. It is well known that old mechanical shops typically used and managed large quantities of chemical substances (including chlorinated solvents). Our experience indicates that housekeeping practices as well as hazardous wastes management in these old facilities was not typically adequate. Therefore, further evaluation of the areas where theses old mechanical shops were operated should be conducted.

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References

- "An Illustrated Handbook of DNAPL Transport and Fate in the Subsurface"; B.H. Kueper, Dr. G. P. Wealthall, J.W.N. Smith, S.A. Leharne and D.N. Lemer; environmental Agency R&D Publication 133; June 2003.

- "Dense Chlorinated Solvents", James F. Parkow and John A. Cherry, Waterloo Press 1995.

- "An Introduction to Characterizing Sites Contaminated with DNAPLs", The Interstate Technology and Regulatory Council (ITRC) - Dense Nonaqueous Liquids Team, September 2003.

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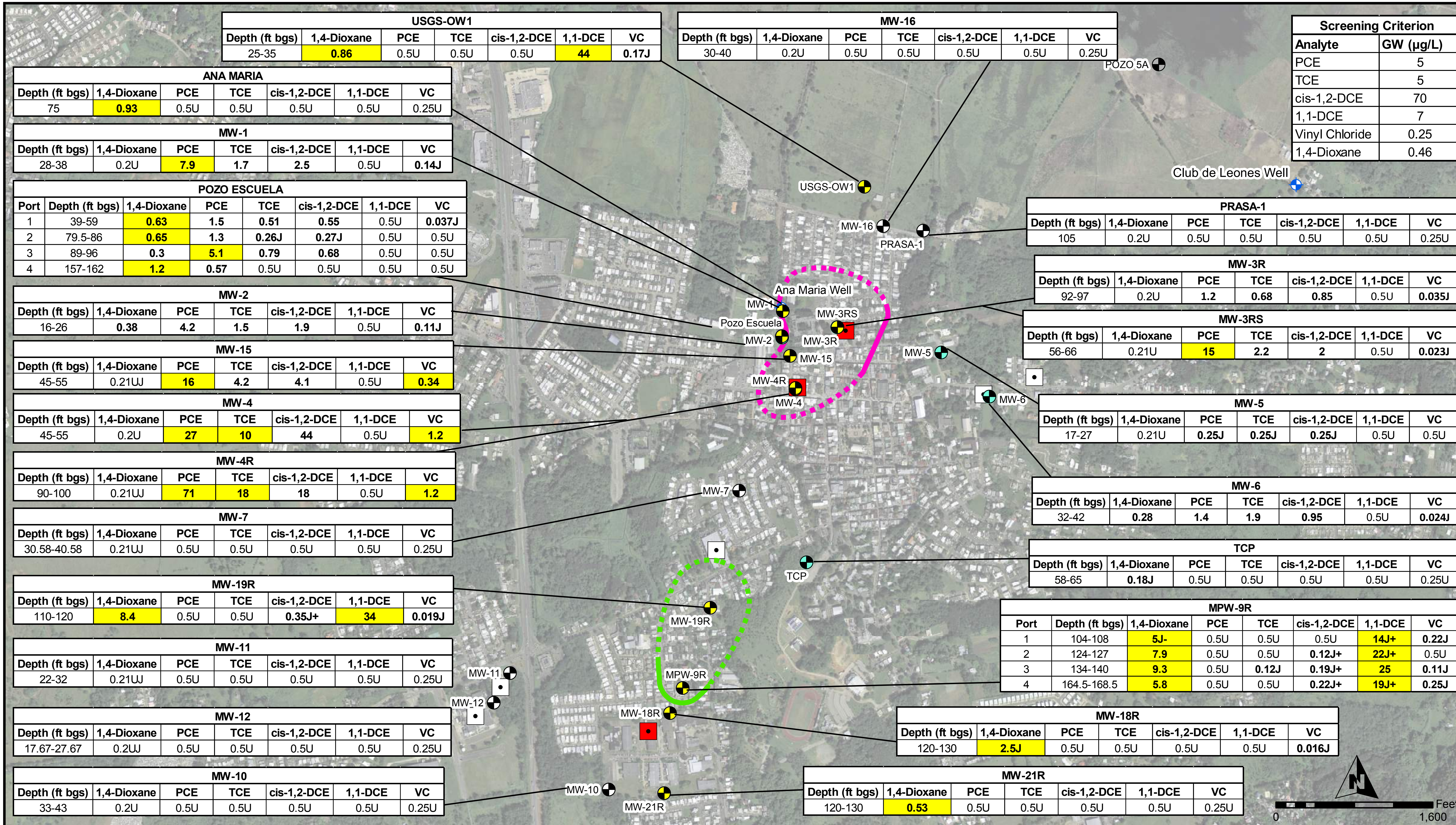
FIGURES



Screening Criterion	
Analyte	GW (µg/L)
PCE	5
TCE	5
cis-1,2-DCE	70
1,1-DCE	7
Vinyl Chloride	0.25
1,4-Dioxane	0.46

USGS-OW1

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
25-35	**0.86**	0.5U	0.5U	0.5U	**44**	**0.17J**

MW-16

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
30-40	0.2U	0.5U	0.5U	0.5U	0.5U	0.25U

ANA MARIA

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
75	**0.93**	0.5U	0.5U	0.5U	0.5U	0.25U

MW-1

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
28-38	0.2U	**7.9**	**1.7**	**2.5**	0.5U	**0.14J**

POZO ESCUELA

Port	Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
1	39-59	**0.63**	**1.5**	**0.51**	**0.55**	0.5U	**0.037J**
2	79.5-86	**0.65**	**1.3**	**0.26J**	**0.27J**	0.5U	0.5U
3	89-96	**0.3**	**5.1**	**0.79**	**0.68**	0.5U	0.5U
4	157-162	**1.2**	**0.57**	0.5U	0.5U	0.5U	0.5U

PRASA-1

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
105	0.2U	0.5U	0.5U	0.5U	0.5U	0.25U

MW-3R

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
92-97	0.2U	**1.2**	**0.68**	**0.85**	0.5U	**0.035J**

MW-3RS

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
56-66	0.21U	**15**	**2.2**	**2**	0.5U	**0.023J**

MW-2

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
16-26	**0.38**	**4.2**	**1.5**	**1.9**	0.5U	**0.11J**

MW-15

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
45-55	0.21UJ	**16**	**4.2**	**4.1**	0.5U	**0.34**

MW-4

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
45-55	0.2U	**27**	**10**	**44**	0.5U	**1.2**

MW-5

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
17-27	0.21U	**0.25J**	**0.25J**	**0.25J**	0.5U	0.5U

MW-4R

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
90-100	0.21UJ	**71**	**18**	**18**	0.5U	**1.2**

MW-6

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
32-42	**0.28**	**1.4**	**1.9**	**0.95**	0.5U	**0.024J**

MW-7

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
30.58-40.58	0.21UJ	0.5U	0.5U	0.5U	0.5U	0.25U

TCP

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
58-65	**0.18J**	0.5U	0.5U	0.5U	0.5U	0.25U

MW-19R

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
110-120	**8.4**	0.5U	0.5U	**0.35J+**	**34**	**0.019J**

MPW-9R

Port	Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
1	104-108	**5J-**	0.5U	0.5U	0.5U	**14J+**	**0.22J**
2	124-127	**7.9**	0.5U	0.5U	**0.12J+**	**22J+**	0.5U
3	134-140	**9.3**	0.5U	**0.12J**	**0.19J+**	**25**	**0.11J**
4	164.5-168.5	**5.8**	0.5U	0.5U	**0.22J+**	**19J+**	**0.25J**

MW-11

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
22-32	0.21UJ	0.5U	0.5U	0.5U	0.5U	0.25U

MW-18R

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
120-130	**2.5J**	0.5U	0.5U	0.5U	0.5U	**0.016J**

MW-12

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
17.67-27.67	0.2UJ	0.5U	0.5U	0.5U	0.5U	0.25U

MW-10

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
33-43	0.2U	0.5U	0.5U	0.5U	0.5U	0.25U

MW-21R

Depth (ft bgs)	1,4-Dioxane	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
120-130	**0.53**	0.5U	0.5U	0.5U	0.5U	0.25U

Public Supply Wells
Confirmed Source Area
Former Potential Source Area
PCE plume contour (5 µg/L)
1,1-DCE plume contour (7 µg/L)

Groundwater Sample Results
Detection
Exceedance
Non-Detect
Not Sampled

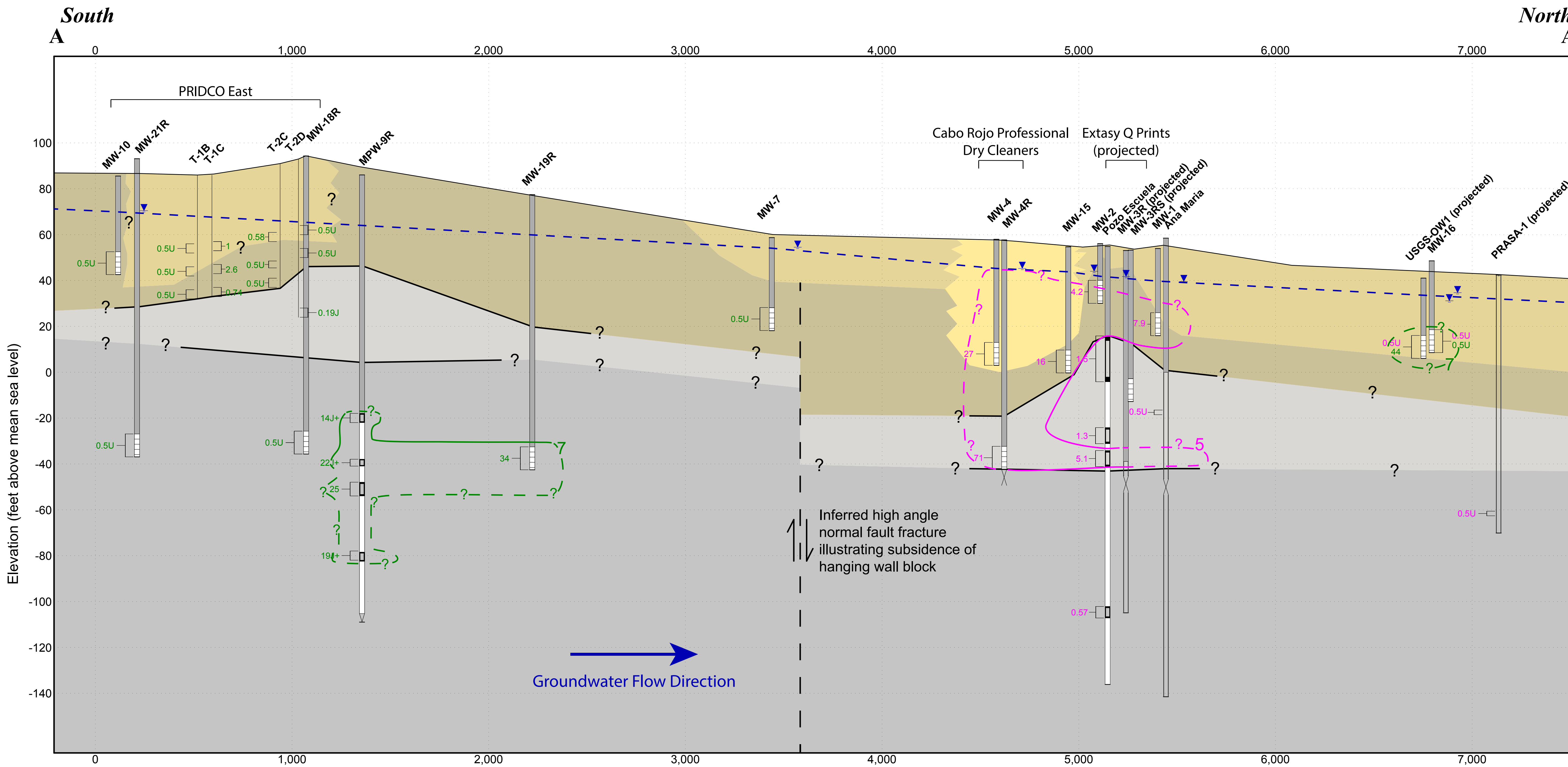
Acronyms:
PCE - tetrachloroethene
DCE - dichloroethene
TCE - trichloroethene
VC - vinyl chloride
NR - no result

µg/L - micrograms per liter
ft bgs - feet below ground surface
GW - groundwater
DUP - duplicate sample
J+ - estimated value, bias high
J- - estimated value, bias low

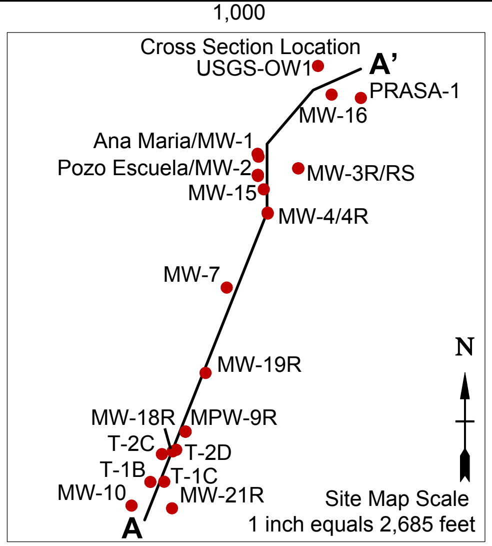
U - not detected; value shown is detection limit
Bolded text indicates a detection below screening criteria.
Bolded and yellow highlight indicates a detection at or above screening criteria.
Plume lines are dashed where inferred.

Figure 4-5b
Site-Related Monitoring Well Sampling Results - Round 2
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

CDM Smith



LEGEND:



- Alluvium
- Overburden
- Saprolite
- Weathered / Highly Fractured Bedrock
- Bedrock
- ? Contact is inferred
- PVC Casing
- Screened Interval
- Open Borehole
- Borehole Blockage
- Sample Interval
- Multiport Well Casing
- Sampling Port

MW-3R and MW-3RS analytical data are not displayed due to their projection onto the section.

Analytical Results
Tetrachloroethene (PCE)
1,1-Dichloroethene (1,1-DCE)
All results in micrograms per liter
U - not detected, detection limit is value to left
J - estimated concentration
+ - high bias

- Water Table (5/2017)
- PCE groundwater plume contour (dashed where inferred) (µg/L)
- 1,1-DCE groundwater plume contour (dashed where inferred) (µg/L)

Horizontal Scale (feet): 0 – 525
Vertical Scale (feet): 0 – 45
Vertical Exaggeration: 11.5x

CDM Smith

Figure 4-6
Cross Section A-A'
Selected PCE and 1,1-DCE Groundwater Results
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

PLC PROFESSIONAL LEGAL COUNSELS LLC

Diana M. Batlle-Barasorda, Esq.
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September 3, 2018

Mr. Daniel Rodríguez
Remedial Project Manager
U.S. Environmental Protection Agency
Caribbean Environmental Protection Division
City View Plaza II – Suite 7000
#48 Road 165 km 1.2
Guaynabo, Puerto Rico 00968-8069

Vía Email: *rodriguez.daniel@epa.gov*

Re: Cabo Rojo Groundwater Contamination Superfund Site
Cabo Rojo, Puerto Rico

Dear Mr. Rodríguez:

As you are aware, the United States Environmental Protection Agency ("EPA") published on August 2, 2018, a Proposed Cleanup Plan for this site, and on this same date also sent to our client, the Puerto Rico Industrial Development Company ("PRIDCO"), a Notice of Potential Liability for this site under the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. §9601, *et seq*. The EPA published notice informed the general public of the availability of this Proposed Cleanup Plan and the administrative record, so as to allow comments to be submitted before the September 3, 2018 public comment period deadline. On August 31, 2018, PRIDCO presented a timely request for an extension of time to submit comments to the proposed Cleanup Plan and the administrative record. Since no answer to said request has been received, we hereby submit some comments for EPA's review. Nevertheless, PRIDCO insists on its extension request in order to have an adequate opportunity to further consider the Notice and amend or supplement its comments having had such adequate opportunity.

The EPA through its Proposed Cleanup Plan identifies that the Cabo Rojo Groundwater Contamination Superfund Site contains two distinct groundwater areas where the contamination with tetrachloroethene ("PCE"), trichloroethene ("TCE"), cis-1,2-DCE, 1,1-DCE, and vinyl chloride was detected to exceed the maximum contaminant levels. See Figure 3 of the Cleanup Plan. The first groundwater contamination area was labeled as Plume 1, which is to the north near the Ana María groundwater well, and it was determined that the contamination source areas are from the Cabo Rojo Professional Dry Cleaners ("CRPDC") and the Extasy Q Prints ("EQP") location sites. On the other hand, Plume 2 is located to the south of this Plume 1, and the EPA has determined that the source area is likely the PRIDCO East site.

Since PRIDCO has been determined as the Potentially Responsible Party ("PRP") for only the Plume 2 contamination, we hereby focus our comments exclusively on the results, analysis and conclusions related to the Plume 2 contamination, its extent and the determination that its potential source area is the PRIDCO East property.

A) PRIDCO is not an Owner, but holds indicia of ownership to protects the security interest

PRIDCO was established as a public corporation and an instrumentality of the Puerto Rico government for the purpose of promoting the development of Puerto Rico's economy by stimulating the formation of new local firms and encouraging firms in the United States and foreign countries to establish and expand operations in Puerto Rico. To accomplish its mission, PRIDCO maintains a continuing infrastructure development program, including facilities for lease or sale to qualified private industrial and commercial investors, and the construction of industrial and commercial facilities for lease. In addition, PRIDCO disburses legislative appropriations in accordance with various special incentives programs to assist manufacturers in offsetting allowable startup costs. The basic purpose underlying PRIDCO's supporting role to Puerto Rico's economic development program is the creation of jobs and the consequent improvement of living standards in Puerto Rico. In order to conduct its legislative-created authority, PRIDCO has the power, among other things, to acquire, own, sell, and lease property, all for the purpose of assisting and enhancing Puerto Rico's economy.

PRIDCO does not operate any facility. It owns the land and/or buildings to be used by commercial and industrial entities for economic development purposes. That is the case for the PRIDCO East site located in Cabo Rojo. PRIDCO holds title primarily to secure the money it has advanced to purchase and develop the facilities it leases to its industrial tenants; to protect its interest in advancing industrial development. By purchasing the property and leasing it to several manufacturing operators, said operators would benefit from low cost lease and different incentives that could be passed along through PRIDCO. PRIDCO collects the rent proceeds from the operators or tenants to secure the repayment of principal and interest on the bonds used for the property acquisition. Thus, PRIDCO has never participated in the operation of the business of its tenants at the PRIDCO East site.

It is important to note that under the CERCLA "ownership", it **does not include** a person that, without participating in the management of the facility, merely holds **indicia of ownership** primarily to protect the security interest of the person in the facility. 42 U.S.C. §9601(20)(A)

B) PRIDCO East property is not the source of the Plume 2 contamination

Attached with this letter, we are including PRIDCO's environmental consultant, Caribe Environmental Services, Inc. ("CES"), evaluation and comments on the Proposed Cleanup Plan, the Remedial Investigation and the Feasibility Study that comprises EPA's evaluation of the contamination in the Cabo Rojo Groundwater Superfund Site, and the likely analysis and conclusions that lead to the EPA determination that PRIDCO is a PRP for the Plume 2 found in the site.

The data included in the Remedial Investigation (RI) report related to the groundwater contamination in Plume 2, clearly suggest that the encountered contamination was originally discharged in the soil, and would then leach in the subsurface reaching the groundwater by runoff rainwater, allowing the contaminant migration to occur through the underlying bedrock fractures existing in the property. The RI specifically states in its Page ES-9, that: "In the saprolite and highly fractured bedrock, dilution and dispersion are expected to actively reduce concentrations moving downgradient." Thus, it concluded that the concentration reductions in Plume 2, were "likely dominated by dilution and dispersion."

Therefore, based on such scientific description of the groundwater environment in Plume 2, the data results should then reflect that the concentrations found at PRIDCO East site should be the highest for 1,1-DCE, and should continue to decrease as it moves outside and downgradient from the site. Interestingly, the results collected by the EPA do not show that trend. Immediately downgradient from the PRIDCO East site is well MW-18R, which is immediately down-gradient from the PRIDCO site buildings. Down -gradient of this well are wells MPW-9R and then MW-19R (See RI Table 4-8, and Proposed Cleanup Plan Table 1). The Remedial Investigation concluded that the concentration trend is a reduction of the contamination as it moves downgradient. If this is the case, then the concentration results should be the highest at PRIDCO site and at MW-18 which is closest to the PRIDCO site, and should decrease as it moves to MPW-9R and then to MW-19R. Nonetheless, the results depicted in the RI, do not purport to that trend.

On the contrary, it shows that the concentration increased significantly as it moves downgradient, showing the highest concentrations at MW-19R. Based on EPA's own conclusion that concentration should be reducing, then a simple analysis can be achieved, and it is that the real source of the contamination for the Plume 2 should probably be found closer to the MW-19R as this is the area with the highest concentration of the 1,1-DCE, as seen in the Round 2 and Post-María results. Therefore, even though contamination has been found at MW-18R immediately downgradient of PRIDCO East site, the results have shown that the contamination shows a very low concentration (0.57 µg/L). Therefore, after the effects of dilution and dispersion of the groundwater at the PRIDCO site, it is scientifically impossible for PRIDCO to be the source of the higher concentrations downgradient at the Plume 2, and around MW-19R. As such, the source for the Plume 2 shall be investigated further, as it should be in the area near MW-19R.

We believe that these comments demonstrate the need for additional analysis and investigation related to Plume 2, that should be pursued the EPA before issuing the Record of Decision.

Sincerely,

Diana Batlle

Carlos W. López Freytes
CWL Legal Services, PSC

MEMORANDUM

Prepared by: Raúl Colón, P.E., P.H.
Caribe Environmental Services

Subject: Site Visit Report
Evaluation of RI/FS Reports
Cabo Rojo Groundwater Contamination Superfund Site
Cabo Rojo, Puerto Rico
EPA Facility ID No. PRN000206319
CES Project No. 12-0021

Date: October 5, 2018

On August 31, 2018, Eng. Raúl Colón, of Caribe Environmental Services (CES) accompanied by Mrs. Karen Fornes, of the Puerto Rico Industrial Development Company (PRIDCO), conducted a visual site inspection to investigate the potential location of chlorinated solvents source areas down-gradient of the PRIDCO East Park. During this site visit we obtained information that in the past, three mechanical shops operated at the lot either adjacent or up-gradient of an abandoned gasoline station located along the PR-103 Road. For reference purposes, well MW-19R, installed by the EPA, was observed located in the sidewalk to the west of this gasoline station. The information provided by neighbors, at that time, indicated that the names of the three shops were Maguiche, Rebelde and Nestor López and that those shops operated at this area for many years. Knowing that these types of facilities typically use and manage hazardous substance and hazardous wastes, including chlorinated solvents, we recommended that further evaluation of the areas where these old mechanical shops were operated should be conducted.

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As requested by PRIDCO, Eng. Colón conducted a follow-up site visit on October 3, 2018 to further investigate the information previously provided for the mechanical shops. Mrs. Fornes accompanied Eng. Colón during the site visit. At the time of the site visit we contacted Mr. Miguel Martínez who is the Publics Work Director of the Cabo Rojo Municipality. The objective of contacting Mr. Martinez was to obtain information regarding possible Municipality residents that might have historical knowledge of the mechanical shop's operations at the studied area. Mr. Martínez provided the following references for interview:

- Mrs. Danitza Feliciano, who is the director of the Municipal Patent Office (Tel: 787-851-1025, X-2200 and X-2211). We interviewed Mrs. Feliciano to determine if information about the time the three identified mechanical shops operated at the area of concern could be obtained. Mrs. Feliciano called to the meeting Mrs. María Ceda, who is in charge of the patent's records. Mrs. Ceda has lived in the Cabo Rojo town all her life and indicated that she recalls the mechanical shops operation at the abandoned gasoline station area. She indicated that she will be checking the patents records for any mechanical shop operations at the area of concern and that will provide the data to us. However, at the time that this report was prepared no information from the Municipality Patents Office had been received.

- An elderly mechanic that has worked in Cabo Rojo all his life. He indicated that this person lives near the PRIDCO industrial park but he did not recall his name. We were able to find this mechanic and spoke to him. He indicated that he is retired now but did not provided his name. According to the mechanic, the Manguiche, Rebelde and Nestor Lopez mechanical shops operated at the property which was part of the gasoline station. He indicated that these three shops rented their sites from the gasoline station operator. He confirmed that these shops were in operation from at least the 1960s to the 1990s. He indicated that the shops conducted light and heavy mechanical activities.

- Junior Ramírez who operates a transmissions mechanical shop to the south of the PRIDCO Industrial Park. We interviewed Mr. Ramirez who indicated that he is 65-year-old and has been doing mechanical work in Cabo Rojo for many years. Mr. Ramirez also confirmed that the identified mechanical shops operated at the abandoned gasoline station area for at least the 1960s to the 1990s. He indicated that the owner of the gasoline station was Mr. Perfecto Rodriguez Cabassa who rented the shops to Manguiche, Nestor López and Rebelde. He indicated that he recalls that these shops conducted engine and transmissions mechanical work. He recalls the work was conducted in "Ranchones" and in bare ground. I asked if by that time the mechanical shops in the area had processes for

MEMORANDUM

> the management of hazardous substances and disposal of wastes generated in the shop. He indicated that as far as he recalls, at that time, no controlled processes for the management of these substances existed at any of the mechanical shops that he remembers. This information is consistent with our experience in Puerto Rico which suggest that even today, the housekeeping and the hazardous substances and waste management at these types of facilities are not adequate. It is well known that old mechanical shops typically used and managed large quantities of chemical substances (including chlorinated solvents). Our experience indicates that housekeeping practices as well as hazardous wastes management in these old facilities was not typically adequate.

The results of the October 3 site visit confirms that at least three mechanical shops operated at the area where the abandoned gasoline station is located and down-gradient of the PRIDCO Industrial Park. The approximate location of the identified mechanical shops relative to the EPA MW-19R is presented in ***Figure 1***. As shown in this figure, the reported mechanical shops were located between 30 to 60 meters to the east or southeast of the EPA MW-19R.

The results of the RI indicate that the highest 1,1 DCE concentrations reported by the EPA, downgradient of the PRIDCO park, during the Round 2 and the Post Maria sampling events were detected at MW-19R with concentrations of 34 and 40 μg/L, respectively. These concentrations are higher than those detected in MW-9R, which is located approximately 80 meters down-gradient of the PRIDCO site and orders of magnitude higher than those detected immediately down-gradient of the PRIDCO site in MW-18R.

It is our opinion that the information presented in the RI report, as well as the data obtained for historical uses down-gradient of the PRIDCO site, suggest that the identified mechanical shops appear to be a likely significant source of chlorinated solvents to the Plume 2 area. However, further investigation of the area, where the reported mechanical shops were operated, will be necessary to determine whether or not these mechanical shops are a source of contamination to the Plume 2 area.

MEMORANDUM

FIGURES

LEGEND:

- APPROXIMATE PROPERTY LIMITS INCLUDED IN PHASE I ESA
- 1 PHOTOGRAPH NUMBER AND ORIENTATION
- 1 MAINTENANCE AREA
- 2 JARDINES DE MONTE LLANO DEVELOPMENT
- 3 RECREATION AREA
- 4 PRASA MANHOLE
- 5 POLE MOUNTED TRANSFORMER (NON-PBC LABEL)
- 6 GARBAGE COLLECTION AREA
- 7 PRASA PUMP STATION

SOURCE: GOOGLE AERIAL PHOTOGRAPH DATED JANUARY 9, 2018, AND SITE VISIT CONDUCTED BY CES PERSONNEL ON .

FIGURE NOT TO SCALE

ALL LOCATIONS ARE APPROXIMATE AND ARE ACCOMMODATED TO FIT THIS FIGURE.

CES
Caribe Environmental Services

SITE VISIT REPORT
EVALUATION OF RI/FS REPORTS
CABO ROJO GROUNDWATER CONTAMINATION SITE
EPA FACILITY ID NO. PRN0002-6319

CABO ROJO, PUERTO RICO

APPROXIMATE LOCATION OF REPORTED MECHANICAL SHOPS RELATIVE TO THE EPA MW 19R

PROJECT NO. 12-0021A

FIGURE 1

Diana M. Batlle-Barasorda, Esq.
Direct No. (787)523-3579
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October 5, 2018

Mr. Daniel Rodríguez
Remedial Project Manager
U.S. Environmental Protection Agency
Caribbean Environmental Protection Division
City View Plaza II – Suite 7000
#48 Road 165 km 1.2
Guaynabo, Puerto Rico 00968-8069

Vía Email: *rodriguez.daniel@epa.gov*

Re: Cabo Rojo Groundwater Contamination Superfund Site
Cabo Rojo, Puerto Rico

Dear Mr. Rodríguez:

As you are aware, the United States Environmental Protection Agency ("EPA") published on August 2, 2018, a Proposed Cleanup Plan for this site, and on this same date also sent to our client, the Puerto Rico Industrial Development Company ("PRIDCO"), a Notice of Potential Liability for this site under the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. §9601, *et seq*. The EPA published notice informed the general public of the availability of this Proposed Cleanup Plan and the administrative record, so as to allow comments to be submitted before the September 3, 2018 public comment period deadline. On August 31, 2018, PRIDCO presented a timely request for an extension of time to submit comments to the proposed Cleanup Plan and the administrative record, which was accepted by the EPA, and an extension thus was awarded until today.

The EPA through its Proposed Cleanup Plan identifies that the Cabo Rojo Groundwater Contamination Superfund Site contains two distinct groundwater areas where the contamination with tetrachloroethene ("PCE"), trichloroethene ("TCE"), cis-1,2-DCE, 1,1-DCE, and vinyl chloride was detected to exceed the maximum contaminant levels. See Figure 3 of the Cleanup Plan. The first groundwater contamination area was labeled as Plume 1, which is to the north near the Ana María groundwater well, and it was determined that the contamination source areas are from the Cabo Rojo Professional Dry Cleaners ("CRPDC") and the Extasy Q Prints ("EQP") location sites. On the other hand, Plume 2 is located to the south of this Plume 1, and the EPA has determined that the source area is likely the PRIDCO East site.

Since PRIDCO had not received a notice approving the extension of time, the initial comments were presented on September 3, 2018, where it was sustained that PRIDCO is not an owner under CERCLA, since it only holds indicia ownership to protect its secure interest over the property. Additionally, it was explained that based on the available data, the PRIDCO East site does not seem to be the true source of the contamination found in Plume 2, which was the only Plume the EPA determined that PRIDCO was a Potential Responsible Party ("PRP"). These arguments remain and are reiterated though this letter, however, PRIDCO would like to offer additional comments that will allow the EPA to have a more complete administrative record in this case, and to allow EPA the probability of identifying the real contributors to the potential source of this contamination found in Plume 2.

CERCLA Section 107(a), 42 U.S.C. §9607(a), identifies the following persons or entities as potentially liable parties for the response actions:

(1) the current owner or operator of a facility;
(2) any owner or operator of a facility at the time of disposal of the hazardous substances;
(3) any person who arranged for the disposal or treatment of hazardous substances at the facility; and
(4) any person who accepted the hazardous substance for transport to the facility.

The EPA has established in the Proposed Cleanup Plan, and the Remedial Investigation and Feasibility Study that PRIDCO is a PRP due to their current "ownership" status of the PRIDCO East property. However, this conclusion needs to be qualified, as PRIDCO has argued that the ownership definition under CERCLA, Section 101(20), exempts from liability entities that hold indicia ownership. As this matter has been discussed in our previous letter, we won't reiterate and discuss it in these comments. Nonetheless, it is important to note that within the PRIDCO East site, there is an additional "current owner" of an industrial lot since May 2004, which is Fábrica Muebles La Caborrojeña, Inc. This information was provided on October 2012 to the EPA as part of the Response to the Request for Information issued to PRIDCO, and it is presently part of the administrative record. Therefore, if PRIDCO is deemed a PRP under CERCLA by being an owner within the PRIDCO East site, this other entity should also be designated as a PRP, along with PRIDCO.

The data and discussion included in the Remedial Investigation (RI) report related to the groundwater contamination in Plume 2, clearly suggests that the encountered contamination was originally discharged in the soil and would then leach into the subsurface until reaching the groundwater by runoff rainwater, allowing the contaminant migration to occur through the underlying bedrock fractures existing in the property. Based on this fact, and as discussed in our previous letter, the data in Plume 2 should reflect that the concentrations found closest to the PRIDCO East site should be the highest for 1,1-DCE, which is the contaminant of concern in this site, and then continue to decrease as it moves outside and downgradient from the site. Nevertheless, the EPA results do not show this trend, as the concentration increases significantly as you move further downgradient from the PRIDCO East site. Therefore, the only likely scientific conclusion for this data is that the real source contributing to the contamination for Plume 2 should probably be found closer to the MW-19R as this is the area with the highest concentration of the 1,1-DCE, as seen in the Round 2 and Post-María results. After the effects of dilution and dispersion existing in the groundwater at the PRIDCO site, as described in the RI, it is scientifically impossible for PRIDCO East site to be the source of the higher concentrations found downgradient at the Plume 2 around MW-19R.

As such, PRICO has performed an initial investigation of possible sources surrounding MW-19R. Attached with this letter, we are including PRIDCO's environmental consultant, Caribe Environmental Services, Inc. ("CES"), additional evaluation and comments related to these investigations. In summary, CES conclusion after conducting site visits on August 31 and October 3, 2018 and interviewing residents of the Cabo Rojo town with historical knowledge of the area, it can be concluded that at least three mechanical shops operated near MW-19R, at the area where an abandoned gasoline station is located, upgradient of the PR-103 and PR-308 Roads intersection and down-gradient of the PRIDCO East Industrial Park. The location of the identified mechanical shops relative to the EPA MW-19R, is approximately 30 to 60 meters to the east or southeast. CES report indicates that the information presented in the RI report, as well as the data obtained for historical uses down-gradient of the PRIDCO site, suggest that the identified mechanical shops appear to be a likely significant source of chlorinated solvents to the Plume 2 concentrations. However, further investigation of the area, where the reported mechanical shops were operated, will be necessary to determine whether or not these mechanical shops are a source of contamination to the Plume 2 area.

This scientific analysis of the data included in the RI can lead, at most, to the conclusion that the PRIDCO East site can only be an extremely small contributor to the existing 1,1-DCE concentrations found in Plume 2. If that were the case, then PRIDCO should not be the only PRP considered for this process, as CERCLA allows the inclusion as a PRP the owner or operators at the time of the disposal. As the EPA knows, PRIDCO is a public corporation and governmental instrumentality established for promoting the economic development in Puerto Rico, by stimulating different entities to establish and expand their operations on the island. To accomplish this mission, PRIDCO maintains an infrastructure development program, which included the construction of facilities for lease or sale to qualified private industrial and commercial investors. Therefore, PRIDCO does not operate any manufacturing or other industrial facility. PRIDCO just holds title to the land were the buildings were constructed to be used and leased to tenants. Hence, PRIDCO does not handle and does not generate any hazardous substances, as it is only a passive landowner which leases the properties for economic development purposes.

Based on this fact, the EPA should be encouraged, not only to investigate other potential sources outside of the PRIDCO site, but also to consider including PRIDCO's tenants as the PRPs responsible for any of the contamination alleged that the PRIDCO East site may have contributed. These tenants are then the entities responsible for any of the soil contamination with 1,1 DCE found and any other chlorinated solvent found at the site in the April-May 2013 sampling events, or even that may be found in the future. Thus, these soil and groundwater contamination findings in Plume 2 with 1,1 DCE are then the responsibility of these tenants, which have been summarized in Table 4 of PRIDCO's response from October 2012 to the EPA Request for Information.

This response in no way represents an acknowledgement of liability for costs related to response activities or other costs incurred or to be incurred at the Site, with any such liability expressly denied. Moreover, PRIDCO reserves the right to contest any allegation that it is in any way responsible for the site, and, in addition, this response in no way waives any rights to which PRIDCO may be entitled under law. PRIDCO reserves the right to supplement its response if relevant information not known or not available to PRIDCO as of the date of this submission should later become known or available.

We believe that these comments demonstrate the need for additional analysis and investigation related to Plume 2, that should be pursued by the EPA before issuing the Record of Decision.

Sincerely,

s/
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APPENDIX IX
Responsiveness Summary

PUBLIC COMMENTS PREPARED IN SUPPORT OF THE RESPONSIVENESS SUMMARY FOR THE RECORD OF DECISION CABO ROJO GROUNDWATER CONTAMINATION SITE CABO ROJO, PUERTO RICO

INTRODUCTION

This Responsiveness Summary provides a summary of comments and concerns received by the U.S. Environmental Protection Agency (EPA) during the public comment period related to the Cabo Rojo Groundwater Contamination Site (Site) Proposed Plan, and it provides EPA's responses to those comments and concerns. All comments summarized in this document have been considered in EPA's final decision in the selection of the remedy.

SUMMARY OF COMMUNITY RELATIONS ACTIVITIES

The Remedial Investigation (RI), Feasibility Study (FS), Human Health Risk Assessment (HHRA), Screening Level Ecological Risk Assessment (SLERA) and the Proposed Plan for the Site were released to the public for comments on August 2, 2018. These documents were made available to the public at information repositories maintained at the Blanca E. Colberg public library in Cabo Rojo, the EPA Region 2 Office in Guaynabo, Puerto Rico, the Puerto Rico Environmental Quality Board (PREQB), and the EPA Region 2 Office in New York, New York. Documents were also made available electronically on the EPA webpage for the Cabo Rojo Site https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0206319. The notice of availability for the above-referenced documents was published in the Primera Hora newspaper on August 2, 2018. The 30-day public comment period was to run from August 2, 2018 to September 3, 2018.

On August 9, 2018, EPA held a public meeting at the Blanca E. Colberg public library in Cabo Rojo to inform public officials and citizens about the Superfund process, to present the Proposed Plan for the Site, including the preferred remedial alternative, and to respond to questions and comments from attendees. On August 31, 2018, the Puerto Rico Industrial Development Company (PRIDCO), requested an extension of time to submit comments on the Proposed Plan and administrative record for the Site. In response to the request, EPA extended the public comment period until October 5, 2018.

Responses to the questions and comments received at the public meeting and in writing during the public comment period are included in the Responsiveness Summary below. Based on comments received during the public comment period, the public generally supports the selected remedy.

SUMMARY OF COMMENTS AND RESPONSES

Comments were received at the public meeting and in writing. The transcript from the public meeting and the written comments submitted during the public comment period can be found in Appendix VIII. A summary of the comments provided at the public meeting and in writing, as well as EPA's responses to them, are provided below.

Comments from the Public Meeting held on August 9, 2018

Comment 1: How can someone submit a comment on the Proposed Plan?

EPA response to comment 1: EPA presented the Proposed Plan at the public meeting and made all documents available in the information repositories and online. Copies of the Proposed Plan were provided at the public meeting. At the public meeting, EPA advised that comments could be sent to EPA via e-mail or by regular mail. The e-mail address and regular mail address were provided in the Proposed Plan. EPA also advised that EPA could be contacted by telephone at the phone number provided in the Proposed Plan. The public was encouraged to review the documents and raise any concerns within the public comment period.

Comment 2: What would be the impact of the construction and implementation of the preferred alternative to the community? Would the preferred alternative be harmful to the public?

EPA response to comment 2: Construction and implementation of EPA's preferred alternative is expected to have minor impact to the community. Vehicle and pedestrian traffic could be affected temporarily in some areas and there will be some impacts to the businesses in the two source areas during construction activities. There would be no harmful releases of contaminants to the air. The preferred remedy will comply with all commonwealth and federal air emission requirements. Measures would be taken to protect public health and safety during construction and operation of the treatment systems.

Comment 3: What measures are being taken to protect residents near the groundwater plumes from exposure?

EPA response to comment 3: There are no unacceptable risks from current exposure to the contamination plumes. The public supply well that had detections near the cleanup standard or maximum contaminant level (MCL), the Ana Maria Well, was disconnected from the system and the wells currently being used for potable water are not impacted by the contaminant plumes. The active public supply wells, which never had detections above MCLs, are being monitored by Puerto Rico Aqueduct and Sewer Authority (PRASA) in compliance with the Department of Health. In addition, none of the residences that were included in the vapor intrusion investigations had detections of contaminants at concentrations that pose a risk to human health. Two commercial properties in the Plume 1 source area have higher levels of soil vapor contaminants. Detections at these properties were evaluated against commercial property vapor criteria and no unacceptable risks to workers were found. If the use of the source area properties remains unchanged and the contaminated groundwater is not used as a source of potable water, the contamination at the Site should not pose a risk to human health. The contaminated groundwater presents a potential future risk of exposure. Because the concentrations are above EPA's groundwater and soil cleanup standards or criteria, EPA must act to remediate the impacted media.

Comment 4: In the plume that EPA identified, EPA was very specific regarding the areas where elevated levels were found. So, not all people in the area are at risk. Rather is it where EPA determined that the contamination is present that EPA will act?

EPA response to comment 4: Correct, EPA has identified areas of soil and groundwater contamination that are being addressed through the cleanup called for in the Record of Decision (ROD). As indicated in the response to comment 3 above, there are no unacceptable risks to the community from current exposure to contaminants in drinking water from supply wells or through current exposure to contaminants in vapor. EPA is acting based on contaminant concentrations that are above EPA's soil and groundwater criteria based on potential future exposure.

Comment 5: What environmental restrictions or controls are there on the operating businesses in source areas to prevent contamination from happening again?

EPA response to comment 5: There are environmental laws and regulations that address how businesses and facilities must manage the chemicals and materials they use and the wastes they produce. Regulations exist to prevent mismanagement of waste products and it is the responsibility of the business or facility operator to follow them. Of the two facilities identified as contributing to the groundwater contamination in the northern area of the Site (Plume 1), only Extasy Q Prints (EQP) is currently active. The other business, Cabo Rojo Professional Dry Cleaners (CRPDC), has not been operating for a number of years. As noted in the response to Comment 6 below, EPA discussed disposal practices with EQP during EPA Site reconnaissance activities between November 29 and December 7, 2006. Since EPA started sampling at EQP, contamination in groundwater has not increased. The PRIDCO Industrial Park (PRIDCO East) has been identified as an historic source of the groundwater contamination in the southern area of the Site (plume 2). No active sources of contamination were identified at PRIDCO East.

Comment 6: Why didn't EPA or another Agency inform EQP of releases, practices, or products that were causing the contamination?

EPA response to comment 6: During the Site Reconnaissance activities performed between November 29 and December 7, 2006**,** EPA learned that EQP used chemicals containing volatile organic compounds (VOCs) and wastewater from the use of those chemicals was being disposed directly to bare soil at the Site. Based on this information, EPA representatives asked EQP to discontinue the disposal of wastewater to soil. In addition, following the soil vapor investigation performed by EPA in 2011, EPA recommended the relocation of the pre-school (Head Start) in a building adjacent to EQP due to nearby elevated vapor intrusion sampling results. EQP was notified of the situation and was required to install vapor extraction fans in the EQP building. Furthermore, during Site listing on the National Priority List (NPL) and later, during the remedial investigation, at least two public availability sessions were held a short distance from the EQP facility at the Blanca E. Colberg public library in Cabo Rojo. EPA representatives were present at the availability sessions to answer questions and address community concerns. Notifications of the public availability sessions were posted, and notices were delivered door-to-door to nearby residences and business, including EQP. EPA also established an information repository at the Blanca E. Colberg public library. The local information repository includes all Site documents and EPA contact information. EPA believes that ample opportunity was provided for EQP to ask questions, request information, and discuss the Site with EPA during the public availability sessions and during multiple Site visits and sampling events at the EQP property.

Comment 7: EPA should resample the EQP facility. The contamination found in the Cabo Rojo area groundwater is not associated with the current practices at the EQP facility.

EPA response to comment 7: EPA does not believe that additional sampling is needed at the EQP facility or in the surrounding area. As part of Pre-Remedial Site Investigations at the Site, EPA representatives conducted Site reconnaissance activities at 68 properties in the Cabo Rojo area, including EQP. A subsequent report (Weston 2007) documented that screens used in the printing process at EQP were cleaned with liquids containing VOCs, including PCE. The report also documented that wash water and cleaners were discharged directly to the ground surface and a drainage swale that flows past the adjacent daycare center to the sewer system. Subsequent soil sampling conducted on the EQP property as part of the RI, indicated the presence of PCE and cis-1,2-DEC at concentrations exceeding soil screening criteria, which are contributing to groundwater contamination in Plume 1. Regardless of current waste disposal practices at the EQP facility, the soil is contaminated. The only other sources of contamination that were identified at the Site are the CRPDC (Plume 1) and PRIDCO East (Plume 2). EPA, with the concurrence of PREQB, has determined that enough information has been collected at the Site to determine the nature and extent of the contamination, identify source areas, and to proceed with the selected remedy for the Site.

Comment 8: Products from other sources could be contaminating the groundwater in the Cabo Rojo area in addition to EQP and Cabo Rojo Dry Cleaners.

EPA response to Comment 8: After conducting Site reconnaissance activities at 68 facilities in the Cabo Rojo area, conducting detailed source investigations at 15 of the 68 facilities, and performing multiple sampling events at the Site during the remedial investigation, EPA did not find a source of contamination hydraulically upgradient from either facility that would indicate there are sources for Plume 1 other than EQP and CRPDC. There is strong evidence that indicates these facilities used, stored, and mishandled VOC-containing products (based on elevated contaminant concentrations in surface soils within the facilities). The sampling results from both facilities further identifies them as the source areas for the VOC contamination in Plume 1.

Comment 9: Would there be an investigation of the Villa Taína treatment plant overflow problem?

EPA response to comment 9: No, the Villa Taina treatment plant is unrelated to the Site in that it is outside the impacted area and did contributed to the plumes. The Villa Taina wastewater treatment plant was closed in early 2011 and a wastewater pumping station was placed at the location of this former wastewater treatment plant.

Comment 10: Are there other sources of contamination? What were the risks for the nearby school and at the former preschool?

EPA Response to comment 10: See response to Comment 5, above. EPA has not found any additional sources of contamination to the plumes, that have not been discussed herein. Levels of chlorinated VOCs detected by PRASA in public supply wells have always been below the levels of Puerto Rico and federal drinking water standards. At no time has the water from public supply wells posed a public health threat to the community that uses water from the Cabo Rojo Urbano public water supply system. The highest concentrations of VOCs that were detected in one of the wells was below EPA drinking water standards. The Ana Maria Well, was closed in 2014.

No unacceptable risks to human health were found for the nearby school, Ines Mendoza High School. The former preschool was relocated in response of EPA’s recommendation due to elevated soil vapor detections at EQP, the adjacent source area, after a soil vapor investigation in 2011.

Comment 11: Does the preferred alternative include a remedial action for the PRIDCO groundwater plume (Plume 2).

EPA Response to comment 11: Yes, EPA has selected MNA for Plume 2. Plume 2 presents a risk within the acceptable risk range but it exceeds the point of departure of 1×10^{-6}. Groundwater contaminant concentrations also exceed cleanup standards but are relatively low. As a consequence, EPA expects the plume will naturally attenuate over time. To ensure continued protection of human health and the environment, long-term monitoring of Plume 2 will be conducted to monitor groundwater concentration trends and evaluate natural attenuation of contaminants. Institutional controls will also serve to limit access to contaminated groundwater until groundwater cleanup standards are met.

Comment 12: Does EPA have an educational outreach program for businesses that handle these kinds of chemicals in order to prevent these types of contamination problems from occurring?

EPA Response to comment 12: EPA has an array of information available on its website that provides information about the proper management of materials, products, and wastes generated by various industries. Also, various business associations often provide assistance to businesses in specific industry sectors.

Comment 13: EPA should release more frequent notifications with investigation results and updates to better inform the community.

EPA Response to comment 13: EPA has established a community participation process for this Site. As part of that process, EPA established an information repository at the public library in Cabo Rojo and placed the relevant Site documents there for easy community access. EPA has distributed Fact Sheets, Press Releases and held public meetings during the investigatory process. EPA maintains a Cabo Rojo website and will schedule public information sessions and meetings as necessary during the cleanup.

Comment 14: PRIDCO disagrees with EPA's conclusion that PRIDCO East is a source of VOC contamination for Plume 2. While PRIDCO suggests that additional analysis and investigation should be undertaken before EPA issues a ROD for the Site, PRIDCO agrees with EPA's proposed approach for addressing the Plume 2 contamination. PRIDCO also suggests that there are other sources of contamination for Plume 2.

EPA Response to Comment 14: EPA disagrees that PRIDCO East is not a source of the VOC contamination in Plume 2 for reasons including that the 1,1-dichloroethene (1,1-DCE) contamination observed in groundwater monitoring wells downgradient of the PRIDCO East property has been traced back to the PRIDCO East Property. EPA considered multiple lines of evidence described below in its determination that PRIDCO East is a source of the Plume 2 groundwater contamination. That evidence includes:

1. Results of the investigations conducted from 2006 through 2012, to identify other potential source areas (PSAs) near public supply wells contaminated with VOCs (CDM Smith, RI Report, April 2018[1]);
2. Results from groundwater samples from monitoring wells installed upgradient and downgradient of the PRIDCO East property.
3. The history of businesses operating at PRIDCO East (CDM Smith, RI Report, April 2018, Section 1.3.5); and
4. The detection of 1,1-DCE in soil, soil gas, and groundwater samples collected at PRIDCO East.

During 2006, EPA and the Region 2 Site Assessment Team (SAT) 2 conducted file searches at multiple divisions within the PREQB and at the offices of the PRIDCO. An internet search was also conducted for listings of PSAs in the Cabo Rojo area. The results were used to develop a complete list of industrial facilities, commercial facilities, service stations, and schools. EPA then conducted on-site reconnaissance activities at 68 facilities within the municipality of Cabo Rojo (See Pre-CERCLIS Screening Report[2] as discussed in the CDM Smith RI Report, Section 1.3.5).

The list of facilities where Site reconnaissance was completed included four facilities near PRIDCO East including one upgradient (south): Reto Warehouse/US Product Corporation; and several downgradient (north): La Caborrojeana, Inc., Edhsan Aluminum Works, and Mechanica Cabassa (Weston 2007, Figure 2). Based on the information collected and the Site reconnaissance, the PRIDCO East facility and 14 other properties, was identified for further investigation. (CDM Smith, RI Report, Section 1.3.5).

From 2007 to 2012, EPA conducted soil, groundwater, and soil vapor testing at PSAs including PRIDCO East. In July 2011, EPA conducted soil gas sampling at 13 facilities and at PRIDCO East. At PRIDCO East, DCE was detected in two soil vapor samples at 23 parts per billion by volume (ppbv) at one location (PIP-07) and 42 ppbv a second location (PIP-13). The samples were collected near two vacant buildings in the northern portion of the PRIDCO East property (SERAS 2012,[3] Figure 5, as discussed in CDM Smith, RI Report Section 1.3.5).

As discussed further below, nothing was found upgradient of PRIDCO East.

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[1] CDM Smith, Final Remedial Investigation Report, Cabo Rojo Groundwater Contamination Site, Remedial Investigation/Feasibility Study, Cabo Rojo, PR, April 10, 2018.

[2] Weston Solutions, Inc., Pre-CERCLIS Screening Report, Cabo Rojo Site Discovery Initiative Cabo Rojo, Puerto Rico. Document Control No. SAT2.2 0113.030.330 (2007) ("Weston 2007").

[3] Scientific, Engineering, Response & Analytical Services (SERAS) Trip Report – Soil Gas Investigation, Cabo Rojo Site, Work Assignment No.: SEARAS-130, Document No. SERAS130-DRT-011312-DRAFT, 2012. ("SERAS 2012").

In October 2012, PRIDCO responded to an EPA Request for Information issued under CERCLA. The information provided in PRIDCO's response indicated the potential for subsurface contamination from several previous tenants of PRIDCO East.

Based on these findings, in 2013, EPA collected additional soil gas, soil, and groundwater samples at the PSAs, including PRIDCO East. (CDM Smith 2018, RI Report Sections 2.1.3 and 4.2.3). 1,1-DCE was detected at 620 micrograms per kilogram (μg/kg) in soil screening sample PE-SB-01C collected from the PRDICO East property at a depth interval of 14 to 16 feet below the ground surface (CDM Smith, RI Report Table 2-2). Groundwater results show the following:

Upgradient of the PRIDCO East Property

- 1,1-DCE was not detected in shallow monitoring well MW-10, which extends to a depth of 45 feet below the ground surface. This well is located at the southwest corner of the PRIDCO East property and is up and side gradient of borings T1-C, T2-B, T2-C, and T2-D where 1, 1-DCE was detected at similar depths in groundwater samples (CDM Smith, RI Report Figures 3-10 and 4-3).
- 1,1-DCE was not detected in deep bedrock well MW-21R located upgradient of deep bedrock wells MW-18R and MW-9R, which are located north (downgradient) of the PRIDCO East property (CDM Smith, RI Report, Figures 3-12, 4-5b and 4-6). Upgradient well MW-21R is screened at about the same elevation as the screened interval of MW-18R, where 1,1-DCE was detected in the sample collected in February 2018 (post Hurricane Maria sampling), and between the two shallow ports (Port 1 and Port 2) in multiport well MW-9R where 1,1-DCE was also detected (CDM Smith 2018, RI Report Table 4-8 and Figure 4-6).

On the PRIDCO East Property

- 1,1-DCE was detected in groundwater screening samples collected in boring T1-C, one of six borings on transect T1 which extend from west to east across the middle of PRIDCO East (CDM Smith, RI Report Figure 4-3). Concentrations of 1,1-DCE results were 0.74 ug/L, and 2.6 ug/L in the three samples collected from boring T-1C over a depth range of 29 to 53 feet below ground surface (CDM Smith, RI Report Figure 4-3).
- 1,1-DCE was detected in groundwater screening samples collected in three borings T2-B, T-2C, and T2-D installed along transect T2 across the north side of PRIDCO East (CDM Smith 2018, RI Report Figure 4-3). Concentrations of 1,1-DCE ranged from 0.19 J ug/L at boring T2-D to 0.58 ug/L at boring T2-C.
- These data, along with the lack of detection of 1,1-DCE in shallow upgradient well MW-10, which is screened over part of the interval sampled in the T1 and T2 borings (24 to 65 feet below ground surface), and upgradient, deep bedrock well MW-21R, indicate that a source of 1,1-DCE is located near or south of boring T1-C (CDM Smith, RI Report, Figure 4-6).

Downgradient of the PRIDCO East Property

- 1,1-DCE was detected in well MW-18R, located 50 feet east-northeast and side gradient of boring T2-D, during post-Hurricane Maria sampling at a concentration of 0.57 μg/L (CDM Smith RI Report, Table 4-8). This well is screened in deep bedrock from 120 to 130 feet below the ground surface.
- 1,1-DCE was detected at concentrations ranging from 14 J μg/L to 30 μg/L in the Round 2 and February 2018 sampling events, in all four ports installed in downgradient bedrock

multiport monitoring well MPW-9R which is located about 250 feet north of transect T2 (CDM Smith RI Report, Figures 4-3 and 4-6, and Table 4-8).

- 1,1-DCE was detected at concentrations ranging from 34 J μg/L to 40 μg/L in the Round 2 and post Hurricane Maria sampling, in well MW-19R which is located about 1,200 feet north of transect T2 (CDM Smith, RI Report, Figure 4-6 and Table 4-8). Well MW-19R is screened from 110 to 120 feet below ground surface, which is at a similar elevation range as Port 2 in well MPW-9R: 124 to 137 feet.
- Groundwater flow is primarily to the north in the PRIDCO East area (CDM Smith 2018, RI Report Figures 3-10 and 3-11, Section 3.2.4). The contamination observed in the bedrock wells MPW-9R and MW-19R is consistent with contaminated groundwater moving north, from the PRIDCO East facility, in the unconsolidated deposits and down into the bedrock and then along fractures in the bedrock towards wells MPW-9R and MW-19R. The flow of groundwater in bedrock, including movement of contaminated groundwater vertically downward, is represented in the Site conceptual model (CDM Smith 2018, RI Report Section 5.6.2 and Figure 5-1).

The groundwater sampling data presented in the RI report show the conditions in Plume 2 at the time of sampling (CDM Smith, RI Report, Figure 4-6). Currently, these data show lower concentrations of 1,1-DCE near PRIDCO East, and higher concentrations of 1,1-DCE downgradient of PRIDCO East in monitoring wells MPW-9R and MW-19R. The current configuration of the plume is consistent with a release that occurred in the past, has moved downgradient, and has been influenced by dilution and dispersion. As discussed in the Site conceptual model, concentrations of 1,1-DCE are lower in the shallow, more permeable units where dilution and dispersion are greater, and are higher in the deeper less permeable fractured bedrock where dilution and dispersion are slower. This is represented conceptually in Figure 5-1 in the RI report (CDM Smith 2018).

Based on the multiple lines of evidence summarized above, EPA has identified PRIDCO East as a source area for the Plume 2 groundwater contamination. This conclusion is based on a thorough investigation of all the PSAs in the area; the presence of 1,1-DCE in soil, soil gas, and groundwater samples collected from PRIDCO East; groundwater flow direction toward the north; the lack of 1,1-DCE in shallow and deep upgradient wells; and the presence of elevated concentrations of 1,1-DCE in downgradient wells.

Comment #15: PRIDCO submitted additional information and suggests there are other sources of contamination responsible for Plume 2. PRIDCO submitted the results of its own reconnaissance activities and interviews with former workers of three historic automobile repair shops that operated during the period from the 1960s through the 1990s. PRIDCO also noted that EPA monitoring well MW-19R, the well that showed the highest level of contamination, is near the former gas station where the auto shops had operated.

EPA Response to Comment #15: EPA has reviewed the additional information provided by PRIDCO. The interviews did not provide information about any waste management practices during the period they were in operation, or evidence that VOC wastes or VOC wastes containing 1,1-DCE were disposed of at these facilities. In addition, 1,1-DCE has not been the solvent of choice for operations such as degreasing, which typically occur at automobile repair shops. The preferred solvents for degreasing typically are chlorinated ethenes such as tetrachlorethene (PCE) and trichloroethene (TCE). The primary use of 1,1-DCE is in the production of polyvinylidene copolymers used in the manufacture of flexible films for food packaging (SARAN and VELON wraps), as a flame retardant for fibers, as a steel pipe coating, and in adhesive applications (ATSDR 1994). In addition, no petroleum-related VOCs were detected in MW-19R as would be expected if the source was associated with automotive repair.

Based on the data collected by EPA and the multiple lines of evidence discussed above, EPA has identified the PRIDCO East property as a source of the 1,1-DCE contamination in groundwater. EPA does not believe that additional investigation is necessary and that adequate information has been collected to support the selected remedy.

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[4] Agency for Toxic Substances and Disease Registry 1994. Toxicological Profile for 1,1-Dichloroethene, May 1994.