DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
Final 6/25/04
RCRA Corrective Action
Environmental Indicator (EI) RCRIS Code (CA725)

Current Human Exposures Under Control

Facility Name: Valero St. Charles Refinery (formerly Orion Refining Corporation)
Facility Address: 14902 River Road, New Sarpy, Louisiana 70079
Facility EPA ID #: LAD000225862

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 AIN@ (more information needed) status code.

Definition of Environmental Indicators (for the RCRA Corrective Action)

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

Definition of ACurrent Human Exposures Under Control@ EI

A positive ACurrent Human Exposures Under Control@ EI determination (AYE@ status code) indicates that there are no Aunacceptable@ human exposures to Acontamination@ (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 Acontamination@ 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 ACurrent Human Exposures Under Control@ EI is for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and does not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program=s overall mission to protect human health and the environment requires that final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI determinations status codes should remain in Resource Conservation and Recovery Information System (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 Valero St. Charles Refinery (formerly the Orion Refining Corporation [Orion] facility) is a 997-acre facility in New Sarpy, Saint Charles Parish, Louisiana. The site is located at 29° 59' 02" north latitude and 90° 19' 40" west longitude. The site is situated on the east bank of the Mississippi River approximately 20 miles upstream of New Orleans, Louisiana. The site is bordered by U.S. Highway 61 to the north, the Mississippi River to the south, and the Shell Oil Company Refinery to the west.

The refinery has a production capacity of 155,000 barrels per day (bpd) of American Petroleum Institute (API) gravity sour crude oil and 185,000 bpd of total throughput capacity. Current production activities at the refinery include: atmospheric and vacuum distillation, desalting, reforming, alkylation, desulfurization, fluid catalytic cracking, coking, light end processing, and sulfur recovery. Operations at the refinery are divided into the West Plant, East Plant, and various tank farms (e.g., Section 2 - Tank Farm).

A total of 19 solid waste management units (SWMUs) (including two former GATX SWMUs) and six areas of concern (AOCs) have been identified at the refinery. No further action (NFA) or investigation was recommended for SWMUs 5, 7, 9, and 11 through 15 as well as AOC 1 through AOC 6 in the Phase I RCRA Facility Investigation (RFI) work plan. Louisiana Department of Environmental Quality (LDEQ) agreed with the NFA recommended in a November 19, 1997, letter.

The SWMUs without NFA status include: East Plant Wastewater Treatment Plant (SWMU 1), Sludge Drying Beds (SWMU 2), Sludge Silos (SWMU 3), East Plant API Separator (SWMU 4), Dissolved Air Flotation (DAF) Unit (SWMU 6), East Plant Wastewater Sumps (SWMU 8), No. 6 Oil Storage Tank (SWMU 10), and Former National Pollutant Discharge Elimination System (NPDES) Outfall at Bayou La Branche (SWMU 16). To date, investigations have been conducted at the East Plant Area, which includes Technical Unit 1 (SWMUs 1, 3, 4, 6, and 8), SWMU 2, SWMU 10, and SWMU 16.

Three SWMUs (SWMU 17, 18, and 19) are not included in this EI. For SWMU 17, Satellite Accumulation Areas (SAAs), although LDEQ has not granted a formal NFA determination, the release potential for the SAAs is considered low because they consist of labeled, lidded containers used for accumulating waste (i.e., less than 90-day storage) situated on concrete or asphalt pads. Therefore, this SWMU will not be further discussed in this EI. In addition, the investigation of the former GATX SWMUs (SWMUs 18 and 19) was initiated under a different EPA identification number and prior to Orion purchasing the tank farm. SWMUs 18 and 19 (a.k.a., Section 2 - Tank Farm) will be addressed in a separate CA725 EI determination and will not be further discussed in this EI.

2. Are groundwater, soil, surface water, sediments, or air media known or reasonably suspected to be **Acontaminated@**[1] above appropriately protective risk-based Alevels@ (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)?

	Yes	No	?	Rationale / Key Contaminants
Groundwater	___	x	___	No impact to groundwater
Air (indoors)[2]	___	x	___	No impact to indoor air
Surface Soil (e.g., <2 ft)	x		___	**Metals and SVOCs above RECAP screening standards**
Surface Water	___	x	___	No impact to surface waters
Sediment	___	x	___	No impact to sediment
Subsurf. Soil (e.g., >2 ft)	x		___	**Metals and SVOCs above RECAP screening standards**
Air (outdoors)	___	x	___	No impact to outdoor air

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

__X__ If yes (for any media) - continue after identifying key contaminants in each Acontaminated@ medium, citing appropriate Alevels@ (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 AIN@ status code.

Rationale and Reference(s):

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[1] AContamination@ and Acontaminated@ describe media containing contaminants (in any form, nonaqueous phase liquid (NAPL) and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based Alevels@ (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) suggests 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.

Groundwater: Monitoring wells have been installed at the refinery during various phases of investigation. All of the wells associated with the East Plant Area (GDU-MW-1, GDU-MW-2, GDU-MW-3, GDU-MW-5, EPMW-1, EPMW-3, EPMW-4, EPMW-5, MW-22, and MW-23) are screened in the shallow aquifer interval. The most recently available groundwater data for the East Plant Area were collected in April 2004 (Valero, 2004). The shallow aquifer beneath the refinery has been classified as Groundwater Class 3A (GW3A), which is a non-potable water unit that is sufficiently permeable to transmit water to a well at a maximum sustainable yield of less than 800 gallons per day (LDEQ, 2002). The groundwater levels from the April 2004 sampling event indicate that groundwater flows radially from Technical Unit 1 (SWMUs 1, 3, 4, 6, and 8), to the north in the northern portions of the East Plant Area, and to the southwest in the southwestern portions of the East Plant Area (Valero, 2004).

To identify the contaminants of potential concern (COPCs) for shallow groundwater generally flowing to the north, contaminant concentrations in groundwater in the northern portions of the East Plant Area were conservatively compared to LDEQ=s Risk Evaluation/Corrective Action Program (RECAP) Groundwater Class 3 Non-Drinking Water (GW3NDW) values without applying an associated dilution and attenuation factor (DAF3). Lead was the only contaminant with a maximum detected concentration (0.14 mg/l; EPMW-5) above the GW3NDW (0.05 mg/l) (Valero, 2004). To determine the DAF3 under the Management Option-1 (MO-1) and develop groundwater screening levels (GWss), the closest distance of EPMW-5 to Bayou La Branche was measured (approximately 700 feet) and the thickness of source area (Sd) was assumed to be equal to the screening interval (i.e., 5 feet). Thus, the appropriate DAF3 under the MO-1 is 63. The GW3NDW values for the COPCs were multiplied by the DAF3 to derive the GWss and the maximum detected concentrations were screened against the GWss. The maximum detection of lead in groundwater fell below the GWss of 3.2 mg/l.

To identify the COPCs for shallow groundwater flowing to the southwest, contaminant concentrations in groundwater in the southwestern portions of the East Plant Area were conservatively compared to LDEQ=s RECAP GW3NDW without applying an associated DAF3. Arsenic and Lead were the only contaminants with maximum detected concentrations (0.19 mg/l and 0.29 mg/l, respectively in GDU-MW-3) above the GW3NDW (both 0.05 mg/l) (Valero, 2004). To determine the DAF3 under the MO-1and develop GWss, the distance of the GDU-MW3 to the Mississippi River was measured (approximately 3600 feet) and the Sd was assumed to be equal to the screening interval (i.e., 20 feet). Thus, the appropriate DAF3 under MO-1 is 110. The maximum detection of arsenic and lead in groundwater fell below the GWss of 5.5 mg/l.

Indoor Air: The groundwater maximum detected concentrations of volatile organic compounds (VOCs) were compared to LDEQ RECAP groundwater standards for indoor air (GWesi). The maximum detected concentration of aromatic >C8-C10 (0.149 mg/l; MW-22) was the only contaminant in groundwater which exceeded the GWesi (0.065 mg/l) (Valero, 2004). The concentration of aromatic >C8-C10 in the other wells within the East Plant Area were non-detect and the detection limits do not exceed the GWesi. Because there are no buildings near or downgradient of MW-22, indoor air is not currently expected to be of concern.

Surface Soil: In April 2004, a surface soil investigation was conducted in the East Plant Area. It should be noted that this surface soil investigation was conducted across the East Plant Area at locations without paving and do not necessarily correlate with a specific SWMU or technical unit; thus, the surface soil results will be discussed on an area-wide basis. The maximum detected concentrations in surface soil were compared to the LDEQ RECAP soil standards for industrial use (SOIL_SSi). The maximum detected concentrations of 15.8 mg/kg of arsenic (DB-23 [0 - 3 feet below ground surface (bgs)]) and 0.565 mg/kg of benzo(a)pyrene (DB-20 [0 - 3 feet bgs]) exceeded the SOIL_SSi (Conestoga-Rovers, 2004).

Subsurface Soil: In 1993, six confirmation soil samples were collected from native soil beneath the Sludge Drying Beds (SWMU 2) to demonstrate equivalency closure to EPA for this unit. The maximum concentration of benzo(a)pyrene (0.42 mg/kg) was the only contaminant detected in subsurface soil at SWMU 2 above the SOIL_SSi (URS, 1996).

SWMU 10 consisted of a 55,000-barrel oil storage tank which was decommissioned in 1995. Subsurface investigation of this unit was conducted in 1995 and 1996, as part of an RFI, and included a total of nine subsurface soil locations. The maximum detected concentrations in subsurface soil at SWMU 10 above the SOIL_SSi were as follows: 40.7 mg/kg of benzo(a)anthracene (BFD-3 [6 feet bgs]), 3.07 mg/kg of benzo(a)pyrene (B-8 [8 feet bgs]), 794 mg/kg of naphthalene (BFD-3 [6 feet bgs]), and 57 mg/kg of arsenic (B-7 [4 feet bgs]) (URS, 1998).

In 1999, a Phase I RFI was conducted for Technical Unit 1 (SWMUs 1, 3, 4, 6, and 8) and Former NPDES Outfall at Bayou La Branche (SWMU 16). The maximum detected concentrations detected in subsurface soil during the Phase I RFI above SOIL_SSi were as follows: 5.07 mg/kg of benzo(a)anthracene (B-4 [3-6 feet bgs]) and 3.34 mg/kg of benzo(b)fluoranthene (B-4 [3-6 feet bgs]) (Conestoga-Rovers, 2000).

Surface Water: Surface water runoff at the site is managed by the facility and discharged through permitted outfalls (Orion, 2003). Thus, shallow groundwater to surface water discharge is the only migration pathway of concern for surface water. Because the maximum detected concentrations in groundwater from the East Plant Area fell below the GWss levels, groundwater to surface water discharge from the East Plant Area is not currently expected to be of concern.

Sediment: No surface water bodies are currently present nor has sediment been identified as a media of concern as a result of contamination at Technical Unit 1 (SWMUs 1, 3, 4, 6, and 8), SWMU 2, SWMU 10, or SWMU 16. It should be noted that the fire water pond (i.e., aeration pond) was not considered a surface water body because it is an active component of the East Plant Wastewater Treatment Unit (SWMU 1).

Outdoor Air: No outdoor air investigation has been conducted at the site. However, the maximum detected concentrations of VOCs in groundwater within the East Plant Area were compared to LDEQ RECAP industrial groundwater standards for emission of VOCs to outdoor air (GWairi). Since the maximum detected concentrations in groundwater fell below the GWairi, migration of VOCs from groundwater into outdoor air via volatile emissions is not currently expected to be of concern.

The majority of the refinery process units at the East Plant are paved, which significantly reduces the potential for particulates in outdoor air. Thus, the migration of contaminated particulates are not expected to be significant exposure pathway for on-site workers at the site.

References:

URS, 1996. ARCRA Facility Investigation (RFI) - Task I: Description of Current Conditions@ URS Greiner (URS), October 25, 1996.

URS, 1998. ARCRA Facility Investigation (RFI) - SWMU 10 Supplemental Investigation.@ URS Greiner (URS), January 23, 1998.

Conestoga-Rovers, 2000. APhase I RCRA Facility Investigation Report.@ Conestoga-Rovers & Associates (Conestoga-Rovers), June, 2000.

LDEQ, 2002. ALetter from Joseph Musso, LDEQ to Robert Gross, Orion Refining Company. Re: Evaluation of Groundwater Classification.@ Louisiana Department of Environmental Quality (LDEQ), March 4, 2002.

Orion, 2003. AResponse to Conceptual Site Model Data Gaps from Orion Refining Corporation to LDEQ Remediation Services Division. Re: Conceptual Site Model Comments.@ Orion Refining Corporation (Orion), May 29, 2003.

Valero, 2004. A Letter from Robert Gross, Valero to Keith Casanova, LDEQ. Re: Environmental Indicators Conceptual Site Model Data Gaps.@ Valero St. Charles Refinery (Valero), May 13, 2004.

Conestoga-Rovers, 2004. AEmail Correspondence from Gil Gabaldon, Conestoga-Rovers to Angela Sederquist, Booz Allen Hamilton. Re: 019828-02 Valero Refining Surficial Soil Data Results.@ Conestoga-Rovers & Associates (Conestoga-Rovers), June 4, 2004.

3. Are there complete pathways between Acontamination@ 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)

AContaminated@ Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
~~Groundwater~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~
~~Air (indoors)~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~
Soil (surface, e.g., <2 ft)	no	yes	no	yes	no	no	no
~~Surface Water~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~
~~Sediment~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~
Soil (Subsurface, e.g., >2 ft)	no	no	no	yes	no	no	no
~~Air (outdoors)~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~	~~C~~

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors= spaces for Media which are not Acontaminated@) as identified in #2 above.

2. Enter Ayes@ or Ano@ for potential Acompleteness@ under each AContaminated@ Media -- Human Receptor combination (Pathway).

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

_____ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter @YE@ status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

__X__ If yes (pathways are complete for any AContaminated@ Media - Human Receptor combination) - continue after providing supporting explanation.

_____ If unknown (for any AContaminated@ Media - Human Receptor combination) - skip to #6 and enter AIN@ status code

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

Rationale and Reference(s):

The Valero St. Charles Refinery is an industrial facility and no residents or day-care centers are currently present. Thus, residential and day-care exposure to contaminated surface/subsurface soil are not considered complete exposure pathways. The Valero St. Charles Refinery is not used for agriculture; thus, exposure to contaminated surface/subsurface soil via food intake in also not considered a complete exposure pathway.

Surface/Subsurface Soil: The Valero St. Charles Refinery has a perimeter fence that restricts access to trespassers at the site. Thus, the trespasser exposure pathway was not currently considered complete. In addition, there are no areas within the East Plant Area that would be suitable for recreation (e.g., hunting); thus, the recreator exposure pathway was also not currently considered complete.

On-site workers and construction workers may potentially be exposed to contaminated surface soil within the East Plant Area. In addition, construction workers may be exposed to subsurface soil at Technical Unit 1 (SWMUs 1, 3, 4, 6, and 8), SWMU 2, SWMU 10, and/or SWMU 16. Thus, on-site worker and construction worker exposure to contaminated surface soil and surface/subsurface soil, respectively, was considered a complete exposure pathway.

4. Can the exposures from any of the complete pathways identified in #3 be reasonably expected to be Asignificant@[44] (i.e., potentially Aunacceptable@ 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 Alevels@ (used to identify the Acontamination); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable Alevels could result in greater than acceptable risks)?

__X__ If no (exposures can not be reasonably expected to be significant (i.e., potentially Aunacceptable@) for any complete exposure pathway) - skip to #6 and enter AYE@ status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to Acontamination@ (identified in #3) are not expected to be Asignificant.@

_____ If yes (exposures could be reasonably expected to be Asignificant@ (i.e., potentially Aunacceptable@) for any complete exposure pathway) - continue after providing a description (of each potentially Aunacceptable@ exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to Acontamination@ (identified in #3) are not expected to be Asignificant.@

_____ If unknown (for any complete pathway) - skip to #6 and enter AIN@ status code

Rationale and Reference(s):

Surface/Surface Soil: Construction worker exposure to contaminated surface/subsurface soil is considered a completed exposure pathway, but the exposure is not currently expected to be significant due to institutional controls at the refinery. All contractors are required to attend an eight hour training course that addresses health and safety at the refinery. In addition, all contractors are required to prepare and implement a site-specific safety and health plan (Valero, 2004). Construction workers are expected to adhere to the appropriate Occupational Safety and Health Administration (OSHA) regulations (e.g., donning appropriate personal protective equipment [PPE]), to mitigate potential exposure to contaminated surface/subsurface soil. Thus, construction workers are not expected to be exposed to contamination.

On-site worker exposure to contaminated surface soil is considered a complete exposure pathway, but the exposure is not currently expected to be significant due to institutional controls at the refinery. On-site worker safety procedures (e.g., PPE) and training have been established for on-site workers, in accordance with applicable OSHA regulations and guidance, to mitigate potential exposures to contaminated surface soil (Valero , 2004). Thus, on-site workers are not expected to be exposed to contamination.

References:

Valero, 2004. AEmail Correspondence from Robert Martin, Valero St. Charles Refinery to Angela Sederquist, Booz Allen Hamilton. Re: Valero St. Charles Refinery EI Determinations.@ Valero St. Charles Refinery (Valero), June 9, 2004.

[4] If there is any question on whether the identified exposures are Asignificant@ (i.e., potentially Aunacceptable@) consult a human health Risk Assessment specialist with appropriate education, training and experience.

5. Can the Asignificant@ exposures (identified in #4) be shown to be within acceptable limits?

_____ If yes (all Asignificant@ exposures have been shown to be within acceptable limits) - continue and enter AYE@ after summarizing and referencing documentation justifying why all Asignificant@ exposures to Acontamination@ 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 Aunacceptable@)- continue and enter ANO@ status code after providing a description of each potentially Aunacceptable@ exposure.

_____ If unknown (for any potentially Aunacceptable@ exposure) - continue and enter AIN@ status code

Rationale and Reference(s):

Not Applicable

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 **Valero St. Charles Refinery** facility, EPA ID # **LAD000225862**, located at **New Sarpy, Louisiana**, under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

____ NO - "Current Human Exposures" are NOT "Under Control."

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

Completed by Myrna Moline, Geologist — Date 6/25/2004
LDEQ/OEA/ETD/GG1

With Technical Assistance from
Angela Sederquist
Risk Assessor, BAH

LDEQ Reviewer N M Dave — Date 6/25/2004
Narendra Dave, Geological Manager
LDEQ/OEA/ETD/GG1

EPA WAM Nancy Fagan
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Locations where References may be found:

LDEQ Public Records.

Contact telephone and e-mail numbers

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

THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

Attachments Available
Upon Request

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
Final 6/30/04
RCRA Corrective Action
Environmental Indicator (EI) RCRIS Code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: Valero St. Charles Refinery (formerly Orion Refining Corporation)
Facility Address: 14902 River Road, New Sarpy, Louisiana 70079
Facility EPA ID#: LAD000225862

1. Have **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 (SWMUs), regulated units (RUs), and areas of concern (AOCs)), 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.

Definition of Environmental Indicators (for the RCRA Corrective Action)

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

Definition of "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 Resource Conservation and Recovery Information System (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 Valero St. Charles Refinery (formerly the Orion Refining Corporation [Orion] facility) is a 997-acre facility in New Sarpy, Saint Charles Parish, Louisiana. The site is located at 29° 59' 02" north latitude and 90° 19' 40" west longitude. The site is situated on the east bank of the Mississippi River, approximately 20 miles upstream of New Orleans, Louisiana. The site is bordered by U.S. Highway 61 to the north, the Mississippi River to the south, and the Shell Oil Company Refinery to the west. This CA750 addresses a portion of the facility, as described below in more detail.

The refinery has a production capacity of 155,000 barrels per day (bpd) of American Petroleum Institute (API) gravity sour crude oil and 185,000 bpd of total throughput capacity. Current production activities at the refinery include: atmospheric and vacuum distillation, desalting, reforming, alkylation, desulfurization, fluid catalytic cracking, coking, light end processing, and sulfur recovery. Operations at the refinery are divided into the West Plant, East Plant, and various tank farms (e.g., Section 2 - Tank Farm).

A total of 19 solid waste management units (SWMUs) (including two former GATX SWMUs) and six areas of concern (AOCs) have been identified at the refinery. No further action (NFA) or investigation was recommended for SWMUs 5, 7, 9, and 11 through 15, as well as AOCs 1 through 6, in the Phase I RCRA Facility Investigation (RFI) work plan. Louisiana Department of Environmental Quality (LDEQ) agreed with the NFA recommended in a November 19, 1997, letter.

The SWMUs without NFA status include: East Plant Wastewater Treatment Plant (SWMU 1), Sludge Drying Beds (SWMU 2), Sludge Silos (SWMU 3), East Plant API Separator (SWMU 4), Dissolved Air Flotation (DAF) Unit (SWMU 6), East Plant Wastewater Sumps (SWMU 8), No. 6 Oil Storage Tank (SWMU 10), and Former National Pollutant Discharge Elimination System (NPDES) Outfall at Bayou La Branche (SWMU 16).

This CA750 EI addresses the East Plant Area, which includes Technical Unit 1 (SWMUs 1, 3, 4, 6, and 8), SWMU 2, SWMU 10, and SWMU 16. SWMUs 17, 18, and 19 are not addressed. For SWMU 17, Satellite Accumulation Areas (SAAs), although LDEQ has not granted a formal NFA determination, the release potential for the SAAs is considered low because they consist of labeled, lidded containers used for accumulating waste (i.e., less than 90-day storage) situated on concrete or asphalt pads. Therefore, this SWMU will not be further discussed in this EI. In addition, the investigation of the former GATX SWMUs (SWMUs 18 and 19) was initiated under a different EPA identification number and prior to Orion purchasing the tank farm. SWMUs 18 and 19 (a.k.a., Section 2 - Tank Farm) will be addressed in a separate CA750 EI determination and will not be further discussed in this EI.

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?

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

_X_ 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 geology of the Valero site is characterized by 0 to 5 feet of fill material, underlain by natural levee deposits of the Mississippi River. The natural levee deposits are thicker and coarser near the river and thinner away from the river where sediments grade to finer-sized black swamp clay and silt deposits. Boring logs from the site indicate that the levee deposits consist predominantly of clay and silt, with minimal sand. The uppermost clay is a sandy, brown to gray, soft to medium stiff clay layer that ranges from 10 to 15 feet thick. Below the uppermost clay is a soft to very stiff gray clay layer with wood and organic matter encountered to a depth between 65 and 75 feet below ground surface (bgs). Below approximately 75 feet bgs, a thin, dense, tan to gray silty sand layer is present. The sand is the uppermost confined water-bearing stratum beneath the site. The sand is underlain by stiff to very stiff tan and gray Pleistocene clay layer.

Site investigations have focused on delineating contaminant concentrations in the fill and levee deposits that comprise the shallow aquifer. The shallow aquifer beneath the refinery has been classified as Groundwater Class 3A (GW3A), which is a non-potable water unit that is sufficiently permeable to transmit water to a well at a maximum sustainable yield of less than 800 gallons per day (Ref. 1). All monitoring wells associated with the East Plant Area (GDU-MW-1, GDU-MW-2, GDU-MW-3, GDU-MW-5, EPMW-1, EPMW-3, EPMW-4, EPMW-5, MW-22, and MW-23) are screened in the shallow aquifer. Depth to groundwater in the shallow aquifer occurs at approximately three feet bgs. Historic groundwater data indicate that flow direction across the site is generally north, northeast, and east, away from the Mississippi River. The most recent groundwater data for the East Plant Area, collected in April 2004 (Ref. 3), indicate that local groundwater flow is radially from Technical Unit 1 (SWMUs 1, 3, 4, 6, and 8), to the north in the northern portions of the East Plant Area, and to the southwest in the southwestern portions of the East Plant Area.

The most recent water quality data were collected in April 2004 (Ref. 3). The April sampling event, and associated well installation activities, were conducted in response to a Sampling and Analysis Plan (SAP) developed by Booz Allen & Hamilton for EPA Region 6 (Ref. 2). The SAP was designed to address data gaps identified during the preparation of the CA750. Groundwater monitoring wells MW-22 and MW-23, a nested well pair, were installed and sampled in response to the SAP.

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[1] "Contamination" and "contaminated" describe media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

To identify the contaminants of potential concern (COPCs) for shallow groundwater generally flowing to the north, contaminant concentrations in groundwater in the northern portions of the East Plant Area were conservatively compared to LDEQ's Risk Evaluation/Corrective Action Program (RECAP) Groundwater Class 3A Non-Drinking Water (GW3NDW) values without applying an associated dilution and attenuation factor (DAF3). Lead was the only contaminant with a maximum detected concentration (0.14 mg/l; EPMW-5) above the GW3NDW (0.05 mg/l) (Valero, 2004). To determine the DAF3 under the Management Option-1 (MO-1) and develop site-specific groundwater screening criteria, the closest distance from well EPMW-5 to Bayou La Branche was measured (approximately 700 feet) and the thickness of source area (Sd) was assumed to be equal to the screening interval (i.e., 5 feet). Based on these calculations, the appropriate DAF3 under the MO-1 is 63. The maximum detected concentrations were then compared to the product of the GW3NDW values for the COPCs and the DAF3 to derive the site-specific MO-1 criteria. As presented in Table 1, the maximum detection of lead in groundwater falls below the site-specific MO-1criteria of 3.2 mg/l.

To identify the COPCs for shallow groundwater flowing to the southwest, contaminant concentrations in groundwater in the southwestern portions of the East Plant Area were conservatively compared to LDEQ's RECAP GW3NDW without applying an associated DAF3. Arsenic and lead were the only contaminants with maximum detected concentrations (0.19 mg/l and 0.29 mg/l, respectively in GDU-MW-3) above the GW3NDW (both 0.05 mg/l) (Ref. 3). To determine the DAF3 and site-specific groundwater screening criteria under MO-1, the distance of well GDU-MW3 to Bayou La Branche was measured (approximately 1200 feet). This distance is conservative because the groundwater flow path from this well is quite circuitous as it moves towards the Mississippi River (3600 feet away) before it assumes a likely course towards Bayou La Branche. The Sd was assumed to be equal to the screening interval (i.e., 20 feet). Based on these calculations, the appropriate DAF3 under MO-1 is 43. As presented in Table 1, the maximum detection of arsenic and lead in groundwater fall below the site-specific groundwater screening criteria of 2.25 mg/l.

Table 1. Groundwater Concentrations Detected Above RECAP GWss without DAF3 (mg/L)

Constituent	Well I.D.	Concentration[1]	RECAP GW3NDW w/out DAF3	Site-Specific Criteria Management Option 1[2] with DAF3
Northern Portion of East Plant Area				
Lead	EPMW-5	0.14	0.05	3.2
Southwestern Portion of East Plant Area				
Arsenic	GDU-MW-1	0.074	0.05	2.25
	GDU-MW-3	0.19	0.05	2.25
	GDU-MW-5	0.092	0.05	2.25
Lead	GDU-MW-1	0.066	0.05	2.25
	GDU-MW-3	0.29	0.05	2.25

1. Samples collected and laboratory analyzed in April 2004 (Ref. 3).

2. Criteria listed are the Risk Evaluation Corrective Action Program (RECAP) Screening Standard (GW_{SS}) Groundwater Non-Drinking Water (GWNDW) without calculation of the dilution and attenuation factor for Class 3A groundwater (DAF3) and the RECAP site-specific criteria using Management Option 1 (MO-1) and calculated DAF3s based on aquifer thickness and distance to the nearest surface water body.

As presented in Table 3, the six groundwater detections that exceed the RECAP GW3NDW screening standards are below the site-specific criteria developed under MO-1 with a calculated DAF3. Therefore, groundwater within the area addressed in this CA750 EI is not considered to be contaminated above relevant groundwater protection standards.

References:

1. Letter from Joseph Musso, LDEQ to Robert Gross, Orion Refining Company. Re: Evaluation of Groundwater Classification. Louisiana Department of Environmental Quality (LDEQ). Dated March 4, 2002.
2. Draft Sampling and Analysis, Orion Refining Corporation, Soil, Groundwater, and Surface Water Sampling, New Sarpy, Louisiana, Booz Allen & Hamilton for EPA Region 6. Dated November 13, 2003.
3. Letter from Robert Gross, Valero to Keith Casanova, LDEQ. Re: Environmental Indicators Conceptual Site Model Data Gaps. Dated May 13, 2004.

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)?

___ 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:

[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.

___ 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:

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)?

___ 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:

[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 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:

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[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?"

___ 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:

Additional Information

Valero continues to monitor the groundwater at the St. Charles Refinery under solid waste regulations for their permitted units (East Plant Ponds and New Sarpy Ponds) and to assess groundwater conditions under the continuing RCRA Facility Investigation (RFI) for the Section 2 Tank Farm. In addition, new wells installed by the facility in the GDU project area and the East Plant areas may be used to monitor the groundwater.

A listing of monitor wells used in this evaluation and to monitor groundwater at the facility is included in the attached tables and in figure 1, proposed sampling locations (Valero, 2004).

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 Benton Creosoting Works, EPA ID #LAD 008056632, located at 6695 Louisiana Highway No. 3, Benton, Louisiana. 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 Myrna Moline Date 6/30/2004
Myrna Moline, Geologist
LDEQ/OEA/ETD/GG1

With technical assistance from
Lucas Kingston
Hydrogeologist, BAH

LDEQ Reviewer N M Dave Date 6/30/2004
Narendra M. Dave, Geological Manager
LDEQ/OEA/ETD/GG1

EPA WAM
Nancy Fagan
EPA Region 6

Locations where References may be found:

LDEQ Public Records.

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Attachments Available
Upon Request