DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: Caribbean Petroleum Refining, LP (CPR)
Facility Address: Bayamón, Puerto Rico
Facility EPA ID#: PRD-00632182

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) 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, etc.) 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 "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "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 "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated groundwater and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

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

The Caribbean Petroleum Refining, LP (CPR) facility is located in the Luchetti Industrial Park in Bayamón, Puerto Rico, approximately three miles south of the island's coast with the Atlantic Ocean. The CPR site encompasses approximately 179 acres, of which 115 are developed. The facility is divided into four general areas: tank farm area, process area, administration area, and wastewater treatment plant

area. In addition, CPR owns and operates a loading dock facility on San Juan Bay in Guaynabo, approximately two and one-half miles northeast of the main facility (Ref. 1).

Petroleum refining operations commenced at the site in 1955 under the name of Caribbean Refining Corporation. The facility was purchased in 1962 by the Gulf Oil Corporation, at which time the name was changed to Caribbean Gulf Refining Corporation. Chevron Corporation acquired ownership of the facility when it purchased Gulf Oil Corporation in 1984. In 1987, the facility was sold to First Oil Corporation and now operates as an independent refinery. Until cessation of operations in 2000, CPR operated a 48,000-barrel a day petroleum refining facility at the site. CPR now operates the facility as a petroleum product storage and distribution facility, although refining operations may commence again sometime in the future (Ref. 1).

The CPR site is bounded to the west and southwest by industrial and commercial facilities, and to the south and east by Fort Buchanan, a U.S. military reservation. Highway 28 separates the CPR facility from an industrial/commercial area to the southwest and from the Fort Buchanan property. An undeveloped land area owned by CPR is situated north of the operations area and extends about 1,000 feet (ft) north to Highway 22, a major thoroughfare in the Bayamón area. Swampy, undeveloped land, an industrial facility, and a small residential community occur north of Highway 22 (Ref. 2).

Hazardous wastes historically managed at the site include primary oil/water/solids separation sludge (F037), secondary oil/water/solids separation sludge (F038), slop oil emulsion solids (K049), heat exchanger bundle solids (K050), API separator sludge (K051), ignitable waste (D001), and toxicity characteristic (benzene) wastewater (D018) (Ref. 2).

CPR has two on-site water wells which are completed in the carbonate formations underlying the facility. However, only one of the wells (North well) is currently being used. Water from this well is used for process purposes only. Drinking water at the site is provided by a municipal supply system (Ref. 2).

Two general hydrogeologic units occur at the CPR facility. The uppermost unit is a clayey silt overburden, which contains a low permeability semi-perched layer and a permeable water-bearing zone (referred to as Zone A in CPR documents). Borehole information from the CPR facility shows that the overburden thickness varies from about 10 feet at the southern perimeter of the facility to about 90 feet at the northern perimeter (Ref. 3). The underlying second unit is an unlithified carbonate sediment. The water-bearing zone in the unlithified carbonate sediment is referred to as Zone B in CPR documents (Ref. 1).

During an April 2008 groundwater monitoring event, the general horizontal groundwater flow direction in Zone A was reported to be generally to the north, although localized mounds and depressions occurred in the central portion of the facility. Groundwater flow direction in Zone B ranged from north to northeast. An easterly flow component also was reported in the northern portion of the facility (Ref. 3).

Surface water bodies that traverse through the CPR facility are Las Lajas and Diego Creeks. Las Lajas Creek is a low-flow, shallow stream that originates in the hills south of the facility, traverses through the north-central part of the facility and eventually discharges into San Juan Bay, located about 1.75 miles north of the facility. Las Lajas Creek is channeled underground as it enters the facility and returns to an open channel north of the facility's wastewater treatment plant area (WWTP). Diego Creek is a shallow low-flow creek that traverses through the northwest portion of the CPR site (Ref. 1 and 2).

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 Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs):

An Administrative Order on Consent was executed by EPA and CPR in October 1995 to investigate 32 solid waste management units (SWMUs)/Areas of Concern (AOCs), Las Lajas Creek Sediment, the facility Process Sewer, and the groundwater beneath the site. A RCRA Facility Investigation (RFI) is currently being performed at the facility, which includes a Sitewide Groundwater Monitoring Program (SGMP) (Ref. 2).

Interim measure activities consist of measurement and recovery of petroleum hydrocarbon light non-aqueous phase liquid (LNAPL) and groundwater monitoring. The CPR groundwater recovery monitoring system consists of 131 groundwater monitoring wells, 16 of which are sampled in March and 10 of which are sampled in September of every year to assess the downgradient migration of dissolved constituents from the LNAPL plumes. In addition, quarterly water level and/or product thickness measurements are also collected at the 131 monitoring wells. Monthly measurements are made at 63 of the wells (Ref. 4). LNAPL is routinely recovered at 60 wells. Twenty-two of the 60 recovery wells are equipped with pneumatic ejector pumps. Additional product is recovered from the remaining 38 wells by manual bailing. For the reporting period of October through December 2007, 873 gallons of product were recovered, and for the reporting period of January through March 2008, 265 gallons of product were recovered. As of March 2008, the total amount of product recovered since October 1991 was 80,368 gallons (Ref. 4 and 9).

RCRA closure of the Equalization Basin at the WWTP was completed in August 1999. Closure activities consisted of dewatering the basin, stabilization of the residual sludge, backfilling the basin, installing an impermeable clay and flexible membrane liner cap, installing a drainage layer, and installing a vegetative cap. Groundwater sampling is performed on an annual basis. Groundwater monitoring of this unit has been conducted since 1991, and was incorporated into the SGMP as part of corrective action in 2002. As per the sampling schedule in the SWGP, groundwater sampling at the former Equalization Basin was performed on a semi-annual basis during the three-year period of 2003 through 2005. Sampling is presently being performed every March, on an annual basis. Annual sampling began during 2006 and will continue through 2010. Sampling will be discontinued after 2010, if contaminant levels are less than EPA maximum contaminant levels (MCLs) in all wells and if there is no trend of increasing concentration (Ref.5).

In July 2006, an Interim Corrective Measures (ICM) Work Plan, Revision 2.0, was submitted to EPA. The ICM proposed soil excavation in the area of the former Old Oil Lagoons, so that a new tank for the CPR facility could be constructed in the area. An Addendum to the ICM Work Plan was submitted in March 2008. The tank has since been installed; however, EPA has not yet issued a no further action letter for the area under the tank. Additional information on the ICM was requested from the facility.

Concentrations of constituents of concern remain above levels which are protective of groundwater as indicated in Table 1 below (Ref. 7).

Results from soils sampling conducted at SWMU 11 in support of the ICM include the following contaminants which are above the soil screening levels (SSLs) for protection of groundwater for a dilution attenuation factor (DAF) of 20 (Ref. 7):

Table 1- ICM SWMU 11 Soil Data Above SSLs

Contaminant (SSL[1])	Detected Concentration	Sampling Location	Depth Range of Sample
Arsenic (29)	41.8 μg/L	PR – 1	10.5 – 11.0
	95.8 μg/L	PR – 4	5.0 – 5.5
	99.4 μg/L	PR – 7	9.5 – 10.0
	78.0 μg/L	PR – 7D	9.5 – 10.0
	79.8 μg/L	PR – 8	11.3 – 11.8
	115μg/L	PR – 8	15.5 – 16.0
	49.6 μg/L	PR – 14	10.0 – 10.5
Chromium (42[2])	188 μg/L	PR – 3	8.0 – 8.5
	1560 μg/L	PR – 3D	8.0 – 8.5
	1070 μg/L	PR – 3	12.6 – 13.1
	130 μg/L	PR – 4	5.0 – 5.5
	1080 μg/L	PR – 5	8.5 – 9.0
	161 μg/L	PR – 5	13.0 – 13.5
	139 μg/L	PR – 7	9.5 – 10.0
	117 μg/L	PR – 7D	9.5 – 10.0
	112 μg/L	PR – 8	11.3 – 11.8
	105 μg/L	PR – 13	6.2 – 6.8
	194 μg/L	PR – 14	10.0 – 10.5
2-Methylnaphthalene (18,000)	166,000 μg/L	PR – 14	10.0 –10.5
Benzo(a)anthracene (6,200[3])	18,100 μg/L	PR – 14	10.0 –10.5
Benzo(a)pyrene (6,200[3])	16,200 μg/L	PR – 14	10.0 –10.5
Benzo(b)flouranthene (6,200[3])	6,600 μg/L	PR – 14	10.0 –10.5

[1] SSL Values Taken From Ref. 8.

[2] Only those values which exceeded the site-specific background value for chromium of 86 μg/L were included in the Table.

[3] The benzo(a)pyrene MCL-based SSL was used in lieu of the risk-based SSL.

2. Is **groundwater** known or reasonably suspected to be "**contaminated"**[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

_X_ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

___ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

___ If unknown - skip to #8 and enter "IN" status code.

Rationale:

Appropriately protective "levels" for the CPR facility include the federal MCLs and, where MCLs are not available, the Regional Screening Levels should be used (Ref. 8).

For lead, the EPA action level of 15 micrograms per liter (μg/l) was used as a groundwater screening level. For methyl tert butyl ether (MTBE), the acceptable drinking water guideline of 12 μg/l was used.

Groundwater sampling is conducted at select wells semi-annually for the underground recovery system (Ref. 4), and annually at select wells associated with the former Equalization Basin (Ref. 5).

Of the 131 groundwater monitoring wells in CPR's underground recovery monitoring system, 16 of these wells are used for the groundwater sampling program. The 16 wells selected are intended to provide information for evaluating potential downgradient migration of dissolved constituents from the FPH plume at the facility. Five of the sampled wells monitor the upper clayey sediment water-bearing zone (Zone A) and 11 monitor the unlithified carbonate sediment zone (Zone B) (Ref. 3).

The last comprehensive groundwater sampling events were conducted as part of the SGMP in May-July 2003 and October 2003. At that time, groundwater samples were collected from 51 monitoring wells and 11 direct-push locations (Ref. 1). Additional groundwater sampling at select wells has also been conducted between October 2003 and the present to address identified data gaps.

Petroleum hydrocarbons are present in upper clayey sediment and carbonate sediment water bearing zones at concentrations high enough to create LNAPLs. Water levels and product thicknesses are measured routinely in 131 monitoring wells throughout the facility as part of CPR's underground recovery monitoring system. Sixty of those wells are routinely pumped to remove free product (Ref. 9)

Sixteen monitoring wells have also been sampled for benzene, toluene, ethylbenzene, xylene, and dissolved lead since 1991. Dissolved lead was detected at wells MW-15A, MW-37A, MW-77B and MW-78B at concentrations ranging from 3.0 to 20.0 μg/L. The concentration at well MW-37A of 20.0 μg/L was the only detection above the lead screening level of 15 μg/L. Evaluation of historical results for dissolved lead shows the general absence of dissolved lead at the facility. The dissolved lead

[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 appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

detection above the action level at well MW-37A during the current sampling event was not expected and is inconsistent with historical results (Ref 3).

Six monitoring wells have been sampled for dissolved arsenic since March of 2004 (MW-20B, MW-21B, MW-75B, MW-76B2, MW-77B, and MW-78B). Dissolved arsenic was detected at well, MW-78B in April 2008 at a concentration of 4.0 μg/L, which is below the arsenic screening level of 10 μg/L (Ref 3).

Mercury has been detected at levels just about the MCL along the northern boundary of the site. Monitoring wells MW-21B and MW-78B have been sampled multiple times for mercury. Historic groundwater sampling for mercury at the CPR facility has been performed since March 1996. Mercury was detected at least once at 13 out of 52 monitoring wells. The four rounds of groundwater sampling for mercury (between June 2006 and December 2007) were performed at these wells, plus at one additional well (Well MW-17B) for delineation purposes. Dissolved mercury concentrations were below the screening level of 2 μg/L at all 14 sampled monitoring wells. Total mercury results were below the screening level at all monitoring wells, except MW-21B and MW-78B. Total mercury exceeded its screening level at well MW-21B (2.3 μg/L) only in July 2006 and at well MW-78B (2.2 μg/L) only in June 2007 where well construction and geologic characteristics make it difficult to obtain a sample without high turbidity (Ref 10).

In an April 2008 sampling event, dissolved mercury was detected at MW-78B (0.22 μg/L), below its screening level of 2 μg/L. The low level detection of mercury at this well is consistent with previous sampling events. Total and dissolved mercury were detected at MW-14A2 at 0.59 μg/L and 0.70 μg/L, respectively, which are below the mercury screening level. (Ref 3)

Mercury data well MW-21B shows an overall decreasing concentration trend for dissolved mercury. Dissolved mercury has been below its screening level since September 1999, with one exception (2.2 μg/L in May 2003). The total mercury results are highly variable and show a poor correlation to dissolved results. The TSS data for well MW-21B show low values, except for July 2006 (8 J mg/L), during which time the total mercury level (2.3 μg/L) exceeded the screening level, which is suggestive of high bias due to sample turbidity. Historical exceedances for total mercury also occurred in October and May 2003 (3.4 and 8.3 μg/L, respectively). Review of field notes from these two sampling rounds showed that the sample was slightly silty indicating sample turbidity.

In addition, during the April 2008 sampling event, samples were collected and analyzed for volatile organic compounds (VOCs) from well MW-30B. VOC detections at well MW-30B (located in the west-central part of the facility) consisted of 1,2-dichloropropane above its MCL of 5 ug/L (58.1 μg/L) and 1,2-dichloroethane below its MCL of 5 μg/L (3.8 μg/L). The detection of 1,2-dichloropropane is within the range of recent samples of 28.9 μg/L (March 2006) and 74.6 μg/L (June 2007) (Ref. 3).

VOCs were detected during the April 2008 sampling event. The VOC detections at well MW-14B (located in the central part of the facility, downgradient of the FPH plume) consisted of BTEX constituents with total BTEX concentrations of 3.95 μg/L. None of the individual BTEX concentrations exceeded MCLs. No other VOCs were detected at well MW-14B. (Ref. 3)

Trichloroethylene and vinyl chloride have been detected in monitoring wells along the eastern boundary of CPR. This plume is considered part of a larger plume located primarily on the property of Fort Buchanan, located east of CPR. Fort Buchanan is currently in the process of identifying the source and evaluating the need for remedial actions for this plume.

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

_X_ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2].

___ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) - skip to #8 and enter "NO" status code, after providing an explanation.

___ If unknown - skip to #8 and enter "IN" status code.

Rationale:

Petroleum hydrocarbons are present in upper clayey sediment and carbonate sediment water bearing zones at concentrations high enough to create LNAPLs. Water levels and product thicknesses are measured routinely in 131 monitoring wells throughout the facility. Sixty of those wells are routinely pumped to remove free product. Twenty-two of the 60 recovery wells are equipped with pneumatic ejector pumps. Additional product is recovered from 38 supplemental wells by bailing; product is recovered weekly from 28 of the wells and monthly from 10 of the wells. Maps of the free product locations and thicknesses indicate all LNAPLs are within site boundaries (Ref. 3 and 9)

The BTEX source associated with MW-14B is interpreted to be from dissolution of the FPH plume with subsequent downgradient transport. The combined effects of dilution, dispersion, adsorption, volatilization, and biodegradation appear to reduce the concentration of any dissolved hydrocarbons downgradient of the plume and prevent off-site migration. Wells MW-15A and MW-16A are located nearest to the FPH plume upgradient of the CPR equalization basin. April 2008 and historical data for wells 15A and 16A show BTEX compounds have not been detected for more than ten years. Thus, the plume is unlikely to have an impact on groundwater monitoring results for the equalization basin (Ref. 3).

Sampling was performed at well MW-30B for VOCs in June 2007 in response to EPA's June 2006 email since 1,2-dichloropropane was detected above its MCL. This constituent was not detected in any downgradient wells and its potential presence at well MW-30B appears to be localized (Ref. 3).

VOC detections at well MW-30B (located in the west-central part of the facility) consisted of 1,2-dichloropropane above its MCL of 5 ug/L (58.1 ug/L) and 1,2-dichloroethane below its MCL of 5 μg/L (3.8 μg/L). The detection of 1,2-dichloropropane is within the range of recent samples of 28.9 μg/L (March 2006) and 74.6 μg/L (June 2007).

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[2] "Existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

___ If yes - continue after identifying potentially affected surface water bodies.

_X_ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

___ If unknown - skip to #8 and enter "IN" status code.

Rationale:

Surface water bodies that traverse through the CPR facility are Las Lajas and Diego Creeks. Las Lajas Creek is a low-flow, shallow stream that originates in the hills south of the facility, traverses through the north-central part of the facility and eventually discharges into San Juan Bay, located about 1.75 miles north of the facility. Las Lajas Creek is channeled underground as it enters the facility and returns to an open channel north of the facility's WWTP area. Once Las Lajas Creek has passed through the facility proper, much of the flow is outfall discharge. Diego Creek is a shallow low-flow creek that traverses through the northwest portion of the CPR site (Ref. 1 and 2).

Groundwater discharge from the overburden water-bearing zone to Las Lajas Creek was indicated as part of the Las Lajas Creek Assessment. Thus, groundwater sampling results from shallow wells nearby and adjacent to the creek (Monitoring Wells MP-1, MP-5A, MP-9, MP-10, MW-86A, MW-110A, and MW-111A) are used to demonstrate surface water environmental indicators. None of the results from these wells show any constituents of concern above groundwater screening levels. Total arsenic and vanadium were detected above screening levels at Monitoring Well MW-110A during the July 2004 sampling event; however, the dissolved metals results were below screening levels. High turbidity occurred in the groundwater sample, which biased high the total metals results. Therefore, the dissolved arsenic and vanadium results are considered to be more representative than the total metals results for this sampling event. Resampling of Monitoring Well MW-111A in September of 2004 showed that both total and dissolved metals were below screening levels, which confirms the dissolved metals results from July 2004. Therefore, no impact to surface water due to groundwater is indicated (Ref. 1).

Further, no LNAPL plumes occur adjacent to Las Lajas Creek, hence to impact to surface water from the LNAPL plumes is indicated. As discussed above, the LNAPL plumes are stable and not migrating (Ref. 1).

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be "**insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

___ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgment/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or ecosystem.

___ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

___ If unknown - enter "IN" status code in #8.

Rationale:

Not Applicable

[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable"** (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

___ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and ecosystems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment[5], appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialist, including an ecologist) adequately protective of receiving surface water, sediments, and ecosystems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

___ If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or ecosystem.

___ If unknown - skip to 8 and enter "IN" status code.

Rationale:

Not Applicable

[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[5] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

7. Will groundwater **monitoring**/measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

_X_ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

___ If no - enter "NO" status code in #8.

___ If unknown - enter "IN" status code in #8.

Rationale:

Groundwater sampling is conducted at select wells semi-annually for the underground recovery system (Ref. 4), and annually at select wells associated with the former Equalization Basin (Ref. 5). The last comprehensive groundwater sampling events were conducted as part of the SGMP in May-July 2003 and October 2003. At that time, groundwater samples were collected from 51 monitoring wells and 11 direct-push locations (Ref. 1). Additional groundwater sampling at select wells has also been conducted between October 2003 and the present to address identified data gaps.

Groundwater sampling for underground recovery system will continue on a semiannual basis. The next sampling event is scheduled for September 2008 (Ref. 3). Water level and product thickness measurements will continue on a monthly and quarterly basis (Ref. 9).

Annual sampling for the former Equalization Basin began during 2006 and will continue through 2010. Sampling will be discontinued after 2010, if contaminant levels are less than EPA MCLs in all wells and if there is no trend of increasing concentration (Ref. 5).

8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

X YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the CPR site, EPA ID# PRD-00632182, located at in Bayamón, Puerto Rico, under current and reasonably expected conditions. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater." This determination will be re-evaluated when EPA becomes aware of significant changes at the facility.

___ NO - Unacceptable migration of contaminated groundwater is observed or expected.

___ IN - More information is needed to make a determination.

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Locations where references may be found:

References reviewed to prepare this EI determination are identified below. Reference materials are available at U.S. EPA, Region 2.

References:

1) *Sitewide Groundwater Monitoring Program, Draft Final Report.* Prepared by Anderson, Mulholland, and Associates, Inc. (AMAI). Dated January 2004.

2) *Documentation of Environmental Indicator Determination, Environmental Indicator RCRIS code (CA725), Current Human Exposures Under Control.* Dated September 29, 2004.

3) *Groundwater Quality Sampling Results, Underground Recovery System, April 2008.* Prepared by AMAI. Dated May 2008.

4) *Quarterly Data Summary, Underground Recovery System, October – December 2007.* Prepared by AMAI. Dated February 2008.

5) *Equalization Basin 2008 Annual RCRA Groundwater Monitoring Report.* Prepared by AMAI. Dated June 2008.

6) *Letter from Axel P. Soderberg, Director, Caribbean Environmental Protection Division, to Julio Hernandez, Refinery Manager, CPR, RE: Interim Corrective Measure Work Plan: Old Oil Lagoons (Rev 2) ADDENDUM, March 2008.* Dated June 6, 2008.

7) *Scope of Proposed Supplemental Soil Excavation at Old Oil Lagoons, Caribbean Petroleum Refining LP, Bayamon, Puerto Rico.* Prepared by AMAU. Dated January 2008.

8) *Generic Regional Screening Levels for Contaminants of Potential Concern at Superfund Sites*. Developed by Oak Ridge National Laboratory under an Interagency Agreement with EPA. Dated September 12, 2008. website access: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables

9) *Quarterly Data Summary, Underground Recovery System, January – March 2008.* Prepared by AMAI. Dated May 2008.

10) *Technical Memorandum, Groundwater Sampling for Mercury and TCE, Evaluation of Results from Four Sampling Rounds between July 2006 and December 2007, Sitewide Groundwater Monitoring Program.* Dated June 2008.