DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures Under Control

Facility Name: Valero St. Charles Refinery (Former GATX Tank Terminal)
Facility Address: 15292 River Road, New Sarpy, Louisiana 70078
Facility EPA ID #: LAD062644778

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

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

   ____ If no - re-evaluate existing data, or

   ____ if data are not available skip to #6 and enter "IN" (more information needed) status code.

Definition of Environmental Indicators (for the RCRA Corrective Action)

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

Definition of "Current Human Exposures Under Control" EI

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

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action 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 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 is a 997-acre facility located in New Sarpy just east of the town of Norco, St. Charles Parish, Louisiana. The site, at 29° 59' 12" north latitude and 90° 22' 38" west longitude, is situated on the east bank of the Mississippi River approximately 20 miles upstream of New Orleans, Louisiana. The facility is bordered by U.S. Highway 61 to the north, the Mississippi River to the south, and the Shell Oil Company/Motiva Enterprises Refinery to the west. This CA725 addresses a portion of the facility, as described below in more detail.

The refinery has a production capacity of 190,000 barrels per day (bpd) of American Petroleum Institute (API) gravity sour crude oil and 250,000 bpd of total throughput capacity. The production activities at the refinery include atmospheric and vacuum distillation, desalting, reforming, alkylation, desulphurization, 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. A total of 19 SWMUs and six AOCs have been identified at the refinery.

GATX Terminals Corporation (GATX) operated a tank terminal at the site from 1925-1997. In 1997, the tank terminal was purchased by the TransAmerican Refining Corporation (TARC), an heir to the Good Hope Refinery that existed in the area from the 1940s through the early 1980s. TARC, which changed names to the Orion Refining Corporation (Orion), declared bankruptcy in 2003. On July 1, 2003, Valero Refining purchased the refinery assets of Orion.

A total of 19 SWMUs and six AOCs have been identified at the refinery. Separate CA725 and CA750 EI determinations were conducted for 17 SWMUs and six AOCs associated with EPA ID LAD000225862. Therefore, these SWMUs and AOCs will not be further discussed in this EI determination. This EI determination addresses the Former GATX Creosote Tanks Area (SWMU 18) and Former GATX Wastewater Impoundment Area (SWMU 19), which were subsequently purchased and redeveloped into Section 2- Tank Farm at the Valero St. Charles Refinery. These SWMUs have not achieved "no further action" (NFA) status. SWMU 18 stored creosote brought in by ship or barge on the Mississippi River. The creosote was stored in three tanks (two 25,000-barrel capacity tanks and one 37,500-barrel capacity tank) from 1918 to 1980. The creosote was transferred from the tanks to either trucks or rail cars; there are no records of creosote being used on the site. Two of the tanks were dismantled from 1980 to 1982 to allow for the construction of Section 2 - Tank Farm. The third tank was converted into an oil reuse tank and was demolished in 2006. SWMU 19 consists of three unlined surface impoundments located within Section 2 - Tank Farm to collect wastewater from the Good Hope Refinery's operations. The impoundments were apparently in use from the 1940s to at least 1969, and were dewatered, backfilled and closed from 1980 to 1981. It should be noted that Valero has conducted investigations at Section 2 - Tank Farm, but not on a SWMU-specific basis. Thus, this EI discusses the investigation on an area-wide basis (i.e., Section 2 - Tank Farm). SWMU 18 comprises the southern and central portion of the Section 2 – Tank Farm area and is shown in Figures 1 and 2. SWMU 19 comprises the north central portion the Section 2 – Tank Farm area. The locations of the former Waste Impoundments 1, 2, and 3 are shown in Figure 2 as adjacent and south of the Steam Methane Reformer (SMR) area, which is downgradient of both SWMU's.

References:

LDEQ, 2003. *Risk Evaluation/Corrective Action Program (RECAP)*, Louisiana Department of Environmental Quality (LDEQ), October 2003.

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

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

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

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

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

Rationale and Reference(s):

---

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

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

Groundwater:

The hydrogeology of the Valero site is characterized by 0 to 5 feet of silty, clayey 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 backswamp clay, silt and peat deposits. Boring logs from the site indicate that the levee and backswamp deposits consist predominantly of clay and silt with organic matter in the upper permeable zone and some sand. The generalized shallow stratigraphy is described as follows. The uppermost clay is a brown to gray, soft to medium stiff silty clay layer extending to a depth of approximately 10 to 15 ft below ground surface (ft-bgs). Below the uppermost clay is the first permeable zone (Zone II) that consists of a loose gray silt layer with clayey silt, wood and organic matter encountered to a depth of approximately 20 to 25 ft bgs. The third zone consists of gray clay and silty clays and extends to approximately 25 to 30 ft bgs; this zone serves as an aquitard between the permeable zones, Zone II and Zone IV, but it is not continuous across the site and may not be present in some areas. Where it is not in direct contact with the first permeable zone, the second permeable zone consists of a permeable firm gray silt, sandy silt, and silty clay which extends to approximately 35 to 40 ft-bgs. Below this second permeable zone are soft gray clays that overlie the stiffer clays and cleaner sands of the Pleistocene deposits. The contact between the Holocene (Recent) and Pleistocene deposits occurs at approximately 60 to 70 ft-bgs beneath the site. Below the depth of approximately 100-120 feet bgs at the site is the Gramercy Aquifer. Soil boring locations and the line of geologic cross section are provided in Figure 3; a geologic cross section through the SMR and GATX SWMU area is provided as Figure 4.

Site investigations have concentrated on delineating contaminant concentrations in the Holocene (Recent) backswamp and levee deposits that comprise the shallow groundwater unit. The shallow unit beneath the refinery has been classified as Groundwater Class 3A (GW3A), which is a non-potable water unit that has low permeability and is able to transmit water to a well at a maximum sustainable yield of less than 800 gallons per day (LDEQ, 2003). All monitoring wells associated with the Section 2 - Tank Farm are screened within the two permeable zones in the shallow unit, Zone II and Zone IV. The upper zone generally extends from the water table to a depth of 20 feet bgs and is monitored by wells MW-2 through MW-4, MW-7 through MW-21, MW-24, and MW-26. The lower zone generally extends to a depth of 35 to 40 feet bgs and is monitored by wells MW-1, MW-2B, MW-3B, MW-5, MW-6, MW-7B, MW-8B, MW-25, and MW-27 (Conestoga-Rovers & Associates, 2003). Table 1 provides the monitoring well locations and screened intervals, and Table 2 lists the measured total depth, top of casing elevation, and general static water level of wells used for groundwater monitoring at the facility.

Depth to groundwater in the shallow unit in April 2004 ranged from approximately 2.3 feet to 5.3 feet (Valero, 2004a). Local groundwater flow direction in the shallow Holocene deposits is generally to the north across the property and away from the Mississippi River. A comparison of water level elevations reported for nested well pairs MW-24/MW-25 and MW-26/MW-27 located at the northern and northeastern boundaries of the SMR indicates very slight upward vertical gradients (Valero, 2004a), which is a finding consistent with previous observations for the area (Conestoga-Rovers & Associates, 2003).

The April 2004 sampling event and associated well installation were conducted in response to a Sampling and Analysis Plan (draft SAP, November 13, 2003) designed to address data gaps identified during the initial preparation of the CA750 (Booz Allen Hamilton, 2003). In response to the SAP requirements and in addition to a site-wide groundwater sampling event, groundwater monitoring wells MW-24/MW-25 and MW-26/MW-27 (two nested well pairs) were installed and sampled; three temporary borings (TDP-1, TDP-2, and TDP-3) were sampled between SWMUs 18 and 19 and the northeastern boundary (Figure 3); and five surface water samples were collected from Bayou La Branche, off site and downgradient of Section 2 (designated SW-1 through SW-5) (Valero, 2004a). The November 2004 groundwater data were obtained as grab samples of shallow groundwater from seven soil borings/temporary wells, designated SMR-1 through SMR-7, that were installed and sampled to provide soil and groundwater data to support the design of the Steam Methane Reformer (SMR) foundation (Conestoga-Rovers & Associates, 2005). SMR-1 through SMR-7 are shown in Figure 3, Figures 5a through 5e, and Figure 6.

Previous investigations have identified two separate groundwater contaminant plumes in the upper zone of the shallow groundwater unit. These include a benzene plume underlying the former waste impoundments (SWMU 19),

and a polyaromatic hydrocarbon (PAH) plume underlying the area of the former creosote tanks (SWMU 18). The maximum contaminant concentrations in these two plumes in April 2004 are presented in the table below (page 6).

The table was developed by first comparing contaminant concentrations in the Section 2 - Tank Farm to the Louisiana Department of Environmental Quality (LDEQ) Risk Evaluation/Corrective Action Program (RECAP) Groundwater Class 3A Non-Drinking Water (GW3NDW) values without applying an associated dilution and attenuation factor (DAF3). As indicated in the table, several PAHs, metals, and one volatile organic compound (VOC) (benzene) exceed GW3NDW. As a second step, the DAF3 under Management Option-1 (MO-1) and site-specific groundwater screening criteria were developed. The closest distance from impacted groundwater (well MW-10) and the first surface water body was estimated (approximately 2,200 feet) and the thickness of source area (Sd) was assumed to be equal to the screened interval (i.e., 20 feet). According to RECAP, the appropriate DAF3 under MO-1 for these conditions is 110. The MO-1 with DAF3 values were calculated as the product of the GW3NDW values and the DAF3. As presented in the following table, maximum benzene concentrations that exceed the MO-1 with DAF3 are reported at boring/temporary well SMR-4. Other wells that define the benzene plume (i.e., those wells whose concentrations have exceeded MO-1 with DAF3) include MW-7, MW-8, and MW-10 through MW-13. Maximum PAH concentrations that exceed MO-1 with DAF3 are reported in well MW-16 (benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoranthene, benzo (k) fluoranthene, chrysene, dibenzofuran, and flouranthene). Other wells that define the PAH plume include MW-2, MW-17, and MW-21. All concentrations are reported in milligrams per liter (mg/L).

References:

Booz Allen Hamilton, 2003. *Draft Sampling and Analysis Plan (SAP) for Orion Refining Corporation, Soil, Groundwater, and Surface Water Sampling, New Sarpy, Louisiana*, Booz Allen Hamilton for EPA Region 6, November 13, 2003.

LDEQ, 2003. *Risk Evaluation/Corrective Action Program (RECAP)*, Louisiana Department of Environmental Quality (LDEQ), October 2003.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)
Page 6
Groundwater Concentrations Detected Above RECAP GW3NDW without DAF3 (mg/L) Compared to Site Specific MO-1 with DAF3

Constituent	Well I.D.	Concentration[1,2]	RECAP GW3NDW[3] w/out DAF3	Site-Specific Criteria Management Option 1[3] (MO-1) with DAF3
VOCs				
Benzene	SMR-4	**631**	0.013	1.43
SVOCs				
2-methylnaphthalene	MW-16	2.41	0.027	2.97
Acenaphthene	MW-16	3.45	0.54	59.4
Anthracene	MW-16	0.953J	0.11	12.1
Benzo(a)anthracene	MW-16	**0.782J**	0.00000038	0.0000418
Benzo(a)pyrene	MW-16	**0.222J**	0.0002	0.022
Benzo(b)fluoranthene	MW-16	**0.471J**	0.000091	0.01
Benzo(k)fluoranthene	MW-16	**0.244J**	0.00091	0.1001
Chrysene	MW-16	**0.767J**	0.000038	0.00418
Dibenzofuran	MW-16	**2.09**	0.015	1.65
Fluoranthene	MW-16	**4.14**	0.032	3.52
Fluorene	MW-16	3.16	0.078	8.58
Naphthalene	MW-16	9.27	0.22	24.2
Phenanthrene	MW-16	8.87	0.21	23.1
Pyrene	MW-16	2.67	1.4	154.0
Aromatics				
Aromatic >C8-C10	MW-21	82.3	31	3,410
Aromatic >C12-C16	MW-16	40.9	31	3,410
Aromatic >C16-C21	MW-16	55.8	24	2,640
Aromatic >C21-C35	MW-16	33.4	24	2,640
Metals				
Arsenic	MW-21	0.26	0.05	5.5
Cadmium	MW-13	0.025	0.01	1.1
Lead	TDP-2	0.18	0.05	5.5

1. Samples collected and laboratory analyzed in April 2004 (Valero, 2004a), except for SMR-4, which was obtained as a grab sample collected in November 2004 from a soil boring completed as part of the SMR project (Conestoga-Rovers & Associates, 2005).
2. **Bold** formatting indicates that the reported concentration exceeds both the RECAP GW3NDW and MO-1 with DAF3. "J" qualifier indicates estimated concentration.
3. 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.

Indoor Air: There are no buildings located in the area or downgradient from the GATX SWMUs that are subject to a complete exposure pathway via vapor intrusion. However, maximum detected groundwater concentrations were compared to LDEQ RECAP groundwater standards for indoor air (GWesi) to evaluate the potential for VOCs to migrate into indoor air via the vapor intrusion pathway at the site. The results of this screening are summarized in the following table.

Groundwater Concentrations Detected Above LDEQ RECAP GWesi (in mg/L)

Contaminant	GWesi	Concentration Exceeding the GWesi	Monitoring Well Number
Aliphatics>C6-C8	230	**369/412**	SMR-4/SMR-4 DUP
Aliphatics >C8-C10	7.9	<9.50 **21.7** <9.50 <9.50 <30/<30	MW-7 MW-8 MW-16 MW-21 SMR-4/SMR-4 DUP
Aliphatics>C12-C16	1.3	**2.01**	MW-16
Aromatics>C8-C10	71	**82.3**	MW-21
Benzene	7.2	**125** **79.8** **40.5** **136/631** **33.6**	MW-7 MW-8 MW-10 SMR-4/SMR-4 DUP SMR-5

Bold indicates that the concentration exceeds the applicable GWesi

For illustration, an operator shack (i.e., trailer) is shown on Figure 1-4 of the RECAP Report for the Section 2 - Tank Farm (Conestoga-Rovers & Associates, 2003). The shack has an elevated foundation and does not rest directly on the ground surface, and thus does not represent a complete exposure pathway for vapor intrusion. Well MW-21 is located approximately 500 feet upgradient/crossgradient to the trailer. Contaminated groundwater at that location would also not be expected to impact indoor air at the trailer location due to the distance, and the fact that only one TPH fraction slightly exceeded the GWesi (aromatics>C8-C10 = 82.3 mg/l; GWesi = 71 mg/L). With the exception of MW-16, all other monitoring wells reporting exceedances of the GWesi are located downgradient from the trailer location. Thus, the benzene concentrations in groundwater that exceed the GWesi by two orders of magnitude (e.g., 631 mg/L in SMR-4 DUP; GWesi = 7.2 mg/L) would not be expected to impact indoor air at the location of the trailer.

The aliphatics >C12-C16 (2.01 mg/L) fraction was detected above its respective GWesi (1.3 mg/L) at monitoring well MW-16, which is adjacent to the trailer location. This exceedance is minor, as the aliphatics>C12-C16 fraction was detected at approximately 1.5 times the GWesi. The aliphatics >C8-C10 fraction was not detected at MW-16 above the reporting detection limit (RDL) of 9.5 mg/L; however, the RDL slightly exceeds the GWesi of 7.9 mg/L. Technically, the concentration of the aliphatics>C8-C10 fraction would slightly exceed the GWesi at MW-16 (i.e., less than 1.2 times the GWesi).

Surface Soil: Surface soil investigations were conducted in the Section 2 - Tank Farm between June 2002 through October 2004 (Conestoga-Rovers & Associates, 2003; Conestoga-Rovers & Associates, 2004; Valero, 2004a; Conestoga-Rovers & Associates, 2005). The surface soil investigation was conducted across the Section 2 - Tank Farm at locations that do not necessarily correlate with a specific SWMU; thus, the surface soil results

are 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 in surface soil that exceeded the SOIL_SSi were 106 milligrams per kilogram (mg/kg) of arsenic (DB-2 [0-3 feet bgs]), 47.6 mg/kg of benzo(a)anthracene (SB-06 [0-3 feet bgs]), 14.1 mg/kg of benzo(a)pyrene (RFI-3 [0-3 feet bgs]), 16.5 mg/kg of benzo(b)fluoranthene (CB-05 [0-3 feet bgs]), 1.8 mg/kg of dibenz (a,h)anthracene (CB-05 [0-3 feet bgs]), 273 mg/kg of dibenzofuran (RFI-3 [0-3 feet bgs]), 3.24 mg/kg of indeno(1,2,3-cd)pyrene (CB-05 [0-3 feet bgs]), and 127 mg/kg of naphthalene (CB-05 [0-3 feet bgs]) (Conestoga-Rovers & Associates, 2005). See Figure 5a, Figure 5e, and Figure 6.

Subsurface Soil: Various subsurface soil investigations have been conducted at SWMU 18, SWMU 19, and Section 2 - Tank Farm. Since the Section 2 - Tank Farm investigations included the aforementioned SWMUs, and more recent investigations have occurred on an area-wide basis, the subsurface soil results are discussed on an area-wide basis. The maximum detected concentrations in subsurface soil were compared to the LDEQ SOIL_SSi. The maximum detected concentrations in subsurface soil that exceeded the SOIL_SSi were 49.9 mg/kg of arsenic (CB-8 [6-9 feet bgs]), 468 mg/kg of benzene (SMR-3 [12-14 feet bgs]), 127 mg/kg of benzo(a)anthracene (CB-15 [3-6 feet bgs]), 45.5 mg/kg of benzo(b)fluoranthene (CB-15 [3-6 feet bgs]), 53.7 mg/kg of benzo(k)fluoranthene (CB-15 [3-6 feet bgs]), 39.9 mg/kg of benzo(a)pyrene (CB-15 [3-6 feet bgs]), 2,050 mg/kg of carbazole (CB-15 [3-6 feet bgs]), 710 mg/kg of dibenzofuran (CB-15 [10-12 feet bgs]), 217 mg/kg of 2-methylnaphthalene (CB-4 [10-12 feet bgs]), 1,050 mg/kg of naphthalene (CB-15 [3-6 feet bgs]), 11,000 mg/kg of total petroleum hydrocarbons-diesel range organics (TPH-DRO) (CB-15 [3-6 feet bgs]), 843 mg/kg TPH-gasoline range organics (TPH-GRO) (SB-06 [4-6 feet bgs]), and 7,750 mg/kg of TPH-oil range organics (TPH-ORO) (SB-06 [4-6 feet bgs]) (PRC, 1991; G&E Engineering, 1996; Conestoga-Rovers & Associates, 2003; Conestoga-Rovers & Associates, 2005). See Figure 5a, Figure 5e, and Figure 6.

Surface Water: No surface water bodies are present on site, and surface water runoff at the site is collected and treated by the facility. Thus, shallow groundwater to surface water discharge from Section 2 - Tank Farm to Bayou La Branche is the only migration pathway of concern for surface water. Five surface water samples were collected from Bayou La Branche during the April 2004 sampling event (Valero, 2004a). Since the GW3NDW values were developed by LDEQ to be protective of human health exposure to surface water (i.e., incidental ingestion of water and fish/shellfish ingestion), the maximum detected concentrations in surface water were compared to the GW3NDW values without applying a DAF. All contaminant concentrations in surface water fell below the GW3NDW values. In addition, it should be noted that none of the aforementioned contaminants were detected in on-site shallow groundwater above GWss levels; thus, it is not expected that current contaminant concentrations detected in on-site shallow groundwater will impact surface water in Bayou La Branche a result of groundwater discharge to surface water. Thus, surface water is not currently considered a medium of concern.

Sediment: No surface water bodies are currently present on site, nor has sediment been identified as a medium of concern as a result of contamination at the Section 2 - Tank Farm. Off-site sediment is present in the adjacent wetland to the north and northeast and in Bayou La Branche. However, as indicated above, surface water runoff is collected and treated by the facility; thus, sediment in Bayou La Branche is not expected to be impacted by contaminated surface water runoff. As discussed above, groundwater to surface water discharge is not expected to impact Bayou La Branche. Therefore, sediment is not considered a medium of concern.

Outdoor Air: No investigations of outdoor air have been conducted at the site. To assess the impact to outdoor air due to volatile emissions, the maximum detected concentrations of VOCs and SVOCs in groundwater within Section 2 - Tank Farm (Valero, 2004a) were compared to LDEQ RECAP industrial groundwater standards for emission of volatile compounds to outdoor air (GWairi). The maximum detected concentration of benzene (631 mg/L at SMR-4 DUP) was the only contaminant concentration that exceeded its respective GWairi (390 mg/L). Thus, at the one location SMR-4, volatile emissions to outdoor air were considered to be an exposure pathway of concern.

To assess the impact to outdoor air due to particulate emissions, contaminants in surface soil above RECAP SOIL_SSi were further evaluated. Arsenic was the only contaminant detected in surface soil above the RECAP SOIL_SSi; thus, a site-specific risk-based screening level (RBSL) for inhalation of arsenic-impacted particulates was developed under RECAP Management Option 3 (MO-3) for on-site workers (see Attachment 1). The resulting site-specific RBSL[3] for arsenic was 629 mg/kg. Since the maximum detected concentration of arsenic (106 mg/kg) in surface soil fell below the site-specific RBSL, inhalation of contaminated particulates is not expected to be an exposure pathway of concern.

To assess the impact from soil to outdoor air due to volatile emissions, contaminants in surface/subsurface soil above RECAP SOIL_SSi were further evaluated. Benzene and naphthalene were the only volatile compounds detected in surface/subsurface soil above the RECAP SOIL_SSi; thus, a site-specific RBSL for inhalation of these contaminations were developed under RECAP Management Option 3 (MO-3) for on-site workers (see Attachment 2). The resulting site-specific RBSL for benzene and naphthalene were 44 and 778 mg/kg, respectively. The maximum detected concentration of benzene (486 mg/kg) and naphthalene (1,050 mg/kg) in surface/subsurface soil exceed the site-specific RBSLs. Thus, volatile emissions to outdoor air are considered to be an exposure pathway of concern.

References:

Booz Allen Hamilton, 2003. *Draft Sampling and Analysis Plan (SAP) for Orion Refining Corporation, Soil, Groundwater, and Surface Water Sampling, New Sarpy, Louisiana*, BAH for EPA Region 6, November 13, 2003.

Conestoga-Rovers & Associates, 2003. *Risk Evaluation Corrective Action Program (RECAP) Report, Section 2 Remediation Project, Orion Refining, Norco, Louisiana*, Conestoga-Rovers & Associates, March 2003.

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

Conestoga-Rovers & Associates, 2005. *Groundwater Certification Request, Stream Methane Reformer (SMR).* Conestoga-Rovers & Associates, May 2005.

G&E Engineering, 1996. *Supplemental Investigations - Closed Wastewater Impoundment Area, GATX Terminals Corporation, Norco, Louisiana, GATX Terminal Corporation*, G&E Engineering, March 1996.

LDEQ, 2003. *Risk Evaluation/Corrective Action Program (RECAP)*, Louisiana Department of Environmental Quality (LDEQ), October 2003.

PRC, 1991. *RCRA Facility Assessment Report, TransAmerican Refinery Corporation*, PRC Environmental Management, Inc., August 19, 1991.

Valero, 2004a. Letter from Robert Gross, Valero, to Keith Casanova, LDEQ. Re: Environmental Indicators Conceptual Site Model Data Gaps, May 13, 2004.

---

[3] It should be noted that in this case, the site-specific RBSL for arsenic is considerably higher than the RECAP SOIL_SSi for arsenic because the inhalation of particulates exposure pathway is considered less significant than the incidental ingestion of surface soil exposure pathway.

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

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

"Contaminated" Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[4]
Groundwater	no	no	—	yes	—	—	—
Air (indoors)	—	no	—	—	—	—	—
Soil (surface, e.g., <2 ft)	no	yes	no	yes	no	no	no
~~Surface Water~~							
~~Sediment~~							
Soil (Subsurface, e.g., >2 ft)	no	no	no	yes	no	no	no
Air (outdoors)	no	yes	no	yes	no	no	—

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated") as identified in #2 above.

2. enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

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

_____ 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 "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

_____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

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

Rationale and Reference(s):

The Valero St. Charles Refinery is an industrial facility. No residents or day-care centers are currently present on site or adjacent to the Section 2 - Tank Farm. Thus, residential and day-care exposures to contaminated surface/subsurface soil or outdoor air 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 is also not considered a complete exposure pathway.

Groundwater: Currently, there are no potable or industrial supply wells located within the Section 2 - Tank Farm. In addition, a recent well survey indicated that 75 wells are located within one mile of the Valero St. Charles Refinery (RAM, 2002). Six of the wells are industrial supply wells, 53 are monitoring wells, and the remaining 16 wells were plugged, destroyed, or abandoned. Five of the supply wells pump groundwater from the Norco aquifer, one supply well pumps groundwater from the Gonzales-New Orleans aquifer, and the remaining 53 wells monitor shallow groundwater. No private or public water supply wells were noted within one mile of the Valero St. Charles Refinery. In addition, the groundwater classification is GW3A, which is non-potable groundwater. Thus, resident or on-site worker exposure to contaminated groundwater is not considered a complete exposure pathway.

Since the depth to groundwater is less than 10 feet bgs, construction workers may be exposed to shallow groundwater at the Section 2 - Tank Farm during excavation activities. Thus, construction worker exposure to contaminated groundwater is considered a complete exposure pathway.

Surface/Subsurface Soil: The Valero St. Charles Refinery has a perimeter fence that restricts access to the site by trespassers. Thus, the trespasser exposure pathway is not currently considered complete. In addition, there are no areas within the Section 2 - Tank Farm that would be suitable for recreation (e.g., hunting); thus, the recreation exposure pathway is also not currently considered complete.

On-site workers and construction workers may potentially be exposed to contaminated surface soil within the Section 2 - Tank Farm. In addition, construction workers may be exposed to subsurface soil at the Section 2 - Tank Farm. Thus, on-site worker and construction worker exposures to contaminated surface soil and surface/ subsurface soil, respectively, are considered complete exposure pathways.

Indoor Air: An operator shack (i.e., trailer) is located in the Section 2 - Tank Farm, which is manned seven days a week throughout the year. However, the shack has an elevated foundation, does not rest directly on the ground surface, and thus does not represent a complete exposure pathway for vapor intrusion. . Therefore, on-site worker exposure to potentially contaminated indoor air is not considered a potentially complete exposure pathway.

Outdoor Air: The Valero St. Charles Refinery has a perimeter fence that restricts access to trespassers at the site. Thus, the trespasser exposure pathway is not currently considered complete. In addition, there are no areas within the Section 2 - Tank Farm that would be suitable for recreation (e.g., hunting); thus, the recreation exposure pathway is also not currently considered complete.

On-site workers and construction workers may potentially be exposed to contaminated outdoor air within the Section 2 - Tank Farm.

References:

Risk Assessment and Management Group, Inc. (RAM), 2002. *Evaluation of Groundwater Classification, Orion Refinery Corporation*, RAM, January 16, 2002.

4. Can the exposures from any of the complete pathways identified in #3 be reasonably expected to be "significant"[5]4 (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

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

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

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

Rationale and Reference(s):

Groundwater: Construction worker exposure to contaminated groundwater is considered a completed exposure pathway, but the exposure is not currently expected to be significant due to institutional controls observed 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 health and safety plan (Valero, 2004b). Construction workers are required to observe the appropriate Occupational Safety and Health Administration (OSHA) regulations (e.g., wearing appropriate personal protective equipment [PPE]), to reduce potential exposure to contaminated groundwater. Thus, construction workers are not expected to have significant exposures to contamination in groundwater.

Surface/Subsurface 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 observed 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 health and safety plan (Valero, 2004b). Construction workers are required to observe the appropriate OSHA regulations (e.g., wearing appropriate PPE), to reduce potential exposure to contaminated surface/subsurface soil. Thus, construction workers are not expected to have significant exposures to contamination in surface/subsurface soil.

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 observed at the refinery. On-site worker safety procedures (e.g., PPE) and training have been established for on-site workers, in accordance with

---

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

applicable OSHA regulations and guidance, to reduce potential exposures to contaminated surface soil (Valero, 2004b). Thus, on-site workers are not expected to have significant exposures to contamination in surface soil.

Indoor Air: On-site worker exposure to contaminated indoor air is not considered a potentially complete exposure pathway. An operator shack (i.e. trailer) located next to MW-16 is raised on an open-air cement slab and any volatile emissions from the vadose zone mix with outdoor air and dissipate. Any volatile emissions from the subsurface do not contact the indoor air of the trailer. The Johnson & Ettinger Model for Subsurface Vapor Intrusion into Buildings was not run because the model assumes that buildings are built slab-on-grade or with a basement, a condition which does not apply to the Section 2 - Tank Farm operator shack. Only two constituents were reported to have relatively minor exceedances (i.e., up to 1.5 times the GWesi) at MW-16. The inhalation of potentially contaminated indoor air is not currently considered a significant exposure pathway.

Outdoor Air: On-site worker and construction worker exposure to contaminated outdoor air is considered a complete exposure pathway. The maximum detected concentration of benzene in groundwater is less than two times the GWairi, which is based on a cancer target risk of 1×10^{-5}; therefore, the carcinogenic risk to on-site workers and construction workers for this medium is expected to be within EPA's target risk range. The maximum detected concentration of benzene in surface/subsurface soil exceeds the MO-3 RBSL by less than two orders of magnitude, which is based on a cancer target risk of 1×10^{-6}; therefore, the carcinogenic risk to on-site workers and construction workers for this medium is expected to fall within the EPA's target risk range (1E-06 to 1E-04).

The maximum detected concentration of naphthalene in surface/subsurface soil is less than two times the MO-3 RBSL, which is based on a non- carcinogenic target risk of unity (1). Only one sample location (CB-15 [4-6 feet bgs]) slightly exceeds the MO-3 RBSL (e.g., up to 1.35 times the MO-3 RBSL). Natural dispersion is expected to reduce volatile concentrations in outdoor air from surface/subsurface soil emissions once the contaminant reaches the ground surface. Thus, it is expected that actual outdoor naphthalene concentrations would fall below the EPA target risk level, and the inhalation of contaminated outdoor air is not currently considered a potentially significant exposure pathway.

References:

LDEQ, 2003. *Risk Evaluation/Corrective Action Program (RECAP)*, Louisiana Department of Environmental Quality (LDEQ), October 2003.

Valero, 2004b. Email 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, June 9, 2004.

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

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

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

_____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s):

Not applicable; please see the response to Question No. 4.

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 (Former GATX Tank Terminal)** facility, EPA ID # **LAD062644778**, located at **Norco, 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: Jeffrey Jones, Geologist — Date 6/30/06
Environmental Technology Division, LDEQ

Supervisor — Date 6/30/06
Narendra M. Dave, Geologist Manager
Environmental Technology Division, LDEQ

Locations where references may be found:

LDEQ Public Records, 602 N. Fifth Street, Baton Rouge, LA 70802
Valero St. Charles Refinery, 15272 River Road, Norco, LA 70079

Concur
GPD-A
1/11/07

Contact telephone number and e-mail:

Jeffrey Jones
(225) 219-3397
jeffrey.jones@la.gov

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.