Public Health Assessment

Final Release

EVR-WOOD TREATING/EVANGELINE REFINING COMPANY SUPERFUND SITE

ACADIA PARISH, LOUISIANA

Prepared by the
Louisiana Department of Health and Hospitals

November 14, 2013

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Community Health Investigations
Atlanta, Georgia 30333

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR's Cooperative Agreement Partner pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR's Cooperative Agreement Partner has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30-day public comment period. Subsequent to the public comment period, ATSDR's Cooperative Agreement Partner addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR's Cooperative Agreement Partner which, in the agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Section of Environmental Epidemiology and Toxicology
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List of Acronyms

ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
CCA	chromated copper arsenate
cm^2	centimeters squared
COCs	contaminants of concern
CPT	Cone Penetration Technology
CREG	cancer risk evaluation guide
CSF	cancer slope factor
CVs	comparison values
DHHS	Department of Health and Human Services
DRO	diesel range organics
ED	exposure dose
EMEG	environmental media evaluation guide
ESI	expanded site investigation
EVR	EVR-Wood Treating/Evangeline Refining Company Superfund Site
ft bgs	feet below ground surface
GRO	gasoline range organics
GW	ground water
HRS	hazard ranking system
in	inch
IRIS	integrated risk information system
IUR	inhalation unit risk
kg	kilogram
LDEQ	Louisiana Department of Environmental Quality
LDHH	Louisiana Department of Health and Hospitals
LDNR	Louisiana Department of Natural Resources
LDTOD	Louisiana Department of Transportation and Development
LIF	Laser-Induced Fluorescence
LOAEL	lowest observed adverse effect level
LTHA	life time health advisory
MCL	maximum contaminant level
mg	milligram
mg/day	milligrams per day
mg/kg	milligrams per kilogram
mg/kg/day	milligrams per kilogram per day
mini-ram	miniature real-time aerosol monitor
MRLs	minimal risk levels
MS	matrix spike
MS/MSD	matrix spike/matrix spike duplicate
ND	not detected
NPL	National Priorities List
OPH	Office of Public Health
ORO	oil range organics

OVA	organic vapor analyzer
PAHs	polycyclic aromatic hydrocarbons
PCP	pentachlorophenol
PHA	Public Health Assessment
PID	photo-ionization detector
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
R	rejected
RA	removal assessment
RBC	risk-based concentration
RECAP	Risk Evaluation/Corrective Action Program
RfC	reference concentration
RfD	reference dose
RMEG	reference dose media evaluation guide
ROST	Rapid Optical Screening Tool
RSV	reference screening value
SEET	Section of Environmental Epidemiology and Toxicology
SONRIS	Strategic Online Natural Resources Information System
SSni	soil screening non-industrial
SVOC	semivolatile organic compound
TEF	toxicity equivalency factor
TEQ	toxic equivalency quotient
TPHs	total petroleum hydrocarbons
U	non-detect
ug/L	micrograms per liter
US EPA	United States Environmental Protection Agency
UST	underground storage tank

Summary

Introduction

Through our cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), the Louisiana Department of Health and Hospitals/Office of Public Health/Section of Environmental Epidemiology and Toxicology (LDHH/OPH/SEET) has evaluated environmental data collected during the 2011 Site Reassessment of the EVR-Wood Treating/Evangeline Refining Company Superfund Site (EVR site). LDHH/OPH/SEET's review of this data was performed to determine whether media from the EVR site contains concentrations of contaminants that could pose harm to public health and recommend any actions needed to mitigate exposures and protect health.

Conclusion

Several potential exposure pathways to EVR site-related contaminants were identified. A number of pathways were eliminated due to a lack of exposure pathway. Others could not be fully evaluated as data was not available. LDHH used available data to evaluate potential oral/dermal human exposures to surface soils and wetlands sediments from the EVR site.

- A potential soil exposure pathway existed in the past for children and their caregivers waiting for the school bus along LA highway 97. There was no increase of noncancer or cancer risk in this exposure scenario and exposures are not expected to harm people's health.
- A potential soil exposure pathway existed in the past, and may be occurring now or in the future for adult trespassers (metal salvagers) accessing the EVR site. An evaluation of these exposures revealed that potential exposures to trespassers have not and are not expected to harm health.
- A potential exposure pathway existed in the past, and may be occurring now or in the future for adolescent children (16+) and adult hunters accessing the EVR site. Assuming conservative exposure assumptions are met, oral and dermal exposure to the maximum detected levels of arsenic, pentachlorophenol and total PAHs in surface soils presents a very slight increased total cancer risk for hunters. Arsenic and total PAHs in wetland

	sediments may also be associated with an increased cancer risk for the same population.
Basis for Decision	The EVR Site Reassessment data used in this Public Health Assessment (PHA) was collected to support a proposal to the National Priorities List (NPL) and was not intended to document all areas of contamination or potential risks to ecological or human populations. The data was used conservatively for purposes of exposure analysis and for preliminary assessment of potential site-related health risks. These analyses provide an opportunity to guide future site activities in order to further assess the public health impact of the EVR site.
Next Steps	LDHH will work with the U.S. Environmental Protection Agency (EPA) and the Louisiana Department of Environmental Quality (LDEQ) to gather information in order to assess the potential health impact to site trespassers and to develop access restrictions as necessary. LDHH will provide this PHA to EPA and LDEQ to assist in targeting areas and pathways that would benefit from future characterization during upcoming investigations at the EVR site. The information produced within this Public Health Assessment will be made available for public comment to the community members and stakeholders in Jennings, LA.
For More Information	If you have further concerns about the site, you can call ATSDR at 1-800-CDC-INFO and ask for information about the EVR site. Questions may also be directed to LDHH/OPH/SEET at 1-888-293-7020.

Statement of Issue and Purpose

Background

The EVR-Wood Treating/Evangeline Refining Company (EVR) site is an inactive and abandoned creosote and wolmanizing preserving facility and a former oil refinery located off Highway 97, 1 mile north of Interstate Highway 10, near Jennings, in Acadia Parish, Louisiana. The facilities are bounded to the south by LA State Highway 97, to the west by designated wetland regions which border Bayou Nezpique, to the north by overgrown woodland areas, and to the east by residences and agriculture areas (Appendix A, Figure1) [1].

The facility started creosote operations in the late 1940s. Creosote operations, including the preservation of timber products, ceased around 1980, and the facility was closed in 1985. The former process area contained several tanks with hazard signs identifying the contents as Wolmanac Concentrate 50%. Wolmanac is a trademark preservative consisting of arsenic acid, chromic acid, and copper oxide, also called chromated copper arsenate (CCA). Pentachlorophenol (PCP) was also used in the dry treating process [2].

The Evangeline Refinery Company operated as an oil refinery from 1938 to 1981. The refinery produced naphtha, kerosene, diesel, and No. 5 fuel oil from sweet condensate. The refinery was sold with an agreement that both properties would share a waste treatment impoundment. Evangeline Refinery received wood treating waste water into their lagoons from the EVR-Wood Treating Company via a pipe placed across the fence [3]. No distinct boundaries between the properties were set during the operation years. The releases from the two companies have been identified as a single site because the releases are comingled [2].

Historical documents note that the EVR site consisted of five functional areas: the process area, the refinery area, the impoundment area, the storage area and the chipper area (Appendix A, Figure 2) [4]. These areas supported refining processes and CCA wood treatment, chipping and storage activities; the impoundment area was used by both companies for surface water drainage collection [4]. In addition to the five functional areas, there were four pits, five drum piles and seven above ground storage tanks identified during historical site investigations [4].

The U.S. Environmental Protection Agency (EPA) and the Louisiana Department of Environmental Quality (LDEQ) conducted investigations in 1984, 1989, 1994 and 1999. In October 1999, EPA collected soil and wetland sediment samples from the site. Chemical analyses of the soil samples collected at the former facility revealed elevated concentrations of metals, including arsenic, chromium and copper, polycyclic aromatic hydrocarbons (PAHs), including acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, chrysene, fluorine, fluoranthene, 2-methylnaphthalene, phenanthrene, pyrene and PCP. Chemical analyses of sediment samples collected from the wetlands west of the facility revealed elevated concentrations of these same analytes [2].

Further sampling conducted during EPA's Removal Assessment (RA) investigation (December 1999) revealed several sampling locations with elevated levels of total petroleum hydrocarbons (TPHs) in surface and subsurface soils at the EVR site [4].

During the RA investigation activities, EPA contractors utilized Rapid Optical Screening Tool (ROST) technology to characterize subsurface PAH contamination at the EVR site. The ROST unit is a hydraulically powered/truck mounted device that pushes a cone penetration technology (CPT) probe into the subsurface soil, recording a set of variables to identify soil conditions. A laser-induced fluorescence (LIF) tool, located on the CPT probe, excites PAHs present within the soil and records an energy wavelength that is compared to the waveform of typical PAHs [4]. The ROST was used in the process, refinery, impoundment and wood storage/drying areas, and in onsite pits and storage tanks to determine the extent of PAH contamination. The ROST LIF waveforms at the EVR site were similar to the signatures of six petroleum constituents: fuel oil, diesel fuel, jet fuel, gasoline, creosote and a mixture of PAHs; results indicated widespread PAH contamination at varying depths throughout the EVR site [4].

No removal action has taken place at the EVR site. Since 2001 several on-site tanks have collapsed and the contents soaked into native soil. While several tanks remain onsite, some have been drained and stolen by trespassing metal salvagers; other containers of CCA product have disintegrated. A tank battery torn down by the property owner was not removed in accordance with LDEQ regulations. There is a documented release to wetlands; commercial and recreational fisheries are located in downstream waters. EPA reports that remediation of the site is needed to reduce contaminant migration to downstream surface waters and fisheries [2].

From 2001 to 2011, LDEQ performed periodic inspections to document conditions at the site and attempted to work with the property owner to address further action. The EPA is planning to initiate investigative activities in 2013 [2].

Demographics

Census 2010 results reported a population of 10,383 within Jennings, LA, the nearest city to the EVR site. The largest ethnic group at the site at that time was Caucasian (68%), followed by African-American (28%), and persons reporting two or more races (5%). Approximately two percent (2%) of the population identified themselves as Hispanic. Approximately seventy-two percent (72%) of the population age 25 years or older in 2010 had earned at least a high school diploma. The median household income was $38,910 [5].

The site is located in a semi-remote area that has a few residents, agricultural fields and ponds to the east; Louisiana Highway 97 and agricultural fields to the south; wetlands and Bayou Nezpique to the west; and wetlands and wooded areas to the north [1]. The population residing near the site includes 75 people within one-half mile and an estimated 212 people within one mile [4].

Community Health Concerns

A Site Reassessment was completed in the fall of 2011 at the EVR site in order to provide data to support site evaluation using the EPA's Hazard Ranking System (HRS) for proposal to the National Priorities List (NPL). EPA is currently developing plans to investigate the nature and extent of contamination at the EVR site. At present time, no comments have been presented to EPA, LDEQ or LDHH regarding community health concerns. Outreach efforts will be made to include the community in the Superfund process. LDHH will also assist the community through health education outreach as site investigations proceed in the future.

On May 8, 2013, LDHH placed a public notice advertisement in the Jennings Daily News to notify the community of the public comment period for this Public Health Assessment. The notice directed residents to the LDHH website or to the Jefferson Davis Parish Library in Jennings, LA to view the document. No comments were received during the public comment period.

Discussion

Data Used

Data collected during the 2011 Site Reassessment was used for this Public Health Assessment (PHA). The field sampling event was conducted from September 27, 2011 through September 28, 2011. A total of six subsurface soil samples, 21 surface soil samples, one underground storage tank (UST) sample, eight wetlands sediment samples and one groundwater sample were collected during the event. Background samples collected during the sampling event included one upgradient soil sample, one upgradient wetlands sediment sample and one groundwater sample (Appendix C, Table C-1). In addition, quality assurance samples collected included six field duplicates and three matrix spike/matrix spike duplicates (MS/MSD) [6].

Subsurface Soil

Six subsurface soil samples were collected onsite within the boundaries of the former surface impoundment at the EVR site. One grab soil sample was collected from each of the borings (SO1, SO2, SO3, SO4, S16, S17) at a location of visual contamination or where a photo-ionization detector (PID) reading was registered above background (Appendix A, Figure 4). All borings were drilled to a maximum depth of eight feet below ground surface (ft bgs); samples were collected at depths ranging from 2.5 – 7 ft bgs. One field duplicate was collected at boring S16. All subsurface soil samples were analyzed for semivolatile organic compounds (SVOCs), including polycyclic aromatic hydrocarbons (PAHs) and total metals/mercury [6].

Maximum concentrations of metals including arsenic (40.6 milligrams per kilogram (mg/kg)) and chromium (138 mg/kg) exceeded their respective Agency for Toxic Substances and Disease Registry (ATSDR) health based comparison values (CV). Pentachlorophenol (PCP) was detected at a maximum concentration of 70 mg/kg, which

is above the ATSDR Cancer Risk Evaluation Guide (CREG) of 1.8 mg/kg (Appendix C, Table C-2).

The maximum detected (from all collective subsurface samples) PAH toxic equivalency quotient (TEQ) of 19.73 mg/kg exceeded the benzo(a)pyrene CREG (0.096 mg/kg) (Appendix C, Table C-3). The TEQ methodology and health based comparison values and their usage in the screening process are explained further in Appendix B. A number of individual PAHs also exceeded their respective CVs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene (Appendix C, Table C-2).

Surface Soil

Twenty-one surface soil samples were collected at varying depths throughout the EVR site. All samples were analyzed for SVOCs and total metals/mercury. Two field duplicates were collected in this area. One background sample was collected at boring S18 located near the northeast corner of the property (Appendix A, Figure 4). Several contaminants were detected above health based comparison values in background soil at the EVR site including arsenic (33.1 mg/kg), chromium (60.9 mg/kg), PCP (12 mg/kg), benzo(a)anthracene (1.1 mg/kg), benzo(a)pyrene (0.69 mg/kg), benzo(b)fluoranthene (0.92 mg/kg), benzo(k)fluoranthene (0.92 mg/kg) and chrysene (1.5 mg/kg).

North Side of the Highway LA 97:

Former Wood Treating Operation Area:

Four samples were collected from 1-2 ft bgs in the area of the former wood treating operations. Samples were collected below fill material brought in to cover contaminated soils at the site. One sample was collected from each of the borings at S05, S06, S07, and S08. Maximum concentrations of iron (62,600 mg/kg), thallium (3.7 mg/kg), manganese (5,100 mg/kg) and arsenic (24.2 mg/kg) exceeded their respective comparison values (Appendix C, Table C-5). Arsenic was however, below soil background levels of 33.1 mg/kg detected at soil boring S18. The maximum detected PAH TEQ (7.08 mg/kg), calculated using one-half of the laboratory detection limit for non-detect samples, also exceeded the benzo(a)pyrene CREG. Samples collected from boring S07 contained the maximum detected levels of manganese, thallium and iron in soil at the EVR site.

Former Wood Drying Area:

Surface soil samples were collected from 0-6 inches bgs from four locations (S09, S10, S11, S12) within a wood drying area on the east side of the site (Appendix A, Figure 4). One duplicate sample and two regular samples were collected at boring S09. Maximum detected metals including arsenic (50 mg/kg) and chromium (62.9 mg/kg) exceeded their comparison value. The semi-volatile pentachlorophenol was detected above the CREG (1.8 mg/kg). Several individual PAHs exceeded their CV, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene (Appendix C, Table C-6). The maximum PAH TEQ (9.25 mg/kg) also exceeded the

CREG for benzo(a)pyrene (0.096 mg/kg). Surface soil samples collected from this area (soil boring S09) yielded the highest detected concentrations of arsenic, chromium, PCP and total PAHs in soil from the entire EVR site.

Pond Area West of Northern LA 97:

Surface soil samples were collected from 0-6 inches bgs from three locations (S13, S14, S15) surrounding a small impoundment, previously identified as containing CCA, located adjacent to the road leading to the northern portion of the site. The pond area is heavily vegetated and on the west side of the site road (Appendix A, Figure 5). Arsenic ranges (2.8-7.4 mg/kg) exceeded the CREG but remained below background levels (Appendix C, Table C-6); the PAH TEQ (8.69 mg/kg) calculated using one-half of the laboratory detection limit exceeded the benzo(a)pyrene CREG.

Above Ground Storage Tanks:

Three surface soil samples were collected at a depth of 0-6 inches bgs from the vicinity of two above ground storage tanks (T7,T8,T9) that were formerly located on the east side of the main site road. The sample collection area is heavily vegetated with tree cover. Arsenic (7.3 mg/kg) was detected below soil background levels but above the CREG (Appendix C, Table C-7); the PAH TEQ (0.71 mg/kg) exceeded the benzo(a)pyrene CREG.

South Side of the Highway LA 97:

Surface soil samples (0-6 inches bgs) were collected from six former tank locations (T1, T2, T3, T4, T5, T6) on the south side of the highway (Appendix A, Figure 3). One field duplicate was also collected at boring T5. Arsenic levels (11.3 mg/kg) were below background; however, they exceeded the CREG of 0.47 mg/kg (Appendix C, Table C-8); the PAH TEQ (11.58 mg/kg) also exceeded the benzo(a)pyrene CREG of 0.096 mg/kg.

Underground Storage Tank (UST)

One sample was collected from an UST (U1) located within the former wood treating operations area on the north side of highway LA 97. One duplicate sample was also collected from the same location. Samples were analyzed for SVOCs only. The maximum concentration for several contaminants exceeded comparison values including 2,3,4,6-tetrachlorophenol (1200 ug/L), 2-methylnaphthalene (650 ug/L), pentachlorophenol (16,000 ug/L), benzo(a)anthracene (360 ug/L), benzo(a)pyrene (100 ug/L), benzo(b)fluoranthene (130 ug/L), benzo(k)fluoranthene (100 ug/L), chrysene (350 ug/L), indeno(1,2,3-cd)pyrene (45 ug/L) and pyrene (1500 ug/L) (Appendix C, Table C-9). The PAH TEQ (242.9 ug/L) was well above the benzo(a)pyrene CREG of 0.0048 ug/L).

Wetlands Sediment

Four surface sediment (0-6 in) grab samples (W5,W6,W7,W8) were collected from locations west of the former impoundments (north of the highway); and four samples were collected from locations south of the tank farm (W1, W2, W3, W4). One field duplicate (W6) and one upgradient background sample (W9) were also collected. All sediment samples were submitted for SVOCs and total metals/mercury analyses. Arsenic (7.2 mg/kg) was detected above comparison values in background sediment collected near Bayou Nezpique on the northwest corner upstream of the EVR site (Appendix A, Figure 4).

Maximum detected levels of arsenic (77.1 mg/kg), chromium (93.6 mg/kg), PCP (3.5 mg/kg), benzo(a)anthracene (0.43 mg/kg) and benzo(b)fluoranthene (0.98 mg/kg) exceeded their respective comparison values (Appendix C, Table C-10). The PAH TEQ (6.64 mg/kg) also exceeded the benzo(a)pyrene CREG.

Groundwater

Groundwater was collected from one onsite residential well (GW1) and from one background residential well (GW2) located outside of the former site processing and storage areas to the east of the EVR site. One field duplicate was collected at location GW1. Both well depths range from 136-145 ft bgs. Samples were analyzed for SVOCs and total metals/mercury. All samples, including background, were either non-detect or below health based comparison values (Appendix C, Table C-11). The PAH TEQ 16.09 ug/L (micrograms per liter) was calculated using one-half of the laboratory detection limit for both the residential and background wells; both exceeded the benzo(a)pyrene CREG for drinking water (0.0048 ug/L).

Exposure Pathways Analysis

An exposure pathway consists of five elements: a source of contamination, transport through an environmental medium (air, water, or soil), a point of exposure, a route of human exposure (ingestion, dermal exposure, or inhalation), and a population. Completed pathways are defined as all five necessary elements exist and that exposure to a contaminant has occurred in the past, is presently occurring, or will occur in the future. An exposure pathway can be eliminated if at least one of the five elements is missing and will never be present.

Exposure Pathways at the EVR Site:

Surface and Subsurface Soil

Exposure to contaminants detected in soil samples may occur through incidental (accidental) ingestion or dermal (skin) contact. Exposures to surface soils would be more likely where ground cover such as grass is absent. Subsurface soil samples were collected from varying depths of 2.5 - 8 ft bgs; although several contaminants were

detected in subsurface soil samples, they are unlikely to present an exposure risk unless soil is disturbed.

Historical field activities conducted during the EPA's Expanded Site Investigation (ESI) (February 2000) documented the nearest residence to be approximately 200 feet southeast of the former wood treating operation area near soil borings S05-S08 (Appendix A, Figure 3). These areas contain the maximum detected subsurface soil concentrations of manganese, thallium and iron in soil at the EVR site. Recent discussion (October 2012) with the LDEQ EVR site manager confirmed that the site remains unfenced, and there is no signage posted to alert the public of site conditions; trespassing has been documented in the form of spent shotgun shells on the EVR site property [7]. Potential past, present and future exposures to surface soil contaminants exist for trespassers including metal salvagers and hunters. Exposures to subsurface soil contaminants are unlikely unless excavation or digging takes place.

During the 2000 ESI activities, it was observed that a gravel area on the EVR site property along LA State Highway 97 was used as a bus stop for children. Representatives from the Acadia Parish School Board and Student Transportation Services were contacted to verify the route [8]. They were not aware and had no record of a children's bus stop in this location. In order to be protective, LDHH assumes that a potential exposure pathway may have existed in the past for children and their caregivers while waiting for the school bus. Gravel in the bus stop area should have reduced the contact with the underlying soil.

As previously mentioned, sampling conducted during EPA's RA investigation (December 1999) revealed several locations with elevated levels of TPHs (diesel range organics (DRO), gasoline range organics (GRO) and oil range organics (ORO)) in surface and subsurface soils at the EVR site [4]. Data collected during the 2011 Site Reassessment was not meant to be a full characterization of contamination at the EVR site and did not include laboratory analysis for TPHs. Due to historical refinery processes and previously detected elevated levels of TPHs in soils, it is recommended that EPA evaluate soil TPHs in future site investigations.

Above Ground Storage Tanks

Surface soil samples were collected (during the 2011 EVR Site Reassessment) from the vicinity of above ground storage tanks formerly located on the east side of the main site road at the EVR site. Trespassing for purposes of metal salvage has been indirectly observed by LDEQ; onsite storage tanks containing PCP solution that were identified during site inspections were found missing in later inspections, presumably the solution was drained out onto the ground. A few above ground storage tanks remain on the EVR property. Elevated levels of arsenic and PAHs were detected in the surface soil in these areas; individuals attempting to salvage scrap metal from collapsed storage tanks (in the past, present or future) may be exposed to contaminants in both surface soil and residue on scrap metal via incidental ingestion, inhalation or dermal contact. Furthermore, indirect evidence of access in the form of spent shotgun shells has been documented in this area. Those hunting or recreating in this area may also be exposed to contaminants in the soil or storage tanks.

Small Game Consumption

LDEQ has indirectly observed activity in the wetlands and wooded areas throughout the EVR site property in the form of spent shotgun shells on the site grounds. Small game samples were not collected during the 2011 EVR Site Reassessment; however, it is feasible that small game, such as rabbits and squirrels, may accumulate site-related contamination. A potential past, present and future exposure pathway may exist for hunters and other individuals who consume small game captured from the EVR site. It is not possible to evaluate the consumption of small game at this time, but it is recommended that this pathway be considered in future expanded site investigation activities.

Underground Storage Tank

Exposure to contaminants detected in the underground storage tank located within the former wood treating operations area on the north side of highway LA 97 would occur through incidental ingestion, dermal contact or inhalation of volatile or semi-volatile vapors upon disturbance of the tank. The EVR site is an abandoned wood treating and refining facility and workers (who would be the only individuals accessing the tank) are not present at the site. Any workers that are present during future remedial activities should participate in an appropriate safety plan requiring use of personal protective equipment (PPE).

Air

Air samples were not collected during the 2000 ESI and 2011 Site Reassessment events. Historical site activities are referenced in the 2000 ESI report that briefly discuss the potential for a release of hazardous constituents to the air due to the presence of storage tanks at the EVR site. LDEQ and EPA conducted a site reconnaissance inspection on October 26, 1999, where continuous air monitoring was performed using an organic vapor analyzer (OVA) and a miniature real-time aerosol monitor (mini-ram). The ESI report states that no organic vapors or airborne particulate concentrations were detected above background concentrations [1]. While many of the tanks are reported to have collapsed with contents soaking into onsite soil, potential exposure to storage tank related contaminants may occur via inhalation under conditions where remaining tanks are disturbed or sustain damage. Further characterization of the air pathway is recommended during future site activities.

Wetlands Sediment

Exposure to wetlands sediment contaminants from locations west of the former impoundments (north of highway LA 97) and south of the tank farm (Appendix A, Figure 2) could occur through incidental ingestion or dermal contact. Historical field activities document the overland surface water flow from former site process areas towards

designated wetland areas [1]. Drainage pathways within the wetlands west of the site flow overland into Bayou Nezpique, which is approximately 1,000 feet west of the site.

A distinct drainage path south of the Evangeline Refinery's cooling water pond (southwest of highway LA 97) flows in a westerly direction, presenting a second point of entry for EVR site contamination into Bayou Nezpique [1]. From these points of entry, Bayou Nezpique, a freshwater waterbody, flows south-southeast for approximately 7.5 miles before entering the Mermentau River. While it is unlikely that direct human exposures would occur in the wetland areas as they contain extensive tree cover and dense vegetation, there has been indirect evidence of recreational hunting on the EVR site. There is a potential for past, present and future exposures for hunters via ingestion and/or dermal contact with elevated levels of arsenic, chromium, PCP and PAHs in wetlands sediments.

Groundwater to Surface Water

The depth of Bayou Nezpique is approximately 20 feet at its center point according to observations during the 2000 ESI. In 1997, the depth of ground water beneath the site was approximated to be 6 ft bgs [1]. Groundwater collected from one residential well and one background well during the most recent 2011 Site Reassessment event did not indicate any presence of drinking water contamination. However the contamination of on-site groundwater is possible, which could migrate to and impact the Bayou Nezique and Mermentau River [1].

Recreation/Seafood Consumption

Bayou Nezpique and the Mermentau River have no surface water resource usage (drinking water intakes); however, LDEQ has designated the two water bodies for primary and secondary contact recreation including swimming and fishing. Historical ESI activities have documented fishing and recreational activities in these locations [1]. Exposure to EVR site related contaminants from surface waters may occur through incidental ingestion, dermal contact and inhalation of water vapors. Furthermore, exposure to EVR site contaminants may occur via consumption of contaminated fish, turtle and/or crawfish in these surface water bodies. Currently, there is a fish consumption advisory for Bayou Nezpique due to unacceptable levels of mercury in largemouth bass and bowfin. This advisory is unrelated to the EVR site.

Surface water and seafood samples were not collected or characterized in the 2011 EVR Site Reassessment and therefore are unable to be evaluated at this time. Based upon documented wetland contamination flowing into Bayou Nezpique and the Mermentau River, the recreational and fish consumption pathways present a significant exposure concern that should be evaluated in future site investigation activities.

Groundwater

Exposure to contaminants detected in groundwater sampled from the EVR site would occur through ingestion, dermal contact, or inhalation of water vapor (for semi-volatile

contaminants) during domestic use. The EVR site is situated on the Chicot aquifer, which has a regional thickness of approximately 500 feet [1]. The 2000 ESI cites the Louisiana Department of Transportation and Development (LDOTD) water resources division records of 249 water wells within a 4-mile radius of the EVR site; 28 are public supply and 221 are residential water wells. LDOTD records further note that all of the water wells are screened in the Chicot aquifer, with the minimum depth at approximately 100 ft bgs. There are three public supply wells and 22 domestic wells within a one-mile radius of the EVR site. The City of Jennings Water Station, which is the principal source of drinking water for the town of Jennings, draws from the three public supply wells within one-mile of the EVR site. The remaining population surrounding Jennings (within a four-mile site radius) obtain their water from domestic water wells [1].

LDHH accessed the Louisiana Department of Natural Resources (LDNR) Strategic Online Natural Resources Information System (SONRIS) database to determine if any new drinking water wells have been drilled since 2000; query results report 37 active wells within one mile of the EVR site. Thirty-five wells are residential wells, one industrial and one commercial/public supply. All of the well depths range from 125-195 ft bgs (Appendix A, Figure 6).

The nearest industrial water well is located onsite; however it is not currently in use. The nearest off-site drinking water well is located within 200 feet of the former wood treating operation area, approximately 50 feet east-southeast of the main gate [1]. Historical groundwater monitoring during the 2000 ESI from this location did not detect the presence of any organic or inorganic site-related contamination [1]. Groundwater samples collected during the 2011 Site Reassessment were also free of contamination for sampled analytes (Appendix C, Table C-11). Regional groundwater movement in the Chicot aquifer is to the north in this region at 500 foot depths. Surface topography for the EVR site supports a westerly slope towards nearby wetland areas. Current and historical data does not presently support contamination of the drinking water aquifer; however, historical sampling events utilizing ROST technology to characterize subsurface PAH contamination revealed widespread PAH contamination throughout the EVR site. Six petroleum constituent signatures were identified in subsurface soils of varying depths; wells near the site and region would benefit from further characterization of the potential for PAHs to impact the groundwater exposure pathway.

Evaluation Process

The evaluation process used to assess the potential public health hazard at the EVR site is described in Appendix B. Contaminant concentrations were initially screened using comparison values (CVs) appropriate for their media. These conservative screening values are only used to determine which environmental contaminants need further evaluation. CVs are not used to predict adverse human health effects. Contaminant concentrations that exceeded CVs are identified as contaminants of concern (COCs) and are listed in bold red text in Tables C-1 through C-11 (Appendix C).

The polycyclic aromatic hydrocarbons (PAHs) were evaluated using toxicity equivalency factors (TEFs) [9]. TEFs weight each contaminant in a family of similar compounds against the most toxic and most studied of the compounds in that family.

For conservative screening purposes, contaminants that were not detected were assessed using a value of half the laboratory quantitation limit. The laboratory detection limits for several chemicals were above comparison values used in the data evaluation and therefore we were unable to fully evaluate the health implication of exposures to these chemicals in this PHA. LDHH recognizes that all regulatory agencies do not use the same comparison values for evaluation purposes; however, it is critical that laboratory detection limits are less than or as sensitive as health based comparison values in order to directly compare the levels found. Additional details can be located in Appendix B.

Health Effects Evaluation

The occurrences of health effects are determined by the type of contamination present, the concentration of the contaminant, the exposure pathway, the frequency and duration of a person's exposure, and the individual sensitivity of exposed persons. Exposure doses were derived for contaminants of concern from the EVR site where completed or potential exposure pathways are present. These doses are used to identify the potential development of noncancerous adverse health effects and/or carcinogenic health outcomes related to chronic (greater than 365 days) exposure conditions at the EVR site. Default values used to estimate exposure risks are detailed in Appendix C (Table C-12). Arsenic, chromium, pentachlorophenol and total PAHs in surface soil and wetlands sediments were retained for further evaluation.

The surface soil (including surface soils surrounding the above ground storage tanks) and wetlands sediments exposure scenarios were evaluated for the EVR site. Three population types were assumed to have past, present and/or future ingestion and dermal exposures to contaminants of concern at the EVR site:

- A potential exposure pathway existed in the past for children and their caregivers waiting for the bus along LA Highway 97
- A potential exposure pathway in the past, present, and future for adult trespassers (metal salvagers)
- A potential exposure pathway in the past, present and future for adolescent and adult hunters

Public health implications of contaminant and population specific exposures follow below.

Arsenic

Arsenic is a naturally occurring element widely distributed in the earth's crust. Arsenic may enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching. Arsenic cannot be destroyed in the environment; it can only change its form. Fish and shellfish can accumulate arsenic in an organic form called arsenobetaine that is much less harmful.

Inorganic arsenic compounds are mainly used to preserve wood. Copper chromated arsenate (CCA) is used to make "pressure-treated" lumber. CCA is no longer used in the U.S. for residential uses but is still used in industrial applications. Organic arsenic compounds are used as pesticides, primarily on cotton fields and orchards.

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs. Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet. Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso. Skin contact with inorganic arsenic may cause redness and swelling [10].

Several studies have shown that ingestion of inorganic arsenic can increase the risk of skin cancer and cancer in the liver, bladder, and lungs. Inhalation of inorganic arsenic can cause increased risk of lung cancer. The Department of Health and Human Services (DHHS) and the EPA have determined that inorganic arsenic is a known human carcinogen.

LDHH evaluated the hunter exposure pathway due to the presence of spent shotgun shells that were identified in wetlands and the former wood treating operation areas. Demographic data for U.S. and Louisiana hunters estimates that hunters aged 16 years and older spend an average of 18 days per year pursuing their sport [11]. The average age of all hunters in Louisiana is reported at 45 years old [12]; LDHH assumes a conservative exposure duration of 30 years for hunters. A very slight increased cancer risk might be associated with long-term (18 days per year, 8 hours per day for 30 years) ingestion and dermal exposures of surface soils and/or wetlands sediments for hunters who access the EVR site (Appendix, C, Tables C-13 and C-14). Maximum detected arsenic concentrations (77.1 mg/kg) in wetlands sediments at the EVR site are estimated to pose a worst case total cancer risk of 8.00E-06, or approximately 8 excess cancers per 1,000,000 people. Maximum detected arsenic concentrations in surface soils also present a slight increase in cancer risk (5.39E-06, or 5 excess cancers per 1,000,000 people).

Estimated exposure doses were below the arsenic MRL; therefore, exposure to arsenic in surface soils and/or wetlands sediments at the EVR site is not expected to result in noncancerous adverse health effects for hunters (Appendix C, Tables C-13 and C-14).

There was no increase of noncancer or cancer risk for arsenic related to the children and their caregivers and trespasser exposure pathway scenarios. Default values used to estimate incidental ingestion and dermal exposure doses can be accessed in Appendix C, Table C-13.

Chromium

Chromium is a naturally occurring element found in rocks, animals, plants and soil. It can exist in several different forms as a liquid, solid or gas. Chromium can be found in air, soil and water after release from the manufacture, use and disposal of chromium-based products, and during the manufacturing process. Individuals can be exposed to chromium by eating food containing chromium III, an essential nutrient that helps the body use sugar, protein and fat; by breathing contaminated workplace air or skin contact during use in the workplace; by drinking contaminated well water; and/or by living near an uncontrolled hazardous waste site containing chromium or industries that use chromium. The main health problems seen in animals following ingestion of chromium (VI) compounds are irritation and ulcers in the stomach and small intestine and anemia [13]. DHHS and EPA have determined that chromium (VI) compounds are known human carcinogens by the inhalation route only; carcinogenic potential of the oral exposure route has not been determined at this time. There was no increase of noncancer risk for chromium related to the children and their caregivers and trespasser exposure pathway scenarios. Default values used to estimate incidental ingestion and dermal exposure doses can be accessed in Appendix C, Table C-13.

Polycyclic Aromatic Hydrocarbons (PAHs)

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds. Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides.

PAHs enter the air mostly as releases from volcanoes, forest fires, burning coal, and automobile exhaust. PAHs enter water through discharges from industrial and wastewater treatment plants. They stick to solid particles and settle to the bottoms of lakes or rivers. In soils, PAHs are most likely to stick tightly to particles; certain PAHs move through soil to contaminate groundwater.

PAHs can break down by reacting with sunlight and other chemicals in the air over a period of days to weeks. Microorganisms can break down PAHs in soil or water after a period of weeks to months. PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

You can be exposed to PAHs by breathing air containing PAHs in the workplace; from cigarette smoke, wood smoke, vehicle exhausts, asphalt roads, or agricultural burn smoke; eating grilled or charred meats, contaminated cereals, vegetables, fruits, meats, and processed or pickled foods; or by drinking contaminated water or cow's milk. Nursing infants of mothers living near hazardous waste sites may be exposed to PAHs through their mother's milk.

Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. DHHS has determined that some PAHs may reasonably be expected to be carcinogens [9].

Exposure dose concentrations were calculated with location specific maximum detected PAH TEQ concentrations (Appendix C, Table C-13). Children would be most likely to be exposed to the PAHs in surface soils located closest to the school bus stop (north of highway LA 97). Hunters and trespassers could access PAH contaminated soils sitewide, therefore, the higher PAH TEQ for surface soil samples collected south of LA 97 was used to assess exposures for these populations.

Exposure to the maximum detected levels of PAHs using the benzo(a)pyrene TEQ (11.58 mg/kg) presents a very slight increased total cancer risk for hunters exposed to surface soils at the EVR site (Appendix C, Table C-13). The worst case scenario using conservative exposure assumptions might be associated with an excess total cancer risk of 5.85E-06, or approximately 6 excess cancers per 1,000,000 people. Exposure to maximum detected levels of PAHs in wetlands sediments also presents a slight increase in cancer risk (3.35E-06, or approximately 3 excess cancers per 1,000,000 people) (Appendix C, Table C-14). Note that there were several PAHs in surface soil and wetlands sediments that were reported as nondetects, so one-half the laboratory detection limit was used to ensure a conservative, health-protective estimation of potential health risks.

No acute or chronic MRLs have been derived for B(a)P because no adequate human or animal dose-response data are available that identify threshold levels for appropriate non-cancer health effects. There was no increased cancer risk for total PAHs related to the children and their caregivers and trespasser exposure pathway scenarios (Appendix C, Table C-13).

Pentachlorophenol

Pentachlorophenol (PCP) does not occur naturally in the environment, rather it is a manufactured chemical used industrially as a wood preservative for utility poles, railroad ties and wharf pilings. PCP was historically one of the most heavily used pesticides in the United States, but is now regulated as a restricted use pesticide and is no longer used as an ingredient for insecticides or herbicides for home use.

PCP can be found in all environmental media due to its past widespread usage. It enters the environment through evaporation from treated wood surfaces, industrial spills and

disposal at uncontrolled hazardous waste sites. PCP is broken down by sunlight, other chemicals or microorganisms within a few days to months. It is found in fish and other foods, but tissue levels are usually low.

Exposures to the general population may occur through contact with contaminated environmental media, particularly in the vicinity of wood treatment facilities and hazardous waste sites. Adverse health effects have been observed in humans and experimental animals following short and long term exposures to PCP via inhalation, oral and dermal routes. The results of several epidemiology studies suggest that PCP may be a human carcinogen. A minimal risk level (MRL) of 0.001 mg/kg/day has been derived for chronic oral exposure to PCP based on alterations in thyroid hormone levels in animals [14]. Estimated exposure doses for all exposure scenarios were below the MRL; therefore, exposure to PCP at the EVR site is not expected to result in noncancerous adverse health effects to any potentially exposed population (Appendix C, Tables C-13 and C-14).

A very slight increased cancer risk for hunters might be associated with long-term ingestion and dermal exposures of PCP contaminated surface soils at the EVR site. Assuming each of the conservative exposure assumptions are met, hunters exposed to the maximum detected levels of PCP in surface soils (110 mg/kg) may experience a worst case total excess cancer risk of 3.07E-06, or 3 excess cancers per 1,000,000 people. Until more samples are collected, LDHH is unable to conclude whether PCP in surface soils at the EVR site could harm people's health.

Trespassing for purposes of metal salvage has been indirectly observed by LDEQ; onsite storage tanks containing PCP solution that were identified during site inspections were found missing in later inspections, presumably the solution was drained out onto the ground. Exposures may have occurred during metal salvaging, but there are insufficient data to assess these exposures if they took place. A few above ground storage tanks remain on the EVR property.

Child Health Considerations

The physical differences between children and adults demand special emphasis in assessing public health hazards. Children play outdoors and engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than are adults and breathe dust, soil, and vapors close to the ground. A child's lower body weight and higher intake rate result in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage.

Children may have been exposed to contaminated surface soils in the past while waiting for the school bus along LA state highway 97. This bus stop is not currently in use and will not harm children's health as there are no exposures occurring. LDHH assessed the potential health risks for children from past oral and dermal exposures to surface soils

from the EVR site; there were no increased noncancer or cancer risks for this exposure pathway (Appendix C, Table C-13).

According to demographic data from the U.S. Fish and Wildlife Service, adolescent children ages 16 and up may participate in hunting activities on average of 18 days per year [11]. LDEQ has documented indirect evidence of spent ammunition at the EVR site; therefore, LDHH conservatively assumed that children in this age group may be included in a potential hunter exposure pathway. Very slight increased cancer risks exist for adolescent child hunters exposed to arsenic, pentachlorophenol, and total PAHs in surface soils and arsenic and total PAHs in wetlands sediments.

Conclusions

LDHH recognizes that the EVR Site Reassessment data used in this PHA was collected to support a proposal to the NPL and was not intended to document all areas of contamination or potential risks to ecological or human populations. The data was used conservatively for purposes of exposure analysis and a preliminary assessment of potential site-related health risks. These analyses provide an opportunity to guide future site activities in order to further assess the public health impact of the EVR site.

Several potential exposure pathways to EVR site-related contaminants were identified in this document. A number of pathways were eliminated as exposures were not expected, while others could not be fully evaluated as data was not available. LDHH used available data to evaluate potential oral/dermal human exposures to surface soils and wetlands sediments from the EVR site.

- A potential exposure pathway existed in the past for children and their caregivers waiting for the school bus along LA highway 97. There was no expected increase of noncancer or cancer risk in this scenario and exposures are not expected to harm people's health.
- A potential exposure pathway existed in the past, and may be occurring now or in the future for adult trespassers (metal salvagers) accessing the EVR site. A health effects evaluation of available data revealed that potential exposures via the trespasser pathway are not expected to harm health.

  A potential exposure pathway existed in the past, and may be occurring now or in the future for adolescent children (16+) and adult hunters accessing the EVR site. Assuming conservative exposure assumptions are met, oral and dermal exposure to the maximum detected levels of arsenic, PCP and total PAHs in surface soils presents a very slight increased total cancer risk for hunters. Arsenic and total PAHs in wetland sediments may also be associated with an increased cancer risk for the same population. At this time, LDHH is unable to conclude whether arsenic, PCP and total PAHs in surface soils and arsenic and total PAHs in wetlands sediments could harm hunters' health.

If you have further concerns about the site, you can call ATSDR at 1-800-CDC-INFO and ask for information about the EVR site. Questions may also be directed to LDHH/OPH/SEET at 1-888-293-7020.

Recommendations

Several exposure pathways could not be evaluated due to a lack of environmental data. LDHH recommends that the following pathways be considered during future site activities:

- A potential past, present and future exposure pathway may exist for hunters and other individuals who consume small game captured from the EVR site. If possible, tissue samples from small game should be collected from on-site areas in order to evaluate this pathway.
- Bayou Nezpique lies approximately 1,000 feet west of wetlands sediments contaminated with arsenic and PAHs from the EVR site. This freshwater body flows into the Mermentau River; both water bodies are a source of recreation and fishing. EPA should consider collecting surface water and fish samples from these sources to characterize the risk of consumption and oral/dermal/inhalation risks from exposures to surface water.
- Historical sampling revealed several EVR site locations with elevated levels of TPHs in surface and subsurface soils. Due to historical refinery processes and previously detected elevated levels of TPHs in soils, it is recommended that EPA evaluate soil TPHs in future site investigations.
- Further characterization of the groundwater to surface water pathway should be considered, as historical site investigations suggest the potential for contamination of shallow onsite groundwater. Due to overland surface water flow towards the wetlands sediments, this pathway possibly presents additional burden to recreational users/fishers in Bayou Nezpique and the Mermentau River.
- Collection of additional groundwater samples surrounding the EVR site would be beneficial as there are a number of shallow wells near the site and region. While current data does not support contamination of any drinking water aquifers, periodic sampling of drinking water provides data to assess contaminant migration to nearby wells.
- Historical sampling events utilizing ROST technology to characterize subsurface PAH contamination revealed widespread PAH contamination throughout the EVR site. Six petroleum constituent signatures were identified in subsurface soils of varying depths; further characterization of the potential for PAHs to impact the groundwater exposure pathway is recommended.
- A few above ground storage tanks remain onsite at the EVR site. There has been evidence of trespassing to salvage scrap metal from storage tanks containing pentachlorophenol solution. Previously collected air samples (1999) did not detect any organic vapors or particulate matter above background levels;

however, EPA may wish to reevaluate this pathway during future site investigations.

Future samples collected from the EVR site should be analyzed using quantitation limits that fall below the health comparison values related to the contaminants being evaluated.

LDHH will be available to assess samples collected in further investigations or assessments performed at the EVR site.

Public Health Action Plan

LDHH identified several potential exposure pathways in this PHA. A number of pathways were unable to be fully evaluated as necessary data was unavailable at this time. LDHH will work with EPA and LDEQ to gather information about the hunter access exposure pathway in order to conclude the potential health impact to the hunting community and to develop access restrictions as necessary.

LDHH will provide this PHA to EPA and LDEQ to assist in targeting areas and pathways that would benefit from future characterization during upcoming investigations at the EVR site.

LDHH will provide a copy of this PHA for public comment; it will be disseminated to the library repository and to the community members and stakeholders in Jennings, LA.

Report Preparation

This Public Health Assessment for the Review of Data from the EVR-Wood Treating/Evangeline Refining Company Site was prepared by the Louisiana Department of Health and Hospitals/Office of Public Health/Section of Environmental Epidemiology and Toxicology under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved agency methods, policies, procedures existing at the date of publication. Editorial review was completed by the cooperative agreement partner. ATSDR has reviewed this document and concurs with its findings based on the information presented.

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13. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Chromium. September 2012.

14. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Pentachlorophenol. September 2001.

APPENDIX A: Figures

Figure 1: EVR-Wood Treating/Evangeline Refining Company Site Location. Acadia Parish, LA.

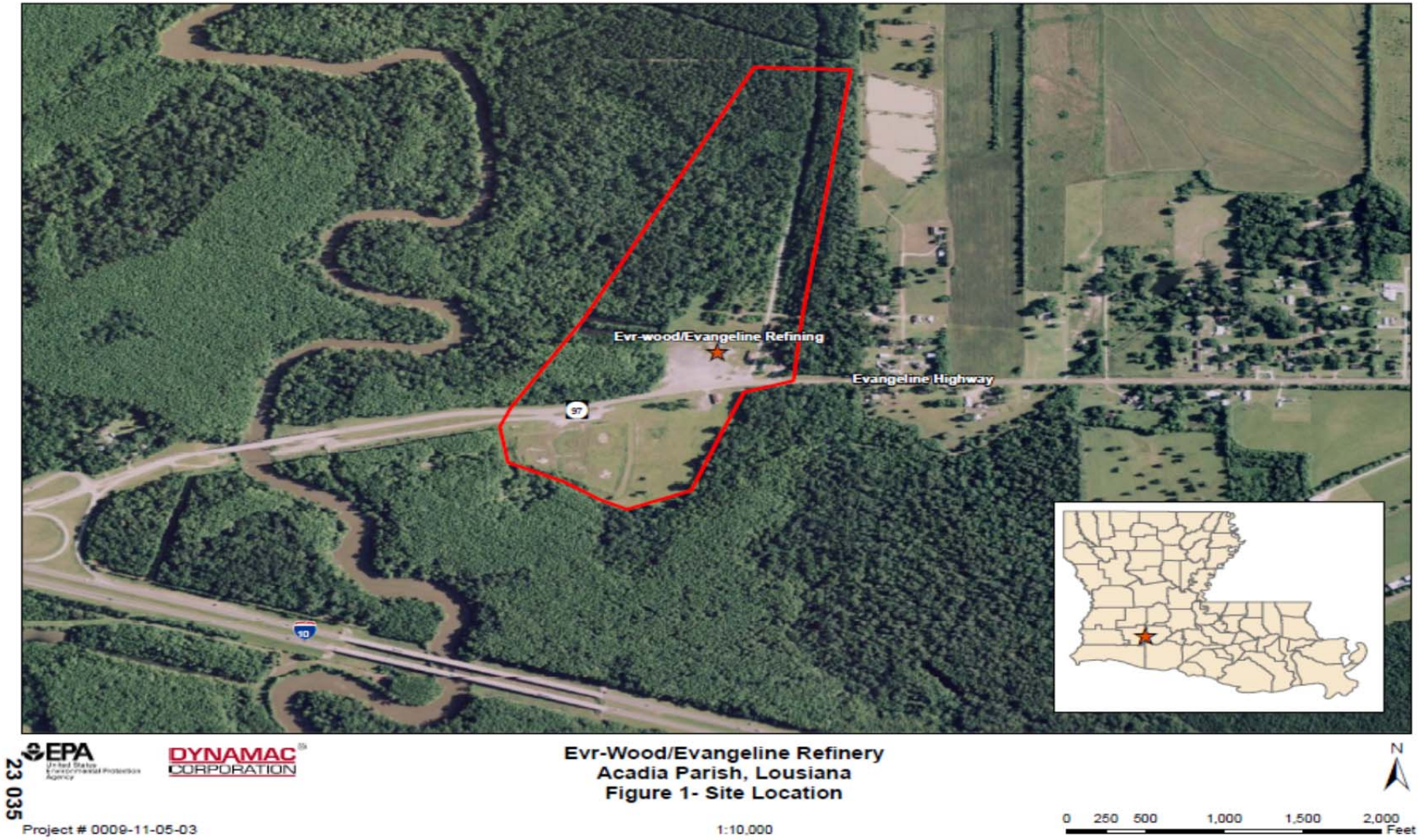


Figure 2: EVR Site Sketch Map. Removal Assessment Report Acadia Parish, LA. June 2000 [4].

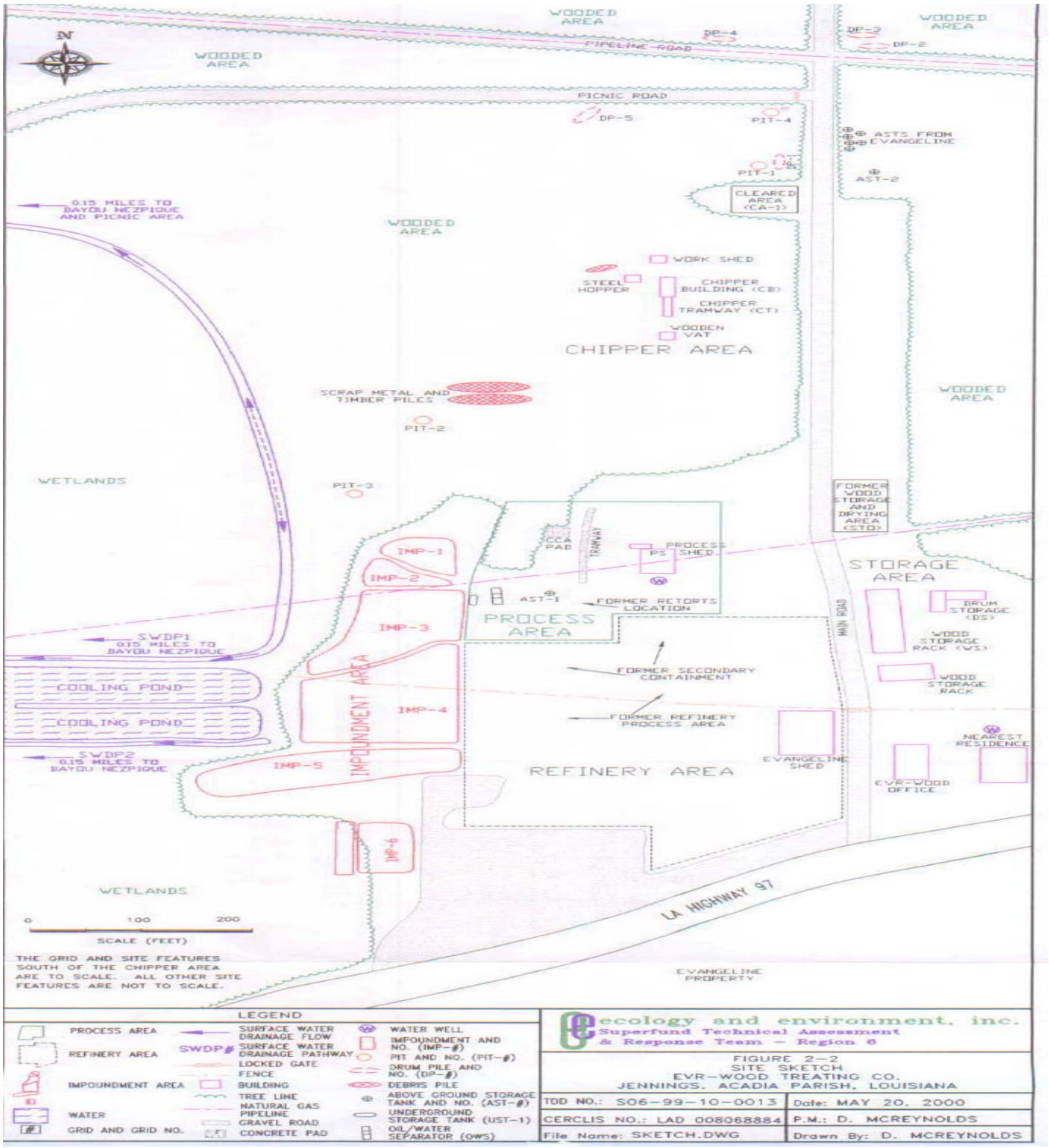


Figure 3: EVR-Wood Treating/Evangeline Refining Company southern sample locations. Acadia Parish, LA. September 2011.

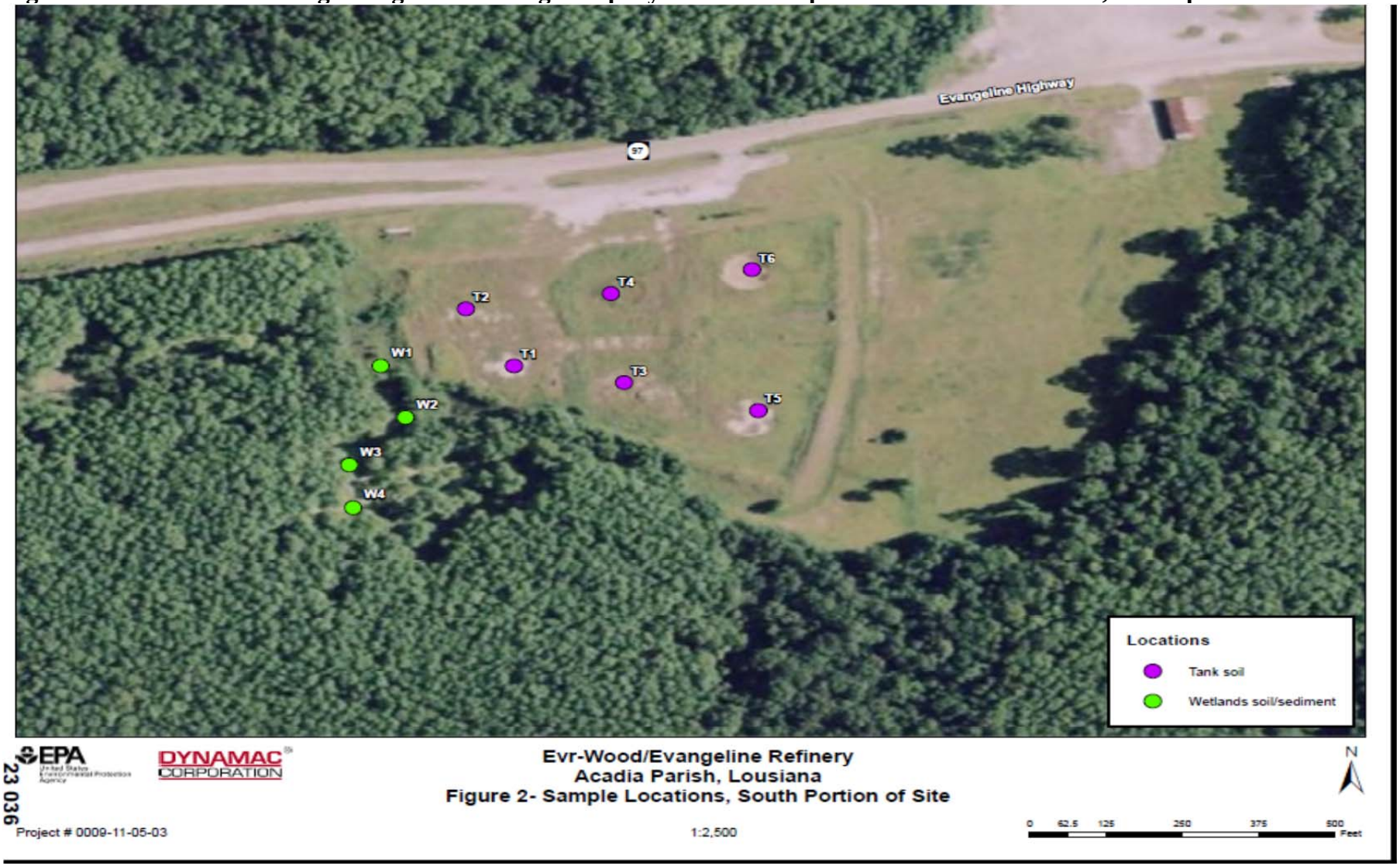


Figure 4: EVR-Wood Treating/Evangeline Refining Company central sample locations. Acadia Parish, LA. September 2011.

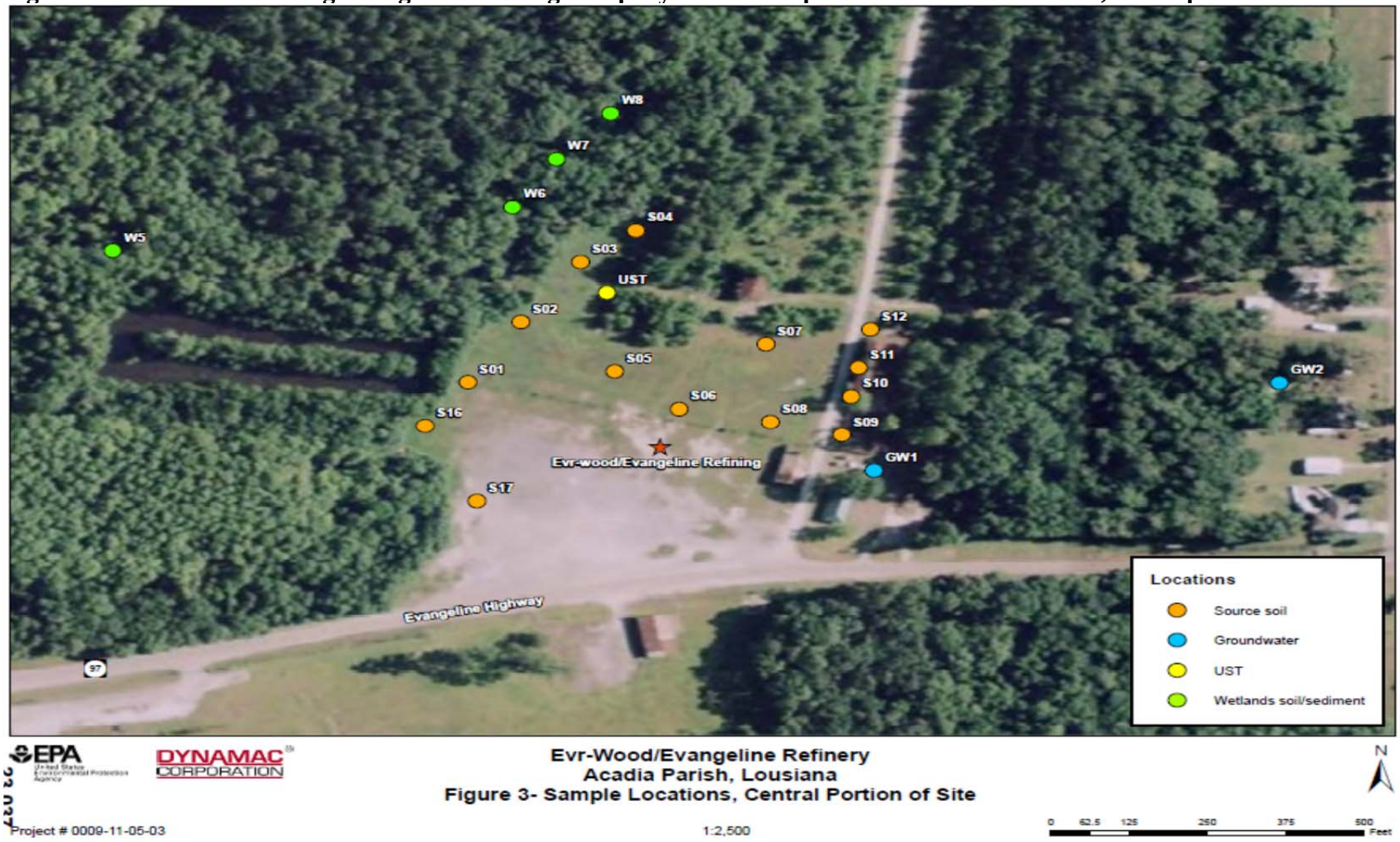


Figure 5**: EVR-Wood Treating/Evangeline Refining Company northern sample locations. Acadia Parish, LA. September 2011.**

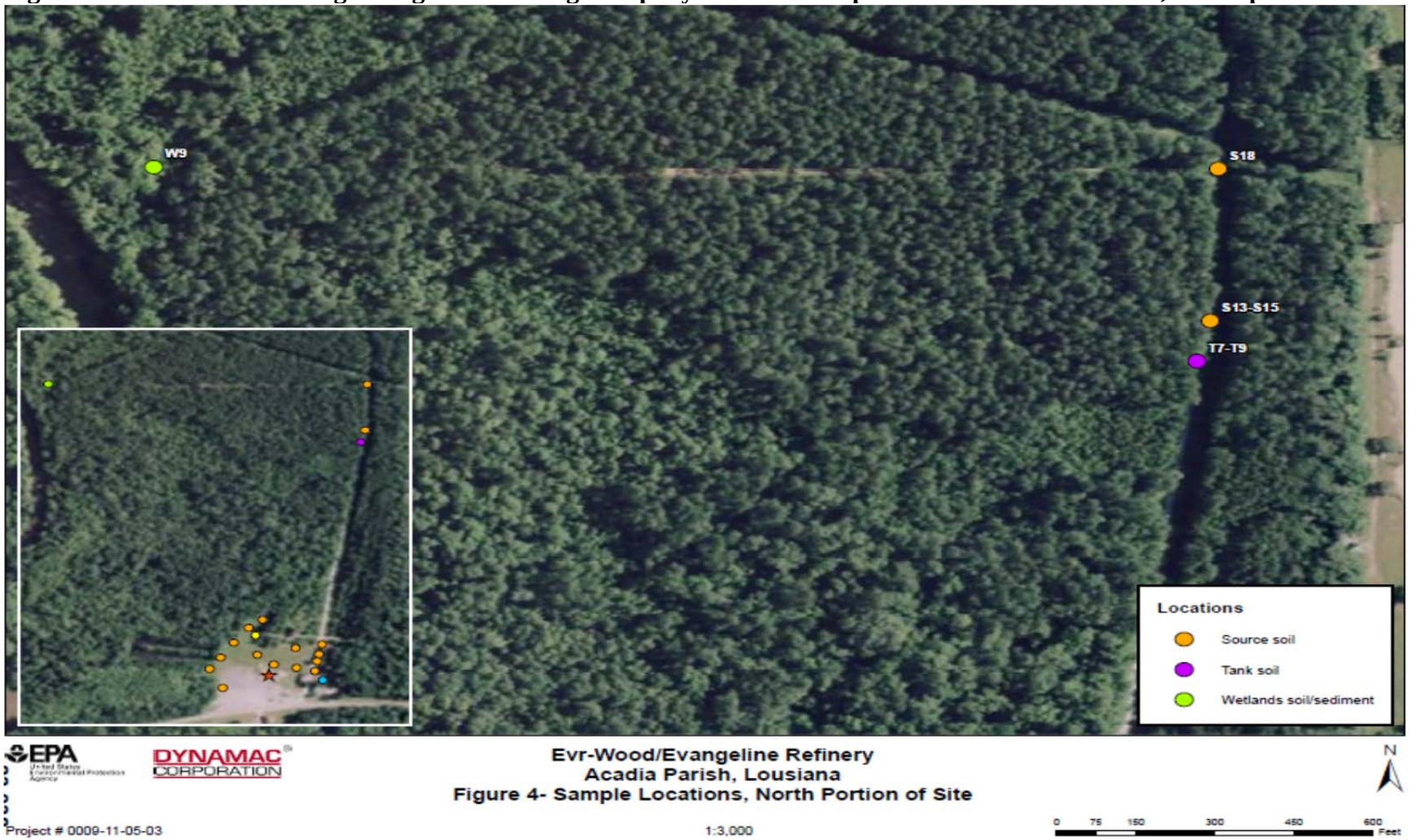
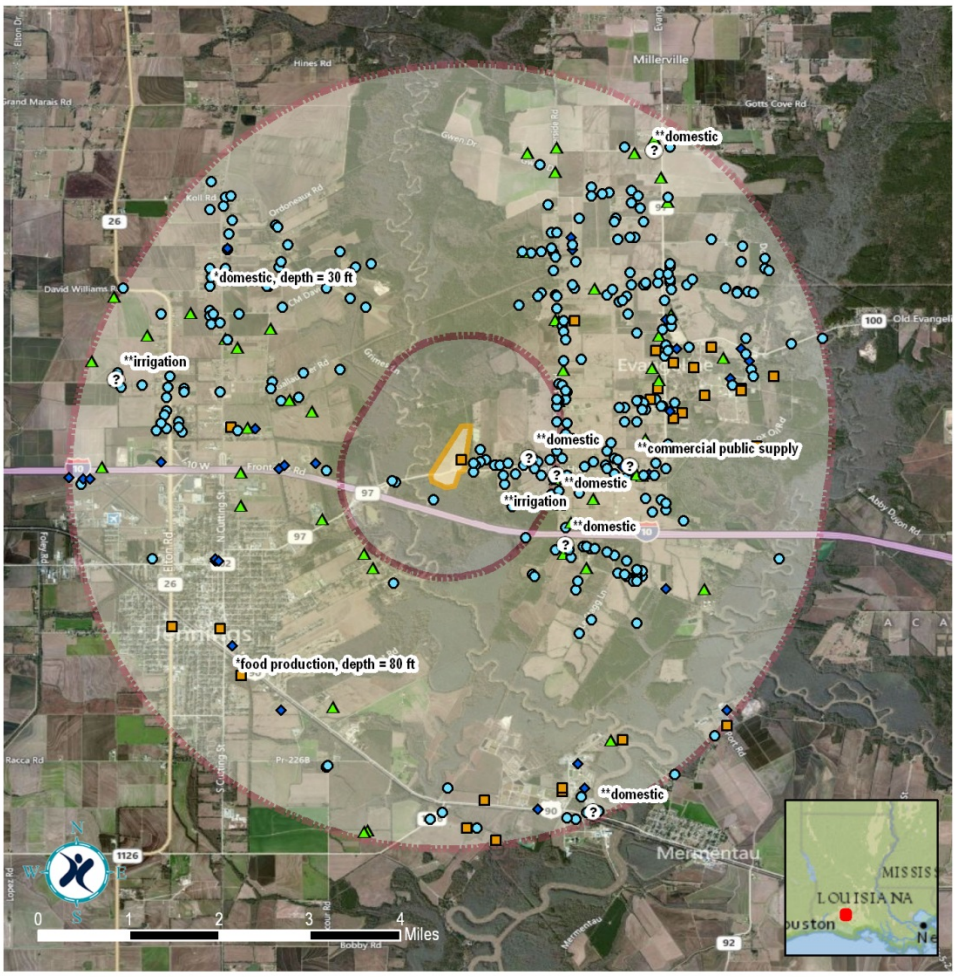


Figure 6: Active wells within 1 and 4 miles of the EVR site. Acadia Parish, LA. October 2012.



Legend

EVR-Wood Treating/Evangeline Refining Co.
Acadia Parish

1 and 4 mile buffers

Active wells within 1 and 4 miles

Count shown in parenthesis
*Water wells under 100 ft depth are labeled with type and depth
**Wells of unknown depth are also labeled by type and marked as: ?
Use Description:

- domestic (299)
- industrial; industrial chemical manufacturing; industrial food processing; industrial petroleum refining (28)
- public supply, institution public supply; municipal public supply; rural public supply (33)
- irrigation; livestock; aquaculture (52)

Water wells data source: Louisiana DNR SONRIS, October 2012
Mapping software: ESRI ArcMap 10
Imagery: Microsoft Virtual Earth

Map Produced October 26, 2012 by the Louisiana Department of Health and Hospitals (LDHH), Section of Environmental Epidemiology & Toxicology (SEET).

LDHH SEET cannot guarantee the accuracy of the information contained on this map and expressly disclaims liability for errors and omissions in its contents.

APPENDIX B: Data Evaluation

Screening Process

Comparison Values (CVs) are chemical and media-specific concentrations in air, soil, and drinking water that are used by ATSDR health assessors and others to identify environmental contaminants at hazardous waste sites that require further evaluation. CVs incorporate assumptions of daily exposure to the chemical and in the case of soil and water a standard amount that someone may likely take into their body each day. CVs are conservative and non-site specific. CVs are based on health guidelines with uncertainty or safety factors applied to ensure that they are adequately protective of public health.

The comparison of environmental data with ATSDR CVs is one of the first steps in the public health assessment process. The results of this screening step give health assessors an understanding of the priority contaminants at the site. When a contaminant is detected at a concentration less than its respective CVs, exposure is not expected to result in health effects and it is not considered further as part of the public health assessment process. It should be noted that contaminants detected at concentrations that exceed their respective CVs, do not necessarily represent a health threat. Instead, the results of the CV screening identify those contaminants that warrant a more detailed, site-specific evaluation to determine whether health effects are expected to occur. CVs are not intended to be used as environmental clean-up levels.

CVs can be based on either carcinogenic or non-carcinogenic effects. Cancer-based CVs are calculated from the U.S. Environmental Protection Agency's (EPA) oral cancer slope factor (CSF) or inhalation unit risk (IUR). CVs based on cancerous effects account for a lifetime exposure (70 years) with a theoretical excess lifetime cancer risk of 1 extra case per 1 million exposed people. Non-cancer values are calculated from ATSDR's Minimal Risk Levels (MRLs), EPA's Reference Doses (RfDs), or EPA's Reference Concentrations (RfCs). When a cancer and non-cancer CV exists for the same chemical, the lower of these values is used in the data comparison for public health protectiveness.

The ATSDR Environmental Media Evaluation Guide (EMEG), Reference Dose Media Evaluation Guide (RMEG) and Cancer Risk Evaluation Guide (CREG) were used as CVs in this evaluation. EMEGs are estimated contaminant concentrations that are unlikely to cause adverse non-carcinogenic health effects. EMEGs are calculated by using ATSDR's Minimal Risk Level (MRL), which is also an estimate of daily exposure to contaminants that are unlikely to cause adverse non-cancer health effects. If no MRL is available to derive an EMEG, ATSDR develops an RMEG using EPA's reference dose. Like EMEGs, RMEGs represent concentrations of substances to which humans may be exposed without experiencing adverse health effects. Cancer risk comparison values used in this health consultation are based on ATSDR's CREG and EPA's CSF. CREGs are used to identify concentration of cancer-causing substances that are unlikely to result in an increase of cancer rates in an exposed population.

EPA Region III Risk-Based Concentrations (RBCs), Maximum Contaminant Levels (MCLs) and Lifetime Health Advisories (LTHAs) were also used as CVs in this evaluation. RBCs are calculated using EPA's reference dose and are also used as a screening tool when evaluating non-carcinogenic health effects. An MCL is an

enforceable drinking water regulation that is the maximum permissible level of contaminant in water that is delivered to the free-flowing outlet of the ultimate user of a public water system. LTHAs represent a concentration of a chemical in drinking water that is not expected to cause adverse (noncancer) health effects over a lifetime of exposure.

The Louisiana Department of Environmental Quality's (LDEQ) Risk Evaluation Corrective Action Program (RECAP) Soil Screening Non-Industrial (SSni) values were used when ATSDR CVs were not available. RECAP screening standards are concentrations at or above which remediation of a medium (soil, sediment, or water) should occur.

It should be noted that LDHH utilized residential soil regulations to compare detected sediment concentrations, as sediment specific regulations were also unavailable. Furthermore, groundwater comparison values were used to evaluate aqueous underground storage tank (UST) contaminant concentrations as UST specific CVs were not available. This step provides added protectiveness, as UST contents will never serve as a drinking water source.

Appendix C, Table C-3 depicts the Toxic Equivalency Factors (TEFs) for PAHs detected in subsurface soil samples collected at the EVR site. The overall carcinogenic potential of a mixture of PAHs is often expressed as the benzo(a)pyrene toxic equivalent (TEQ) concentration. The TEQ is an estimate of the pure benzo(a)pyrene concentration that would have the same carcinogenic potential as the mixture of PAHs in the sample. The available toxicological evidence indicate that there are no appreciable interactions between different PAH compounds, therefore, adding the effects of multiple PAHs is appropriate. The total benzo(a)pyrene TEQ concentration is calculated by multiplying the maximum detected concentration of each of the PAHs by its respective toxic equivalency factor. The product of each is then added to obtain a total benzo(a)pyrene TEQ concentration. To ensure a conservative, protective estimation, constituents with non-detect values were assumed at half the method detection limit in the total PAH determination.

There were no comparison values, TEFs, or other screening standards available with which to evaluate calcium, magnesium, potassium, sodium, 2-nitrophenol, 4-bromophenyl-phenylether, carbazole, 4-chloro-3-methylphenol, 4-chlorophenyl-phenylether, 4-methylphenol, and benzo(g,h,i)perylene in soil and/or sediment samples.

There were no comparison values, TEFs or other screening standards available to evaluate calcium, iron, magnesium, potassium, sodium, 2-nitrophenol, 3-nitroaniline, 4-bromophenyl-phenylether, 4-chloro-3-methylphenol, 4-chlorophenyl-phenylether, 4-methylphenol, acenaphthylene, benzo(g,h,i)perylene, carbazole, dibenzofuran, dimethylphthalate and phenanthrene in groundwater and/or underground storage tank samples.

Several comparison values used in the data evaluation were below their respective chemical-specific laboratory detection limit at varied sample locations and were therefore unable to be fully evaluated in this PHA. LDHH recognizes that all regulatory agencies do not use the same comparison values for evaluation purposes; however, it is critical that laboratory detection limits are more than or as sensitive as health based comparison

values in order to capture the specific health effect that the value is based upon. The following contaminants of potential concern that were fully or partially affected include:

Soil:

Arsenic, thallium, bis(2-chloroethyl)ether, 3,3-dichlorobenzidine, n-nitroso-di-n-propylamine, pentachlorophenol, thallium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h,)anthracene, hexachlorobenzene and indeno(1,2,3-cd)pyrene

Groundwater:

Antimony, arsenic, cadmium, thallium, 1,2,4,5-tetrachlorobenzene, 2,4,6-trichlorophenol, 4,6-dinitro-2-methylphenol, 3,3,-dichlorobenzidine, 4-nitroaniline, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h,)anthracene, bis(2-chloroethyl)ether, bis(2-ethylhexyl)phthalate, chrysene, hexachlorobenzene, hexachlorobutadiene, hexachloroethane, indeno(1,2,3-cd)pyrene, n-nitroso-di-n-propylamine, pentachlorophenol

Matrix spike (MS) samples were not used as individual data points in the evaluation process. The three MS samples collected at the EVR wood site were used as supporting documentation for laboratory quality assurance and quality control purposes.

Noncancer Health Effects

Exposure doses for contaminants identified as COCs were estimated using ATSDR's dose calculation equations. The default values used in calculating the exposure doses are listed in Appendix C, Table C-12. The equations used to estimate ingestion and dermal exposures are as follows:

Ingestion Exposure Dose Equation:

ED= (C) (IR) (EF) (CF) / (BW)

where C= Contaminant concentration

IR= Ingestion Rate

EF= Exposure Factor= $\frac{hours}{day} X \frac{days}{year} =$

$\frac{hours}{24\ hours} X \frac{days}{365\ days}$

CF= Conversion Factor= 10^{-06}

BW= Body Weight

Dermal Exposure Dose Equation:

ED= (C) (A) (AF) (EF) (CF) / (BW)

where C= Concentration

A= Total Soil Adhered

AF= Bioavailability Factor

EF= Exposure Factor= $\frac{hours}{day} X \frac{days}{year} =$

$\frac{hours}{24\ hours} X \frac{days}{365\ days}$

CF= Conversion Factor= 10^{-06}

BW= Body Weight

The estimated exposure doses were compared to the appropriate health guideline values, which are doses below which adverse health effects are unlikely. These values are based on valid toxicological studies. The health guideline values used in the evaluation of EVR site samples are listed below:

A *minimum risk level* (MRL) is an estimated daily human exposure to a substance that is not likely to cause adverse noncancer health effects over a specified duration of exposure. Developed by the ATSDR, MRLs are not intended to be used as predictors of adverse health effects. MRLs may be found at http://www.atsdr.cdc.gov/mrls.html.

A *reference dose* (RfD) is an estimated daily lifetime exposure to a substance that is unlikely to cause adverse noncancer health effects to human populations. RfDs may be found in the EPA's Integrated Risk Information System (IRIS) at http://www.epa.gov/iris.

A lowest-observed-adverse-effects level (LOAEL) is the lowest level of continuous exposure to a contaminant that has been observed to result in adverse health effects. Exposure doses that do not exceed LOAELs are not considered likely to pose harm to public health. LOAELs may be found in chemical specific toxicological profiles at http://www.atsdr.cdc.gov

Calculation of Carcinogenic Risk

SEET estimated the total excess cancer risk for COCs that are recognized as potential cancer-causing agents. This represents the increase in the probability of an individual developing cancer as a result of being exposed to a contaminant over a lifetime. Where appropriate, the estimated increases in cancer risk are bolded in red in Tables C-13 through C-14.

Cancer risks were calculated multiplying each exposure dose by EPA's *cancer slope factor* (available at http://www.epa.gov/iris) and summing the cancer risks across exposure routes (ingestion or dermal) for each potential cancer-causing agent. The results estimate the worst-case maximum increase in the risk of developing cancer after exposure to the contaminant.

APPENDIX C: Data Tables

Table C-1: Sample locations and analyses from the EVR-Wood Treating site. Sept. 2011.

Sample #	Location	Description	Matrix	Sample Date	Analyses
06NY-0001	GW1	Site Well	GW[1]	9/28/2011	SVOC[2], Metals
06NY-0002	GW1 *	Site Well	GW	9/28/2011	SVOC, Metals
06NY-0003	GW2	Background groundwater	GW	9/28/2011	SVOC, Metals
06NY-0004	S01	Lagoon 4 (subsurface soil)	Soil	9/27/2011	SVOC, Metals
06NY-0005	S02	Lagoon 3 (subsurface soil)	Soil	9/27/2011	SVOC, Metals
06NY-0006	S16	Lagoon 5 (subsurface soil)	Soil	9/27/2011	SVOC, Metals
06NY-0007	S03	Lagoon 2 (subsurface soil)	Soil	9/27/2011	SVOC, Metals
06NY-0008	S04	Lagoon 1 (subsurface soil)	Soil	9/27/2011	SVOC, Metals
06NY-0009	S05	Plant soil (wood treatment)	Soil	9/27/2011	SVOC, Metals
06NY-0010	S06	Plant soil (wood treatment)	Soil	9/27/2011	SVOC, Metals
06NY-0011	S07	Plant soil (wood treatment)	Soil	9/27/2011	SVOC, Metals
06NY-0012	S08	Plant soil (wood treatment)	Soil	9/27/2011	SVOC, Metals
06NY-0013	S09	Drying area soil	Soil	9/27/2011	SVOC, Metals
06NY-0013DL	S09	Drying area soil	Soil	9/27/2011	SVOC, Metals
06NY-0014	S10	Drying area soil	Soil	9/27/2011	SVOC, Metals
06NY-0015	S11	Drying area soil	Soil	9/27/2011	SVOC, Metals
06NY-0016	S12	Drying area soil	Soil	9/27/2011	SVOC, Metals
06NY-0017	S13	Pond sediment	Soil	9/27/2011	SVOC, Metals
06NY-0018	S14	Pond sediment	Soil	9/27/2011	SVOC, Metals
06NY-0019	S15	Pond sediment	Soil	9/27/2011	SVOC, Metals
06NY-0020	T1	Tank farm, SW tank	Soil	9/27/2011	SVOC, Metals
06NY-0021	T2	Tank farm, NW tank	Soil	9/27/2011	SVOC, Metals
06NY-0022	T3	Tank farm, SC tank	Soil	9/27/2011	SVOC, Metals
06NY-0023	T4	Tank farm, NC tank	Soil	9/27/2011	SVOC, Metals
06NY-0024	T5	Tank farm, SE tank	Soil	9/27/2011	SVOC, Metals
06NY-0025	T5 *	Tank farm, SE tank	Soil	9/27/2011	SVOC, Metals
06NY-0026	T6	Tank farm, NE tank	Soil	9/27/2011	SVOC, Metals
06NY-0027	T7	Above ground storage tank	Soil	9/27/2011	SVOC, Metals
06NY-0028	T8	Above ground storage tank	Soil	9/27/2011	SVOC, Metals
06NY-0029	U1	Under ground storage tank	Aqueous	9/28/2011	SVOC
06NY-0029DL	U1*	Underground storage tank	Aqueous	9/28/2011	SVOC
06NY-0030	W1	Wetland south of tank farm	Sediment	9/28/2011	SVOC, Metals
06NY-0031	W2	Wetland south of tank farm	Sediment	9/28/2011	SVOC, Metals
06NY-0032	W3	Wetland south of tank farm	Sediment	9/28/2011	SVOC, Metals
06NY-0033	W4	Wetland south of tank farm	Sediment	9/28/2011	SVOC, Metals
06NY-0034	W5	Wetland west of EVR-wood	Sediment	9/28/2011	SVOC, Metals
06NY-0035	W6	Wetland west of EVR-wood	Sediment	9/28/2011	SVOC, Metals
06NY-0036	W6 *	Wetland west of EVR-wood	Sediment	9/28/2011	SVOC, Metals
06NY-0037	W7	Wetland west of EVR-wood	Sediment	9/28/2011	SVOC, Metals
06NY-0038	W8	Wetland west of EVR-wood	Sediment	9/28/2011	SVOC, Metals
06NY-0039	W9	Background wetland north	Sediment	9/28/2011	SVOC, Metals
06NY-0040	T9	Above ground storage tank	Soil	9/27/2011	SVOC, Metals
06NY-0041	S16*	Lagoon 5 (subsurface soil)	Soil	9/27/2011	SVOC, Metals
06NY-0042	S17	Lagoon 6 (subsurface soil)	Soil	9/27/2011	SVOC, Metals
06NY-0043	S18	Background soil	Soil	9/27/2011	SVOC, Metals
06NY-0044	S09 *	Drying area soil	Soil	9/27/2011	SVOC, Metals

***** Duplicate sample
[1]GW- ground water
[2]SVOC- semi volatile organic compound

Table C-2: Range of contaminant concentrations in subsurface soil samples (2.5-7 ft bgs) collected at the EVR-Wood site. September 2011.
(Contaminant concentrations exceeding their screening values are listed in bold red)

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
Metals					
Aluminum	5,340	24,700	06NY-0005	50,000	Child EMEG[3]
Antimony	ND[4]	ND	-	20	Child RMEG[5]
Arsenic	**5.5**	**40.6**	06NY-0007	0.47	CREG[6]
Barium	223	2,640	06NY-0005	10,000	Child EMEG
Beryllium	0.9	1.1	06NY-0005 06NY-0008	100	Child EMEG
Cadmium	ND	0.63	06NY-0005	5	Child EMEG
Chromium	9.8	**138**	06NY-0007	50	Child EMEG
Cobalt	5.3	11.3	06NY-0042	500	Child EMEG
Copper	7.6	69.8	06NY-0007	500	Child EMEG
Lead	16.6	74.3	06NY-0007	400	EPA RSV[7]
Manganese	158	813	06NY-0042	2,500	Child RMEG
Mercury	ND	0.084	06NY-0006	2.3	RECAP SSni[8]
Nickel	8.3	29.2	06NY-0042	1,000	Child RMEG
Silver	ND	ND	-	250	Child RMEG
Thallium	ND	ND	-	0.78	RBC[9]
Vanadium	15.8	75.6	06NY-0005	500	Child EMEG
Essential Nutrients					
Calcium	3,420	47,800	06NY-0006	NA[10]	Ess. Nutrient[11]
Iron	9,110	21,600	06NY-0042	55,000	RBC
Magnesium	1,540	8,610	06NY-0042	NA	Ess. Nutrient
Potassium	317	1,600	06NY-0042	NA	Ess. Nutrient
Selenium	ND	ND	-	250	Child EMEG
Sodium	ND	3,530	06NY-0005	NA	Ess. Nutrient
Zinc	21.9	129	06NY-0005	15,000	Child EMEG
Semi Volatiles					
1,1-Biphenyl	ND	47	06NY-007	2,500	Child RMEG
1,2,4,5-Tetrachlorobenzene	ND	ND	-	15	Child RMEG
2,2-Oxybis (1-chloropropane)	ND	ND	-	2,000	Child RMEG
2,3,4,6-Tetrachlorophenol	ND	ND	-	1,500	Child RMEG
2,4,5-Trichlorophenol	ND	ND	-	5,000	Child RMEG
2,4,6-Trichlorophenol	ND	ND	-	64	CREG
2,4-Dichlorophenol	ND	ND	-	150	Child EMEG
2,4-Dimethylphenol	ND	ND	-	1,000	Child RMEG

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
2,4-Dinitrophenol	ND	ND	-	100	Child RMEG
2,4-Dinitrotoluene	ND	ND	-	100	Child EMEG
2,6-Dinitrotoluene	ND	ND	-	200	Child EMEG
2-Chloronaphthalene	ND	ND	-	400	Child RMEG
2-Chlorophenol	ND	ND	-	250	Child RMEG
2-Methylnaphthalene	6.1	160	06NY-007	2,000	Child EMEG
2-Methylphenol	ND	ND	-	2,500	Child RMEG
2-Nitroaniline	ND	ND	-	780	RBC
2-Nitrophenol	ND	ND	-	NA	NA
3,3-Dichlorobenzidine	ND	ND	-	1.6	CREG
3-Nitroaniline	ND	ND	-	130	RECAP SSni
4,6-Dinitro-2-methylphenol	ND	ND	-	200	Child EMEG
4-Bromophenyl-phenylether	ND	ND	-	NA	NA
4-Chloro-3-methylphenol	ND	ND	-	NA	NA
4-Chloroaniline	ND	ND	-	200	Child RMEG
4-Chlorophenyl-phenylether	ND	ND	-	NA	NA
4-Methylphenol	ND	ND	-	NA	NA
4-Nitroaniline	ND	ND	-	100	RECAP SSni
4-Nitrophenol	ND	ND	-	320	RECAP SSni
Acetophenone	ND	ND	-	5,000	Child RMEG
Atrazine	ND	ND	-	150	Child EMEG
Benzaldehyde	ND	ND	-	5,000	Child RMEG
Bis(2-chloroethoxy)methane	ND	ND	-	230	RBC
Bis(2-chlorothyl)ether	ND	ND	-	0.64	CREG
Bis(2-ethylhexyl)phthalate	ND	ND	-	35	RECAP SSni
Butylbenzylphthalate	ND	ND	-	10,000	Child RMEG
Caprolactam	ND	ND	-	25,000	Child RMEG
Carbazole	ND	51	06NY-007	NA	NA
Dibenzofuran	0.082	160	06NY-007	290	RECAP SSni
Diethylphthalate	ND	ND	-	300,000	Child EMEG
Dimethylphthalate	ND	ND	-	1,500	RECAP SSni
Di-n-butylphthalate	ND	ND	-	7,800	RBC
Di-n-octylphthalate	ND	ND	-	240	RECAP SSni
Hexachlorobenzene	ND	ND	-	0.44	CREG
Hexachlorobutadiene	ND	ND	-	9	CREG
Hexachlorocyclopentadiene	ND	ND	-	5,000	Child EMEG
Hexachloroethane	ND	ND	-	18	CREG

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
Isophorone	ND	ND	-	10,000	Child EMEG
Naphthalene	0.075	220	06NY-007	30,000	Child EMEG
Nitrobenzene	ND	ND	-	100	Child RMEG
N-Nitroso-di-n-propylamine	ND	ND	-	0.33	RECAP SSni
N-Nitrosodiphenylamine	ND	ND	-	90	RECAP SSni
Pentachlorophenol	ND	**70**	06NY-007	1.8	CREG
Phenol	ND	ND	-	15,000	Child RMEG
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	0.11	200	06NY-007	30,000	Child EMEG
Acenapthylene	ND	2.4	06NY-007	350	RECAP SSni
Anthracene	0.07	100	06NY-007	500,000	Child EMEG
Benzo (a) anthracene	ND	**26**	06NY-007	0.015	RBC
Benzo (a) pyrene	ND	**6.2**	06NY-007	0.096	CREG
Benzo (b) fluoranthene	ND	**9.8**	06NY-007	0.015	RBC
Benzo (g,h,i) perylene	ND	1.6	06NY-007	NA	NA
Benzo (k) fluoranthene	ND	**8.7**	06NY-007	1.5	RBC
Chrysene	ND	27	06NY-007	150	RBC
Dibenzo(a,h)anthracene	ND	ND	-	0.0015	RBC
Fluoranthene	0.059	260	06NY-007	20,000	Child EMEG
Fluorene	0.049	160	06NY-007	20,000	Child EMEG
Indeno (1,2,3-cd) pyrene	ND	**3.1**	06NY-007	0.015	RBC
Phenanthrene	0.066	480	06NY-007	2,100	RECAP Soil SSni
Pyrene	ND	130	06NY-007	1,500	Child RMEG

[1] ppm =parts per million
[2] CV=comparison value
[3]EMEG = Environmental Media Evaluation Guide
[4]ND = not detected
[5]RMEG = Reference Dose Media Evaluation Guide
[6]CREG = cancer risk evaluation guide
[7]EPA RSV= Environmental Protection Agency Reference Screening Value
[8] RECAP Soil SSni =Louisiana Department of Environmental Quality Risk Evaluation/Corrective Action Program Screening Option Soil Screening Standard for Non-industrial exposures
[9] RBC = Risk based concentration
[10]NA= Not available
[11]Ess. Nutrient= Essential nutrient; calcium, magnesium and sodium are considered to be essential nutrients that do not present adverse health risks at low levels

Table C-3: Example Toxicity equivalency quotient (TEQ) for maximum detected polycyclic aromatic hydrocarbons (PAHs) in subsurface soil samples collected at the EVR-Wood site. September 2011.

PAH[1]	Concentration (ppm[2])	TEF[3]	TEQ[4]
Acenaphthene	200	0.001	0.2
Acenaphthylene	2.4	0.001	0.0024
Anthracene	100	0.01	1
Benzo(a)anthracene	26	0.1	2.6
Benzo(a)pyrene	6.2	1	6.2
Benzo(b)fluoranthene	9.8	0.1	0.98
Benzo(g,h,i)perylene	1.6	0.01	0.016
Benzo(k)fluoranthene	8.7	0.1	0.87
Chrysene	27	0.01	0.27
Dibenzo(a,h)anthracene	1.25 U[5]	5	6.25
Fluoranthene	260	0.001	0.26
Fluorene	160	0.001	0.16
Indeno(1,2,3-cd)pyrene	3.1	0.1	0.31
Phenanthrene	480	0.001	0.48
Pyrene	130	0.001	0.13
		Total PAH TEQ	19.73

[1]PAH = polycyclic aromatic hydrocarbon
[2]ppm = parts per million
[3]TEF = toxicity equivalency factors
[4] TEQ = toxicity equivalency quotient
[5] U = not detected (concentration listed is half the quantitation limit)

TEFs retrieved from: Agency for Toxic Substances and Disease Registry. Toxicological Profile for Polycyclic Aromatic Hydrocarbons. Atlanta. US Department of Health and Human Services; 1995.

Table C-4: Range of contaminant concentrations in soil samples (1-2 ft bgs) collected North of LA 97 at the former wood treatment facility at the EVR-Wood site. September 2011.
(Contaminant concentrations exceeding their screening values are listed in bold red)

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
Metals					
Aluminum	6,890	11,600	06NY-0011	50,000	Child EMEG[3]
Antimony	ND[4]	ND	-	20	Child RMEG[5]
Arsenic	**8.1**	**24.2**	06NY-0011	0.47	CREG[6]
Barium	126	815	06NY-0011	10,000	Child EMEG
Beryllium	0.53	1.7	06NY-0011	100	Child EMEG
Cadmium	ND	0.18	06NY-0009	5	Child EMEG
Chromium	9.5	18.9	06NY-0011	50	Child EMEG
Cobalt	3.3	103	06NY-0011	500	Child EMEG
Copper	6.4	18.6	06NY-0011	500	Child EMEG
Lead	23.3	96.8	06NY-0011	400	EPA RSV[7]
Manganese	246	**5,100**	06NY-0011	2,500	Child RMEG
Mercury	ND	0.64	06NY-0009	2.3	RECAP SSni[8]
Nickel	ND	17.3	06NY-0011	1,000	Child RMEG
Silver	ND	ND	-	250	Child RMEG
Thallium	ND	**3.7**	06NY-0011	0.78	RBC[9]
Vanadium	22.5	79.8	06NY-0009	500	Child EMEG
Essential Nutrients					
Calcium	3,340	24,100	06NY-0010	NA[10]	Ess. Nutrient[11]
Iron	1,400	**62,600**	06NY-0011	55,000	RBC
Magnesium	792	2,340	06NY-0010	NA	Ess. Nutrient
Potassium	ND	357	06NY-0010	NA	Ess. Nutrient
Selenium	ND	ND	-	250	Child EMEG
Sodium	ND	ND	-	NA	Ess. Nutrient
Zinc	22.5	79.8	06NY-0009	15,000	Child EMEG
Semi Volatiles					
1,1-Biphenyl	ND	ND	-	2,500	Child RMEG
1,2,4,5-Tetrachlorobenzene	ND	ND	-	15	Child RMEG
2,2-Oxybis (1-chloropropane)	ND	ND	-	2,000	Child RMEG
2,3,4,6-Tetrachlorophenol	ND	ND	-	1,500	Child RMEG
2,4,5-Trichlorophenol	ND	ND	-	5,000	Child RMEG
2,4,6-Trichlorophenol	ND	ND	-	64	CREG
2,4-Dichlorophenol	ND	ND	-	150	Child EMEG
2,4-Dimethylphenol	ND	ND	-	1,000	Child RMEG

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
2,4-Dinitrophenol	ND	ND	-	100	Child RMEG
2,4-Dinitrotoluene	ND	ND	-	100	Child EMEG
2,6-Dinitrotoluene	ND	ND	-	200	Child EMEG
2-Chloronaphthalene	ND	ND	-	400	Child RMEG
2-Chlorophenol	ND	ND	-	250	Child RMEG
2-Methylnaphthalene	ND	ND	-	2,000	Child EMEG
2-Methylphenol	ND	ND	-	2,500	Child RMEG
2-Nitroaniline	ND	ND	-	780	RBC
2-Nitrophenol	ND	ND	-	NA	NA
3,3-Dichlorobenzidine	ND	ND	-	1.6	CREG
3-Nitroaniline	ND	ND	-	130	RECAP SSni
4,6-Dinitro-2-methylphenol	ND	ND	-	200	Child EMEG
4-Bromophenyl-phenylether	ND	ND	-	NA	NA
4-Chloro-3-methylphenol	ND	ND	-	NA	NA
4-Chloroaniline	ND	ND	-	200	Child RMEG
4-Chlorophenyl-phenylether	ND	ND	-	NA	NA
4-Methylphenol	ND	ND	-	NA	NA
4-Nitroaniline	ND	ND	-	100	RECAP SSni
4-Nitrophenol	ND	ND	-	320	RECAP SSni
Acetophenone	ND	ND	-	5,000	Child RMEG
Atrazine	ND	ND	-	150	Child EMEG
Benzaldehyde	ND	ND	-	5,000	Child RMEG
Bis(2-chloroethoxy)methane	ND	ND	-	230	RBC
Bis(2-chlorothyl)ether	ND	ND	-	0.64	CREG
Bis(2-ethylhexyl)phthalate	ND	ND	-	35	RECAP SSni
Butylbenzylphthalate	ND	ND	-	10,000	Child RMEG
Caprolactam	ND	ND	-	25,000	Child RMEG
Carbazole	ND	ND	-	NA	NA
Dibenzofuran	ND	ND	-	290	RECAP SSni
Diethylphthalate	ND	ND	-	300,000	Child EMEG
Dimethylphthalate	ND	ND	-	1,500	RECAP SSni
Di-n-butylphthalate	ND	ND	-	7,800	RBC
Di-n-octylphthalate	ND	ND	-	240	RECAP SSni
Hexachlorobenzene	ND	ND	-	0.44	CREG
Hexachlorobutadiene	ND	ND	-	9	CREG
Hexachlorocyclopentadiene	ND	ND	-	5,000	Child EMEG
Hexachloroethane	ND	ND	-	18	CREG

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
Isophorone	ND	ND	-	10,000	Child EMEG
Naphthalene	ND	ND	-	30,000	Child EMEG
Nitrobenzene	ND	ND	-	100	Child RMEG
N-Nitroso-di-n-propylamine	ND	ND	-	0.33	RECAP SSni
N-Nitrosodiphenylamine	ND	ND	-	90	RECAP SSni
Pentachlorophenol	ND	ND	-	1.8	CREG
Phenol	ND	ND	-	15,000	Child RMEG
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	ND	ND	-	30,000	Child EMEG
Acenapthylene	ND	ND	-	350	RECAP SSni
Anthracene	ND	ND	-	500,000	Child EMEG
Benzo (a) anthracene	ND	ND	-	0.015	RBC
Benzo (a) pyrene	ND	ND	-	0.096	CREG
Benzo (b) fluoranthene	ND	ND	-	0.015	RBC
Benzo (g,h,i) perylene	ND	ND	-	NA	NA
Benzo (k) fluoranthene	ND	ND	-	1.5	RBC
Chrysene	ND	ND	-	150	RBC
Dibenzo(a,h)anthracene	ND	ND	-	0.0015	RBC
Fluoranthene	ND	ND	-	20,000	Child EMEG
Fluorene	ND	ND	-	20,000	Child EMEG
Indeno (1,2,3-cd) pyrene	ND	ND	-	0.015	RBC
Phenanthrene	ND	ND	-	2,100	RECAP Soil SSni
Pyrene	ND	ND	-	1,500	Child RMEG

[1] ppm =parts per million
[2] CV=comparison value
[3]EMEG = Environmental Media Evaluation Guide
[4]ND = not detected
[5]RMEG = Reference Dose Media Evaluation Guide
[6]CREG = cancer risk evaluation guide
[7]EPA RSV= Environmental Protection Agency Reference Screening Value
[8] RECAP Soil SSni =Louisiana Department of Environmental Quality Risk Evaluation/Corrective Action Program Screening Option Soil Screening Standard for Non-industrial exposures
[9] RBC = Risk based concentration
[10] NA= Not available
[11]Ess. Nutrient= Essential nutrient; calcium, magnesium and sodium are considered to be essential nutrients that do not present adverse health risks at low levels

Table C-5: Range of contaminant concentrations in surface soil samples (0-6 in) collected North of LA 97 at the wood drying area at the EVR-Wood site. September 2011.
(Contaminant concentrations exceeding their screening values are listed in bold red)

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
Metals					
Aluminum	3,840	5,110*	06NY-0044	50,000	Child EMEG[3]
Antimony	ND[4]	ND	-	20	Child RMEG[5]
Arsenic	**21.8**	**51.9***	06NY-0044	0.47	CREG[6]
Barium	265	487	06NY-0015	10,000	Child EMEG
Beryllium	0.28	0.53	06NY-0013	100	Child EMEG
Cadmium	0.36	1.1*	06NY-0044	5	Child EMEG
Chromium	29.2	62.9*	06NY-0044	50	Child EMEG
Cobalt	3.6	16.2	06NY-0015	500	Child EMEG
Copper	13.6	52.9*	06NY-0044	500	Child EMEG
Lead	35.4	208*	06NY-0044	400	EPA RSV[7]
Manganese	434	1,130	06NY-0015	2,500	Child RMEG
Mercury	0.023	0.59*	06NY-0044	2.3	RECAP SSni[8]
Nickel	2.7	7.5	06NY-0016	1,000	Child RMEG
Silver	ND	ND	-	250	Child RMEG
Thallium	ND	ND	06NY-0011	0.78	RBC[9]
Vanadium	19.5	24.4*	06NY-0044	500	Child EMEG
Essential Nutrients					
Calcium	87,500	160,000	06NY-0014	NA[10]	Ess. Nutrient[11]
Iron	11,900	20,200	06NY-0015	55,000	RBC
Magnesium	817	1,520	06NY-0016	NA	Ess. Nutrient
Potassium	ND	228	06NY-0014	NA	Ess. Nutrient
Selenium	ND	ND	-	250	Child EMEG
Sodium	366*	909	06NY-0013	NA	Ess. Nutrient
Zinc	186	931	06NY-0015	15,000	Child EMEG
Semi Volatiles					
1,1-Biphenyl	ND	ND	-	2,500	Child RMEG
1,2,4,5-Tetrachlorobenzene	ND	ND	-	15	Child RMEG
2,2-Oxybis (1-chloropropane)	ND	ND	-	2,000	Child RMEG
2,3,4,6-Tetrachlorophenol	ND	4.3	06NY-0013	1,500	Child RMEG
2,4,5-Trichlorophenol	ND	ND	-	5,000	Child RMEG
2,4,6-Trichlorophenol	ND	ND	-	64	CREG
2,4-Dichlorophenol	ND	ND	-	150	Child EMEG
2,4-Dimethylphenol	ND	ND	-	1,000	Child RMEG

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
2,4-Dinitrophenol	ND	ND	-	100	Child RMEG
2,4-Dinitrotoluene	ND	ND	-	100	Child EMEG
2,6-Dinitrotoluene	ND	ND	-	200	Child EMEG
2-Chloronaphthalene	ND	ND	-	400	Child RMEG
2-Chlorophenol	ND	ND	-	250	Child RMEG
2-Methylnaphthalene	ND	0.092	06NY-0044	2,000	Child EMEG
2-Methylphenol	ND	ND	-	2,500	Child RMEG
2-Nitroaniline	ND	ND	-	780	RBC
2-Nitrophenol	ND	ND	-	NA	NA
3,3-Dichlorobenzidine	ND	ND	-	1.6	CREG
3-Nitroaniline	ND	ND	-	130	RECAP SSni
4,6-Dinitro-2-methylphenol	ND	ND	-	200	Child EMEG
4-Bromophenyl-phenylether	ND	ND	-	NA	NA
4-Chloro-3-methylphenol	ND	ND	-	NA	NA
4-Chloroaniline	ND	ND	-	200	Child RMEG
4-Chlorophenyl-phenylether	ND	ND	-	NA	NA
4-Methylphenol	ND	ND	-	NA	NA
4-Nitroaniline	ND	ND	-	100	RECAP SSni
4-Nitrophenol	ND	ND	-	320	RECAP SSni
Acetophenone	ND	ND	-	5,000	Child RMEG
Atrazine	ND	ND	-	150	Child EMEG
Benzaldehyde	ND	ND	-	5,000	Child RMEG
Bis(2-chloroethoxy)methane	ND	ND	-	230	RBC
Bis(2-chlorothyl)ether	ND	ND	-	0.64	CREG
Bis(2-ethylhexyl)phthalate	ND	ND	-	35	RECAP SSni
Butylbenzylphthalate	ND	ND	-	10,000	Child RMEG
Caprolactam	ND	ND	-	25,000	Child RMEG
Carbazole	ND	14	06NY-0013	NA	NA
Dibenzofuran	ND	7.1	06NY-0013	290	RECAP SSni
Diethylphthalate	ND	ND	-	300,000	Child EMEG
Dimethylphthalate	ND	ND	-	1,500	RECAP SSni
Di-n-butylphthalate	ND	ND	-	7,800	RBC
Di-n-octylphthalate	ND	ND	-	240	RECAP SSni
Hexachlorobenzene	ND	ND	-	0.44	CREG
Hexachlorobutadiene	ND	ND	-	9	CREG
Hexachlorocyclopentadiene	ND	ND	-	5,000	Child EMEG
Hexachloroethane	ND	ND	-	18	CREG

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
Isophorone	ND	ND	-	10,000	Child EMEG
Naphthalene	ND	ND	-	30,000	Child EMEG
Nitrobenzene	ND	ND	-	100	Child RMEG
N-Nitroso-di-n-propylamine	ND	ND	-	0.33	RECAP SSni
N-Nitrosodiphenylamine	ND	ND	-	90	RECAP SSni
Pentachlorophenol	**13**	**110**	06NY-0013	1.8	CREG
Phenol	ND	ND	-	15,000	Child RMEG
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	ND	5.5	06NY-0013	30,000	Child EMEG
Acenapthylene	ND	0.52	06NY-0013	350	RECAP SSni
Anthracene	ND	31	06NY-0013	500,000	Child EMEG
Benzo (a) anthracene	ND	**8.7**	06NY-0013	0.015	RBC
Benzo (a) pyrene	ND	**1.5**	06NY-0013	0.096	CREG
Benzo (b) fluoranthene	ND	**4.6**	06NY-0013	0.015	RBC
Benzo (g,h,i) perylene	ND	0.50	06NY-0013	NA	NA
Benzo (k) fluoranthene	ND	**2.6**	06NY-0013	1.5	RBC
Chrysene	ND	6.6	06NY-0013	150	RBC
Dibenzo(a,h)anthracene	ND	ND	-	0.0015	RBC
Fluoranthene	ND	52	06NY-0013	20,000	Child EMEG
Fluorene	ND	10	06NY-0013	20,000	Child EMEG
Indeno (1,2,3-cd) pyrene	ND	**1.2**	06NY-0013	0.015	RBC
Phenanthrene	0.65	62	06NY-0013	2,100	RECAP Soil SSni
Pyrene	1.7	26	06NY-0013	1,500	Child RMEG

*Duplicate sample
[1] ppm =parts per million
[2] CV=comparison value
[3]EMEG = Environmental Media Evaluation Guide
[4]ND = not detected
[5]RMEG = Reference Dose Media Evaluation Guide
[6]CREG = cancer risk evaluation guide
[7]EPA RSV= Environmental Protection Agency Reference Screening Value
[8] RECAP Soil SSni =Louisiana Department of Environmental Quality Risk Evaluation/Corrective Action Program Screening Option Soil Screening Standard for Non-industrial exposures
[9] RBC = Risk based concentration
[10] NA= Not available
[11]Ess. Nutrient= Essential nutrient; calcium, magnesium and sodium are considered to be essential nutrients that do not present adverse health risks at low levels

Table C-6: Range of contaminant concentrations in soil samples (0-6 in) collected North of LA 97 from the pond area at the EVR-Wood site. September 2011.
(Contaminant concentrations exceeding their screening values are listed in bold red)

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
Metals					
Aluminum	3,720	6,390	06NY-0019	50,000	Child EMEG[3]
Antimony	ND[4]	ND	-	20	Child RMEG[5]
Arsenic	**2.8**	**7.4**	06NY-0019	0.47	CREG[6]
Barium	85.4	145	06NY-0019	10,000	Child EMEG
Beryllium	ND	0.41	06NY-0019	100	Child EMEG
Cadmium	ND	0.22	06NY-0019	5	Child EMEG
Chromium	7.5	9.6	06NY-0017	50	Child EMEG
Cobalt	2.4	4.7	06NY-0019	500	Child EMEG
Copper	5.6	13.8	06NY-0019	500	Child EMEG
Lead	11.3	18.6	06NY-0019	400	EPA RSV[7]
Manganese	185	405	06NY-0019	2,500	Child RMEG
Mercury	0.043	0.076	06NY-0019	2.3	RECAP SSni[8]
Nickel	1.6	3.3	06NY-0019	1,000	Child RMEG
Silver	ND	ND	-	250	Child RMEG
Thallium	ND	ND	-	0.78	RBC[9]
Vanadium	15.4	20.7	06NY-0019	500	Child EMEG
Essential Nutrients					
Calcium	903	1,750	06NY-0019	NA[10]	Ess. Nutrient[11]
Iron	5,800	12,900	06NY-0019	55,000	RBC
Magnesium	205	402	06NY-0019	NA	Ess. Nutrient
Potassium	ND	228	06NY-0014	NA	Ess. Nutrient
Selenium	ND	ND	-	250	Child EMEG
Sodium	ND	ND	-	NA	Ess. Nutrient
Zinc	7.7	21.9	06NY-0019	15,000	Child EMEG
Semi Volatiles					
1,1-Biphenyl	ND	ND	-	2,500	Child RMEG
1,2,4,5-Tetrachlorobenzene	ND	ND	-	15	Child RMEG
2,2-Oxybis (1-chloropropane)	ND	ND	-	2,000	Child RMEG
2,3,4,6-Tetrachlorophenol	ND	ND	-	1,500	Child RMEG
2,4,5-Trichlorophenol	ND	ND	-	5,000	Child RMEG
2,4,6-Trichlorophenol	ND	ND	-	64	CREG
2,4-Dichlorophenol	ND	ND	-	150	Child EMEG
2,4-Dimethylphenol	ND	ND	-	1,000	Child RMEG

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
2,4-Dinitrophenol	ND	ND	-	100	Child RMEG
2,4-Dinitrotoluene	ND	ND	-	100	Child EMEG
2,6-Dinitrotoluene	ND	ND	-	200	Child EMEG
2-Chloronaphthalene	ND	ND	-	400	Child RMEG
2-Chlorophenol	ND	ND	-	250	Child RMEG
2-Methylnaphthalene	ND	ND	-	2,000	Child EMEG
2-Methylphenol	ND	ND	-	2,500	Child RMEG
2-Nitroaniline	ND	ND	-	780	RBC
2-Nitrophenol	ND	ND	-	NA	NA
3,3-Dichlorobenzidine	ND	ND	-	1.6	CREG
3-Nitroaniline	ND	ND	-	130	RECAP SSni
4,6-Dinitro-2-methylphenol	ND	ND	-	200	Child EMEG
4-Bromophenyl-phenylether	ND	ND	-	NA	NA
4-Chloro-3-methylphenol	ND	ND	-	NA	NA
4-Chloroaniline	ND	ND	-	200	Child RMEG
4-Chlorophenyl-phenylether	ND	ND	-	NA	NA
4-Methylphenol	ND	ND	-	NA	NA
4-Nitroaniline	ND	ND	-	100	RECAP SSni
4-Nitrophenol	ND	ND	-	320	RECAP SSni
Acetophenone	ND	ND	-	5,000	Child RMEG
Atrazine	ND	ND	-	150	Child EMEG
Benzaldehyde	ND	ND	-	5,000	Child RMEG
Bis(2-chloroethoxy)methane	ND	ND	-	230	RBC
Bis(2-chlorothyl)ether	ND	ND	-	0.64	CREG
Bis(2-ethylhexyl)phthalate	ND	ND	-	35	RECAP SSni
Butylbenzylphthalate	ND	ND	-	10,000	Child RMEG
Caprolactam	ND	ND	-	25,000	Child RMEG
Carbazole	ND	ND	-	NA	NA
Dibenzofuran	ND	ND	-	290	RECAP SSni
Diethylphthalate	ND	ND	-	300,000	Child EMEG
Dimethylphthalate	ND	ND	-	1,500	RECAP SSni
Di-n-butylphthalate	ND	ND	-	7,800	RBC
Di-n-octylphthalate	ND	0.25	06NY-0019	240	RECAP SSni
Hexachlorobenzene	ND	ND	-	0.44	CREG
Hexachlorobutadiene	ND	ND	-	9	CREG
Hexachlorocyclopentadiene	ND	ND	-	5,000	Child EMEG
Hexachloroethane	ND	ND	-	18	CREG

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
Isophorone	ND	ND	-	10,000	Child EMEG
Naphthalene	ND	ND	-	30,000	Child EMEG
Nitrobenzene	ND	ND	-	100	Child RMEG
N-Nitroso-di-n-propylamine	ND	ND	-	0.33	RECAP SSni
N-Nitrosodiphenylamine	ND	ND	-	90	RECAP SSni
Pentachlorophenol	ND	ND	-	1.8	CREG
Phenol	ND	ND	-	15,000	Child RMEG
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	ND	ND	-	30,000	Child EMEG
Acenapthylene	ND	ND	-	350	RECAP SSni
Anthracene	ND	ND	-	500,000	Child EMEG
Benzo (a) anthracene	ND	ND	-	0.015	RBC
Benzo (a) pyrene	ND	ND	-	0.096	CREG
Benzo (b) fluoranthene	ND	ND	-	0.015	RBC
Benzo (g,h,i) perylene	ND	ND	-	NA	NA
Benzo (k) fluoranthene	ND	ND	-	1.5	RBC
Chrysene	ND	ND	-	150	RBC
Dibenzo(a,h)anthracene	ND	ND	-	0.0015	RBC
Fluoranthene	ND	ND	-	20,000	Child EMEG
Fluorene	ND	ND	-	20,000	Child EMEG
Indeno (1,2,3-cd) pyrene	ND	ND	-	0.015	RBC
Phenanthrene	ND	ND	-	2,100	RECAP Soil SSni
Pyrene	ND	ND	-	1,500	Child RMEG

[1] ppm =parts per million
[2] CV=comparison value
[3]EMEG = Environmental Media Evaluation Guide
[4]ND = not detected
[5]RMEG = Reference Dose Media Evaluation Guide
[6]CREG = cancer risk evaluation guide
[7]EPA RSV= Environmental Protection Agency Reference Screening Value
[8] RECAP Soil SSni =Louisiana Department of Environmental Quality Risk Evaluation/Corrective Action Program Screening Option Soil Screening Standard for Non-industrial exposures
[9] RBC = Risk based concentration
[10] NA= Not available
[11]Ess. Nutrient= Essential nutrient; calcium, magnesium and sodium are considered to be essential nutrients that do not present adverse health risks at low levels

Table C-7: Range of contaminant concentrations in surface soil samples (0-6 in)collected North of LA 97 from the above ground storage tank area of the EVR-Wood site. September 2011.
(Contaminant concentrations exceeding their screening values are listed in bold red)

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
Metals					
Aluminum	4,360	4,750	06NY-0028	50,000	Child EMEG[3]
Antimony	ND[4]	ND	-	20	Child RMEG[5]
Arsenic	**6.1**	**7.3**	06NY-0040	0.47	CREG[6]
Barium	71.2	91.6	06NY-0028	10,000	Child EMEG
Beryllium	0.27	0.31	06NY-0028	100	Child EMEG
Cadmium	ND	ND	-	5	Child EMEG
Chromium	7.5	8.3	06NY-0027	50	Child EMEG
Cobalt	ND	5.9	06NY-0028	500	Child EMEG
Copper	4	7.7	06NY-0040	500	Child EMEG
Lead	22.9	79.5	06NY-0040	400	EPA RSV[7]
Manganese	134	780	06NY-0028	2,500	Child RMEG
Mercury	ND	0.024	06NY-0027 06NY-0028	2.3	RECAP SSni[8]
Nickel	ND	1.4	06NY-0028	1,000	Child RMEG
Silver	ND	ND	-	250	Child RMEG
Thallium	ND	ND	-	0.78	RBC[9]
Vanadium	24.9	27.9	06NY-0040	500	Child EMEG
Essential Nutrients					
Calcium	675	850	06NY-0040	NA[10]	Ess. Nutrient[11]
Iron	9,730	13,000	06NY-0040	55,000	RBC
Magnesium	313	372	06NY-0028	NA	Ess. Nutrient
Potassium	ND	ND	-	NA	Est. Nutrient
Selenium	ND	ND	-	250	Child EMEG
Sodium	ND	ND	-	NA	Ess. Nutrient
Zinc	7.8	35.3	06NY-0040	15,000	Child EMEG
Semi Volatiles					
1,1-Biphenyl	ND	ND	-	2,500	Child RMEG
1,2,4,5-Tetrachlorobenzene	ND	ND	-	15	Child RMEG
2,2-Oxybis (1-chloropropane)	ND	ND	-	2,000	Child RMEG
2,3,4,6-Tetrachlorophenol	ND	ND	-	1,500	Child RMEG
2,4,5-Trichlorophenol	ND	ND	-	5,000	Child RMEG
2,4,6-Trichlorophenol	ND	ND	-	64	CREG
2,4-Dichlorophenol	ND	ND	-	150	Child EMEG

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
2,4-Dimethylphenol	ND	ND	-	1,000	Child RMEG
2,4-Dinitrophenol	ND	ND	-	100	Child RMEG
2,4-Dinitrotoluene	ND	ND	-	100	Child EMEG
2,6-Dinitrotoluene	ND	ND	-	200	Child EMEG
2-Chloronaphthalene	ND	ND	-	400	Child RMEG
2-Chlorophenol	ND	ND	-	250	Child RMEG
2-Methylnaphthalene	ND	ND	-	2,000	Child EMEG
2-Methylphenol	ND	ND	-	2,500	Child RMEG
2-Nitroaniline	ND	ND	-	780	RBC
2-Nitrophenol	ND	ND	-	NA	NA
3,3-Dichlorobenzidine	ND	ND	-	1.6	CREG
3-Nitroaniline	ND	ND	-	130	RECAP SSni
4,6-Dinitro-2-methylphenol	ND	ND	-	200	Child EMEG
4-Bromophenyl-phenylether	ND	ND	-	NA	NA
4-Chloro-3-methylphenol	ND	ND	-	NA	NA
4-Chloroaniline	ND	ND	-	200	Child RMEG
4-Chlorophenyl-phenylether	ND	ND	-	NA	NA
4-Methylphenol	ND	ND	-	NA	NA
4-Nitroaniline	ND	ND	-	100	RECAP SSni
4-Nitrophenol	ND	ND	-	320	RECAP SSni
Acetophenone	ND	ND	-	5,000	Child RMEG
Atrazine	ND	ND	-	150	Child EMEG
Benzaldehyde	ND	ND	-	5,000	Child RMEG
Bis(2-chloroethoxy)methane	ND	ND	-	230	RBC
Bis(2-chlorothyl)ether	ND	ND	-	0.64	CREG
Bis(2-ethylhexyl)phthalate	ND	ND	-	35	RECAP SSni
Butylbenzylphthalate	ND	ND	-	10,000	Child RMEG
Caprolactam	ND	ND	-	25,000	Child RMEG
Carbazole	ND	ND	-	NA	NA
Dibenzofuran	ND	ND	-	290	RECAP SSni
Diethylphthalate	ND	ND	-	300,000	Child EMEG
Dimethylphthalate	ND	ND	-	1,500	RECAP SSni
Di-n-butylphthalate	ND	ND	-	7,800	RBC
Di-n-octylphthalate	ND	0.25	06NY-0019	240	RECAP SSni
Hexachlorobenzene	ND	ND	-	0.44	CREG
Hexachlorobutadiene	ND	ND	-	9	CREG
Hexachlorocyclopentadiene	ND	ND	-	5,000	Child EMEG

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
Hexachloroethane	ND	ND	-	18	CREG
Isophorone	ND	ND	-	10,000	Child EMEG
Naphthalene	ND	ND	-	30,000	Child EMEG
Nitrobenzene	ND	ND	-	100	Child RMEG
N-Nitroso-di-n-propylamine	ND	ND	-	0.33	RECAP SSni
N-Nitrosodiphenylamine	ND	ND	-	90	RECAP SSni
Pentachlorophenol	ND	ND	-	1.8	CREG
Phenol	ND	ND	-	15,000	Child RMEG
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	ND	ND	-	30,000	Child EMEG
Acenapthylene	ND	ND	-	350	RECAP SSni
Anthracene	ND	ND	-	500,000	Child EMEG
Benzo (a) anthracene	ND	ND	-	0.015	RBC
Benzo (a) pyrene	ND	ND	-	0.096	CREG
Benzo (b) fluoranthene	ND	ND	-	0.015	RBC
Benzo (g,h,i) perylene	ND	ND	-	NA	NA
Benzo (k) fluoranthene	ND	ND	-	1.5	RBC
Chrysene	ND	ND	-	150	RBC
Dibenzo(a,h)anthracene	ND	ND	-	0.0015	RBC
Fluoranthene	ND	ND	-	20,000	Child EMEG
Fluorene	ND	ND	-	20,000	Child EMEG
Indeno (1,2,3-cd) pyrene	ND	ND	-	0.015	RBC
Phenanthrene	ND	0.044	06NY-0027	2,100	RECAP Soil SSni
Pyrene	ND	ND	-	1,500	Child RMEG

[1] ppm =parts per million
[2] CV=comparison value
[3]EMEG = Environmental Media Evaluation Guide
[4]ND = not detected
[5]RMEG = Reference Dose Media Evaluation Guide
[6]CREG = cancer risk evaluation guide
[7]EPA RSV= Environmental Protection Agency Reference Screening Value
[8] RECAP Soil SSni =Louisiana Department of Environmental Quality Risk Evaluation/Corrective Action Program Screening Option Soil Screening Standard for Non-industrial exposures
[9] RBC = Risk based concentration
[10] NA= Not available
[11]Ess. Nutrient= Essential nutrient; calcium, magnesium and sodium are considered to be essential nutrients that do not present adverse health risks at low levels

Table C-8: Range of contaminant concentrations in surface soil samples (0-6 in)collected South of LA 97 at the EVR-Wood site. September 2011.
(Contaminant concentrations exceeding their screening values are listed in bold red)

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
Metals					
Aluminum	3,500	6,500	06NY-0021	50,000	Child EMEG[3]
Antimony	ND[4]	ND	-	20	Child RMEG[5]
Arsenic	ND	**11.3**	06NY-0020	0.47	CREG[6]
Barium	33.6	167	06NY-0025	10,000	Child EMEG
Beryllium	ND	0.49	06NY-0023	100	Child EMEG
Cadmium	ND	ND	-	5	Child EMEG
Chromium	4.9	13.4	06NY-0020	50	Child EMEG
Cobalt	ND	9.8	06NY-0022	500	Child EMEG
Copper	3.4	8.5	06NY-0023	500	Child EMEG
Lead	4.9	28.9	06NY-0021	400	EPA RSV[7]
Manganese	99.9	1,120	06NY-0023	2,500	Child RMEG
Mercury	ND	0.08	06NY-0020	2.3	RECAP SSni[8]
Nickel	ND	12.9	06NY-0025	1,000	Child RMEG
Silver	ND	ND	-	250	Child RMEG
Thallium	ND	ND	-	0.78	RBC[9]
Vanadium	9.5	49.3	06NY-0020	500	Child EMEG
Essential Nutrients					
Calcium	471	5,140	06NY-0024	NA[10]	Ess. Nutrient[11]
Iron	7,420	24,300	06NY-0022	55,000	RBC
Magnesium	518	2,680	06NY-0025	NA	Ess. Nutrient
Potassium	ND	652	06NY-0024	NA	Ess. Nutrient
Selenium	ND	ND	-	250	Child EMEG
Sodium	ND	1530	06NY-0020	NA	Ess. Nutrient
Zinc	9.2	34.5	06NY-0025	15,000	Child EMEG
Semi Volatiles					
1,1-Biphenyl	ND	ND	-	2,500	Child RMEG
1,2,4,5-Tetrachlorobenzene	ND	ND	-	15	Child RMEG
2,2-Oxybis (1-chloropropane)	ND	ND	-	2,000	Child RMEG
2,3,4,6-Tetrachlorophenol	ND	ND	-	1,500	Child RMEG
2,4,5-Trichlorophenol	ND	ND	-	5,000	Child RMEG
2,4,6-Trichlorophenol	ND	ND	-	64	CREG
2,4-Dichlorophenol	ND	ND	-	150	Child EMEG
2,4-Dimethylphenol	ND	ND	-	1,000	Child RMEG

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
2,4-Dinitrophenol	ND	ND	-	100	Child RMEG
2,4-Dinitrotoluene	ND	ND	-	100	Child EMEG
2,6-Dinitrotoluene	ND	ND	-	200	Child EMEG
2-Chloronaphthalene	ND	ND	-	400	Child RMEG
2-Chlorophenol	ND	ND	-	250	Child RMEG
2-Methylnaphthalene	ND	ND	-	2,000	Child EMEG
2-Methylphenol	ND	ND	-	2,500	Child RMEG
2-Nitroaniline	ND	ND	-	780	RBC
2-Nitrophenol	ND	ND	-	NA	NA
3,3-Dichlorobenzidine	ND	ND	-	1.6	CREG
3-Nitroaniline	ND	ND	-	130	RECAP SSni
4,6-Dinitro-2-methylphenol	ND	ND	-	200	Child EMEG
4-Bromophenyl-phenylether	ND	ND	-	NA	NA
4-Chloro-3-methylphenol	ND	ND	-	NA	NA
4-Chloroaniline	ND	ND	-	200	Child RMEG
4-Chlorophenyl-phenylether	ND	ND	-	NA	NA
4-Methylphenol	ND	ND	-	NA	NA
4-Nitroaniline	ND	ND	-	100	RECAP SSni
4-Nitrophenol	ND	ND	-	320	RECAP SSni
Acetophenone	ND	ND	-	5,000	Child RMEG
Atrazine	ND	ND	-	150	Child EMEG
Benzaldehyde	ND	ND	-	5,000	Child RMEG
Bis(2-chloroethoxy)methane	ND	ND	-	230	RBC
Bis(2-chlorothyl)ether	ND	ND	-	0.64	CREG
Bis(2-ethylhexyl)phthalate	ND	ND	-	35	RECAP SSni
Butylbenzylphthalate	ND	ND	-	10,000	Child RMEG
Caprolactam	ND	ND	-	25,000	Child RMEG
Carbazole	ND	ND	-	NA	NA
Dibenzofuran	ND	ND	-	290	RECAP SSni
Diethylphthalate	ND	ND	-	300,000	Child EMEG
Dimethylphthalate	ND	ND	-	1,500	RECAP SSni
Di-n-butylphthalate	ND	ND	-	7,800	RBC
Di-n-octylphthalate	ND	ND	-	240	RECAP SSni
Hexachlorobenzene	ND	ND	-	0.44	CREG
Hexachlorobutadiene	ND	ND	-	9	CREG
Hexachlorocyclopentadiene	ND	ND	-	5,000	Child EMEG
Hexachloroethane	ND	ND	-	18	CREG

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
Isophorone	ND	ND	-	10,000	Child EMEG
Naphthalene	ND	ND	-	30,000	Child EMEG
Nitrobenzene	ND	ND	-	100	Child RMEG
N-Nitroso-di-n-propylamine	ND	ND	-	0.33	RECAP SSni
N-Nitrosodiphenylamine	ND	ND	-	90	RECAP SSni
Pentachlorophenol	ND	ND	-	1.8	CREG
Phenol	ND	ND	-	15,000	Child RMEG
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	ND	ND	-	30,000	Child EMEG
Acenapthylene	ND	ND	-	350	RECAP SSni
Anthracene	ND	ND	-	500,000	Child EMEG
Benzo (a) anthracene	ND	ND	-	0.015	RBC
Benzo (a) pyrene	ND	ND	-	0.096	CREG
Benzo (b) fluoranthene	ND	ND	-	0.015	RBC
Benzo (g,h,i) perylene	ND	ND	-	NA	NA
Benzo (k) fluoranthene	ND	ND	-	1.5	RBC
Chrysene	ND	ND	-	150	RBC
Dibenzo(a,h)anthracene	ND	ND	-	0.0015	RBC
Fluoranthene	ND	ND	-	20,000	Child EMEG
Fluorene	ND	ND	-	20,000	Child EMEG
Indeno (1,2,3-cd) pyrene	ND	ND	-	0.015	RBC
Phenanthrene	ND	ND	-	2,100	RECAP Soil SSni
Pyrene	ND	ND	-	1,500	Child RMEG

[1] ppm =parts per million
[2] CV=comparison value
[3]EMEG = Environmental Media Evaluation Guide
[4]ND = not detected
[5]RMEG = Reference Dose Media Evaluation Guide
[6]CREG = cancer risk evaluation guide
[7]EPA RSV= Environmental Protection Agency Reference Screening Value
[8] RECAP Soil SSni =Louisiana Department of Environmental Quality Risk Evaluation/Corrective Action Program Screening Option Soil Screening Standard for Non-industrial exposures
[9] RBC = Risk based concentration
[10] NA= Not available
[11]Ess. Nutrient= Essential nutrient; calcium, magnesium and sodium are considered to be essential nutrients that do not present adverse health risks at low levels

Table C-9: Range of contaminant concentrations in underground storage tank liquid samples at the EVR-Wood site. September 2011.
(Contaminant concentrations exceeding their screening values are listed in bold red)

Contaminant	Range of concentrations detected (ppb)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppb)	CV reference
Semi Volatiles					
1,1-Biphenyl	ND[3]	230	06NY-0029	500	Child RMEG[4]
1,2,4,5-Tetrachlorobenzene	ND	ND	-	3	Child RMEG
2,2-Oxybis (1-chloropropane)	ND	ND	-	400	Child RMEG
2,3,4,6-Tetrachlorophenol	ND	**1200**	06NY-0029	300	Child RMEG
2,4,5-Trichlorophenol	ND	ND	-	1,000	Child RMEG
2,4,6-Trichlorophenol	ND	ND	-	3.2	CREG[5]
2,4-Dichlorophenol	ND	ND	-	30	Child EMEG[6]
2,4-Dimethylphenol	ND	41	06NY-0029	200	Child RMEG
2,4-Dinitrophenol	ND	ND	-	20	Child RMEG
2,4-Dinitrotoluene	ND	ND	-	20	Child EMEG
2,6-Dinitrotoluene	ND	ND	-	40	Child EMEG
2-Chloronaphthalene	ND	ND	-	800	Child RMEG
2-Chlorophenol	ND	ND	-	50	Child RMEG
2-Methylnaphthalene	**640**	**650***	06NY-0029DL	400	Child EMEG
2-Methylphenol	ND	13	06NY-0029	500	Child RMEG
2-Nitroaniline	ND	ND	-	160	RBC[7]
2-Nitrophenol	ND	ND	-	NA[8]	NA
3,3-Dichlorobenzidine	ND	ND	-	0.078	CREG
3-Nitroaniline	ND	ND	-	NA	NA
4,6-Dinitro-2-methylphenol	ND	ND	-	1.3	RBC
4-Bromophenyl-phenylether	ND	ND	-	NA	NA
4-Chloro-3-methylphenol	ND	ND	-	NA	NA
4-Chloroaniline	ND	ND	-	40	Child RMEG
4-Chlorophenyl-phenylether	ND	ND	-	NA	NA
4-Methylphenol	ND	25	06NY-0029	NA	NA
4-Nitroaniline	ND	ND	-	3.4	RBC
4-Nitrophenol	ND	ND	-	60	LTHA[9]
Acetophenone	ND	ND	-	1,000	Child RMEG
Atrazine	ND	ND	-	30	Child EMEG
Benzaldehyde	ND	ND	-	1,000	Child RMEG
Bis(2-chloroethoxy)methane	ND	ND	-	47	RBC
Bis(2-chloroethyl)ether	ND	ND	-	0.032	CREG

Contaminant	Range of concentrations detected (ppb)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppb)	CV reference
Bis(2-ethylhexyl)phthalate	ND	ND	-	4.8	RBC
Butylbenzylphthalate	ND	ND	-	2,000	Child RMEG
Caprolactam	ND	ND	-	5,000	Child RMEG
Carbazole	ND	850	06NY-0029	NA	NA
Dibenzofuran	1,100	1,300	06NY-0029	NA	NA
Diethylphthalate	ND	ND	-	60,000	Child EMEG
Dimethylphthalate	ND	ND	-	NA	NA
Di-n-butylphthalate	ND	ND	-	1,000	Child RMEG
Di-n-octylphthalate	ND	ND	-	4,000	Child EMEG
Hexachlorobenzene	ND	ND	-	0.022	CREG
Hexachlorobutadiene	ND	ND	-	0.45	CREG
Hexachlorocyclopentadiene	ND	ND	-	1,000	Child EMEG
Hexachloroethane	ND	ND	-	0.88	CREG
Isophorone	ND	ND	-	37	CREG
Naphthalene	660	760*	06NY-0029DL	6,000	Child EMEG
Nitrobenzene	ND	ND	-	20	Child RMEG
N-Nitroso-di-n-propylamine	ND	ND	-	0.005	CREG
N-Nitrosodiphenylamine	ND	ND	-	7.1	CREG
Pentachlorophenol	**11,000**	**16,000**	06NY-0029	0.088	CREG
Phenol	ND	26	06NY-0029	3,000	Child RMEG
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	1,300	1,500*	06NY-0029DL	6,000	Child EMEG
Acenapthylene	ND	35	06NY-0029	NA	NA
Anthracene	1,000	1,000	06NY-0029	100,000	Child EMEG
Benzo (a) anthracene	ND	**360**	06NY-0029	0.029	RBC
Benzo (a) pyrene	ND	**100**	06NY-0029	0.0048	CREG
Benzo (b) fluoranthene	ND	**130**	06NY-0029	0.029	RBC
Benzo (g,h,i) perylene	ND	26	06NY-0029	NA	NA
Benzo (k) fluoranthene	ND	**100**	06NY-0029	0.29	RBC
Chrysene	ND	**350**	06NY-0029	2.9	RBC
Dibenzo(a,h)anthracene	ND	ND	-	0.0029	RBC
Fluoranthene	2,500	2,700	06NY-0029	4,000	Child EMEG
Fluorene	1,400	1,400	06NY-0029	4,000	Child EMEG
Indeno (1,2,3-cd) pyrene	ND	**45**	06NY-0029	0.029	RBC
Phenanthrene	4,800	5,000*	06NY-0029DL	NA	NA
Pyrene	1,400	**1,500***	06NY-0029DL	300	Child RMEG

*Duplicate sample
[1] ppb =parts per billion
[2] CV=comparison value
[3]ND = not detected
[4]RMEG = Reference Dose Media Evaluation Guide
[5]CREG = cancer risk evaluation guide
[6]EMEG = Environmental Media Evaluation Guide
[7]RBC = Risk based concentration
[8]NA = not available
[9]LTHA= Life Time Health Advisory

Table C-10: Range of contaminant concentrations in wetland sediment samples (0-6 in) at the EVR-Wood site. September 2011.
(Contaminant concentrations exceeding their screening values are listed in bold red)

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
Metals					
Aluminum	5,930	12,500	06NY-0032	50,000	Child EMEG[3]
Antimony	ND[4]	ND	-	20	Child RMEG[5]
Arsenic	**4.5**	**77.1**	06NY-0036	0.47	CREG[6]
Barium	0.38	486	06NY-0034	10,000	Child EMEG
Beryllium	ND	1.3	06NY-0032	100	Child EMEG
Cadmium	ND	1	06NY-0036	5	Child EMEG
Chromium	8.7	**93.6**	06NY-0035	50	Child EMEG
Cobalt	4.5	21.1	06NY-0034	500	Child EMEG
Copper	4.4	33.1	06NY-0035	500	Child EMEG
Lead	13.9	64.2	06NY-0034	400	EPA RSV[7]
Manganese	331	1,670	06NY-0037	2,500	Child RMEG
Mercury	ND	0.13	06NY-0034	2.3	RECAP SSni[8]
Nickel	3.4	14.9	06NY-0034	1,000	Child RMEG
Silver	ND	ND	-	250	Child RMEG
Thallium	ND	ND	-	0.78	RBC[9]
Vanadium	ND	51.9	06NY-0037	500	Child EMEG
Essential Nutrients					
Calcium	2,430	11,900	06NY-0038	NA[10]	Ess. Nutrient[11]
Iron	10,500	29,200	06NY-0037	55,000	RBC
Magnesium	701	2,160	06NY-0032	NA	Ess. Nutrient
Potassium	ND	559	06NY-0036	NA	Ess. Nutrient
Selenium	ND	ND	-	250	Child EMEG
Sodium	ND	ND	06NY-0020	NA	Ess. Nutrient
Zinc	11.3	111	06NY-0038	15,000	Child EMEG
Semi Volatiles					
1,1-Biphenyl	ND	ND	-	2,500	Child RMEG
1,2,4,5-Tetrachlorobenzene	ND	ND	-	15	Child RMEG
2,2-Oxybis (1-chloropropane)	ND	ND	-	2,000	Child RMEG
2,3,4,6-Tetrachlorophenol	ND	ND	-	1,500	Child RMEG
2,4,5-Trichlorophenol	ND	ND	-	5,000	Child RMEG
2,4,6-Trichlorophenol	ND	ND	-	64	CREG
2,4-Dichlorophenol	ND	ND	-	150	Child EMEG
2,4-Dimethylphenol	ND	ND	-	1,000	Child RMEG

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
2,4-Dinitrophenol	ND	ND	-	100	Child RMEG
2,4-Dinitrotoluene	ND	ND	-	100	Child EMEG
2,6-Dinitrotoluene	ND	ND	-	200	Child EMEG
2-Chloronaphthalene	ND	ND	-	400	Child RMEG
2-Chlorophenol	ND	ND	-	250	Child RMEG
2-Methylnaphthalene	ND	ND	-	2,000	Child EMEG
2-Methylphenol	ND	ND	-	2,500	Child RMEG
2-Nitroaniline	ND	ND	-	780	RBC
2-Nitrophenol	ND	ND	-	NA	NA
3,3-Dichlorobenzidine	ND	ND	-	1.6	CREG
3-Nitroaniline	ND	ND	-	130	RECAP SSni
4,6-Dinitro-2-methylphenol	ND	ND	-	200	Child EMEG
4-Bromophenyl-phenylether	ND	ND	-	NA	NA
4-Chloro-3-methylphenol	ND	ND	-	NA	NA
4-Chloroaniline	ND	ND	-	200	Child RMEG
4-Chlorophenyl-phenylether	ND	ND	-	NA	NA
4-Methylphenol	ND	ND	-	NA	NA
4-Nitroaniline	ND	ND	-	100	RECAP SSni
4-Nitrophenol	ND	ND	-	320	RECAP SSni
Acetophenone	ND	ND	-	5,000	Child RMEG
Atrazine	ND	ND	-	150	Child EMEG
Benzaldehyde	ND	ND	-	5,000	Child RMEG
Bis(2-chloroethoxy)methane	ND	ND	-	230	RBC
Bis(2-chlorothyl)ether	ND	ND	-	0.64	CREG
Bis(2-ethylhexyl)phthalate	ND	0.042	06NY-0030	35	RECAP SSni
Butylbenzylphthalate	ND	ND	-	10,000	Child RMEG
Caprolactam	ND	ND	-	25,000	Child RMEG
Carbazole	ND	ND	-	NA	NA
Dibenzofuran	ND	ND	-	290	RECAP SSni
Diethylphthalate	ND	ND	-	300,000	Child EMEG
Dimethylphthalate	ND	ND	-	1,500	RECAP SSni
Di-n-butylphthalate	ND	ND	-	7,800	RBC
Di-n-octylphthalate	ND	ND	-	240	RECAP SSni
Hexachlorobenzene	ND	ND	-	0.44	CREG
Hexachlorobutadiene	ND	ND	-	9	CREG
Hexachlorocyclopentadiene	ND	ND	-	5,000	Child EMEG
Hexachloroethane	ND	ND	-	18	CREG

Contaminant	Range of concentrations detected (ppm)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppm)	CV reference
Isophorone	ND	ND	-	10,000	Child EMEG
Naphthalene	ND	ND	-	30,000	Child EMEG
Nitrobenzene	ND	ND	-	100	Child RMEG
N-Nitroso-di-n-propylamine	ND	ND	-	0.33	RECAP SSni
N-Nitrosodiphenylamine	ND	ND	-	90	RECAP SSni
Pentachlorophenol	ND	**3.5**	06NY-0034	1.8	CREG
Phenol	ND	ND	-	15,000	Child RMEG
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	ND	ND	-	30,000	Child EMEG
Acenapthylene	ND	ND	-	350	RECAP SSni
Anthracene	ND	ND	-	500,000	Child EMEG
Benzo (a) anthracene	ND	**0.43**	06NY-0035	0.015	RBC
Benzo (a) pyrene	ND	ND	-	0.096	CREG
Benzo (b) fluoranthene	ND	**0.98**	06NY-0036	0.015	RBC
Benzo (g,h,i) perylene	ND	0.47	06NY-0035	NA	NA
Benzo (k) fluoranthene	ND	0.61	06NY-0035	1.5	RBC
Chrysene	ND	0.58	06NY-0035	150	RBC
Dibenzo(a,h)anthracene	ND	ND	-	0.0015	RBC
Fluoranthene	ND	1.6	06NY-0035	20,000	Child EMEG
Fluorene	ND	ND	-	20,000	Child EMEG
Indeno (1,2,3-cd) pyrene	ND	ND	-	0.015	RBC
Phenanthrene	ND	ND	-	2,100	RECAP Soil SSni
Pyrene	ND	1.4	06NY-0035	1,500	Child RMEG

[1] ppm =parts per million
[2] CV=comparison value
[3]EMEG = Environmental Media Evaluation Guide
[4]ND = not detected
[5]RMEG = Reference Dose Media Evaluation Guide
[6]CREG = cancer risk evaluation guide
[7]EPA RSV= Environmental Protection Agency Reference Screening Value
[8] RECAP Soil SSni =Louisiana Department of Environmental Quality Risk Evaluation/Corrective Action Program Screening Option Soil Screening Standard for Non-industrial exposures
[9] RBC = Risk based concentration
[10] NA= Not available
[11]Ess. Nutrient= Essential nutrient; calcium, magnesium and sodium are considered to be essential nutrients that do not present adverse health risks at low levels

Table C-11: Range of contaminant concentrations in residential groundwater well samples at the EVR-Wood site. September 2011.
(Contaminant concentrations exceeding their screening values are listed in bold red)

Contaminant	Range of concentrations detected (ppb)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppb)	CV reference
Metals					
Aluminum	ND[3]	ND	-	10,000	Child EMEG[4]
Antimony	ND	ND	-	4	Child RMEG[5]
Arsenic	ND	ND	-	0.023	CREG[6]
Barium	120	184	06NY-0003	2,000	Child EMEG
Beryllium	ND	ND	-	20	Child EMEG
Cadmium	ND	ND	-	1	Child EMEG
Chromium	ND	ND	-	10	Child EMEG
Cobalt	ND	ND	-	100	Child EMEG
Copper	ND	ND	-	100	Child EMEG
Lead	ND	ND	-	15	EPA MCL[7]
Manganese	161	178	06NY-0003	500	Child RMEG
Mercury	ND	ND	-	2	EPA MCL
Nickel	ND	ND	-	200	Child RMEG
Silver	ND	ND	-	50	Child RMEG
Thallium	ND	ND	-	2	MCL
Vanadium	ND	ND	-	100	Child EMEG
Essential Nutrients					
Calcium	49,200	49,800	06NY-0002	NA[8]	Ess. Nutrient[9]
Iron	959	1,200	06NY-0003	11,000	RBC[10]
Magnesium	701	2,160	06NY-0032	NA	Ess. Nutrient
Potassium	ND	1,860	06NY-0001	NA	Ess. Nutrient
Selenium	R[11]	R	-	50	Child EMEG
Sodium	34,100	35,500	06NY-0002	NA	Ess. Nutrient
Zinc	ND	ND	-	3,000	Child EMEG
Semi Volatiles					
1,1-Biphenyl	ND	ND	-	500	Child RMEG
1,2,4,5-Tetrachlorobenzene	ND	ND	-	3	Child RMEG
2,2-Oxybis (1-chloropropane)	ND	ND	-	400	Child RMEG
2,3,4,6-Tetrachlorophenol	ND	ND	-	300	Child RMEG
2,4,5-Trichlorophenol	ND	ND	-	1,000	Child RMEG
2,4,6-Trichlorophenol	ND	ND	-	3.2	CREG
2,4-Dichlorophenol	ND	ND	-	30	Child EMEG
2,4-Dimethylphenol	ND	ND	-	200	Child RMEG

Contaminant	Range of concentrations detected (ppb)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppb)	CV reference
2,4-Dinitrophenol	ND	ND	-	20	Child RMEG
2,4-Dinitrotoluene	ND	ND	-	20	Child EMEG
2,6-Dinitrotoluene	ND	ND	-	40	Child EMEG
2-Chloronaphthalene	ND	ND	-	800	Child RMEG
2-Chlorophenol	ND	ND	-	50	Child RMEG
2-Methylnaphthalene	ND	ND	-	400	Child EMEG
2-Methylphenol	ND	ND	-	500	Child RMEG
2-Nitroaniline	ND	ND	-	160	RBC
2-Nitrophenol	ND	ND	-	NA	NA
3,3-Dichlorobenzidine	ND	ND	-	0.078	CREG
3-Nitroaniline	ND	ND	-	NA	NA
4,6-Dinitro-2-methylphenol	ND	ND	-	1.3	RBC
4-Bromophenyl-phenylether	ND	ND	-	NA	NA
4-Chloro-3-methylphenol	ND	ND	-	NA	NA
4-Chloroaniline	ND	ND	-	40	Child RMEG
4-Chlorophenyl-phenylether	ND	ND	-	NA	NA
4-Methylphenol	ND	ND	-	NA	NA
4-Nitroaniline	ND	ND	-	3.4	RBC
4-Nitrophenol	ND	ND	-	60	LTHA[12]
Acetophenone	ND	ND	-	1,000	Child RMEG
Atrazine	ND	ND	-	30	Child EMEG
Benzaldehyde	ND	ND	-	1,000	Child RMEG
Bis(2-chloroethoxy)methane	ND	ND	-	47	RBC
Bis(2-chlorothyl)ether	ND	ND	-	0.032	CREG
Bis(2-ethylhexyl)phthalate	ND	ND	-	4.8	RBC
Butylbenzylphthalate	ND	ND	-	2,000	Child RMEG
Caprolactam	ND	ND	-	5,000	Child RMEG
Carbazole	ND	ND	-	NA	NA
Dibenzofuran	ND	ND	-	NA	NA
Diethylphthalate	ND	ND	-	60,000	Child EMEG
Dimethylphthalate	ND	ND	-	NA	NA
Di-n-butylphthalate	ND	ND	-	1,000	Child RMEG
Di-n-octylphthalate	ND	ND	-	4,000	Child EMEG
Hexachlorobenzene	ND	ND	-	0.022	CREG
Hexachlorobutadiene	ND	ND	-	0.45	CREG
Hexachlorocyclopentadiene	ND	ND	-	1,000	Child EMEG
Hexachloroethane	ND	ND	-	0.88	CREG

Contaminant	Range of concentrations detected (ppb)[1] Minimum	Maximum	Sample Source, Maximum	CV[2] (ppb)	CV reference
Isophorone	ND	ND	-	37	CREG
Naphthalene	ND	ND	-	6,000	Child EMEG
Nitrobenzene	ND	ND	-	20	Child RMEG
N-Nitroso-di-n-propylamine	ND	ND	-	0.005	CREG
N-Nitrosodiphenylamine	ND	ND	-	7.1	CREG
Pentachlorophenol	ND	ND	-	0.088	CREG
Phenol	ND	ND	-	3,000	Child RMEG
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	ND	ND	-	6,000	Child EMEG
Acenapthylene	ND	ND	-	NA	NA
Anthracene	ND	ND	-	100,000	Child EMEG
Benzo (a) anthracene	ND	ND	-	0.029	RBC
Benzo (a) pyrene	ND	ND	-	0.0048	CREG
Benzo (b) fluoranthene	ND	ND	-	0.029	RBC
Benzo (g,h,i) perylene	ND	ND	-	NA	NA
Benzo (k) fluoranthene	ND	ND	-	0.29	RBC
Chrysene	ND	ND	-	2.9	RBC
Dibenzo(a,h)anthracene	ND	ND	-	0.0029	RBC
Fluoranthene	ND	ND	-	4,000	Child EMEG
Fluorene	ND	ND	-	4,000	Child EMEG
Indeno (1,2,3-cd) pyrene	ND	ND	-	0.029	RBC
Phenanthrene	ND	ND	-	NA	NA
Pyrene	ND	ND	-	300	Child RMEG

[1] ppb =parts per billion
[2] CV=comparison value
[3]ND = not detected
[4]EMEG = Environmental Media Evaluation Guide
[5] RMEG = Reference Dose Media Evaluation Guide
[6]CREG = cancer risk evaluation guide
[7]EPA MCL= Environmental Protection Agency Maximum Contaminant Level
[8]NA = not available
[9]Ess. Nutrient= Essential nutrient; calcium, magnesium and sodium are considered to be essential nutrients that do not present adverse health risks at low levels
[10] RBC = Risk based concentration
[11]R= rejected sample
[12]LTHA= Life Time Health Advisory

Table C-12: Default values used to estimate incidental ingestion and dermal exposure doses for contaminants of concern at the EVR site.

Ingestion: Intake Rate	**Children**	**Adults**
Sediment/Soil (incidental intake)	200 mg/day[1]	100 mg/day
Dermal: Skin Surface Area (100% exposed)	15,223.117 cm^2 (adolescents 12-17 yrs) 8,754.375 cm^2 (children 1-11 yrs)	19,400 cm^2
Dermal: Total Soil/Sediment Adherence	3,044.62 mg^3 (adolescents 12-17 yrs) 1,750.875 mg (children 1-11 yrs)	1,357.99 mg
Exposure Factor for soil exposures: Children	$\frac{.30\ hours}{24\ hours} X \frac{180\ days}{365\ days} =$ **0.006**	
Exposure Factor for soil exposures: Trespassers	$\frac{2\ hours}{24\ hours} X \frac{18\ days}{365\ days} =$ **0.004**	
Exposure Factor for soil and wetland sediment exposures: Hunters	$\frac{8\ hours}{24\ hours} X \frac{18\ days}{365\ days} =$ **0.016**	
Exposure Duration:	13 years (children) 15 years (trespassers) 30 years (hunters)	
Weight:		
for Ingestion Exposures	16 kg^4 (children 1-6 yrs)	70 kg
for Dermal Exposures	50 kg (adolescents 12-17 yrs) 30 kg (children 1-11 yrs)	70 kg
Chemical-Specific Dermal Factors	**Bioavailability Factor Soil/Sediment (unitless)**	
metals	1.00E-01	
Pentachlorophenol	1.00E-01	
PAHs	1.00E-01	

[1]mg/day- milligrams per day; [2]cm^2-square centimeters; [3]mg-milligram; [4]kg-kilogram

Table C-13: Assessment of maximum detected contaminants of concern (by exposure pathway) in surface soils from the EVR site. September 2011. (Increased cancer risks in bold red)

Contaminant	Health Guidelines (mg/kg/day)[1]	Ingestion dose (mg/kg/day)	Dermal dose (mg/kg/day)	CSF[2] (mg/kg/day)$^{-1}$	Increased Cancer Risk		Total Cancer Risk
					Ingestion	Dermal	
Arsenic (51.9 ppm, Boring S09)							
Child Exposure (by weight):							
16 kg[3] ED[4]:	3.00E-04 (chronic oral MRL[5])	3.89E-06	--	1.5E+00	1.08E-06	--	1.08E-06
30 kg ED:		2.08E-06	1.82E-06	1.5E+00	5.78E-07	5.06E-07	1.08E-06
50 kg ED:		1.25E-06	1.9E-06	1.5E+00	3.47E-07	5.28E-07	8.75E-07
Trespasser Exposure (by weight):							
70 kg ED:	3.00E-04 (chronic oral MRL)	2.97E-07	4.03E-07	1.5E+00	9.53E-08	1.29E-07	2.24E-07
Hunter Exposure (by weight):							
50 kg ED:	3.00E-04 (chronic oral MRL)	3.32E-06	5.06E-06	1.5E+00	**2.14E-06**	**3.25E-06**	**5.39E-06**
70 kg ED:		1.19E-06	1.61E-06	1.5E+00	7.63E-07	**1.04E-06**	**1.80E-06**
Chromium (62.9 ppm, Boring S09)							
Child Exposure (by weight):							
16 kg ED:	1.00E-03 (chronic oral MRL)	4.72E-06	--	NA	NA	NA	NA
30 kg ED:		2.52E-06	2.2E-06	NA	NA	NA	NA
50 kg ED:		1.51E-06	2.3E-06	NA	NA	NA	NA
Trespasser Exposure (by weight):							
70 kg ED:	1.00E-03 (chronic oral MRL)	3.59E-07	4.88E-07	NA	NA	NA	NA
Hunter Exposure (by weight):							
50 kg ED:	1.00E-03 (chronic oral MRL)	4.03E-06	6.13E-06	NA	NA	NA	NA
70 kg ED:		1.44E-06	1.95E-06	NA	NA	NA	NA

Contaminant	Health Guidelines (mg/kg/day)	Ingestion dose (mg/kg/day)	Dermal dose (mg/kg/day)	CSF (mg/kg/day)$^{-1}$	Increased Cancer Risk		Total Cancer Risk
					Ingestion	Dermal	
Pentachlorophenol (110 ppm, Boring S09)							
Child Exposure (by weight):							
16 kg ED:	1.00E-03 (chronic oral MRL)	8.26E-06	--	4.00E-01	6.13E-07	--	6.13E-07
30 kg ED:		4.40E-06	3.85E-06	4.00E-01	3.27E-07	2.86E-07	6.13E-07
50 kg ED:		2.64E-06	4.02E-06	4.00E-01	1.96E-07	2.99E-07	4.95E-07
Trespasser Exposure (by weight):							
70 kg ED:	1.00E-03 (chronic oral MRL)	6.29E-07	8.54E-07	4.00E-01	5.39E-08	7.32E-08	1.27E-07
Hunter Exposure (by weight):							
50 kg ED:	1.00E-03 (chronic oral MRL)	7.04E-06	1.07E-05	4.00E-01	**1.21E-06**	**1.86E-06**	**3.07E-06**
70 kg ED:		2.51E-06	3.41E-06	4.00E-01	4.31E-07	5.85E-07	**1.02E-06**
Total Polycyclic Aromatic Hydrocarbons (Benzo(a)Pyrene TEQ[6]= 9.24 ppm, Boring S09)							
Child Exposure (by weight):							
16 kg ED:	NA	6.93E-07	--	7.3E+00	9.40E-07	--	9.40E-07
30 kg ED:		3.70E-07	3.24E-07	7.3E+00	5.01E-07	4.39E-07	9.40E-07
50 kg ED:		2.22E-07	3.38E-07	7.3E+00	3.01E-07	4.58E-07	7.59E-07
Total Polycyclic Aromatic Hydrocarbons (Benzo(a)Pyrene TEQ= 11.58 ppm, South of LA 97, ALL ND[7])							
Trespasser Exposure (by weight):							
70 kg ED:	NA	6.62E-08	8.99E-08	7.3E+00	1.04E-07	1.41E-07	2.45E-07
Hunter Exposure (by weight):							
50 kg ED‡:	NA	7.41E-07	1.13E-06	7.3E+00	**2.32E-06**	**3.53E-06**	**5.85E-06**
70 kg ED:		2.65E-07	3.59E-07	7.3E+00	8.28E-07	**1.12E-06**	**1.95E-06**

[1]mg/kg/day- milligrams per kilogram per day; [2]CSF- cancer slope factor; [3]kg- kilogram; [4]ED- exposure dose; [5]MRL- minimum risk level; [6]TEQ- toxic equivalency quotient; [7]ND- not detected

Table C-14: Assessment of maximum detected contaminants of concern (by exposure pathway) in wetland sediments from the EVR site. September 2011. (Increased cancer risk in bold red)

Contaminant	Health Guidelines (mg/kg/day)[1]	Ingestion dose (mg/kg/day)	Dermal dose (mg/kg/day)	CSF[2] (mg/kg/day)$^{-1}$	Increased Cancer Risk		Total Cancer Risk
					Ingestion	Dermal	
Arsenic (77.1 ppm, Location W6*)							
Hunter Exposure (by weight):							
50 kg[3] ED[4]:	3.00E-04	4.93E-06	7.51E-06	1.5E+00	**3.17E-06**	**4.83E-06**	**8.00E-06**
70 kg ED:	(chronic oral MRL[5]	1.76E-06	2.39E-06	1.5E+00	**1.13E-06**	**1.54E-06**	**2.67E-06**
Chromium (93.6 ppm, Location W6)							
Hunter Exposure (by weight):							
50 kg ED:	1.00E-03	5.9E-06	9.12E-06	NA	NA	NA	NA
70 kg ED:	(chronic oral MRL)	2.14E-06	2.91E-06	NA	NA	NA	NA
Pentachlorophenol (3.5 ppm, Location W5)							
Hunter Exposure (by weight):							
50 kg ED:	1.00E-03	2.24E-07	3.41E-07	4.00E-01	3.84E-08	5.85E-08	9.69E-08
70 kg ED:	(chronic oral MRL)	8.00E-08	1.09E-07	4.00E-01	1.37E-08	1.86E-08	3.23E-08
Total Polycyclic Aromatic Hydrocarbons (Benzo(a)Pyrene TEQ[6]= 6.64 ppm, Locations W6, W6*)							
Hunter Exposure (by weight):							
50 kg ED‡:	NA	4.25E-07	6.47E-07	7.3E+00	**1.33E-06**	**2.02E-06**	**3.35E-06**
70 kg ED:		1.52E-07	2.06E-07	7.3E+00	4.75E-07	6.45E-07	**1.12E-06**

[1]mg/kg/day- milligrams per kilogram per day
[2]CSF- cancer slope factor
[3]kg- kilogram
[4]ED- exposure dose
[5]MRL- minimum risk level
[6]TEQ- toxic equivalency quotient
*duplicate sample