

**FIFTH FIVE-YEAR REVIEW REPORT FOR
VEGA ALTA PUBLIC SUPPLY WELLS SUPERFUND SITE
VEGA ALTA, PUERTO RICO**



Prepared by

U.S. Environmental Protection Agency

Region II

New York, New York

A handwritten signature in black ink, appearing to read "P. Evangelista", is written over a horizontal dashed line.

Pat Evangelista, Acting Director

Superfund & Emergency Management Division

A handwritten date "9/23/19" is written in black ink over a horizontal dashed line.

Date

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List of Abbreviations & Acronyms

CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CIC	Community Involvement Coordinator
EPA	United States Environmental Protection Agency
GPM	Gallons per Minute
MCL	Maximum Contaminant Level
µg/l	Micrograms per Liter
NCP	National Contingency Plan
NPL	National Priorities List
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethylene
PRASA	Puerto Rico Aqueduct and Sewer Authority
RA	Remedial Action
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SAMP	Sampling, Analysis and Monitoring Plan
SDA	Soil Disposal Area
TCE	Trichloroethylene
TI	Technical Impracticability

I Introduction

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

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

This is the fifth FYR for the Vega Alta Public Supply Wells Superfund site located in Vega Alta, Puerto Rico. The triggering action for this policy review is the completion date of the previous FYR on September 23, 2014. A FYR is required at this Site due to the fact that the remedial action will not leave hazardous substances, pollutants or chemicals on Site above levels that allow for unlimited use and unrestricted exposure but will take more the five years to complete.

The site consists of two Operable Units (OUs). The first operable unit (OU-1) addresses the groundwater contamination at the Site. The second operable unit (OU-2) addresses the source(s) of the contamination. The soil remedy has been completed and allows for use without restriction and is not the subject of this FYR. As such, this review focuses on the OU-1 ongoing groundwater remedy.

The Vega Alta Public Supply Wells Superfund Site FYR was led by Adalberto Bosque, Remedial Project Manager (RPM), Kathryn Flynn, Hydrogeologist and Marian Olsen, Risk Assessor as well as the state agency representative Pascual Velazquez, PREQB. The Vega Alta group representative was notified of the initiation of the five-year review. The review began on October 1, 2018.

Site Background

The Site is located north of the town of Vega Alta in the municipality of Vega Alta, Puerto Rico (Figure 1). Vega Alta is a municipality of about 39,950 people (US Census Bureau 2010) located in the central part of the north coast of Puerto Rico, about 20 miles west of San Juan. The Site does not have specific boundaries; however, most of the data collection activities have been conducted over an area bounded by the Atlantic Ocean to the north and the U.S. Geological Survey (USGS) Vega Alta Quadrangle boundary to the south. The east and west boundaries correspond with longitudes W 66° 15' and W 66°23', respectively. This area is referred to as the Vega Alta Study Area.

The Site was previously defined by EPA as the area that serves the public water supply well field in the municipality of Vega Alta, Puerto Rico, and includes the Puerto Rico Industrial Development Company (PRIDCO) Industrial Park (the "Industrial Park") and any area to which contamination has migrated. Activities have generally been conducted within a study area bounded by the Atlantic Ocean to the north, Highway 2 to the south, Rio Cibuco to the west, and Rio de la

Plata to the east. The Industrial Park, which was the focus of the source investigation, is located within the Vega Alta Study Area along Highway 2.

The PRIDCO Industrial Park was the focus of the source investigation and is located within the Vega Alta Study Area along Highway 2. PRIDCO has sold and leased properties and buildings to industries for various manufacturing operations. In August 1983, PRASA ceased pumping the supply well GE-1. In June 1983, PRASA constructed supply well Bajura 5(3) (also referred to as either Bajura 3 or Bajura 5). Public water supply wells Bajura 5(3), Bajura 1, and GE-2 were subsequently shut down in early 1989 after PRASA constructed a pipeline between the Vega Alta distribution system and the Maguayo well field. PRASA completed two new supply wells, Maguayo 6 and 7, in October 1988 and November 1988, respectively. The Vega Alta Site was listed on the Superfund National Priorities List (NPL) on September 1, 1984.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Vega Alta Public Supply Wells Superfund Site		
EPA ID: PRD980763783		
Region: 2	State: PR	City/County: Vega Alta
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	Has the site achieved construction completion? Yes	
REVIEW STATUS		
Lead agency: EPA If "Other Federal Agency" was selected above, enter Agency name:		
Author name (Federal or State Project Manager): Adalberto Bosque		
Author affiliation: EPA		
Review period: 2014-09-23 - 2019-09-13		
Date of site inspection: 2019-09-10		
Type of review: Policy		
Review number: 5		
Triggering action date: 2014-09-23		
Due date (<i>five years after triggering action date</i>): 2019-09-23		

II Response Action Summary

Basis for Taking Action

The Remedial Investigation for OU-1 (groundwater) was performed from April 1984 to March 1985. The objectives of the RI were to characterize the hydrogeologic system, determine the extent and type of hazardous substances in groundwater, make a preliminary assessment of potential contamination sources, and evaluate the migration potential of contaminants from the ground surface to the water table.

As part of the OU-1 RI, groundwater analyses were performed on 168 samples from 23 wells. Volatile Organic Compounds (VOCs) were identified as chemicals of concern that posed a potential public health risk. Analyses of the water distribution system indicated that the VOC most frequently detected and with the highest concentrations was TCE. Other frequently detected compounds were tetrachloroethene, 1,1,1-trichloroethane, 1,1-dichloroethene, and 1,2-dichloroethene. These results led to the issuance of the OU-1 Record of Decision in 1987 (1987 ROD), discussed in detail below.

While the implementation of OU-1 was proceeding, on September 27, 1990, EPA issued a Unilateral Administrative Order, Index No. II-CERCLA-00301 (1990 Order) to a group of potentially responsible parties (PRPs) which required them to conduct an RI/FS for OU-2 at the Site to identify contaminant source areas. Based on the results of the RI and FS Reports, and after careful consideration of all reasonable alternatives, EPA issued a ROD for OU-2 (OU-2 ROD) on September 30, 1997.

The baseline human health risk assessment for the Site found ingestion of groundwater by future residents had a total cancer risk for children of 2.6×10^{-3} (2.6 in 1,000) and for adults was 1.2×10^{-3} (1.2 in 1,000) and these risks exceed the risk range established under the National Oil and Hazardous Substances Contingency Plan. The primary chemicals contributing to this risk included 1,1-dichloroethene, ethylene dibromide, TCE, arsenic and beryllium. The cancer risks from inhalation while showering for the future Site adult resident was 3.7×10^{-4} and the main chemicals contributing to the risks were 1,1-dichloroethene and TCE.

The Baseline Human Health Risk Assessment found the carcinogenic risk to the future construction worker at the site was 8.1×10^{-6} (or 8.1 in a million) and the non-cancer hazard was 0.26. The cancer risk was within the risk range and the non-cancer hazard is below the goal of protection of a Hazard Index = 1.

A separate analysis was conducted to evaluate further degradation of the site groundwater from subsurface soil. The analysis used soil screening levels (SSLs) derived for specific chemicals found in the Site groundwater (EPA OSWER Guidance 540-R-96-018). The SSLs represent the concentration in soils that would be protective of groundwater based on the Maximum Concentration Levels in soil. The SSL is the chemical concentration in soil below which there is no concern for ingestion, inhalation and migration to groundwater, provided certain conditions were met. The SSLs were calculated using site-specific data (e.g., aquifer thickness, aquifer recharge rate, source area length, and organic carbon content). Based on the results from the model

used to calculate the chemical specific SSLs, the predicted SSLs were exceeded by the maximum concentration in soil ranging from 3.5 to 95 times for tetrachloroethylene, trichloroethylene, and 1,1-dichloroethane.

Based on the existing chemical-analytical data base and hydrogeological conditions no adverse environmental impacts are anticipated as a result of contaminant migration from the Vega Alta Site as indicated in the RODs. EPA is not aware of a specific assessment of environmentally sensitive areas; however, Site-related VOCs would be unlikely to encounter environmentally sensitive areas, because the water table is well below the base of surface water features within the area of groundwater monitoring. The source area, as it pertains to VOCs in groundwater related to the Site, is located in the Vega Alta Industrial Park. Dissolved VOCs in groundwater downgradient from the source area are well below the surface. There are unlikely to be environmentally sensitive areas in the industrial park or at water table depth.

Response Actions

The basis for EPA's clean-up decision is documented in its September 29, 1987 OU-1 ROD as well as the OU-1 Explanation of Significant Differences (ESDs) issued in 1989, 1994, 1997 and the OU-2 ROD signed in September 30, 1999 for the site.

A. Remedy Selection for OU-1 (Groundwater)

On September 29, 1987, EPA issued a ROD (1987 ROD) selecting a remedial action for the groundwater contamination. The remedial action objectives (RAOs) were restoration of the aquifer, management of migration of contaminants in the groundwater system and protection of the public from adverse health impacts through groundwater ingestion.

The major components of the selected remedy were the following:

- Treatment of PRASA wells GE-1, GE-2, and Bajura 3 by individual treatment systems consisting of scaling pretreatment, air stripping and possibly activated carbon. The specifics of the treatment system were to be determined during the Remedial Design.
- Discharge of treated effluent into the PRASA distribution system for public use.
- Treatment of Ponderosa Well by scaling pretreatment and air stripping.
- Discharge of treated effluent from the Ponderosa Well to Honda Creek.
- Connection of the users of Monterrey 2 and G&M Cash and Carry private wells to the PRASA distribution system.
- Initiation of an RI/FS to fully assess and evaluate the source(s) of VOC contamination at the Site.

On September 30, 1988, EPA issued Administrative Order Index No. II-CERCLA-80217 (1988 Order) to Caribe GE, Motorola, Harman, West, and PRIDCO requiring them to implement the 1987 ROD.

B. 1989 Explanation of Significant Differences

The OU-1 remedy was modified by an Explanation of Significant Differences (1989 ESD) issued by EPA on March 22, 1989. The 1989 ESD required surface discharge of all treated water, instead

of discharge to the PRASA water supply distribution system. This aspect of the ROD was changed in response to a request from the Puerto Rico Environmental Quality Board (EQB). The 1988 Order was superseded by an administrative order issued to the same Respondents on March 22, 1989, Administrative Order Index No. II-CERCLA-90302 (the 1989 Order). The 1989 Order required implementation of the 1987 ROD, as amended by the 1989 ESD.

C. 1994 Explanation of Significant Differences

On August 30, 1994, EPA issued a second ESD which modified the remedy authorized by the 1987 ROD and the 1989 ESD. On the same date, EPA issued an Amended Order (1994 Order) which required the Respondents to implement the modified remedy. Groundwater investigations at the Site associated with the OU-2 RI/FS showed that, in the six years following the issuance of the 1987 ROD, the plume of groundwater contamination had migrated downgradient of three of the extraction wells (GE-1, GE-2, and Bajura 3) selected in the ROD, and that these wells were no longer capable of effectively remediating the Vega Alta aquifer. The remedial action for OU-1, as amended by the ESDs, included the following:

- Pumping of groundwater from the Ponderosa Well, and from a new extraction well (referred to as Well A) to be constructed at the leading downgradient edge of the contaminant plume, which was approximately 4,000 feet north of the Ponderosa Well. The 1994 ESD projected that Well A would withdraw approximately 700 gpm.
- Treatment of the water pumped from the Ponderosa Well and Well A. Such treatment was to be accomplished by construction of a treatment system near the Ponderosa Well and another treatment system near Well A.
- Construction of systems for discharging the treated groundwater to surface water (Honda Creek or the swamps north of the plume of groundwater contamination) or for reintroducing the treated groundwater into the PRASA water distribution system. The treated groundwater would be discharged to surface water unless and until EPA and the Commonwealth of Puerto Rico determined that the treated water should be discharged to the PRASA distribution system.

D. Migration of the Contaminant Plume

In January 1996, the Puerto Rico Department of Health informed PRASA that the Maguayo 3 Well (located north of the Industrial Park) exceeded the Safe Drinking Water Act Maximum Contaminant Level (MCL) standard for TCE of 5 micrograms per liter (ug/l), the primary contaminant of concern at the Site. In late 1996, EPA requested that Carib GE and Unisys undertake a supplemental groundwater survey in the vicinity of the Site. This survey of private wells was conducted in the first quarter of 1997. The samples showed that Monterrey Well 1 (located north of the Industrial Park and utilized by the Monterrey Farm) also exceeded the MCL for TCE. These results indicated that the contaminant plume was continuing to migrate in a northeasterly direction. PRASA also informed EPA of its plans to install a series of large-yield water supply wells a few miles east of the Site, which raised concerns about the continued migration of the plume. The new water supply system, known as the Early Water Initiative (EWI), was projected to withdraw as much as 12 mgd from the upper aquifer, in addition to another 10 mgd from the Rio de la Plata (lower aquifer). The EWI was predicted to increase the groundwater flow gradient to the east, significantly reducing the radius of influence (and therefore, the area of capture) of the proposed new extraction well.

E. 1997 Explanation of Significant Differences

EPA further modified the remedy in an ESD dated December 5, 1997 (1997 ESD). EPA made this change to the selected remedy in response to new information discussed above and because additional investigations at the Site during the OU-2 RI/FS enabled EPA to pinpoint more precisely an area of high contaminant concentration within the plume and locate the remaining primary source of contamination. At the same time, EPA amended the 1994 Order. The remedial action for OU-1, as amended by the 1997 ESD, included the following:

- Pumping and treatment of groundwater from a well or a series of wells which will be known as the Source Area Well(s) (SAW(s)), rather than from “Well A” called for by the 1994 ESD. The SAW(s) would be located in close proximity to the source of contamination, which had been determined to be within the Industrial Park. Once the SAW(s) were fully operational, the Ponderosa Well could be taken out of service if determined by EPA that its continued operation would not be beneficial or would adversely affect the efficiency of the SAW(s).
- Pumping and treatment of water from the SAW(s) at an estimated rate of 300 gpm. The actual pumping rate to be determined during the installation, start-up, and operation of the new extraction well(s). The treated groundwater would be discharged to Honda Creek if not needed for consumption and household use.
- Implementation of a monitoring program to evaluate the performance of the Ponderosa Well including the continuity of its operations and capture zone evaluation.
- Implementation of a long-term monitoring program to evaluate groundwater VOC concentrations, natural attenuation of VOCs in groundwater, and the capture zone(s) of the extraction wells being used. Further refinement of groundwater modeling and collecting of additional data in order to identify appropriate remedial measures, if any, to address the downgradient portion of the VOC plume which will not be captured by the SAW(s) or the Ponderosa Well.

F. Remedy Selection for OU-2 (Source Area)

While the implementation of OU-1 was proceeding, on September 27, 1990, EPA issued a Unilateral Administrative Order, Index No. II-CERCLA-00301 (OU-2 Order) to the PRPs, which required them to conduct an RI/FS for OU-2 at the site to identify contaminant source areas. Based on the results of the RI and FS Reports, and after careful consideration of all reasonable alternatives, EPA issued the OU-2 ROD on September 30, 1997. The remedial objectives for OU-2 were to reduce the concentrations of VOCs in the areas of the Site known to contain the highest concentrations in the soil matrix, to the extent technologically feasible, reducing the potential risk to human health through exposure to groundwater by reducing the leaching of VOCs from these soil areas, and, thereby, enhancing the existing OU-1 groundwater remedy.

The major components of the OU-2 remedy were the following:

- Operation of a mobile or permanent soil vapor extraction (SVE) treatment system(s) to remove VOCs from the contaminated soils until no more VOCs can be effectively removed. Soil vapors will be treated, if necessary, before being emitted to the atmosphere.
- Implementation of a system monitoring program for soil vapor collection and analysis before and after air treatment, if treatment is determined to be necessary.

- Appropriate environmental monitoring to ensure effectiveness of the remedy.

Status of Implementation

The Ponderosa Well Treatment System was completed on December 22, 1993, and groundwater treatment began in July 1994 until November 16, 2004, when it was shutdown with EPA approval. In an October 31, 2011, letter, EPA provided its approval of the PRP's March 19, 2010, Decommissioning and Demolition Work Plan. In September 2013, the PRPs submitted a permit application for decommissioning of the Ponderosa well to the DNR for review and approval. The approved permit was received in December 2013, and the PRPs initiated the decommissioning of the Ponderosa well which was completed in January 2015.

The Remedial Design Report for the Source Area Wells (SAWs) selected by the 1997 ESD was approved in July 2000. The SAWs Groundwater Remedial Action Work Plan was approved in January 2001. Remedial action construction activities were initiated in July 2001 and completed in November 2001 with the EPA's inspection conducted in December 2001. Based upon the results of the inspection by EPA, EPA issued a Preliminary Close-Out Report in March 2003 finding that construction for the entire Site was completed.

The users of the G&M Cash and Carry well were connected to the PRASA distribution system on October 28, 1993. The users of the Monterrey 2 Well were not connected to the PRASA distribution system because they began using the Monterrey 1 Well, which is located on their property. Pursuant to a private agreement, the PRPs (Caribe GE and Unisys), as the Vega Alta Steering Committee (VASC), provided the users of the Monterrey 2 Well with potable water to meet their drinking water needs from some time starting in 1997. The VASC no longer provides water to Monterrey Farm because there is currently no activity at the Farm. However, the same person who owns Monterrey Farm also owns Santa Cruz Farm, which is located a short distance away. According the VASC has made arrangement to deliver 20 to 30 gallons of bottled water to the Santa Cruz Farm approximately every six (6) weeks, as requested by the farm supervisor.

In December 2002, the SAW Treatment System was placed into continuous operation to hydraulically capture the source area groundwater and remove VOCs. The system has been operating continuously since its startup, with occasional shutdowns resulting from regional power outages and necessary system maintenance/repairs.

Throughout the latest FYR period, Vega Alta Public Supply Wells Superfund Site activities were completed by the VASC. Project coordination was provided by Clear Creek Environmental Solutions. The local contractor responsible for completing inspections, operation and maintenance (O&M), and groundwater monitoring events was IMMAC Environmental Services.

In January 2015, decommissioning of the Ponderosa Treatment System was completed. Decommissioning was documented in the Decommissioning Completion Report, dated June 2015. VASC returned the property to the Puerto Rico Land Administration (PRLA) in January 2017.

The SVE systems were operated from December 2002 until October 1, 2008 in compliance with the requirement of the EPA-approved SVE Operation and Maintenance Manual (LBG, November 2001), the 1997 ROD and the OU-2 Order. Closure testing verified that the objectives for the operations of the SVE system were met.

EPA's approval of the Draft Revised Remedial Action Report and the recommendation to permanently shut down the SVE systems was granted in a letter dated September 25, 2008. The SVE systems were shut down on October 1, 2008

EPA has conducted four five-year reviews at the site. All reviews concluded that response actions at the site are in accordance with the remedy selected by EPA and that the remedy continues to be protective of human health and the environment in the short term.

Institutional Controls

No institutional controls were identified in the ROD. At the time of the ROD there were Commonwealth rules and regulations requiring a permit for the installation of wells. Consequently, there did not appear to be a risk that potable water wells would be installed during the period of remediation. The contaminated groundwater plume has been identified and is under control. All nearby water is provided by public water supply. The Commonwealth requirements concerning installation of wells remain in effect. There remains no need to include institutional controls as a component of the remedy at this Site.

Table: Summary of Implemented Ics

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	No	Vega Alta Site	The Commonwealth rules and regulations prohibits groundwater use from the impacted aquifer.	

System Operations/Operation and Maintenance

Between July 2014 and September 2018, the SAW Treatment System pumped and treated approximately 257,237,062 gallons of groundwater, removing a total of approximately 199 lbs. of CVOCs. The influent and effluent samples from the SAW Treatment System are analyzed monthly for VOCs. The effluent samples show VOC concentrations are non-detect or meet performance standards, and that the system is effective in treating the extracted water.

Routine maintenance activities included cleaning of the air strippers Low Profile Air Stripper 1 and 2 (LPAS-1/ LPAS-2) and other system components, replacement of the treatment chemical, and repair and/or replacement of the fire alarm sensor, flowmeter, water level transducer, and blower fuses. Fluctuations in the electric utility's power supply triggered occasional shutdowns of the groundwater extraction and treatment system. Automatic shutdown notifications are

transmitted to IMMAC Environmental Services in the event of system alarms or power failures, and the system is typically restarted either that same day or the day after the power loss. Prior to pulsed operation and the shutdowns following hurricanes Irma and Maria, the routine maintenance and shutdown response program contributed to a fairly high system operational rate (94.8 percent between July 2014 and April 2017). System run-time has been restored to the mid-90 percent rate.

Quarterly groundwater monitoring through June 2016 demonstrated that the chlorinated volatile organic compound (CVOC) plume was generally stable and that total plume mass was decreasing. Based on these observations, USEPA approved VASC's request to transition to an annual monitoring program beginning in 2017.

During 2017, the VASC evaluated whether pulsed system operation could achieve remedial goals with an improved operational efficiency. The VASC began a pulse trial of the SAW Treatment System by alternating system operation on a weekly schedule, starting in May 2017. The trial was discontinued as a result of hurricane impacts in September 2017. Based on observations during the pulse trial, the VASC concluded that further pulsed operation was unlikely to significantly improve the efficiency of current operations.

On September 6, 2017, Hurricane Irma made landfall on the island. In preparation, the SAW Treatment System was shut down and the building and site trailer were secured to the extent practicable. IMMAC visited the site the following day and noted minor damage to the roof insulation. After power was restored, the supervisory control and data acquisition (SCADA) computer system did not operate properly, so it was taken to a technician for repair.

On September 20, 2017, Category 4 Hurricane Maria made landfall. In preparation, the SAW Treatment System was shut down and secured. The hurricane caused mass devastation to the island, including loss of power and extensive damage to infrastructure. IMMAC visited the site on September 21. The office trailer was in good condition, but the SAW building was flooded and sustained damage to the roof, exterior walls, door, and electrical components. IMMAC was able to use power supplied by the manufacturing facility's backup electrical generator to remove rain water and make temporary repairs. The autodialer and SCADA computer did not work properly, so the system was operated manually using the facility's generator on a limited basis. Between October 2017 and February 2018, the building was reconstructed, and damaged electrical components were replaced. Power was restored to the area in November 2017; however, the system remained in manual operation until April 2018 when the SCADA computer was replaced.

Soon after reconstruction was complete in February 2018, the system began experiencing problems with sustaining flow rates. When the sections of the effluent piping and valves were dismantled for inspection, significant calcification was observed. Cleaning was conducted to the extent practicable, but full operational flow could not be restored. After an evaluation, VASC determined that the 8-inch diameter PVC section of discharge conveyance pipe located on the adjacent property, underground between the SAW System and Honda Creek, was not functional due to scale accumulation. As originally built, system discharge water travels through an underground PVC pipe to a point west of the system where the line transitions to an aboveground steel pipe and then enters a storm water drainage ditch and culvert. The steel pipe ends inside the culvert, which ultimately conveys water to Honda Creek. In its original design, the VASC elected to bury the PVC section of discharge piping underground to prevent system discharge water being an

attractive nuisance. There was no requirement by USEPA to place that piping underground. The buried portion of the PVC pipe crosses two properties that, according to a person who identified himself as the property manager, were sold by the Puerto Rico Industrial Development Corporation (PRIDCO) to an individual. The property manager requested that the VASC re-locate the buried pipe essentially parallel with an existing concrete drainage ditch at the northern end of the property. The VASC evaluated options for burying a new pipe or allowing system discharge to flow through the existing concrete drainage ditch. It was determined that the existing concrete ditch could handle the flow. Thus, plans for an alternate discharge pipe were approved by USEPA and piping was installed in June 2018 to convey system discharge to the concrete ditch. The alternate discharge line consists of a shorter, aboveground pipe that conveys system discharge to the same surface water drainage pathway that the buried line discharges to, but farther upstream and with the end-of-pipe within about 100 feet of the treatment system.

Since that time, the system has been able to operate full-time without flow rate problems, and inspections of the drainage pathway have indicated that the alternate discharge pipe is functioning well.

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

III Progress Since Last Five-Year Review

The fourth FYR was completed in September 2014 and found that the remedy was in place and was protective of human health and the environment. No issues were raised in the last FYR.

Table Protectiveness Determinations/Statements from the 2019 FYR

OU #	Protectiveness Determination	Protectiveness Statement
Sitewide	Protective	The remedy at the Vega Alta Public Supply Wells site is protective of human health and the environment.

As discussed in the previous section, since the last FYR, activities at the site were focused on the decommissioning of the Ponderosa Treatment System and the operation and maintenance of the existing treatment system.

IV Five-Year Review Process

Community Notification, Involvement & Site Interviews

On October 1, 2018, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 42 Superfund sites in New York and New Jersey, including

the Vega Alta Public Supply site. The announcement can be found at the following web address: <https://www.epa.gov/aboutepa/fiscal-year-2019-five-year-reviews>. Documents related to the Vega Alta Site can be found at the Site Profile Page at the following web address: <https://www.epa.gov/superfund/vega-alta-wells>.

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

US Environmental Protection Agency, City View Plaza II- Suite 7000, #48 PR-165 Km. 1.2, Guaynabo, PR 00968-8069

U.S. EPA Records Center, Region 2, 290 Broadway, 18th Floor, New York, New York 10007-1866

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

No interviews were conducted.

Data Review

The monitoring program follows the 2010 *Revised Sampling, Analysis and Monitoring Plan*. One monitoring well and 13 multiport wells are sampled annually for VOCs. The multiport wells are screened in different zones of the Aguada Limestone. TCE is highest concentration compound in groundwater and PCE, cis-1,2-DCE, 1,1-dichloroethane, 1,1-dichloroethene, and chloroform are also frequently detected.

The source area well M22 had the highest total VOC concentrations in this period (Figure 2). From 2000 to 2013 the maximum observed total VOC concentrations at M22 decreased from 1745 ug/l to 181.0 ug/l. In 2018, the maximum total VOC concentration at M22 was 153.5 ug/l.

TCE started to increase at M16 from 2012 to 2016 but has returned to its levels before the increase. At M15, total VOC concentrations increased in both zones since 2012 but started to decline in 2018. Monitoring wells M5 and M17 are located approximately one mile north/northwest of the site property. The previous FYR noted that TCE concentration at M5 increased from 2005 to 2011 but then started to decline. In this review period, TCE continued to decline. M17 showed the same trend, increasing until 2011 and then declining. Total VOC and TCE concentrations throughout the other monitoring network wells are generally stable or decreasing.

The current groundwater monitoring program does not include a hydraulic gradient evaluation or groundwater elevation maps. Although the VOC plume concentrations appear stable at most wells, it is necessary to show the direction of groundwater flow in the plume and the capture zones of the SAW and municipal pumping well systems. The VASC will update the groundwater elevation maps in 2019 to evaluate the direction of local groundwater flow.

Site Inspection

A site inspection was conducted on September 10, 2019 as part of this FYR. In attendance were Adalberto Bosque, EPA RPM, Angel Salgado, EPA and VASC contractors Miguel A. Cedeño, and Maria I. Portela from IMMAC. The purpose of the inspection was to assess the protectiveness of the remedy.

The site inspection revealed that the treatment system is fully operational. No maintenance or repair issues were noted.

V Technical Assessment

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

The remedy is functioning as intended by the ROD and the ESDs. Groundwater VOC concentrations are generally stable or decreasing. However, the groundwater monitoring program needs to include updated elevations and hydraulic gradient to determine the current groundwater flow direction.

The 1997 ESD included pumping from the SAW at an estimated rate of 300 gpm, and further refinement of groundwater modeling and collecting additional data in order to identify appropriate remedial measures for the downgradient plume. The current SAW pumping rates (which were less than 160 gpm in 2018) should be evaluated in a groundwater model to confirm the SAW capture zone. The model should also incorporate the current withdrawal rates from all pumping wells in the region.

The treatment system is effective in meeting the RAOs.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

Are the (1) exposure assumptions and toxicity data (2) used at the time of the remedy selection still valid?

Overall, the remedy remains protective and potential exposure pathways considered in the baseline human health risk assessment from exposures to groundwater are still valid. The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy remain valid. There are no changes in the toxicity or exposure assumptions that will change the overall conclusions of the risk assessment.

Land Use. Land use at the Site is not expected to change during the next five years. The property is zoned industrial and there have been no changes in the physical conditions at the Site that would affect the protectiveness of the remedy. The land use considerations and potential exposure pathways considered in the baseline human health risk assessment are still valid.

Changes in Standards and TBCs. The federal MCLs identified in the 1987 ROD remain protective of human health. The 1987 ROD focused on potential use of the aquifer as a potable or drinking water source with exposures expected to occur through ingestion or other domestic use

of contaminated groundwater distributed through the PRASA system for children and adults. In August 2009 Five Year Review Report, EPA documented its approval of permanent shutdown of the Ponderosa System and continued operation of the SAW system. In addition, users of Monterrey 2 and G&M Cash and Carry private wells are connected to the PRASA distribution system. Other activities such as the OU-2 installation and operation of the SVE system also reduced soil contamination that contributed to the contaminated groundwater. At the current time, exposures through consumption of groundwater at the Site are interrupted and not a completed exposure pathway.

Changes in Toxicity and Other Contaminant Characteristics. The baseline human health risk assessment identified the following chemicals of concern: 1,1-dichloroethene, ethylene dibromide, TCE, arsenic and beryllium. TCE was updated as described in the previous Five Year Review (FYR). The IRIS program continues to work on updating the toxicity values for arsenic and any updates will be evaluated in the next FYR.

Changes in Risk Assessment Methods. Since the last FYR the standard default exposure assumptions were updated. The changes in the default exposure assumptions do not change the results of the original risk assessment.

Changes in Exposure Pathways. There have been no changes in the exposure pathways evaluated in the BHHRA that will change the protectiveness of the remedy. The conclusions from the previous FYR for vapor intrusion have not changed. Specifically, the depth to groundwater water is close to 100 feet across the Site. The 2015 OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources in Indoor Air (OSWER Publication 9200.2-154) indicates that the evaluation of vapor intrusion from groundwater contamination is not recommended when the depth to groundwater is 100 feet or greater. Therefore, further evaluation of this pathway is not believed to be necessary. The remedy remains protective.

Are the Cleanup Values Selected in the ROD Still Valid?

The selected cleanup values selected in the 1987 ROD and subsequent ESDs were the federal MCLs for drinking water established under the Safe Drinking Water Act, and these values remain valid.

Are the remedial action objectives still valid?

The remedial action objectives in the ROD are still valid.

Ecological – The 1987 and 1997 RODs indicated that there were no completed ecological pathways associated with the groundwater plume as groundwater does not discharge to any surface water bodies. Based on previous five-year reviews, as well as reviewing current groundwater monitoring data, the previous conclusions that there are no completed ecological pathways is still valid. Additionally, the cleanup values and remedial action objectives were related to restoring groundwater to beneficial reuse are still valid, although they do not pertain directly to ecological issues.

A component of the remedy that does pertain to ecological resources is the effluent discharge from the pump and treat system. The effluent from the groundwater pump and treat system is discharged to Honda Creek. The effluent data that was reviewed indicates that the COCs are below the discharge criteria and/or non-detect in the effluent, therefore there are no ecological issues associated with the effluent discharge. Based on the data reviewed for this evaluation, the remedy is protective of ecological resources.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

There is no information that calls into question the protectiveness of the selected remedies.

Issues/Recommendations

The selected remedy is fully implemented. It includes ongoing operation, maintenance and monitoring activities as part of the selected remedy. As anticipated by the decision documents, these activities are subject to routine modification and adjustment.

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
01

Although there are no issues that currently affect protectiveness, it is suggested that hydraulic gradient evaluation or groundwater elevation maps be developed for the next FYR. Additionally, the current SAW pumping rates should be evaluated in a groundwater model to confirm the SAW capture zone.

VI Protectiveness Statement

Protectiveness Statement(s)		
Operable Unit: 01	Protectiveness Determination: Protective	Addendum Due Date (if applicable): Click here to enter date.
Protectiveness Statement: The remedy at the Vega Alta Public Supply Wells site is protective of human health and the environment.		

Sitewide Protectiveness Statement (if applicable)	
<i>Protectiveness Determination:</i> Protective	<i>Addendum Due Date (if applicable):</i> Click here to enter date.
<i>Protectiveness Statement:</i> The remedy at the Vega Alta Public Supply Wells site is protective of human health and the environment.	

VII Next Review

The next Five-Year Review for the site will be completed by five years from the completion date of this review.

FIGURES

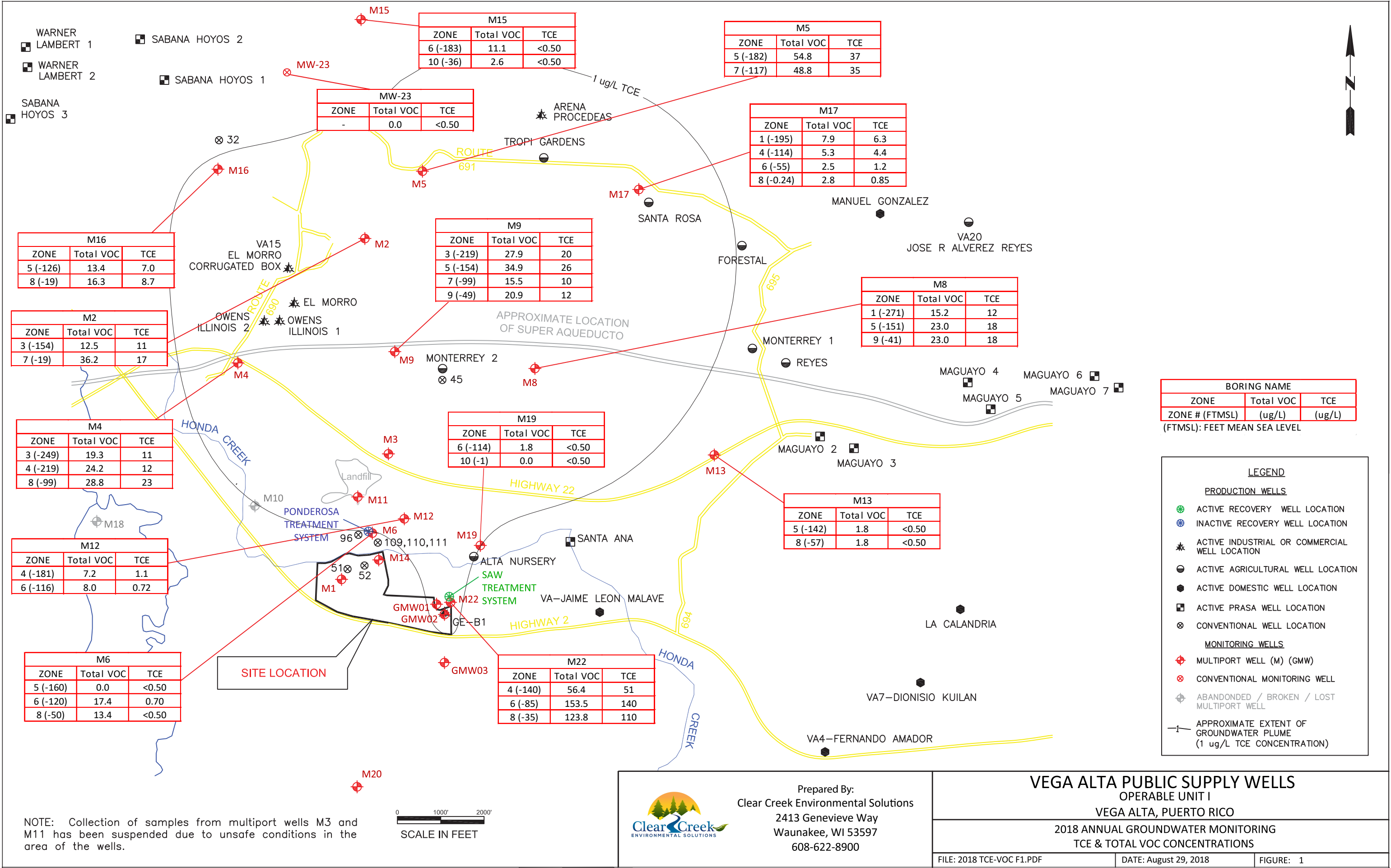


Table 1 – Documents, Data, and Information Reviewed in Completing the Five-Year Review

Document	Date(s)
Record of Decision OU-1	September 1987
Explanation of Significant Differences	March 1989
Explanation of Significant Differences	August 1994
Explanation of Significant Differences	December 1997
Record of Decision OU-2	September 1997
Fourth Five-Year Review	September 2014
Progress Report for Work Performed in 2014	July – December 2014
Progress Report for Work Performed in 2015	January – December 2015
Progress Report for Work Performed in 2016	January – December 2016
Progress Report for Work Performed in 2017	January – December 2017
Progress Report for Work Performed in 2018	January – December 2018
Progress Report for Work Performed in 2019	January – May 2019
Third Quarter 2014 Groundwater Monitoring Report	January 2015
Fourth Quarter 2014 Groundwater Monitoring Report	March 2015
First Quarter 2015 Groundwater Monitoring Report	June 2015
Second Quarter 2015 Groundwater Monitoring Report	September 2015
Third Quarter 2015 Groundwater Monitoring Report	December 2015
Fourth Quarter 2015 Groundwater Monitoring Report	March 2016
First Quarter 2016 Groundwater Monitoring Report	July 2016
Second Quarter 2016 Groundwater Monitoring Report	September 2016
2017 Annual Groundwater Monitoring Report	October 2017
2018 Annual Groundwater Monitoring Report	November 2018