September 26, 2000

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: **HOVENSA LLC**
Facility Address: **1 Estate Hope, Christiansted, St. Croix, U.S. V.I. 00820-5652**
Facility Location: **Limetree Bay, St. Croix, U.S. Virgin Islands**
Facility EPA ID#: **VID980536080**

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 "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 objective of the RCRA Corrective Action program, the EI 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

HOVENSA L.L.C., (HOVENSA) formerly owned by Hess Oil Virgin Islands Corp. (HOVIC), operates a petroleum refinery at Limetree Bay in the Virgin Islands (Figure 1). The facility is situated on 1,500 acres on the south central coast of St. Croix. Operations began in 1965, and the current design capacity is approximately 545,000 barrels of crude oil per day. Over 60 different types of crude oil have been processed, and by means of distillation crude oil is separated into components such as fuel gas, naphtha, jet fuel, kerosene, and No. 2 oil. The Caribbean Sea forms the southern border of the facility. HOVENSA operates a 60 foot deep harbor which can accommodate super tankers at two of nine berths. All transportation of crude and finished products is accomplished by means of tanker ships.

The EPA conducted a RCRA Facility Assessment (RFA) at the facility in 1988 which identified Solid Waste Management Units (SWMU) and the areas of concern (AOC) (Figure 2). Additional SWMUs were also identified at the facility since 1988. A total of 29 SWMUs and 4 AOCs were identified, and groundwater in areas associated with these SWMUs was evaluated to determine if contaminated groundwater is under control. The SWMUs and AOCs are summarized below along with important information regarding corrective measures and current groundwater monitoring activities.

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): All SWMUs and AOCs are described below. A map of the SWMU locations is provided in Figure 2. See Figure 5 for the approximate areal extents of AOC #1 and #4. The exact areal extent of AOC #2 has not yet been fully defined, but it is wholly enclosed by the "existing area of contaminated groundwater", which includes Subdomains 1 through 9 of the "Site-wide Groundwater and PSH Model" (refer to Figure 5C), plus additional areas of the facility enclosed within the red line on Figure 5C. AOC #3 comprises 9 areas within the facility where MTBE or other oxygenated ethers or oxygenated fuels have been or are currently being handled. The AOC #3 areas are shown on Figure 5B. AOC #4, which corresponds to PSH and dissolved constituents on the St. Croix Alumina property (see Figure 5 and Subdomain 10 on Figure 5C) located adjacent to HOVENSA's western boundary, is excluded from this CA750 analysis as will be discussed below under question #3.

SWMU 1, Construction Landfill 1 (closed): No further action required per November 1, 1999 RCRA operating permit with exception of areas around wells CL1-2 and CL1-6, which are addressed as part of SWMU 29 and the Corrective Measures Management Unit (CMMU) #1 corrective measures study.

SWMU 2, Construction Landfill 2 (closed): Chromium has been detected in shoreline wells at SWMU #2, in the southeast portion of the facility. Commencing in 1997, EPA required three years of semi-annual groundwater monitoring to determine if the chromium levels decreased. Recent results [March and September 1999] have still recorded elevated concentrations [wells CL2-2 (160 µg/L), CL2-3 (194 µg/L), CL2-4 (174 µg/L), and CL2-5 (99.8 µg/L)] above the health based concentration level (HBCL) for chromium. HOVENSA maintains the detections are due to leaching from the stainless steel casings and screens in those wells. EPA has recently approved a program, as part of the CMS for SWMU #2, to replace those stainless steel wells with PVC wells, and then monitor those new PVC wells for three years. However, groundwater is not utilized for any purposes downgradient of this SWMU, and between 1997 and 2000, the chromium measured in the groundwater in SWMU #2 wells has been detected at concentrations less than ten times its HBCL, indicating any discharges to the surface waters of the Caribbean Sea would be **"insignificant",** as discussed under question 5 below.

SWMU 3, Asbestos Staging Area: The 1988 RFA did not indicate suspected releases and there have been no subsequent releases. Therefore, no corrective action required.

SWMU 4, Construction Landfill 3 (closed): Approximately 5200 cubic yards of spent catalyst material were disposed of in this landfill as a non-hazardous solid waste [it was not listed when disposed of, and reportedly passed EP Toxicity testing at that time]. Subsequently, effective February 1999, that material became classified as a newly listed hazardous waste (K171 & K172); however, per EPA requirements, material that has been disposed prior to being listed as a hazardous waste can remain in the ground. If it is subsequently excavated, however, it must be managed as a hazardous waste. In June 1999 the buried catalyst material was sampled for all inorganic and organic constituents given in 40 CFR Part 268.40, the Land Disposal Treatment Standards for K171 & K172. Nickel and vanadium were found to exceed their 40 CFR Part 268.40 regulatory limits (11 mg/l TCLP and 1.6 mg/L TCLP, respectively). In October 1999 groundwater was sampled for all inorganic and organic constituents given in 40 CFR Part 268.40. Antimony, nickel, and vanadium (but no organics) were detected in the groundwater in wells immediately south of SWMU#4 at concentrations above their respective HBCL. However, the concentrations were less than ten times their respective HBCL, indicating any discharges to the surface waters of the Caribbean Sea, located approximately 1500 feet to the south, would be **"insignificant",** as discussed under question 5 below. The CMS for SWMU #4 included an evaluation of risk , and concluded that no unacceptable human health or ecological risks are posed by the contaminated groundwater and/or leaving the buried spent catalyst material in place. The proposed CMI remedy includes an initial 5 years of semi-annual groundwater monitoring of 7 downgradient wells for antimony, nickel, vanadium, and in addition, arsenic and benzene, which although not detected above their HBCLs, are also hazardous constituents for the spent catalyst listed wastes K171 & K172. In addition, the proposed CMI includes ongoing institutional controls. Theses releases are located within the "existing area of contaminated groundwater". Groundwater is not utilized for any purposes downgradient of this SWMU.

SWMU 5, Landfarm I (closed): Is a closed hazardous waste management unit subject to 40 CFR Part 264 Subpart F and G groundwater monitoring (and corrective action if necessary), and closure/post-closure requirements under the 1990 Post-Closure Permit. Semi-annual groundwater monitoring of 8 wells surrounding this unit have recorded detections of hazardous constituents; however, through "outside source demonstrations" reviewed and approved by EPA, pursuant to Part 264 procedures, those detections have been ascribed to releases from other SWMUs or AOCs at the facility. Those releases are being dealt with under the facility's 1999 RCRA Operating Permit, and are located within the "existing area of contaminated groundwater". Groundwater is not utilized for any purposes downgradient of this SWMU.

SWMU 6, Landfarm II: Consists of operating Landfarm II, a regulated hazardous waste management unit for treatment/disposal of hazardous waste. The unit is subject to 40 CFR Part 264 Subpart F groundwater monitoring and corrective action requirements under Module X of facility's 1999 RCRA Operating Permit. Semi-annual groundwater monitoring of wells surrounding this unit have recorded detections of hazardous constituents; however, through "outside source demonstrations" reviewed and approved by EPA, pursuant to Part 264 procedures, those detections have been ascribed to releases from other SWMUs or AOCs at the facility. Those releases are being dealt with under the facility's 1999 RCRA Operating Permit, and are located within the "existing area of contaminated groundwater". Groundwater is not utilized for any purposes downgradient of this SWMU.

SWMU 7, Landfarm III: Consists of operating Landfarm III, a regulated hazardous waste management unit for treatment/disposal of hazardous waste. The unit is subject to 40 CFR Part 264 Subpart F groundwater monitoring and corrective action requirements under Module X of facility's 1999 RCRA Operating Permit. Semi-annual groundwater monitoring of wells surrounding this unit have recorded detections of hazardous constituents; however, through "outside source demonstrations" reviewed and approved by EPA, pursuant to Part 264 procedures, those detections have been ascribed to releases from other SWMUs or AOCs at the facility. Those releases are being dealt with under the facility's 1999 RCRA Operating Permit, and are located within the "existing area of contaminated groundwater". Groundwater is not utilized for any purposes downgradient of this SWMU.

SWMU 8, Incinerator (closed): Consists of the former Non-Hazardous Incinerator, which has been removed. The 1988 RFA did not indicate any suspected releases, nor have subsequent releases been documented. No corrective action is required.

SWMU 9, Wastewater Lagoon 1: Consists of Surface Impoundment 1, a wastewater treatment lagoon, which formerly operated as an interim status hazardous waste management unit, but is no longer authorized to manage hazardous waste. The unit is subject to 40 CFR Part 264 Subpart F groundwater monitoring and corrective action requirements under Module X of facility's 1999 RCRA Operating Permit. Semi-annual groundwater monitoring of wells surrounding this unit have recorded detections of hazardous constituents; however, through "outside source demonstrations" reviewed and approved by EPA, pursuant to Part 264 procedures, those detections have been ascribed to releases from other SWMUs or AOCs at the facility. Those releases are being dealt with under the facility's 1999 RCRA Operating Permit, and are located within the "existing area of contaminated groundwater". Groundwater is not utilized for any purposes downgradient of this SWMU.

SWMU 10, Wastewater Lagoon 2: Consists of Surface Impoundment 2, a wastewater treatment lagoon, which formerly operated as an interim status hazardous waste management unit, but is no longer authorized to manage hazardous waste. The unit is subject to 40 CFR Part 264 Subpart F groundwater monitoring and corrective action requirements under Module X of facility's 1999 RCRA Operating Permit. Semi-annual groundwater monitoring of wells surrounding this unit have recorded detections of hazardous constituents; however, through "outside source demonstrations" reviewed and approved by EPA, pursuant to Part 264 procedures, those detections have been ascribed to releases from other SWMUs or AOCs at the facility. Those releases are being dealt with under the facility's 1999 RCRA Operating Permit, and are located within the "existing area of contaminated groundwater". Groundwater is not utilized for any purposes downgradient of this SWMU.

SWMU 11, Wastewater Lagoon 3: Consists of Surface Impoundment 3, a wastewater treatment lagoon, which formerly operated as an interim status hazardous waste management unit, but is no longer authorized to manage hazardous waste. The unit is subject to 40 CFR Part 264 Subpart F groundwater monitoring and corrective action requirements under Module X of facility's 1999 RCRA Operating Permit. Semi-annual groundwater monitoring of wells surrounding this unit have recorded detections of hazardous constituents; however, through "outside source demonstrations" reviewed and approved by EPA, pursuant to Part 264

procedures, those detections have been ascribed to releases from other SWMUs or AOCs at the facility. Those releases are being dealt with under the facility's 1999 RCRA Operating Permit, and are located within the "existing area of contaminated groundwater". Groundwater is not utilized for any purposes downgradient of this SWMU.

SWMU 12, Slop Oil Tank: Consists of Recoverable Oil Tanks which accumulate oil recovered from the Facility's oil/water separators. The recovered oil is then recycled back to the facility's process streams. The 1988 RFA did not indicate any suspected releases and no RFI was required under the Facility operating permit. There have been no subsequent releases, and no corrective action is required.

SWMU 13, Process Sewers (Throughout Facility): Consists of Oily-Water Sewer Lines. Releases, if they occur, are reported to EPA and addressed as described in the Permit. No RFI or other corrective action is required.

SWMU 14, Settling Basin: Consists of the former Ballast Water Settling Basin, which was subsequently filled with construction debris and other solid waste material, including spent sand-blasting material (which has a high lead content). Elevated lead concentrations were found in soils and a RFI and Corrective Measures Study (CMS) were completed. A Corrective Measures Investigation (CMI) was required and a CMI remedy was approved, which included an initial 1 year of semi-annual groundwater sampling for all RCRA metals; followed by 2 years of semi-annual sampling for any constituents found above their HBCLs (i.e., lead and chromium). [Both were less than ten times their respective HBCL, indicating any discharges to the surface waters of the Caribbean Sea would be **"insignificant",** as discussed under question 5 below.] During those subsequent 2 years, i.e. 4 semi-annual sample events (March 1998 - September 1999), both lead and chromium concentrations in the groundwater were below their respective HBCLs. Groundwater is not utilized for any purposes downgradient of this SWMU.

SWMU 15, Spent Catalyst Staging Area: Consists of an area for temporary storage of used catalyst material prior to recycling or disposal. An RFI was completed, no releases were detected, and no further corrective action is required.

SWMU 16, Bundle Wash Area & Flares 2 & 3 Knock-out Drums: Groundwater underlying SWMU #16 contained phased separated hydrocarbon and dissolved benzene plumes. An RFI and CMS were completed, and CMI remedy approved. CMS activities have included collection of potentiometric and fluid level data. Recent data is contained in the bi-monthly progress report for February-March 2000.

SWMU 17, Salvage Yard: The salvage yard is used to accumulate miscellaneous metal equipment. The 1988 RFA did not indicate any suspected releases, nor have subsequent release been detected. Therefore, no corrective action is required.

SWMU 18, East Stormdrain Canal: Consists of the East Stormwater Drainage Canal. As per the Permit, no RFI or other corrective action is required for this SWMU. The basis for this determination is that the original sources of any releases from the drainage canal are:

(i) releases from other units which already have been identified as SWMUs, or if not, will be pursuant to requirements of the facility's 1999 RCRA Operating Permit.

(ii) non-point source releases (i.e., releases other than those through permitted outfalls under the Clean Water Act) from drainage canals will be dealt with under AOCs #1 and #2, as discussed below; or

(iii) releases from specific locales in drainage canals which have been, or will be, confirmed as definite release sites and will be designated as separate SWMUs.

SWMU 19, West Stormdrain Canal: Consists of West Stormwater Drainage Canal. As per the Permit, no RFI or other corrective action is required for this SWMU. The basis for this determination is discussed under SWMU #18 above.

SWMU 20, Main Stormdrain Canal: Consists of Main Stormwater Drainage Canal. As per the Permit, no RFI or other corrective action is required for this SWMU. The basis for this determination is discussed under SWMU #18 above.

SWMU 21, Flare 3 Lowpoint Drains & Structures: This SWMU drains condensed liquids from the base of the Flare No. 3 stack into a curbed concrete pad from which historic releases to soils and groundwater have been documented. An RFI and CMS were completed. A CMI remedy was also approved, and is being implemented. The remedy being implemented is vacuum enhanced recovery (VER).

SWMU 22, Oily Water Sewers Piping between Lagoon 3 and Landfarm 2: This SWMU consists of that portion of the oily water sewer (OWS) lines between Surface impoundment 3 and Landfarm 2 where confirmed releases from the process sewers have occurred. A final RFI report was approved by EPA in 1997. Further assessment is not required for this SWMU, subject to no further releases from the OWS line, or expansion of the PSH plume. Either would trigger resumed investigation. Under interim corrective measures, wells are pumped to contain contaminants. In addition, SWMU 22 VER pilot tests have commenced, and recovery operations will continue until PSH levels decrease significantly in area wells.

SWMU 23, Lagoon 1; Area Underground Oily Water Sewer Piping: SWMU 23 consists of a portion of the OWS lines located on the south side of Surface Impoundment 1, and is a location of confirmed past releases. An RFI was completed, and the CMS is currently in progress which includes soil and groundwater sampling. In addition, enhanced fluid recovery (EFR) pumping and use of oxygen release compounds (ORC) at locations CL23-1 and CL23-2 have reduced dissolved volatile constituents in groundwater. No further action at these wells is proposed by HOVENSA under the CMS for SWMU 23. Ongoing EFR using a vacuum truck at well LW-5A is in progress, and will be evaluated after the 6-month trial. A decreasing trend in concentration was documented at LW-5A during the September 1999 and February 2000 sampling events.

SWMU 24, Lagoon 1 Northern Drainage Ditch: Consists of the Above Ground Drainage Ditch adjacent to the north side of Surface Impoundment 1, and is a location where several confirmed releases occurred. Implementation of the CMS is currently in progress. Ongoing

interim corrective measures include vacuum truck pumping of wells CL24-3 and CL24-4 to remove PSH. Wells 650 and 271 are also vacuum pumped. A VER pilot test will be completed for SWMU 24.

SWMU 25, Construction Debris Burial Area: Consists of the Construction Debris Burial Area located near Flare No. 1, and is an area where construction debris and other solid waste has been buried in the past. An RFI has been completed and approved by EPA. A CMS and, if required, a CMI would be implemented for SWMU 25. Implementation of the CMS for SWMU 25 is in progress. HOVENSA continues to vacuum pump well CL25-4 with a vacuum truck as part of the interim corrective measures for this unit, and pumps well WD-2 via a submersible pump. Pumping will continue until product thicknesses decrease to residual levels, or the VER pilot test is initiated.

SWMU 26, Fire Training Grounds Area: Consists of the Fire Fighting Training Area and associated structures. An RFI has been completed and approved by EPA. A CMS and, if required, a CMI would be implemented for SWMU 26. Implementation of the CMS for SWMU 26 is in progress. HOVENSA continues to vacuum pump well CL25-4 with a vacuum truck as part of the interim corrective measures for this unit, and pumps well WD-2 via a submersible pump. Pumping will continue until product thicknesses decrease to residual levels, or the VER pilot test is initiated.

SWMU 27, Lagoon No. 1 Dredge Spoil Area: Consists of an off-site area where non-hazardous wastewater treatment sludges from Surface Impoundment 1 were formerly disposed. An RFI was conducted. A total of 25 soil borings and 9 shallow wells were installed. Elevated total petroleum hydrocarbon (TPH) concentrations were detected in surface and shallow subsurface soils. Groundwater, which is very shallow at this SWMU was analyzed for the "Skinner List" of constituents, broad list of organic and inorganic constituents associated with petroleum refining activities. No constituents were measured in the groundwater at concentrations exceeding their respective HBCLs. Nevertheless, EPA did not fully approve the CMS' conclusion that natural attenuation is an effective remedy for constituents at SWMU 27. The final remedy has not yet been determined. However, as an Interim Corrective Measure, EPA required five years of annual soil sampling at several locations to confirm the effectiveness of natural attenuation. Three sampling events have been conducted since January 1998, and the results appear to indicate a decrease in soil TPH concentrations, but not at all sample locations.

SWMU 28, Area C: Consists of an area outside the southwestern corner of the Facility in the Krause Lagoon potentially impacted by overland flow and/or non-permitted discharges from the West Side Drainage Canal. An RFI was completed and approved, and no further corrective action is required.

SWMU 29, Abandoned Underground Culverts: Consists of Abandoned Underground Culverts leading to former Outfall No. 5, and is an on-site area where releases of PSH have been observed. An RFI and CMS were completed. A CMI workplan was approved in November 1999. HOVENSA is currently performing interim corrective measures at the SWMU 29 area consisting of PSH and groundwater recovery. Measures include vacuuming gauging points PB-N and PB-S to remove fluids from the plugged and abandoned underground culverts and EFR of

well CL-6. The frequency of vacuuming and EFR was recently changed from weekly to monthly. The CMI remedy for this SWMU is being implemented, and fluid recovery is ongoing at well 560.

The AOCs are listed below:

AOC #1. AOC #1 consists of the PSH plume(s) floating on the groundwater underlying the facility, that cannot be clearly linked to releases from a specific, individual SWMU. AOC #1 also includes all areas impacted, or potentially impacted, by the PSH plumes. No RFI is required, contingent on fully delineating all PSH plumes as part of the Hydrocarbon Recovery Project (HRP) already in progress. In addition, an Interim Corrective Measures Study (ICMS) is being implemented that consists of a recurring program of tightness testing, repair, and/or upgrading of the facility's process sewers and underground hydrocarbon pipelines, as needed. It also includes a recurring program of visual and static head testing for the facility's atmospheric storage tanks. Lastly, the facility is implementing the HRP, and progress reports are submitted on a semi-annual basis.

AOC #2. AOC #2 consists of any dissolved phase hydrocarbon (DPHC) plumes within the groundwater underlying the facility that may pose threats to human health and/or the environment, that cannot be clearly linked to releases from a specific, individual SWMU. AOC #2 also includes all groundwater and/or areas impacted, or potentially impacted, by dissolution of hazardous constituents from the PSH plume(s) into a dissolved phase within the groundwater. No RFI is required contingent on continued sampling of specific monitoring wells, analysis of sampling results, and delineation of plumes that may pose threats to human health and/or the environment. ICMs are also being implemented as a condition of the final permit. Lastly, a CMS is required for AOC #2 to delineate, on a site-wide basis, all DPHC plumes in the groundwater to determine what corrective measures are required to adequately protect human health and/or the environment, and to select the corrective measures to be implemented as the CMI to achieve the final remedy for the DPHC plumes in the groundwater. The CMS includes implementation of a site-wide groundwater flow, PSH flow, and DPHC transport model.

AOC #3. AOC #3 consists of a plume of dissolved methyl tertbutyl ether (MTBE) in the groundwater on the south side of Tankfield 6. No RFI is required. Corrective measures for this AOC consist of additional quarterly monitoring of groundwater, semi-annual hydrostatic pressure testing of specific underground lines, and tank testing every 2 years. The final remedy for AOC #3 also includes remediation of MTBE-contaminated areas to approved clean-up levels.

AOC #4. The PSH and dissolved constituents on the St. Croix Alumina (formerly VIALCO) property correspond to AOC #4 of the 1999 RCRA Permit, but are specifically excluded from this CA750 analysis as will be discussed below under question #3.

Reference:

(1) Draft RCRA Permit - Administrative Record, May 19, 1999 (Table 1).
(2) Final RCRA Operating Permit, November 1, 1999.
(3) Corrective Measure Study (CMS) Workplan for SWMU #2, September 8, 2000.

(4) Draft Final Corrective Measures Implementation Report (CMI) for SWMU #14, August 11, 2000.
(5) Revised CMS Report and Risk Evaluation for SWMU #4, September 18, 2000.
(6) Groundwater Monitoring Plan for SWMU #4, August 1, 2000.
(7) CMS Workplan for AOC #1 and AOC #2, May 11,2000.
(8) Revised CMS Workplan for AOC #3, August 15, 2000.
(9) Site-wide Model: PSH Model Development, Final Report, May 15, 2000.
(10) Final RFI Report and Draft CMS Report for SWMU #27, October 5, 1998.
(11) RFI Bimonthly Progress Report/CMS Bimonthly Status Report for June-July 2000, August 31, 2000.

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:

The EPA conducted a RCRA RFA at the Hess Oil Virgin Islands Corp. (HOVIC) facility in 1988 which identified SWMUs and the AOC. Pursuant to its RCRA Operating permit, HOVIC submitted RFI workplans and conducted RCRA RFIs for those SWMUs and additional SWMUs identified during subsequent investigations conducted at the refinery. Extensive groundwater sampling has been conducted and phase separated hydrocarbon (PSH) and dissolved hazardous constituents have been detected. A hydrocarbon recovery project (HRP) is in place and operational. During the first half of 2000, the facility-wide recovery system included: 117 active PSH and/or groundwater [for hydraulic control purposes] recovery wells, 488 HRP observation wells [to gauge the absence or presence of PSH, and its thickness], 15 HRP dissolved constituent groundwater monitoring wells (see Figure 5A), and 109 regulated unit [i.e. permitted unit] and/or SWMU monitoring wells. Well locations are provided on Figure 3 (Drawing E-RW-100). As of June 30, 2000, a cumulative total of 34,356,000 gallons (818,000 barrels) of the PSH have been recovered from on top of the groundwater, and recycled back into the facility's process stream. An estimated 5,838,000 gallons (139,000 barrels) of PSH remain on top of the groundwater, yet to be recovered.

Water quality data from the facility were compared to HBCLs which were developed from a combination of EPA Corrective Action Rules, MCLs, and toxicity calculations. HBCLs for both metals and organic constituents at the HOVIC facility are presented in Table 2

The electronic water quality database for the HOVIC facility was queried to identify constituents that exceeded HBCLs during the semiannually sampling events from 1997 through 1999. A summary of detections above HBCLs is provided in Table 3, and plotted on Figure 4 (drawing M003607001). These water quality data document that groundwater is contaminated on site. Constituents exceeding HBCLs include benzene, ethylbenzene, toluene, and xylene, which are widespread throughout the facility. In a few isolated areas, there are also exceedances of a variety of VOCs and metals. Groundwater is contaminated with both PSH and dissolved phase hydrocarbons. An isopach map of PSH thickness

[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).

based on December 1999 gauging data is provided in Figure 5. Information from isopach maps suggests pure product is present in some areas up to 4.5 feet in thickness. As stated above, an ongoing hydrocarbon recovery project is in place and operational.

References:

(1) Second Semi-Annual 1999 Hydrocarbon Recovery Project Status Report - February 2000
(2) First Semi-Annual 2000 Hydrocarbon Recovery Project Status Report - August 2000
(3) RFI/CMS Bimonthly Progress Report - June 30, 2000
(4) HOVENSA Electronic Water Quality Database [refer to Amerada Hess' (Alex Sagebien's) letter of September 6, 2000 to EPA (Timothy Gordon)].

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:

A hydrocarbon recovery project (HRP) has been in operation since November 1987, and HOVENSA continues to implement the proposed CMS for SWMUs 1, 14, 16/21, 23, 24, 25/26, 27 and 29; and AOC's 1, 2, and 3. Contamination from hydrocarbon products represents the bulk of historic and current groundwater pollution. Continued operation of the HRP is required under the facility's 1999 RCRA Operating Permit. The August 2000 semi-annual HRP status report indicates that current recovery is estimated to be about 9366 gallons (223 barrels) of PSH per day (Table 4). As of June 30, 2000, a cumulative total of 34,356,000 gallons (818,000 barrels) of the PSH have been recovered from on top of the groundwater, and recycled back into the facility's process stream since inception of the HRP project (Figure 6). An estimated 5,838,000 gallons (139,000 barrels) of PSH remain on top of the groundwater, yet to be recovered.

Recent site-wide modeling of PSH has also been completed. The model documented current hydrocarbon product thickness and compared it to historical maximum thickness for 10 model sub-domain areas across the facility. In all model subdomains, the current hydrocarbon thickness has significantly decreased from historic levels. For example, historic and present day hydrocarbon data for one of the most heavily contaminated areas of the facility are presented in Figure 7. This figure documents that PSH product thickness has decreased up to ten feet at some locations. Historic data for

[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.

other sub-domains show similar trends and are not presented herein, but can be found in the state-wide PSH model-May 2000.

As part of the HRP, HOVENSA operates an active groundwater pumping system to maintain hydraulic control program around segments of the facility perimeter. An estimated 360,000 gallons (8577 barrels) of ground water are recovered per day through pumping (both as part of the PSH recovery and to maintain hydraulic control) and processed through the facility's wastewater treatment system. Hydraulic control has been documented along the western perimeter of the facility in the May 1996 modeling for the "Former SCPC/HOVIC West Fence/St. Croix Alumina Area". In addition, semi-annual groundwater sampling in 15 "dissolved constituent monitoring" wells is required as part of the HRP, under the facility's 1999 RCRA Operating Permit. These "dissolved constituent monitoring" wells located around the perimeter of the facility (see Figure 5A) either detect no BTEX [BENZENE, TOLUENE, ETHYLBENZENE, XYLENE] [benzene, toluene, ethylbenzene, xylene] compounds, or detect BTEX at concentrations of less than ten times the HBCL. Based on this information, it is concluded that, in general, the migration of the greatest mass of hydrocarbon contaminants has stabilized. It is further concluded that the hydrocarbon recovery project results in capture zones that contain other contaminants such as VOCs and metals. The fact that downgradient and boundary observation wells do not detect these constituents provides supporting evidence for this conclusion.

Data provided in Figure 4 indicate that there may be two small isolated areas of contamination located in the northeast (wells 618, 628, 629 for BTEX compounds, and well 626 for benzene and arsenic and chromium) and southeast (wells CL2-2 through CL2-6 for chromium) portion of the facility that may not have fully stabilized. However, in the northeast area, the "existing area of contaminated groundwater" is within the facility's boundary and surrounded by 4 "dissolved constituent monitoring" wells (321, 619, 620, and 626 [see Figure 5A]) required to be sampled semi-annually under the facility's 1999 RCRA Operating Permit. The constituents detected in those 4 wells between 1997 and 2000 are less than 10 times their HBCL, which is the appropriate groundwater level, indicating any discharges would be **"insignificant"** as discussed above under the text for question 5.

In the southeast portion of the facility chromium was detected in shoreline wells at SWMU #2 [wells CL2-2 (160 µg/L), CL2-3 (194 µg/L), CL2-4 (174 µg/L), and CL2-5 (99.8 µg/L)]. However, in all cases, the measured chromium was detected below ten times its HBCL, indicating any discharges would be **"insignificant"** as discussed above under the text for question 5. Furthermore, HOVENSA maintains the detections are due to leaching from the stainless steel casings and screens in those wells, and a program to replace those wells with PVC wells, and then monitor them for three years, is part of the CMS for SWMU #2.

The PSH and dissolved constituents on the St. Croix Alumina (formerly VIALCO) property is specifically excluded from this CA750 analysis. These releases correspond to AOC #4 of the 1999 RCRA Permit, and sub-domain #10 of the site wide groundwater flow and contaminant transport model currently under development for the facility. This area is excluded from this analysis for the following reasons:

(1) EPA has concluded that the contamination resulted from releases at both the HOVENSA site and the St. Croix Alumina company site.

(2) The area will be addressed separately under a RCRA Order involving HOVENSA, HOVIC (prior owner of the facility), and the past and present owners of the alumina company facility. That order is close to being finalized.

(3) The May 31, 1996 "Water Flow and Free Phase Analysis of the former SCPC/HOVIC West Fence/ St. Croix Alumina Area" (Area #10 of site-wide model prepared by ES&T) indicates that hydraulic control is effective along HOVIC/HOVENSA's western boundary. Therefore, no migration of PSH (and by inference, dissolved contaminants) has occurred since 1996 across that boundary.

References:

(1) Second Semi-Annual 1999 Hydrocarbon Recovery Project Status Report - February 2000
(2) First Semi-Annual 2000 Hydrocarbon Recovery Project Status Report - August 2000
(3) RFI/CMS Bimonthly Progress Report - June 30, 2000
(4) Site-Wide Model: PSH Model Development Final Report - May 15, 2000
(5) Water Flow and Free Phase Analysis of the former SCPC/HOVIC West Fence/ St. Croix Alumina Area.- May 1996

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

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

___ 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:

The facility is located on the southern shore of St. Croix, and all groundwater eventually discharges to the Caribbean Sea. Initial water table elevations used in the site-wide model and general direction of groundwater gradients are provided in Figure 8. Groundwater generally flows from north to south toward the ocean.

References:

(1) Site Wide Model: PHS Development Final Report - May 15, 2000

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 ecosystems at these concentrations)?

_X_ 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 judgement/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:

Figure 4 presents concentrations of contaminants detected at various wells and the corresponding HBCL. In the northeast portion of the site, approximately one mile from the surface waters of the Caribbean Sea, offsite sentinel well 626 detected arsenic (116 µg/L, HBCL 50 µg/L); chromium (84.9 µg/L, HBCL 50 µg/L); benzene (16 µg/L, HBCL 5 µg/L) above their corresponding HBCLs. However, those constituents, and all others detected between 1997 and 2000, are less than 10 times their HBCL, which is the appropriate groundwater level, indicating any discharges would be **"insignificant"** as discussed above under the text for question 5. Results of the most current dissolved constituent sampling are presented in the August 2000 "1st Semi-Annual Report for year 2000", and show that other northeast sentinel wells (321, 619 and 620, refer to Figure 5A) were non-detect for all analyzed constituents. It is also anticipated that concentrations of BTEX [BENZENE, TOLUENE, ETHYLBENZENE, XYLENE] compounds would be further reduced as they move further downgradient toward the Caribbean Sea because of natural attenuation mechanisms.

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

In the southeast portion of the facility chromium was detected in shoreline wells at SWMU #2 [wells CL2-2 (160 µg/L), CL2-3 (194 µg/L), CL2-4 (174 µg/L), and CL2-5 (99.8 µg/L)]. However, in all cases, the measured chromium was detected below ten times its HBCL, indicating any discharges would be **"insignificant"** as discussed above under the text for question 5.. [Furthermore, HOVENSA maintains the detections are due to leaching from the stainless steel casings and screens in those wells, and a program to replace those wells with PVC wells, and then monitor them for three years, is part of the CMS for SWMU #2.]

Reference:

(1) HOVENSA Electronic Water Quality Database [refer to Amerada Hess' (Alex Sagebien's) letter of September 6, 2000].
(2) CMS Workplan for SWMU #2, dated September 8, 2000, as modified by EPA's (Ms. Nicoletta DiForte's) letter of September 25, 2000 to HOVENSA (Mr. Michael Clowers).
(3) 1st Semi-Annual Hydrocarbon Recovery Project Report for year 2000", August 2000.

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 ecosystems 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 and Reference(s):

This question is not applicable. See response to question #5.

[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:

Continued semi-annual sampling and analysis of the groundwater in 15 "dissolved constituent monitoring" wells is required as part of the HRP under the facility's 1999 RCRA Operating Permit. These "dissolved constituent monitoring" outpost wells are located around the perimeter of the facility (see Figure 5A) . The "dissolved constituent monitoring" outpost wells associated with contamination in the northeast corner of the facility (Wells 321,619, 620, and 626, refer to Figure 5A) will continue to be sampled as required under the 1999 RCRA Operating Permit. SWMU #2 wells located in the southeast portion of the facility bordering the Caribbean Sea will continue to be monitored as part of the CMS for SWMU 2, under the 1999 RCRA Operating Permit. The bimonthly fluid level gauging of all HRP "observation" wells (currently 488) will continue under the requirements of the 1999 RCRA Operating Permit, for the purpose of assessing the absence or presence of PSH, and its thickness,. Also, semi-annual groundwater sampling and analysis of an additional 20 RCRA monitoring wells will continue at 5 "regulated [i.e., permitted] units" under the facility's 1999 RCRA Operating Permit and at an additional 8 RCRA wells at closed Landfarm I under the 1990 RCRA Post-closure Permit for that unit.

Reference:

(1) Final RCRA Operating Permit, November 1, 1999.
(2) First Semi-Annual 2000 Hydrocarbon Recovery Project Status Report - August 2000.
(3) CMS Workplan for SWMU #2, dated September 8, 2000, as modified by EPA's (Ms. Nicoletta DiForte's) letter of September 25, 2000 to HOVENSA (Mr. Michael Clowers).
(4) RCRA Post-closure Permit for Landfarm I, October 1990.

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 HOVENSA, L.L.C. Facility, EPA ID #VID980536080, located at Limetree Bay, St. Croix, U.S.V.I., whose mailing address is; 1 Estate Hope, Christiansted, V.I. 00820-5652. 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 the Agency 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.

Completed by: ___original signed by_____ Date:__09/22/00_____
Dan Buffalo
Hydrologist
Tetra Tech EM Inc.

Reviewed by: ___original signed by_____ Date:__09/22/00_____
Doug Sullivan
Project Manager
Tetra Tech EM Inc.

___original signed by_____ Date:__09/26/00_____
Tim Gordon, Project Manager
RCRA Programs Branch
EPA Region 2

___original signed by_____ Date:__09/26/00_____
Nicolette DiForte, Section Chief
RCRA Programs Branch
EPA Region 2

Approved by: ___original signed by_____ Date:__09/27/00_____
Raymond Basso, Chief
RCRA Programs Branch
EPA 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, 15th Floor, New York, New York.

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Attachments

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

- Table 1 - Administrative Record, HOVENSA L.L.C. - Draft RCRA Permit
- Table 2 - Health Based Concentration Limits (HBCL)
- Table 3 - Groundwater Detections Above HBCL: 1997-2000
- Table 4 - Hydrocarbon Recovery Project
- Figure 1 - Topographic Map of St. Croix
- Figure 2 - HOVIC Solid Waste Management Units
- Figure 3 - Facility Map showing HOVENSA Recovery and all other Wells (Drawing E-RW-100)
- Figure 4 - Groundwater Detections Above HBCLs (1997 - 2000)
- Figure 5 - HOVENSA L.L.C. Hydrocarbon Isopach Map - June 2000 Gauging Data
- Figure 5A - Hydrocarbon Recovery Project Dissolved Constituent Monitoring Wells
- Figure 5B - Map Showing AOC #3 Areas
- Figure 5C - Map Showing Site-wide Model Subdomains and "Existing Area of Contaminated Groundwater"
- Figure 6 - Hydrocarbon Recovery Project Graph of Cumulative Recovered and Remaining Barrels of Hydrocarbons (June 2000).
- Figure 6A - Hydrocarbon Recovery Project Table of Estimated [Remaining] Phase Separated Hydrocarbons, [Cumulative] Measured Recovery, and Average Recovery Rate [all volumes in 42 gallon barrels] (June 2000).
- Figure 7 - Area 3 Apparent Hydrocarbon Thicknesses
- Figure 8 - Initial Water Table Elevation, January 1994

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