

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action Environmental Indicator (EI) RCRIS code (CA725) Current Human Exposures Under Control

Facility Name: Pharmacia & Upjohn Caribe, Inc.
Facility Address: Highway No. 2 KM 600, Barceloneta, Puerto Rico, 00617-1307
Facility EPA ID#: PRD090398074

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI 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 objective 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 do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action programs 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 RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

Facility Information

Pharmacia and Upjohn Caribe, Inc. (P&UCI) is located on the north coast of Puerto Rico, in the Sabana Hoyos Ward, which is approximately 30 miles from the San Juan metropolitan area. The facility is located in an area zoned as “industrial” (IL-2) by the local Planning Board. The property is approximately 247.10 acres in size and is located 275 to 330 feet above mean sea level. Other major pharmaceutical industries are located within a one-mile radius. The rest of the surrounding area is dedicated to agriculture and cattle ranching.

The facility began operations in 1973, with the manufacture of pharmaceuticals. Prior to 1973, the area was undeveloped. The initial production processes included the formulation of raw materials, fermentation, extraction, crystallization, purification, chemical synthesis of antibiotics, and the manufacturing and packaging of bulk and finished goods. The manufacturing facilities include a main administration building, an engineering building, two warehouse buildings, six production areas (buildings M-20, M-30, M-40, M-50, M-65, and M-66), a storage tank farm, and 50 acres of undeveloped land. Four extraction wells provide process water for manufacturing operations.

P&UCI is currently an operating permitted RCRA facility. The processes generating wastes at P&UCI include the chemical synthesis of antibiotics and other chemicals, packaging of liquid Clindamycin Topical solution, pharmaceutical manufacturing of analgesics, pharmaceutical packaging of medicines, chemical laboratories, and parts cleaning machines. The hazardous waste storage and treatment units operated by P&UCI provide support to the facility's manufacturing activities. No wastes are accepted for storage or treatment by P&UCI from off-site facilities.

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, 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 #6 and enter IN (more information needed) status code

Summary of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs): A SWMU and AOC map has been provided as Attachment 1. SWMUs 1 through 21 were included in the December 26, 1991 RCRA Permit as a result of the 1991 RCRA Facility Assessment (RFA). SWMUs 5A, 6A, 8A, 9A, 12A, 22, 23, and I through III were identified subsequent to the 1991 RFA and issuance of the 1991 Permit.

SWMU 1, Container Storage Area: This unit is an active permitted container storage area. The hazardous waste container storage area (CSA) is located at Building M-11 of the P&UCI facility. The CSA is used for storage of hazardous wastes generated at the site, including off-specification or spilled material (D001, D005, D039, U002, U003, U080, U031, U154, U112, U151, U220, U122, U210, U196), absorbent pads contaminated with acids and bases (D002), mercury-contaminated materials (D009), filters and absorbent pads contaminated with solvents (F003), mother liquors, and asbestos-containing and PCB-contaminated materials. The CSA building has a floor area of 1,920 square feet. The types of containers stored in the CSA include standard 55-gallon steel and/or plastic drums. The maximum inventory of drums in the CSA does not exceed 540 55-gallon drums or a maximum volume of 29,700 gallons. The drums are lined with polyethylene bags. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMU 2, Temporary Container Storage Area: This unit is closed. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMU 3, Tank FA-116A: This unit is closed. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMUs 4 and 4B, 5A, 6A, 7, 8, 9A, 10 and 12A, Tank FA-116B, Tank FA-128, Tank FA-131, Tank FA-107, Tank FA-133, Tank FA-122A, Tank FA-122B, and Tank FA-129: All of these units are part of a tank storage system for the waste materials resulting from chemical production processes. Each unit is part of the active and permitted Tank Farm (Phase II and Tank FA-116 B) and are used for hazardous waste storage. All of the tanks are located within secondary containment dikes and are equipped with a sump. The tanks vary in capacity from 6,300 gallons to 20,000 gallons, and are constructed of stainless steel and carbon steel. The secondary containment system provides more than sufficient capacity to contain the total

capacity of the tanks in case of leaks. The hazardous waste storage is limited to the storage of bulk liquid waste streams that are recovered on site or transported to an off-site facility for either recovery or disposal. These wastes include: waste mixtures containing ignitable spent solvents and toxic wastes with waste codes F002, F003, F005, D001, D008, D035, D038, U112, U220, U122 and U210. Specific information pertaining to each unit is outlined below:

SWMU 4 and 4B, Tank FA-116B: This unit is an active permitted waste storage tank. The old tank associated with this unit was replaced in 1992 with a new tank of the same size at the same location. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMU 5A, Tank FA-128: This unit is an active permitted waste storage tank. The old tank associated with this unit (SWMU 5) was replaced in 1999 by a new tank of the same size at the same location. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMU 6A, Tank FA-131: This unit is an active permitted waste storage tank. The old tank associated with this unit (SWMU 6) was replaced in 1999 by a new tank of the same size at the same location. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMU 7, Tank FA-107: This unit is an active permitted waste storage tank. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMU 8, Tank FA-133: This unit is an active permitted waste storage tank. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMU 9A, Tank FA-122A: This unit is an active permitted waste storage tank. The old tank associated with this unit (SWMU 9) was replaced in 1999 by a new aboveground tank of the same size at the same location. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMU 10, Tank FA-122A: This unit is an active permitted waste storage tank. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMU 12A, Tank FA-129: This unit is an active permitted waste storage tank. The tank associated with this unit was replaced in 1999 by a new aboveground tank of the

same size at the same location. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMU 5, Tank FA-128: This unit is closed. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMU 6, Tank FA-131: This unit is closed. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMU 9, Tank FA-122A: This unit is closed. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMU 11, Tank FA-100: According to the 2000 RCRA Permit, this is an active raw material storage unit and has never contained waste. Therefore, it is no longer considered a SWMU. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this area.

SWMU 12, Tank FA-129: This unit is closed. Based upon the results of the 1991 RFA, there was no evidence of a release having occurred or occurring at this unit. Therefore, EPA determined in the 1991 RCRA Permit that no further action was required for this SWMU.

SWMUs 13, 14, 15, 16, 17, 18, 19, 20, UST FA-122, UST FA-129, UST FA-132, UST FA-107, UST FA-121, UST FA-128, UST FA-131, UST FA-133: The tanks associated with these units were all removed in 1982. A release of approximately 15,300 gallons of waste material from these USTs is believed to have contaminated soil groundwater with carbon tetrachloride, chloroform, acetone, and methylene chloride above relevant screening criteria. This site was proposed for inclusion on the National Priorities List (NPL) for Superfund sites in September 1984 due to this groundwater release. Groundwater remediation in this area is ongoing to address carbon tetrachloride contamination and is required under a 1989 CERCLA Order. A RCRA Facility Investigation (RFI) of the area was completed in March 1994. The use of a Soil Vapor Extraction (SVE) system has also been approved by RCRA to address soil remediation in this area.

SWMU 21, Release from sewer pipe incident at 500-Area building: This unit has been closed. An RFI conducted during the 1991 RCRA Permit showed no evidence of contaminant releases. Therefore, the 2000 RCRA Permit recommended no further action for this unit.

SWMU 22, Release from sewer line incident at 500-Area building: This unit has been closed per EPA approval of the 1998 Assessment Report. An RFI conducted for this unit showed no evidence of contaminant releases. The 2000 RCRA Permit indicated that EPA has provided a no further action determination for this unit.

SWMU 23, Release from sewer line incident at sewer line: An assessment plan has been approved and the Final Report submitted to EPA. The March 2000 Assessment Report indicates

that only chloroform (0.350 J mg/kg) was detected in subsurface soil (29-31 feet below ground surface (bgs)) above the Region 9 Preliminary Remediation Goals (PRGs) (0.240 mg/kg). Carbon tetrachloride was also found in groundwater in this area, but is related to the 1982 release which is being addressed by the groundwater remediation system and the 1989 CERCLA Order. Therefore, P&UCI recommended no further investigation in this area. The P&UCI determination is currently under EPA review.

SWMU I, Underground 55-gallon drums Area A to E Facility Premises: This unit has been closed per approved plans. An RFI conducted during the 1991 RCRA Permit showed no evidence of contaminants release. Therefore, the 2000 RCRA Permit indicates no further action is required.

SWMU II, Underground 55-gallon drums Area F Facility Premises: This unit has been closed per approved plans. An RFI conducted during the 1991 RCRA Permit showed no evidence of contaminant release. Therefore, the 2000 RCRA Permit indicates no further action is required.

SWMU III, Underground 55-gallon drums Area G Facility Premises: This unit has been closed per EPA approval of the 2000 Assessment Report. An RFI conducted for this unit showed no evidence of contaminant releases. The 2000 RCRA Permit indicated that EPA has provided a no further action determination for this unit.

In summary, SWMUs 1 through 12A, 21, 22, I, II, and III, all require no further action. The Assessment Report for SWMU 23 recommends no further investigation in this area. However, this determination is currently under review by EPA. Soil and groundwater contamination associated with SWMUs 13 through 20 is currently being address by the 1989 CERCLA Order (groundwater) and the RCRA-approved SVE system (soil). Based upon the information provided above, only SWMUs 13 through 20 will be addressed in this EI determination, since all other units require no further action at this time and the SWMU 23 data indicates that contaminant concentrations are below health-based levels.

References:

- (1) NPL Site Narrative at Listing, prepared by USEPA - September 1983.
- (2) Preliminary Close Out Report, prepared by USEPA - September 1998.
- (3) Record of Decision (ROD) Abstract, prepared by USEPA - January 14, 1999.
- (4) RCRA Part B Permit Application, prepared by P&UCI - July 8, 1999.
- (5) Revised SWMU Assessment Report for SWMU III, prepared by ERTEC - September 2, 1999.
- (6) Region 2, RCRA Corrective Action Site Fact Sheet, prepared by USEPA - February 10, 2000.
- (7) Draft Solid Waste Management Unit Assessment Report for SWMU No. 23, prepared by ERTEC - March 13, 2000.
- (8) Closure Report of Above Ground Storage Tanks, Tank Farm Area, prepared by ERTEC - May 2, 2000.
- (9) Draft Soil Vapor Extraction System Installation and Start Up Test Summary Report Corrective Measures Study, prepared by ERTEC - May 19, 2000.
- (10) National Priority Site Fact Sheet, prepared by USEPA - September 6, 2000.
- (11) Statement of Basis - Final Permit Decision - September 30, 2000.

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be “contaminated”¹ 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			carbon tetrachloride
Air (indoors) ²		X		
Surface Soil (e.g., <2 ft)		X		
Surface Water		X		
Sediment		X		
Subsurface Soil (e.g., >2 ft)	X			carbon tetrachloride, chloroform, acetone, methylene chloride
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

The Upjohn site lies above the island’s largest aquifer. The Aymamon and Aguada formations, together approximately 1,800 feet thick, comprise this unconfined aquifer (water table aquifer). Groundwater flow beneath the site is to the north, towards the Atlantic Ocean (approximately 3.7 miles north of the site). The water table aquifer exists approximately 300 feet bgs in the area of the site. Below the Aguada formation are the Cibao and the Lares formations, which together are 2,000 to 2,600 feet thick, and

¹ “Contamination” and “contaminated” describes 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).

² Recent evidence (from the Colorado Dept. 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.

comprise the confined or artesian aquifer. The material between the two aquifers is mostly clay, and the two aquifers are not connected. Thus, the artesian aquifer has not been contaminated.

In 1982, approximately 15,300 gallons of waste material, including carbon tetrachloride (65%) and acetonitrile (35%), leaked from an underground storage tank at the site located in the former underground storage tank area (SWMUs 13 through 20). Monitoring after the release detected 44 to 170 ppb of carbon tetrachloride in the water table aquifer. The 44 to 170 ppb detection levels exceeded the EPA Maximum Contaminant Level (MCL) of 5 ppb for carbon tetrachloride in groundwater. Acetonitrile was not detected in groundwater.

Sampling conducted as part of the 1987 RI indicated that the plume of carbon tetrachloride was located in the unconfined aquifer beneath the site and emanated from the tank farm towards the Atlantic Ocean. The plume was measured to be approximately 0.6 miles wide and approximately 2 miles long. Recent monitoring has shown that the plume has decreased in size significantly and has actually split into two smaller plumes.

Air (Indoors)

Depth to groundwater at this facility and in the surrounding area is approximately 300 feet bgs. Based upon this significant depth, contaminant volatilization into indoor air does not appear to be of concern. However as a conservative estimate, the Johnson-Ettinger (JE) Model was run using average concentrations detected in extracted groundwater as presented in the 1998 Five-Year Report, prepared by USEPA pursuant to the CERCLA Order. This report indicates an average concentration is 35 to 40 ug/L of carbon tetrachloride. Site specific input parameters used in the model included: initial groundwater concentration (40 ug/L), depth below grade to bottom of enclosed space floor (200 cm - to assess potential exposure in structures with basements or crawl spaces), depth below grade to water table (760 cm = 25 feet, a conservative estimate of potential depth to groundwater beneath the plume), SCS soil type directly above water table in reported geology (SIC = silty clays), average soil/groundwater temperature (28°C), and vadose zone SCS soil type (SIC = silty clays). Conservative standard default values (i.e., residential exposure parameters and vadose zone soil characteristics) associated with the JE Model were used for all the remaining input parameters. The calculated risk associated with this scenario is 2.1E-07, which is below the USEPA acceptable risk range of 1.0E-04 to 1.0E-06. Therefore, based upon this conservative risk estimate, it does not appear that contamination migration into indoor air is a concern at this site or in the surrounding area.

Surface/Subsurface Soil

No contaminants have been detected in surface soil above relevant screening criteria at the site. According to the Draft SVE Summary Report, the Phase II RFI (1995) detected carbon tetrachloride, chloroform, and acetone in the subsoil in the area of SWMUs 13 through 20. These detections occurred at depths between 140 to 195. Concentrations detected for all three constituents ranged from non-detect to 30,000 ug/kg. Carbon tetrachloride exceeded the USEPA Soil Screening Levels (carbon tetrachloride = 5,000 ug/kg, chloroform = 100,000 ug/kg, acetone = 7,800,000 ug/kg), which were being used by P&UCI as relevant screening criteria at this site. During the installation of the SVE well, methylene chloride was also detected above relevant screening criteria. It is believed that this residual contamination is due to a release that occurred in 1982 in the former underground storage tank area (SWMUs 13 through 20). This 1982 release also resulted in the carbon tetrachloride groundwater plume that is currently being address under the 1989 CERCLA order, as discussed above.

Surface Water/Sediment

There are no surface water bodies located within 1,000 feet of the facility boundaries. There have been no documented impacts on surface water or sediment as a result of the activities conducted at this facility. The aquifer beneath the site that has been impacted by the carbon tetrachloride release does discharge into a wetland area north of the site. However, contaminant concentration studies conducted as part of the CERCLA investigation have indicated that the potential risk to aquatic and terrestrial wildlife is expected to be low based on the estimates of existing and future concentrations in the environment. Therefore, the potential for significant human exposure in these wetland areas would also be expected to be low.

Air (Outdoors)

P&UCI currently operates a groundwater extraction system which treats recovered groundwater by air stripping in an aeration tower. The treated groundwater is then discharged to a sinkhole on site. A soil vapor extraction system is also currently treating contaminated soil in the areas of SWMUs 13 through 20. Both of these systems are regulated for air emissions by CERCLA (groundwater) and RCRA (soil). Therefore, it does not appear that exposure to contaminants in outdoor air is of concern at this site.

References:

- (1) NPL Site Narrative at Listing, prepared by USEPA - September 1983.
- (2) Preliminary Close-Out Report, prepared by USEPA - September 1998.
- (3) Record of Decision (ROD) Abstract, prepared by USEPA - January 14, 1999.
- (4) RCRA Part B Permit Application, prepared by P&UCI - July 8, 1999.
- (5) Region 2, RCRA Corrective Action Site Fact Sheet, prepared by USEPA - February 10, 2000.
- (6) Draft Soil Vapor Extraction System Installation and Start Up Test Summary Report Corrective Measures Study, prepared by ERTEC - May 19, 2000.
- (7) National Priority Site Fact Sheet, prepared by USEPA - September 6, 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 ³
Groundwater	No	No	No	No	--	--	No
<u>Air (indoor)</u>							
<u>Surface Soil (e.g. < 2 ft)</u>							
<u>Surface Water</u>							
<u>Sediment</u>							
Subsurface Soil (e.g., > 2 ft)	--	--	--	No	--	--	No
<u>Air (outdoors)</u>							

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 (“--”). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

- X 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

Rationale:

Groundwater

Due to the 1982 release from the areas of SWMUs 13 through 20, five local water supply wells were closed in 1982. Upon the well closure, P&UCI provided temporary, and ultimately permanent,

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

alternative water supplies to the users of local water supply wells (Garrachales 1 and 2, Tiburones, and Hillside Motel) that were shut down due to the presence of carbon tetrachloride or the threat of contamination resulting from the release. P&UCI either installed a replacement well and/or connected impacted users to a public water system. P&UCI has also installed a grid of 22 groundwater monitoring wells to delineate and monitor the existing plume. In 1984, the tank farm area was covered with a fiberglass-reinforced concrete pad to prevent rainwater from seeping into the ground and leaching contaminants from soil to groundwater. Extraction wells UE-1 and UE-2 are utilized to extract impacted groundwater. The groundwater is then treated by air stripping and disposed of through an existing sinkhole on site. Treated water is required to meet the EPA MCL of 5 ppb for carbon tetrachloride. This system is part of the groundwater remediation program currently under progress at the P&UCI site pursuant to the Administration Order on Consent (AOC), docket No. II-CERCLA 90301 signed between P&UCI and USEPA on March 30, 1989.

Exposure to contaminated groundwater has been mitigated through remedial actions. According to the most recent CERCLA Five-Year Review Report prepared in 1998, the groundwater recovery, treatment, and monitoring systems continue to be protective of human health and the environment. The selected remedy at the site will continue to be operated, maintained, and monitored until the cleanup standard for carbon tetrachloride in groundwater is attained. Based upon this information, no receptors are potentially exposed to the contaminated groundwater plume.

Surface/Subsurface Soil

All soil contamination is located in the subsurface in the area of SWMUs 13 through 20, at depths ranging from 140 to 195 feet bgs. Based upon this depth, direct contact to contaminated soil is unlikely. In addition, a fiberglass-reinforced concrete pad was installed over the former underground storage tank farm in 1984 to prevent rainwater from seeping into the ground and leaching from soil to groundwater. This cap also mitigates any potential direct exposure to contaminated soil in this area. Based upon the absence of contamination in the surface soil, and the depth of contamination in the subsurface soil, exposure to contaminated soil at the site does not appear to be a complete exposure pathway.

References:

- (1) NPL Site Narrative at Listing, prepared by USEPA - September 1983.
- (2) Preliminary Close-Out Report, prepared by USEPA - September 1998.
- (3) Record of Decision (ROD) Abstract, prepared by USEPA - January 14, 1999.
- (4) RCRA Part B Permit Application, prepared by P&UCI - July 8, 1999.
- (5) Region 2, RCRA Corrective Action Site Fact Sheet, prepared by USEPA - February 10, 2000.
- (6) Draft Soil Vapor Extraction System Installation and Start Up Test Summary Report Corrective Measures Study, prepared by ERTEC - May 19, 2000.
- (7) National Priority Site Fact Sheet, prepared by USEPA - September 6, 2000.

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **significant**⁴ (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 response to question #3.

⁴ 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 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):

 X 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 Pharmacia & Upjohn Caribe, Inc. Facility, EPA ID# PRD090398074, located at Highway No. 2 Km, in Barceloneta, 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.

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 - SWMU/AOC Map

Attachment 2 - Summary of Media Impacts Table

Attachment 3 - Johnson-Ettinger Model Run Results

Attachments truncated, see facility file (MSS,03/06/02)