

## DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

### RCRA Corrective Action Environmental Indicator (EI) RCRAInfo Code (CA725) Current Human Exposures Under Control

**Facility Name:** PPG Discontinued Operations Site  
**Facility Address:** PR Route 127, Guayanilla, Puerto Rico 00656  
**Facility EPA ID#:** PRD000692715

#### Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EIs) are measures being used by the Resource Conservation and Recovery Act (RCRA) Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved) to track changes in the quality of the environment. The two EIs developed to date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

#### Definition of “Current Human Exposures Under Control” EI

A positive “Current Human Exposures Under Control” EI determination (“YE” status code) indicates that there are no unacceptable human exposures to “contamination” (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all contamination subject to RCRA corrective action at or from the identified facility [i.e., site-wide]).

#### Relationship of EI to Final Remedies

While final remedies remain the long-term objectives of the RCRA Corrective Action program, the EIs are near-term objectives, which are currently being used as program measures for the Government Performance and Results Act of 1993 (GPRA). The “Current Human Exposures Under Control” EI is for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and does not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program’s overall mission to protect human health and the environment requires that final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

#### Duration / Applicability of EI Determinations

EI determination status codes should remain in the Resource Conservation and Recovery Act Information System (RCRAInfo) national database ONLY as long as they remain true (i.e., RCRAInfo status codes must be changed when the regulatory authorities become aware of contrary information).

#### Facility Information

The PPG Discontinued Operations Site, formerly designated as the PPG Caribe Facility, is situated on approximately 265 acres on the southwestern coast of Puerto Rico. The site is located two miles east of the town of Guayanilla, and 0.5 mile north of the town of Playa de Guayanilla. The study area for ongoing

environmental investigation covers all of the Discontinued Operations Site and areas to the south (the Betterroads Area and Playa de Guayanilla) along Guayanilla Bay.

PPG operated a chemical manufacturing facility at the site between 1971 and 1978. Facility products included chlorine, caustic soda, ethylene glycol, and vinyl chloride monomer (VCM). Manufacturing operations generated both hazardous and nonhazardous waste **streams including mercury-containing sludges, organic wastes, and chlorinated organic compounds in the heavy ends from** vinyl chloride distillation.

PPG began to close down operations at the site at the end of 1978, but PPG continued to store caustic soda on site through 1984. In 1984, PPG sold the site to Demarco Corporation for industrial metal fabrication and storage of bulk fuels and chemicals. As part of facility closure, PPG conducted extensive demolition, cleanup, and removal activities for at least 16 distinct areas at the property. Plants were decommissioned and disassembled; some plant components were cleaned; waste storage tanks were clean-closed; and hazardous waste facilities were removed, including associated sludges, concrete, synthetic-lined impoundments, wastes, and contaminated soils. Areas of known mercury contamination in soil were remediated below applicable risk-based cleanup levels for total and leachable mercury. EPA approved plans for clean closure of the various waste management units in 1984.

In 1990, PPG entered into an Administrative Order with EPA for performance of a formal RCRA Facility Investigation (RFI). Initial RFI field work, including soil and groundwater sampling, was completed between 1991 and 1994. The Draft RFI Report was issued in 1995. After reviewing the draft report, EPA required additional groundwater investigation, particularly in the Playa de Guayanilla area, and interim measures (IM) to address high concentrations of 1,2-dichloroethene and vinyl chloride in the Betterroads Area. Supplemental RFI and IM work was conducted in 1999 and 2004. These efforts included sampling of groundwater, soil, and surface water; sampling and analysis needed to support evaluation and design of potential corrective measures for groundwater contamination in the Betterroads Area; characterization of air quality; and well repair and replacement. A Draft Supplemental RFI/IM Report was issued by PPG in **December 2004 and is currently under review by EPA and the Puerto Rico Environmental Quality Board.**

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

X If yes - check here and continue with #2 below.

If no - re-evaluate existing data, or

If data are not available, skip to #8 and enter "IN" (more information needed) status code.

**Summary of Hazardous Waste Management Units (HWMUs) and Solid Waste Management**

**Units (SWMUs):** In its Part A Permit Application, PPG indicated that five HWMUs were in use at the facility. According to the 1990 Administrative Order (Ref. 2), further investigation and/or remediation was required for only two of these HWMUs: the Mercury Impoundment Area and the Waste Pile and Tar Pit Area. As noted in Table 1 below, post-closure groundwater monitoring has been completed for both units in accordance with the EPA-approved closure plan. Because no further action is required for the remaining HWMUs, they are not discussed further in this EI determination. In addition to the five HWMUs, a number of SWMUs were identified in the 1990 Administrative Order (Ref. 2). Two SWMUs—the API Separator and the Dichloroethane and VCM Plant—have been approved for no further action. The remaining SWMUs are listed in Table 1 below, along with their current status. It is noted that EPA has approved no further investigation or remediation of soil contamination at the PPG site (Refs. 4, 5, and 6), and has approved no further investigation or remediation at the area west of the Land Farm Area (Ref. 7).

**Table 1. HWMUs and SWMUs at PPG**

<b>HWMU</b>	<b>Corrective Actions and Current Status</b>
Mercury Impoundment Area (SU-110)	Area closed. Remediation began in late 1983. Impacted sludge and soil removed to target cleanup levels for total and leachable mercury. EPA accepted closure plan on September 27, 1984. Post-closure groundwater monitoring completed.
Waste Pile and Tar Pit Area	Dichloroethane and mercury reported in soil and groundwater prior to voluntary corrective measures. Source waste material and contaminated soil removed. Low residual concentrations of chlorinated volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) remain in groundwater. VOCs reported below applicable screening levels in post-remediation soil samples. EPA accepted closure plan on September 27, 1984. Post-closure groundwater monitoring completed.
<b>SWMU</b>	<b>Corrective Actions and Current Status</b>
Five Biological Treatment Ponds	Only operated for several months in 1978. Drained in 1979 and not subsequently used. Sludge characterized as nonhazardous. VOCs reported below applicable screening levels in soil.
Utility Pond	Sludge removed twice from pond during 1975 to 1977. Mercury reported below applicable risk-based levels in soil.

SWMU	Corrective Actions and Current Status
Salty Pond	Pond drained in early 1982. Residue and contaminated soil removed to target cleanup levels for total and leachable mercury. VOC contamination detected in groundwater. Likely source of contamination was a leak in the Salty Water Sewer System. Soils in the area of the leak were excavated to remove this potential source. Confirmatory VOC analyses in soil were not conducted nor required. Pond was backfilled in 1983.
Brine Overflow Pond	Unit dismantled in 1983. Residue and surrounding contaminated soil removed to target cleanup levels for total and leachable mercury.
Hydrogen Area	Contaminated soil and concrete removed in 1983 to target cleanup levels for total and leachable mercury.
Rubber Pit (SU 126)	Beginning in October 1982, contaminated soil was removed to target cleanup levels for total and leachable mercury.
North Concrete Pit (SU 113-A)	Unit dismantled by late 1983. Residues and surrounding contaminated soils removed to target cleanup levels for total and leachable mercury.
South Concrete Pit (SU 113-B)	Unit dismantled by late 1983. Residues and surrounding contaminated soils removed to target cleanup levels for total and leachable mercury.
Main Cells Area	From 1981 to 1984, contaminated soil and concrete <del>were removed to target cleanup levels for total and leachable mercury. Recent groundwater monitoring indicates that mercury is present at concentrations below applicable screening levels.</del>
East Mound	Actively used as a disposal site until 1978. Remedial efforts began in late 1979. Mercury and dichloroethane contamination detected in soil, along with other organic compounds. Soils were excavated, and post-remedial sampling reported VOC concentrations below applicable screening levels. Groundwater contamination detected but not yet addressed.
Land Farm Area (includes the NPDES Plow Area)	Contaminated soil above target cleanup levels for mercury and certain VOCs removed for off-site disposal in 1983. Post-remedial sampling reported VOC concentrations below applicable screening levels. Groundwater contamination detected but not yet addressed.
Salty Water Sewer System	Leaking sewer line excavated and removed, along with surrounding soil contaminated by oily wastewater. No sampling was conducted or required. Groundwater impacts identified but not specifically addressed.
Oily Sewers	No evidence of impairment of this sewer system. No remedial work was undertaken or required.

Source: References 1, 3, 5, 6, and 8.

Contamination at PPG has been adequately delineated for purposes of this EI determination. Numerous borings and over 114 monitoring wells have been advanced at the site to evaluate environmental conditions. Pre-remedial contaminants in soil included mercury and several organic contaminants, but EPA has determined that soil remediation at PPG is complete (Refs. 4, 5, and 6). Key concerns for groundwater include multiple VOC plumes spreading from the Plant Area, through the Playa de Guayanilla and Betterroads Areas, to Guayanilla Bay.

As outlined in the Draft Supplemental RFI/IM (Ref. 8), the only remaining source media at PPG is groundwater. Locally elevated VOC plume areas, particularly in shallow groundwater at the Betterroads Area and in a highly impacted column of groundwater beneath the VCM Plant Area, continue to migrate into other, less contaminated areas. Future plans for the PPG site have yet to be determined, but are likely to include implementation of an ongoing groundwater monitoring program and corrective measures for groundwater source areas (i.e., monitored natural attenuation or more active remedial efforts).

**References:**

1. Letter from C. Simon, U.S. EPA Region II Division of Air and Waste Management, to David C. Cannon, Jr. of PPG Industries. Dated September 27, 1984.
2. Administrative Order for PPG Industries, Inc in Guayanilla, Puerto Rico. Prepared by EPA Region II. Dated September 21, 1990.
3. RCRA Facility Investigation, Task 1: Description of Current Conditions for the PPG Discontinued Operations Site, Guayanilla, Puerto Rico. Prepared by Geraghty and Miller, Inc. Dated September 1991.
4. Letter from Philip F. Clappin, U.S. EPA Region II Hazardous Waste Compliance Branch, to Richard J. Samelson of PPG Industries. Dated October 2, 1991.
5. Letter from Philip F. Clappin, U.S. EPA Region II Hazardous Waste Compliance Branch, to Richard J. Samelson of PPG Industries. Dated January 3, 1992.
6. Draft RCRA Facility Investigation, PPG Discontinued Operations Site, Guayanilla, Puerto Rico. Prepared by Geraghty & Miller, Inc. Dated July 1995.
7. Letter from Victor Trinidad, U.S. EPA Region II Caribbean Environmental Protection Division, to Leonard Bryant of PPG Industries. Dated October 6, 1998.
8. Supplemental RCRA Facility Investigation and Interim Measures Draft Report for the PPG Discontinued Operations Site. Prepared by Earth Tech, Inc. Dated December 15, 2004.

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be “contaminated”<sup>1</sup> above appropriately protective risk-based levels (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

Media	Yes	No	?	Rationale/Key Contaminants
Groundwater	X			VOCs
Air (indoors) <sup>2</sup>		X		
Surface Soil (e.g., <2 ft)		X		
Surface Water		X		
Sediment		X		
Subsurface Soil (e.g., >2 ft)		X		
Air (Outdoor)		X		

\_\_\_\_\_ If no (for all media) - skip to #6, and enter YE, status code after providing or citing appropriate levels, and referencing sufficient supporting documentation demonstrating that these levels are not exceeded.

X If yes (for any media) - continue after identifying key contaminants in each contaminated medium, citing appropriate levels (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

\_\_\_\_\_ If unknown (for any media) - skip to #6 and enter IN status code.

**Rationale:**

**Groundwater**

*Site-Specific Hydrogeology*

The PPG site is underlain by a series of alluvial and marine sedimentary hydrogeologic units that provide substantially continuous permeable zones of groundwater movement and contaminant migration in the

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<sup>1</sup> “Contamination” and “contaminated” describe media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based “levels” (for the media, that identify risks within the acceptable risk range).

<sup>2</sup> Recent evidence (from the Colorado Department of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

subsurface. A general description of the hydrogeologic units identified beneath PPG and the surrounding area is presented in the paragraphs below.

The Shallow Sand unit occurs in the marine deposits and extends from the southern part of the PPG site to the shoreline beneath the Playa and the Betterroads Area. Groundwater typically occurs under unconfined conditions in the Shallow Sand unit. Beneath the Playa, the Shallow Sand is approximately 15 feet thick, consists of fine to medium grained sand with varying amounts of gravel and silt, and has a hydraulic conductivity of approximately 17 feet per day (ft/d). In the Betterroads Area, the Shallow Sand is the only widespread permeable sedimentary unit above the bedrock limestone. In this area, the Shallow Sand is generally thicker (up to 25 feet), coarser grained, and more permeable (approximately 27 ft/d) than in other study locations. The Shallow Sand is underlain by a layer of silt and clay throughout the area. Beneath the Playa and much of the Plant, the clay layer ranges in thickness from a few feet to up to 20 feet. At the Betterroads Area and beneath the southernmost portions of the Playa, the clay layer increases to as much as 70 feet thick. Measured hydraulic conductivity values for this clay layer range from  $9.1 \times 10^{-5}$  to  $2.1 \times 10^{-4}$  ft/d (Ref. 1).

The “30-Foot” Sand layer is often encountered between 30 and 40 feet below the ground surface (bgs) in the alluvial and marine deposits. This permeable layer is composed of up to 15 feet of fine to medium grained sand, with up to 40% silt and clay content in some locations. This sand occurs under the southwestern portion of the Plant site and extends through the Playa, but has not been identified in the Betterroads Area. The hydraulic conductivity of this unit has been measured at 3 ft/d. Approximately 20 feet of clay and silt separate the “30-Foot” Sand from deeper permeable zones. Analysis of lab samples indicate that this clay layer has vertical and horizontal hydraulic conductivity values ranging from  $4.5 \times 10^{-4}$  to  $2.4 \times 10^{-2}$  ft/d.

The third permeable hydrogeologic unit at the PPG site is called the “60-Foot” Sand because it is usually encountered in the alluvial sediments between 60 and 70 feet bgs. This layer has the same general composition as the “30-Foot” Sand layer, but is usually thinner (i.e., less than ten feet thick), less continuous, and not as widely distributed. Beneath the Betterroads Area, this sand has been replaced by a thick sequence of clay and silt. At MW-25 the “60-Foot” Sand unit is underlain by a 60-foot thick layer of silty clay, containing approximately 25 feet of sand and rock-fragment lenses. The hydraulic conductivity values of the “60-Foot” Sand has not been determined, but is estimated to be similar to the “30-Foot” Sand based on composition and depositional environment.

The Ponce Limestone extends beneath the entire site area, unconformably underlying the sediments. An up dip in the Ponce Limestone has also been identified outcropping at the surface in the northern portion of the Plant site. The hydraulic conductivity of this unit has been reported at 3 ft/d.

#### *Groundwater Flow Regime*

Groundwater flow in these hydrogeological units has been divided into five “layers” for the purposes of investigation and corrective action. Table 2 outlines the general correlations between the hydrogeologic units and the groundwater flow layers in order of increasing depth. As shown, the top three layers incorporate the sand layers, while the bottom two layers are arbitrary divisions within the Ponce Limestone. Figure 6-1 from the Supplemental RFI Draft Report (Ref. 1) presents a graphic representation of these correlations.

**Table 2. Correlation Between Hydrogeologic Units and Aquifer Flow Layers**

Layer	Approximate Elevation Range (ft msl)	Aquifer Zone Description
1	Land surface to -25	Identified as the water table zone in the Shallow Sand (Playa and Betterroads) and in the shallow Ponce Limestone updip under the VCM Plant.
2	-25 to -50	Identified as the “30-Foot” Sand and the corresponding updip portion of the Ponce Limestone. Includes the deeper portion of the Shallow Sand beneath Betterroads, as that unit is so much thicker in this area and no “30-Foot” Sand unit was identified.
3	-50 to -85	Identified as the “60-Foot” Sand and corresponding updip portion of the Ponce Limestone. Does not extend into the Betterroads Area.
4	-85 to -165	Identified as the portion of the Ponce Limestone immediately beneath the sedimentary deposits under the Playa and Betterroads areas, and the updip equivalent depths in the Ponce Limestone.
5	Deeper than -165	Identified as the deeper reaches of the Ponce Limestone. Only three wells have been completed in this layer (wells MW-7C, MW-11C, and MW-17C).

*Groundwater Contamination*

Soils contaminated by historical surface spills and subsurface leaks have been removed from the facility as part of IMs under RCRA. Consequently, no continuing sources of contamination are believed to be present in soil at the PPG site. However, all layers of groundwater at PPG and in the surrounding area to the south appear to have been impacted by site-related contamination. Figure 2-1 from the Supplemental RFI Draft Report (Ref. 1) shows the location of groundwater monitoring wells at the PPG site, in the town of Playa de Guayanilla (located immediately south of the site), and in the Betterroads Area.

During the Supplemental RFI, 19 VOCs were reported in PPG groundwater at concentrations exceeding Maximum Contaminant Levels (MCLs). Where MCLs were not available, USEPA Region 9 Preliminary Remediation Goals (PRGs) were used as the screening criteria. Contaminants of particular concern include 1,1-dichloroethene, vinyl chloride, 1,1,1-trichloroethane, trichloroethene, chloroform, benzene, and 1,2-dichloroethane. No other constituent classes (e.g., SVOCs, metals) were detected above applicable screening levels during the Supplemental RFI effort in 2004.

Groundwater beneath the Plant Area and the Playa reported 15 VOCs above screening levels. Table 3 lists the highest concentrations for these contaminants in the five groundwater layers. As documented in the table, the highest levels of contamination beneath the Plant and Playa were found in the deep groundwater (i.e., Layers 4 and 5) due to a downward flow gradient. The most significant groundwater contamination in this portion of the study area is located in the vicinity of well cluster MW-11.



**Table 3. Plant and Playa Area Groundwater Exceedances**

Contaminant	MCL* (mg/L)	Maximum Detected Concentration (mg/L) during Supplemental RFI				
		Layer 1	Layer 2	Layer 3	Layer 4	Layer 5
Acetone	610	NE	NE	NE	4,750	1,080
Benzene	5	27.3	7.75	22.3	9.38	16.4
Chloroethane	4.6	5.7	NE	ND	NE	9.28
Chloroform	80	NE	NE	140	12,800	86,500
Chloromethane	1.5	ND	ND	ND	NE	12.3
1,2-Dichloroethane	5	8.58	6.99	29.3	1,600	166,000
1,1-Dichloroethene	7	NE	305	893	2,750	3,640
cis-1,2-Dichloroethene	70	NE	NE	NE	460	2,220
trans-1,2-Dichloroethene	100	NE	NE	573	970	2,070
1,2-Dichloropropane	5	NE	NE	NE	NE	6.27
Methylene chloride	5	NE	NE	10.9	780	1,950
Tetrachloroethene	5	NE	6.6	72.7	90.7	261
1,1,2-Trichloroethane	5	NE	10.2	13.6	158	9,680
Trichloroethene	5	NE	10.7	20.3	665	1,730
Vinyl Chloride	2	29.7	5,740	35,800	197,000	32,400

\*Where MCLs were not available, Region 9 PRGs for tap water were used as the screening criteria

ND: No Detections Reported; NE: No Exceedances

Data from the Supplemental RFI Draft Report dated December 2004 (Ref. 1).

Maximum detection of each constituent is highlighted.

Groundwater beneath the Betterroads Area reported ten VOCs above applicable screening levels. Table 4 lists the highest concentrations for each of these contaminants in the two groundwater layers specific to the Betterroads Area. The three deeper layers are either not represented at Betterroads (e.g., Layer 3 consists only of clay with no aquifer present) or are more closely related to flow from the main study area. Consequently, contamination detected in Layers 4 and 5 beneath the Betterroads Area has been considered as a component of the main study area (i.e., the Plant and Playa Areas). Due to an upward groundwater flow gradient in the Betterroads Area, the highest levels of contamination were detected in shallow groundwater (i.e., Layer 1). The most significant groundwater contamination at Betterroads is located in the vicinity of well MW-40.

**Table 4. Betterroads Area Groundwater Exceedances**

Contaminant	MCL* (mg/L)	Maximum Detected Concentration (mg/L) during Supplemental RFI	
		Layer 1	Layer 2
Benzene	5	43.8	NE
Chloroethane	4.6	11.0	ND
1,2-Dichloroethane	5	332	NE
1,1-Dichloroethene	7	403	24.2
cis-1,2-Dichloroethene	70	686	NE
trans-1,2-Dichloroethene	100	387	NE
Tetrachloroethene	5	41.8	NE
1,1,2-Trichloroethane	5	7.69	15.1
Trichloroethene	5	319	6.01
Vinyl chloride	2	7,420	3.33

\*Where MCLs were not available, Region 9 PRGs for tap water were used as the screening criteria.

ND: No Detections Reported; NE: No Exceedances

Data from the Supplemental RFI Draft Report dated December 2004 (Ref. 1).

Maximum detection of each constituent is highlighted.

**Air (Indoors)**

To evaluate the potential for VOCs to migrate into indoor air at the PPG site, recently detected VOC concentrations in the Shallow Sand aquifer layer (Layer 1) were compared to indoor air screening levels (10<sup>-5</sup> risk level) from EPA's 2002 Draft Guidance "Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soil." These values are based on the most up-to-date Johnson-Ettinger Model, toxicity information, and exposure assumptions. Based upon a review of recently detected contaminant concentrations, maximum concentrations of two VOCs detected in the Plant Area Layer 1 groundwater exceed indoor air screening levels (see Table 5). Likewise, maximum concentrations of eight VOCs detected in the Betterroads Area Layer 1 groundwater exceed indoor air screening levels (see Table 6). In the Playa Area, contaminant concentrations in Layer 1 groundwater samples do not exceed indoor air screening levels (Ref. 1).

**Table 5. Plant Area Groundwater Exceedances of Indoor Air Screening Levels**

Contaminant	Indoor Air Screening Level (Risk Level = 1 x 10 <sup>-5</sup> ) (mg/L)	Maximum Detected Concentration (mg/L) during Supplemental RFI
		Layer 1
Benzene	14	27.3
Vinyl chloride	2.5	29.7

Data from the Supplemental RFI Draft Report dated December 2004 (Ref. 1).

**Table 6. Betterroads Area Exceedances of Indoor Air Screening Levels**

Contaminant	Indoor Air Screening Level (Risk Level = $1 \times 10^{-5}$ ) (mg/L)	Maximum Detected Concentration (mg/L) during Supplemental RFI
		Layer 1
Benzene	14	43.8
1,2-Dichloroethane	23	332
1,1-Dichloroethene	190	403
cis-1,2-Dichloroethene	210	686
trans-1,2-Dichloroethene	180	387
Tetrachloroethene	11	41.8
Trichloroethene	5	319
Vinyl chloride	2.5	7,420

Data from the Supplemental RFI Draft Report dated December 2004 (Ref. 1).

**Despite exceedances of indoor air screening levels, indoor air is not considered to be a medium of concern because no enclosed spaces are used by workers in the Plant and Betterroads Areas (Ref. 2). A Vessel Maintenance Shop, which is a large, open-air, metal-sided building, is present at the Betterroads Area.** Indoor air exposures would not be expected to be of concern at the Vessel Maintenance Shop due to the nature of the building construction. An office area is also present at the main entrance, but is located north of the Betterroads plume (Ref. 2). For these reasons, indoor air at the PPG site is not evaluated further in this EI determination.

#### **Surface/Subsurface Soil**

As discussed in response to Question 1, several of the HWMUs have been clean closed (Ref. 3), and EPA has stated that residual contamination in soils is no longer a concern at the PPG site (Refs. 4, 5, 6). The limited soil sampling that was conducted in conjunction with the Supplemental RFI indicated that detected concentrations are all well below applicable risk-based levels (Ref. 7).

#### **Surface Water/Sediment**

As part of the RFI, six sediment samples were collected from a drainage ditch (located between Route PR-127 and the VCM Plant) and an intermittent stream (located adjacent to the Waste Pile/Tar Pit and East Mound areas) at the site. These samples were analyzed for: VOCs; base, neutral, and acid-extractable organic compounds (BNAs); and ethylene glycol. Based on the results of these analyses, EPA has stated that residual contamination in sediments are no longer a concern at the site (Ref. 4).

In conjunction with the Supplemental RFI, four surface water samples were collected from the drainage ditches at the center of the Playa de Guayanilla, where groundwater in Layer 1 is thought to be discharging. The results of this sampling effort indicate that only a few VOCs are present at detectable concentrations in drainage ditch surface water. All detected concentrations are below applicable risk-based levels (Ref. 1). No surface water sampling in the Macana River or Guayanilla Bay has been conducted.

**To determine whether groundwater discharges may be impacting the Macana River or Guayanilla Bay, reported contaminant concentrations upgradient of potentially impacted surface water are compared to screening criteria based on established surface water standards. In this case, contaminant concentrations potentially** discharging to the Macana River and Guayanilla Bay are compared with the relevant Puerto Rico Water Quality Standards (PRWQS) for SC water bodies (e.g., tidally influenced salt water bodies). However, to account for dilution, dispersion, and other mitigating factors that have the effect of reducing contaminant concentrations at the point of discharge to surface water, the PRWQS are increased by a factor of ten prior to comparison against field data. This comparison is presented in Table 7 below.

**Table 7. Evaluation of Potential Discharges to Surface Water**

Layer	Receiving Surface Water Body	Wells Immediately Adjacent and Upgradient	Constituent	Maximum Conc. (m g/L) June 2004	PRWQS (mg/L)	PRWQS x 10 (mg/L)
1	Central Playa Canal	MW-41A, MW-43A	No exceedances			
	Eastern Playa Canal	MW-27A, MW-42A	No exceedances			
	Macana River	MW-08A, MW-28A, MW-36, MW-39	Benzene	32.7	710	7,100
			1,1-DCE	17.2	32	320
			1,2-DCA	7.31	990	9,900
			Vinyl Chloride	558	5,250	52,500
	Guayanilla Bay	MW-27A, MW-28A, MW-34A, MW-37, MW-43A	1,1-DCE	13.8	32	320
			1,2-DCA	5.29	990	9,900
			Vinyl Chloride	1,870	5,250	52,500
	2	Guayanilla Bay	MW-32B, MW-33B, MW-42B, MW-43B	1,1,2-TCA	6.62	420
1,1-DCE				46.3	32	320
1,2-DCA				6.99	990	9,900
TCE				7.87	810	8,100
Vinyl Chloride				3.5	5,250	52,500
3	Guayanilla Bay	MW-28B, MW-43C	1,1-DCE	7.46	32	320
4	Guayanilla Bay	MW-07B, MW-28C, MW-34B	1,1,2-TCA	19.8	420	4,200
			1,1-DCE	74.7	32	320
			Chloroform	100	4,700	47,000
			TCE	16.6	810	8,100
			Vinyl Chloride	23.2	5,250	52,500
5	Guayanilla Bay	MW-07C	1,1,2-TCA	32.1	420	4,200
			1,1-DCE	49	32	320
			Chloroform	86.3	4,700	47,000
			TCE	11.8	810	8,100

Data from the Supplemental RFI Draft Report dated December 2004 (Ref. 1).

**As shown in Table 7, only one groundwater contaminant, 1,1-DCE, was reported at concentrations exceeding applicable PRWQS, and the magnitude of this exceedance is relatively low. No groundwater contaminants identified adjacent to surface water exceeded the applicable PRWQS multiplied by a factor of ten. Consequently, surface water is not expected to be impacted by contaminants potentially discharging from groundwater impacted by PPG site-related activities.**

Air (Outdoors)

No assessment of the impacts to outdoor air has been documented at the PPG site. However, volatile emission of VOCs (e.g., VC and TCE) from groundwater to outdoor air is not expected to be of concern given the natural dispersion of volatile contaminants once they reach the surface. Additionally, the health and safety air monitoring activities conducted during field activities at the site have not indicated any air quality problems (Ref. 1). Similarly, the migration of particulates entrained on dust is not likely to be significant because soil concentrations of contaminants have been demonstrated to be below risk-based levels (Refs. 4, 5, 6). Therefore, the migration of particulates entrained on dust and/or volatile emissions is not expected to be a significant exposure pathway of concern at the PPG site.

**References:**

1. Supplemental RCRA Facility Investigation and Interim Measures Draft Report for the PPG Discontinued Operations Site. Prepared by Earth Tech, Inc. Dated December 15, 2004.
2. Memorandum from Kristin McKenney, Booz Allen Hamilton, to Luís Negrón, USEPA. Dated April 27, 2004.
3. Administrative Order for PPG Industries, Inc in Guayanilla, Puerto Rico. Prepared by EPA Region II. Dated September 21, 1990.
4. Draft RCRA Facility Investigation, PPG Discontinued Operations Site, Guayanilla, Puerto Rico. Prepared by Geraghty & Miller, Inc. Dated July 1995.
5. Letter from Philip F. Clappin, U.S. EPA Region II Hazardous Waste Compliance Branch, to Richard J. Samelson of PPG Industries. Dated October 2, 1991.
6. Letter from Philip F. Clappin, U.S. EPA Region II Hazardous Waste Compliance Branch, to Richard J. Samelson of PPG Industries. Dated January 3, 1992.
7. **Data Results Summary, 1999 Field Program, Supplemental RCRA Facility Investigation and Interim Measure Work Plans, Volumes I and II. Prepared by DRAI. Dated April 20, 2000.**

3. Are there **complete pathways** between “contamination” and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table  
*Potential **Human Receptors** (Under Current Conditions)*

“Contaminated” Media	Residents	Workers	Day-Care	Construction	Trespasser	Recreation	Food <sup>3</sup>
Groundwater	No	No	No	No	—	—	No
Air (indoor)	—	—	—	—	—	—	—
Surface Soil (e.g. < 2 ft)	—	—	—	—	—	—	—
Surface Water	—	—	—	—	—	—	—
Sediment	—	—	—	—	—	—	—
Subsurface Soil (e.g. > 2 ft)	—	—	—	—	—	—	—
Air (outdoors)	—	—	—	—	—	—	—

Instruction for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors’ spaces for Media which are not “contaminated” as identified in #2 above.
2. Enter “yes” or “no” for potential “completeness” under each “Contaminated”Media — Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential “Contaminated” Media - Human Receptor combinations (Pathways) do not have check spaces. These spaces instead have dashes (“--”). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

- If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter “YE” status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).
- If yes (pathways are complete for any “Contaminated” Media - Human Receptor combination) - continue after providing supporting explanation.
- If unknown (for any “Contaminated” Media - Human Receptor combination) - skip to #6 and enter “IN” status code

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<sup>3</sup> Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish)

**Rationale:**

**Groundwater**

As documented in response to Question 2, concentrations of VOCs in groundwater underlying the Plant, Playa, and Betterroads Areas exceed risk-based levels. However, because no industrial operations are currently occurring at the Plant Area, and no on-site wells are used for facility operations in either the Plant or the Betterroads Area (Ref. 1), the groundwater exposure pathway is incomplete in these two areas.

In the Playa Area, PPG has conducted well surveys to determine whether residents may be using groundwater drawn from domestic wells. Of the 73 houses identified in the Playa plume area, residents of 65 houses confirmed that no domestic wells were present on their properties. Four of the remaining eight properties were either under construction, unoccupied, or abandoned. The other four houses were observed to be well maintained and in livable condition, but residents could not be reached after multiple visits in both July 2003 and June 2004 (Ref. 2). Thus, there is some limited potential for exposure at the four residences which were not interviewed. However, given that no domestic wells were identified at any of the interviewed residences, and given the brackish nature of the shallow groundwater units, this exposure pathway is not expected to be complete.

It is also noted that the Giraud farm is located just north of the northern boundary of the Playa community and extends west toward the town of Guayanilla. The exposure pathway from groundwater to food in this area is considered incomplete for the following reasons: (1) contaminants in this area were not detected at levels above MCLs or PRGs in the most recent sampling events (Refs. 2, 3); (2) the area between the VCM Plant and the Playa community is currently uncultivated (Refs. 2, 3); and (3) use of groundwater for crop irrigation is not expected (Ref. 3), particularly given the brackish nature of the shallow groundwater units.

Based on the above discussion, no groundwater exposure pathways are currently complete at the PPG site.

**References:**

1. Memorandum from Kristin McKenney, Booz Allen Hamilton, to Luís Negrón, USEPA. Dated April 27, 2004.
2. Supplemental RCRA Facility Investigation and Interim Measures Draft Report for the PPG Discontinued Operations Site. Prepared by Earth Tech, Inc. Dated December 15, 2004.
3. E-mail from Rick Jacobs, PPG, to Luís Negrón, USEPA. Dated June 30, 2005.



4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **significant**<sup>4</sup> (i.e., potentially “unacceptable”) because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable “levels” (used to identify the “contamination”); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable “levels”) could result in greater than acceptable risks?

\_\_\_ If no (exposures cannot be reasonably expected to be significant (i.e., potentially “unacceptable”) for any complete exposure pathway) - skip to #6 and enter “YE” status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”

\_\_\_ If yes (exposures could be reasonably expected to be “significant” (i.e., potentially “unacceptable”) for any complete exposure pathway) - continue after providing a description (of each potentially “unacceptable” exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”

\_\_\_ If unknown (for any complete pathway) - skip to #6 and enter “IN” status code.

**Rationale:**

This question is not applicable. See the response to Question 3.

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<sup>4</sup> If there is any question on whether the identified exposures are “significant” (i.e., potentially “unacceptable”) consult a Human Health Risk Assessment specialist with appropriate education, training, and experience.

5. Can the “significant” **exposures** (identified in #4) be shown to be within acceptable limits?

\_\_\_\_\_ If yes (all “significant” exposures have been shown to be within acceptable limits) - continue and enter “YE” after summarizing and referencing documentation justifying why all “significant” exposures to “contamination” are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

\_\_\_\_\_ If no (there are current exposures that can be reasonably expected to be “unacceptable”) - continue and enter “NO” status code after providing a description of each potentially “unacceptable” exposure.

\_\_\_\_\_ If unknown (for any potentially “unacceptable” exposure) - continue and enter “IN” status code.

**Rationale:**

This question is not applicable. See the response to Question 3.

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

- YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the PPG Discontinued Operations site, EPA ID #PRD000692715, located on PR Route 127 in Guayanilla, Puerto Rico, under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.
- NO - "Current Human Exposures" are NOT "Under Control."
- IN - More information is needed to make a determination.

**Completed by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
Jennifer Nystrom  
Risk Assessor  
Booz Allen Hamilton

**Reviewed by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
Kristin McKenney  
Senior Risk Assessor  
Booz Allen Hamilton

**Also Reviewed by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
Luís Negrón, Project Manager  
Environmental Management Branch  
Caribbean Environmental Protection Division  
USEPA Region 2

\_\_\_\_\_  
Victor Trinidad, Chief  
Environmental Management Branch  
Caribbean Environmental Protection Division  
USEPA Region 2

**Approved by:** Original signed by: \_\_\_\_\_ **Date:** September 20, 2005  
Carl-Axel P. Sodeberg, Director  
Caribbean Environmental Protection Division  
USEPA Region 2

**Locations where references may be found:**

References reviewed to prepare this EI determination are identified after each response. Reference materials are available at the USEPA Region 2, RCRA Records Center, located at 290 Broadway, 15<sup>th</sup> Floor, New York, New York.

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**FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.**

**Attachments**

The following attachments have been provided to support this EI determination.

- ▶ Attachment 1 – Summary of Media Impacts Table

**Attachment 1 - Summary of Media Impacts Table  
 PPG Discontinued Operations Site**

<b>AOC</b>	<b>GW</b>	<b>Air (Indoors)</b>	<b>Surface Soil</b>	<b>Surface Water</b>	<b>Sediment</b>	<b>Subsurface Soil</b>	<b>Air (Outdoors)</b>	<b>Corrective Action Measure</b>	<b>Key Contaminants</b>
Plant Area	Yes	No	Yes	No	No	Yes	No	▸ Contaminated soils have been excavated and disposed off site.	VOCs in GW and soil; Mercury in soil
Betteroads Area	Yes	No	No	No	No	No	No	▸ None implemented to date	VOCs
Playa Area	Yes	No	No	No	No	No	No	▸ None implemented to date	VOCs