

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action Environmental Indicator (EI) RCRAinfo code (CA725) Current Human Exposures Under Control

Facility Name: Chevron Products Company, a Division of Chevron U.S.A., Inc.
Facility Address: 1200 State Street, Perth Amboy, Middlesex County, New Jersey
Facility EPA ID #: NJD081982902

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

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

Definition of “Current Human Exposures Under Control” EI

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

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The “Current Human Exposures Under Control” EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program’s overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRAInfo national database ONLY as long as they remain true (i.e., RCRAInfo status codes must be changed when the regulatory authorities become aware of contrary information).

Facility Information

The Chevron Refinery is an active, 368-acre industrial facility located in a heavily industrial area within the city of Perth Amboy, Middlesex County, New Jersey (Figure 1). The facility has been in operation since 1920. Barber Asphalt Company built and operated an asphalt refinery in 1920. The California Oil Company (which later became Chevron) purchased the property in 1946 and expanded the Perth Amboy Refinery into a full service refinery in 1950. In 1983, Chevron shut down several process units and scaled back the Refinery operation to asphalt topping. Chevron continues to operate the facility today.

The facility is bounded to the north and south by industrial properties and to the west by commercial and residential properties along Convery Boulevard (State Highway 35). Amboy Avenue runs north-south through the western portion of the Refinery and State Street runs north-south through the eastern portion of the refinery. Maurer Road crosses east-west through the central portion of the Refinery and connects Amboy Avenue to State Street (Figure 2). The site is bounded to the east by the Arthur Kill, which provides the Refinery with docking berths for tanker ships. Woodbridge Creek flows from the northwest to southeast through the northern portion of the refinery and has been classified by the State of New Jersey as an FW2-NT/SE3 surface water body in the vicinity of the refinery. Spa Spring Creek flows along the northern property boundary and discharges into Woodbridge Creek. Ground water at the facility is not used as a drinking water source, and some areas are saline due to naturally-occurring salt water intrusion.

The refinery is divided into six major geographical areas referred to as Amboy Field, the West Yard, the Central Yard, the North Field/Main Yard, the East Yard and the North Field Extension (NFE) (Figure 3). The facility consists of tankfields, an asphalt distribution terminal, process areas, offices, mechanical shops, wastewater treatment units, pipelines, and tanker docks. The NFE is a vacant tract of land separated from the Refinery by Woodbridge Creek. The NFE has not been developed or used by Chevron for any industrial/commercial purposes.

The facility operates 24-hours a day, 365-days a year. The refinery maintains a comprehensive site security system that includes perimeter fencing with warning signs, video surveillance, controlled gate access and 24-hour security. The refinery also has a security policy establishing locations and procedures for admittance to the site, including maritime security. Employees and contractors are health and safety trained.

Site remediation activities are being conducted pursuant to the Resource Conservation and Recovery Act (RCRA). The RCRA Facility Investigation Report (RFI Report) was submitted on December 10, 2003. The report addresses Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) in the North Field/Main Yard, East Yard, and Central Yard. Chevron is currently in the process of divesting itself of Amboy Field and the West Yard in conjunction with the City of Perth Amboy's Brownfields Redevelopment Program. Chevron has entered into an MOA with the NJDEP and undertaken focused and expedited investigations and corrective measures to allow for the transfer of ownership of these two properties. The NFE has not been developed or used by Chevron for any industrial/commercial purposes. The investigation of the NFE is being addressed separately in conjunction with negotiations with the prior owners.

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

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

If no - re-evaluate existing data, or

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

RCRA Facility Investigation

Chevron conducted a RCRA Facility Investigation (RFI) at the Chevron Perth Amboy Refinery. The objectives of the RFI were to identify releases that resulted from accepted practices employed before the advent of modern waste management procedures and current regulations. The areas investigated included SWMUs and AOCs identified in the permit as having a potential for a release, light non-aqueous phase liquid (LNAPL) areas, receiving surface water bodies and wetlands around the perimeter of the site. Where releases were identified, the nature and extent as well as whether groundwater at the facility was affected by the releases was evaluated. The Full RCRA Facility Investigation Report was submitted to the USEPA and NJDEP on December 10, 2003. The report addresses Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) in the North Field/Main Yard, East Yard, and Central Yard.

A remedial investigation of the NFE has been conducted by Chevron and prior owners/potential purchasers of the property. The results of these investigations have been submitted to EPA and NJDEP in the Remedial Investigation Report (Roux Associates, Inc., March 2005) and the Results of Total Petroleum Hydrocarbon Soil and Chlorinated Groundwater Investigations (TRC Raviv Associates, Inc., February, 2005).

The investigation and corrective measure for the West Yard and Amboy Field were performed under an MOA entered into with the NJDEP. Under the MOA, Chevron prepared numerous workplans and reports documenting environmental conditions, corrective measures and regulatory compliance. The reports are referenced below. These investigations and corrective measures have been expedited to allow for the transfer of ownership of these two properties. Currently, all structures have been removed from the Amboy Field and contaminated soil is being excavated. The Remedial Action Workplan and Remedial Action Report have been approved by NJDEP for the West Yard. Petroleum-contaminated soil in the West Yard has been excavated and removed from the site. Metal contaminated soil in the West Yard has been excavated and placed under new buildings and have been deed restricted. For groundwater in the West Yard above the NJDEP Ground Water Quality Standards, a Classification Exception Area (CEA) has been proposed.

As presented in the RFI Report and various reports for the West Yard, Amboy Field and the NFE, a total of thirty-five AOCs and sixty-two SWMUs have been identified throughout the Refinery. These areas are reasonably characterized and contamination delineated through the collection of over 800 soil samples. Soil contamination appears not to extend off-site. The areas in which surface contamination exists have been targeted for cleanup. Throughout the various investigations conducted at the Refinery, Chevron has identified Light Non-Aqueous Phase Liquid (LNAPL) in seventeen areas of the Refinery

(Figure 4). The LNAPL areas have been delineated and contained within the site. Interim Remedial Measures (IRMs) have been implemented at all of the seventeen LNAPL areas.

Closure /Remedial Action of Four SWMUs (RCRA-Regulated Units)

The closure of four SWMUs which were subject to RCRA Interim Status Closure Requirements and/or NJPDES DGW permit requirements has been performed under NJDEP oversight. The four SWMUs consist of the North Field Basin (NFB), the Surge Pond, the East Yard Basin (EYB) and the Landfarm.

The EYB and NFB were part of the Refinery's stormwater management system. The Surge Pond was used to store oily wastes until 1985. The Landfarm was constructed in 1981 and was only operated for a short time to evaluate the feasibility of land treatment as a means to degrade oily refinery wastes.

Chevron established three groundwater monitoring systems for the three impoundments and the Landfarm. The EYB and the Landfarm were monitored as individual waste management units, each having their own upgradient and downgradient wells. The NFB and adjacent Surge Pond were combined into one area (known as the NFWMA) for purposes of groundwater monitoring.

Closure of the Landfarm has been completed and approved by NJDEP through closure in-place as proposed in Chevron's *Surface Impoundments and Landfarm Closure Plan* - October 1991. Chevron recently clean closed the Landfarm by excavating remaining hazardous waste and reuse of the remaining soils within the unit.

Clean closure of the EYB is nearing completion. All wastes have been removed from the former impoundment by excavation as demonstrated by post-excavation soil sampling. As part of closure, all wastes and any contaminated soils within the EYB were stabilized and disposed of off-site. The void left by the excavation has been partially backfilled. Once backfilling is complete, Chevron will certify closure of the unit.

Closure of the NFB and Surge Pond is completed. Closure of these units was conducted in accordance with Chevron's *Modification to the October 1991 Closure Plan* – May 2001. All waste has been removed from the NFB. Some of this material was disposed of off-site and some of the waste has been stabilized and consolidated into the Surge Pond. Post-excavation soil sampling was completed in early 2003, and demonstrated that clean closure of the NFB has been achieved. In-place closure of the Surge Pond has also been completed.

References

References reviewed to prepare this EI determination are identified in the appendices that follow Question 6.

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

Media	Yes	No	?	Rationale/Key Contaminants
Groundwater	x			See Table 1
Air (indoors) ²	x			Chlorinated Volatile Organic Compounds, Benzene
Surface Soil (e.g., <2 ft)	x			See Table 1
Surface Water		x		
Sediment	x			Petroleum Hydrocarbons (potentially background)
Subsurface Soil (e.g., >2 ft)	x			See Table 1
Air (Outdoor)		x		

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

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

_____ If unknown (for any media) - skip to #6 and enter “IN” status code.

RATIONALE:

The purpose of the RFI at the Chevron Perth Amboy Refinery (see Question 1 for more information) was to delineate contamination exceeding applicable criteria. The RFI was also performed to characterize the subsurface conditions (geologic and hydrogeologic) at the site. The RFI report for the Refinery was submitted on December 10, 2003. The investigation of the West Yard and Amboy Field was performed under an MOA with the NJDEP. The results of the investigations in the West Yard are presented in the West Yard Site Investigation Report (January 1999) and the West Yard Remedial Action Report (June 2001) as well as the additional reports referenced below. The results of the investigation in Amboy Field are presented in the Amboy Field SI/RI Report and the Amboy Field Remedial Action Report.

Footnotes:

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

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

The data from the RFI, West Yard, and Amboy Field investigations has been loaded into a database. Most of the figures and tables discussed below were drawn directly from this database. The data collected in the NFE for the RFI has also been loaded into the same database. However, the data collected by the potential purchasers of the NFE and Chevron related to ongoing litigation has not been loaded into the database. Therefore, separate figures and tables are presented for the NFE for these two sampling events.

Contaminants were identified in the RFI, the West Yard, Amboy Field and the NFE reports within each SWMU or AOC. Table 1 lists the contaminants identified for soil and ground water at the Refinery including the West Yard, Amboy Field and the NFE.

Groundwater

The Chevron Perth Amboy Refinery is situated in the Coastal Plain physiographic province. In general, two to 20 feet of fill material is present throughout the refinery. The fill material consists of reworked clays and silts with varying amounts of sand, gravel and debris. Near Woodbridge Creek and the Arthur Kill, the fill is underlain by peat and gray clay. The clay is variable in thickness, up to 30 feet in some areas. Glacial till underlies the clay or fill and consists of up to 35 feet of reddish brown gravelly sand and silt. The gray clay and glacial till act as confining layers. Beneath the glacial till are the Woodbridge Clay and Farrington Sand (Raritan Formation) which are not continuous throughout the Refinery. Diabase bedrock is encountered at depths ranging from 78 to 96 feet. Shallow groundwater exists within the fill layer and has been found to be perched on top of the fill/native interface over much of the Refinery. Refinery-wide groundwater flow has been confirmed in north to northeasterly direction, toward surface water bodies, with a few variations. The hydraulic gradients range from 0.001 to 0.02 with the average gradient being approximately 0.01. The low permeability of the fill material along the low hydraulic gradients results in a fairly low seepage velocity for the shallow groundwater.

The assessment of groundwater at the Refinery has been based on data collected at 120 monitoring wells used for the RFI and on separate investigations in the West Yard, Amboy Field and the NFE. Two rounds of groundwater samples have been collected from the RFI wells. Round one was collected during the fourth quarter of 2002 and round two was collected during the first six month of 2003. Groundwater samples were also collected from temporary wells during previous investigations and from the investigations in the West Yard, Amboy Field and the NFE. Groundwater samples were analyzed for VOCs, SVOCs, and metals. Currently, site wide quarterly groundwater sampling has been implemented.

Contaminants of Concern (COCs) identified in ground water are listed in Table 1. Refer to Attachment 2 for maps and tables showing all exceedances of NJDEP's Class IIA GWQS. Note that the exceedances to the NJDEP GWQS (Class II-A) shown on the maps and tables in Attachment 2 represent the "worst case" sampling event. Some of the exceedances shown were not repeatable in later groundwater sampling rounds. While areas of groundwater impacted by LNAPL and dissolved phase constituents have been identified within the Refinery, data from the sentinel well system indicates that the perimeter of the site is largely not impacted by these constituents.

One exception is where dissolved chlorinated VOCs are present in the southern portion of the Central Yard. Vertical migration of constituents appears to be limited by the presence of low permeability gray clay and glacial till underlying the fill. Phased investigations were performed from August 2003 to February 2005 to define chlorinated VOCs in groundwater. A groundwater plume appears to be extending from the southern portion of the Central Yard off-site to the east across the Conrail Railroad tracks to a commercial and industrial area. Elevated levels of benzene were also detected at groundwater wells, MW-216 and MW-217, installed along the eastern boundary. An investigation report entitled, "Central Yard Area of Concern (AOC) 36, Triad-Based Approach Chlorinated Plume Investigation, August 25, 2005," was submitted on September 14, 2005. However, further investigation is necessary to fully characterize and delineate the extent of the groundwater plume.

There are no current or planned uses of the ground water in the Refinery area. The Refinery does not use any production wells and all surrounding residents are on a municipal water supply system. In addition, ground water in the portions of the refinery near Woodbridge Creek and the Arthur Kill has characteristics typical of the NJDEP Class III-B (non-potable) designation – brackish with naturally occurring iron, sodium, manganese, and aluminum concentrations in excess of Class II-A GWQS.

Ground water investigations have been conducted at the Refinery as part of the RFI, as well as West Yard, Amboy Field and NFE investigations as discussed in response to Question 1, above.

Indoor Air

For occupational settings, the standards and requirements of the Occupational Safety and Health Administration (OSHA) apply (US EPA, 2003). Chevron regularly monitors their workers and contractors in accordance with OSHA requirements. Refinery workers and contractors are required to go through health and safety training.

Two residential areas are located adjacent to the Refinery (Figure 2). The first residential area is located adjacent to the southwest corner of the Central Yard. The second residential area is located west of Amboy Field (across Convery Blvd). Both of these residential areas are located hydraulically upgradient of the Refinery. As a result, there would be no potential for vapor intrusion of Chevron's contaminants through groundwater into these areas.

The groundwater investigation of chlorinated VOCs in the southern portion of Central Yard and the off-site area to the east appeared to show that Chevron might have contributed to the elevated levels of chlorinated VOCs in groundwater detected in the off-site area. Further investigation of groundwater needs to be performed to delineate a groundwater plume from Chevron. Therefore, it is reasonably concluded that indoor air may be impacted by contaminated groundwater from Chevron via vapor intrusion.

Surface and Subsurface Soil

Portions of the refinery contain surface and subsurface soils that have concentrations of VOCs, semi-VOCs, petroleum hydrocarbons, and metals that exceed the New Jersey Non-Residential Direct Contact Soil Cleanup Criteria (NRDCSCC).

COCs identified in soil during the RFI, West Yard, Amboy Field and NFE investigations are listed in Table 1. Refer to Attachment 1 for maps and tables showing all exceedances of NJDEP's NRDCSCC in surface and subsurface soil.

As stated previously, a total of thirty-five AOCs and sixty-two SWMUs have been identified throughout the Refinery. These areas are reasonably characterized and contamination delineated through the collection of over 800 soil samples. The areas in which surface contamination exists have been targeted for cleanup.

Surface Water and Sediment

Surface water bodies are present both within and adjacent to the Refinery. Spa Spring Creek is along the northern boundary of the Refinery and flows into Woodbridge Creek. Woodbridge Creek runs through the north portion of the Refinery and flows to the east into the Arthur Kill. Woodbridge Creek has been classified by the State of New Jersey as an FW2-NT/SE3 surface water body. The Arthur Kill is located along the eastern border of the East Yard. These waters are patrolled for security by both the Refinery and the Coast Guard. No recreational boating activities have ever been observed in

Woodbridge Creek adjacent to the Refinery. During low tide, most boats cannot navigate the waters of Woodbridge Creek. Therefore, recreational contact with surface water is not likely to occur in the area.

Surface water samples were collected during the RFI and evaluated as part of the Baseline Ecological Evaluation (BEE). Eight surface water samples were collected from Woodbridge Creek including background sample upstream beyond the area of tidal influence, three from Spa Spring Creek and six from the Arthur Kill. The surface water data were screened against the aquatic life protection criteria in NJDEP's Surface Water Quality Standards (SWQS) and the surface water criteria adopted by USEPA that are applicable in New Jersey, pursuant to the NJDEP's February 28, 2003 SWQS *Criteria for Toxic Pollutants Currently Applicable to New Jersey Surface Waters* memorandum. In addition, aquatic life protection criteria published in 1999 by the United States National Oceanic and Atmospheric Administration (NOAA) was used as ecological benchmarks when there were no SWQS or criteria published by USEPA or NJDEP. Surface water sample results indicated three metals (mercury, nickel and zinc) above these criteria. Mercury was only detected above the SWQC at a very low concentration (below the method detection limit) in one sample collected from the Arthur Kill. Mercury was not detected in a duplicate sample collected from the same location. Nickel and zinc were detected in background surface water sample locations, as well as locations adjacent to the Refinery. Based on a comparison of these data to the site soil and groundwater data, the only site-related constituent detected above the SWQS is nickel. Nickel was detected above the NJDEP Chronic SWQS but not above the Acute SWQS. The most recent NJPDES groundwater data (April 2005) indicates nickel was detected above the NJDEP Class II-A groundwater quality standard of 100 ppb in three monitoring wells along Woodbridge Creek at concentrations ranging up to 862 ppb. However, the highest nickel concentration in surface water (52.2 ug/l) was found in the Woodbridge Creek background sample located approximately 3,100 feet north of site in the upstream direction. Surface water samples collected adjacent to the Refinery in Woodbridge Creek show lower concentrations of Nickel ranging from 13.9 ppb to 41.2 ppb. Therefore, Chevron's contribution of nickel to the surface water body does not appear to result in levels that exceed background concentrations.

Sediment samples were collected as part of the RFI and evaluated as part of the BEE. Twenty-nine sediment samples were obtained from Woodbridge Creek along eight transects including background samples collected upstream above the area of tidal influence. Six sediment samples were obtained from Spa Spring Creek along three transects and seven sediment samples were collected from the Arthur Kill along six transects. The sediment analytical data was compared to criteria provided in the NJDEP's 1998 *Guidance for Sediment Quality Evaluations*. This includes Marine/Estuarine Sediment Screening Guidelines (SSG) for selected VOCs, PAHs, PCBs, pesticides and metals in sediment. Sediment sampling results indicated VOCs, metals, and SVOCs above the SSG in the background locations as well as locations adjacent to the Refinery. For the reasons described above for surface water, recreational contact with sediments is not likely to occur in this area.

Outdoor Air

For occupational settings, the OSHA standards and requirements apply (US EPA, 2003). Chevron regularly monitors their workers and contractors in accordance with OSHA requirements. Therefore, outdoor air in this facility is not reasonably suspected to be contaminated above OSHA levels as a result of releases from the refinery.

References

References reviewed to prepare this EI determination are identified in the appendices that follow Question 6.

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

Summary Exposure Pathway Evaluation Table
Potential Human Receptors (Under Current Conditions)

Contaminated Media	Residents	Workers	Day Care	Construction	Trespassers	Recreation	Food ³
Groundwater	No	No	No	Yes	--	--	No
Air (indoors)	No	No					
Soil (surface, e.g., <2 ft)	No	Yes	No	Yes	No	No	No
Surface Water							
Sediment	No	No	--	No	No	No	No
Soil (subsurface, e.g., > 2 ft)	--	Yes	--	Yes	--	--	No
Air (outdoors)							

Instructions for Summary Exposure Pathway Evaluation Table:

- Strike-out specific Media including Human Receptors’ spaces for Media that are not “contaminated” as identified in #2 above.
- Enter “Yes” or “No” for potential “completeness” under each “Contaminated” Media – Human Receptor combination (Pathway).

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

Please Note: evaluations were added for the following Pathways: 1) Subsurface Soil – Workers; and 2) Sediment – Construction.

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

If Yes (pathways are complete for any “Contaminated” Media - Human Receptor combination) - continue after providing supporting explanation.

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

Footnotes:

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

RATIONALE:

Supporting explanation is provided below for the Exposure Pathway Evaluation to determine if complete pathways exist between contamination and potential human receptors, and if exposures can be reasonably expected under the current (land- and ground water-use) conditions.

Residents

There are no residences within the refinery property boundary. Both the Chevron and the NJDEP have agreed to a deed notice to restrict the property to non-residential use. There are no current or planned uses of the ground water in the Refinery area. The nearby residents are on a municipal water supply system.

The results of the soil gas investigation, as part of the phased investigations performed from August 2003 to February 2005, appear to show that there is no potential for exposure to off-site residents to the east of the Central Yard of Chevron's contaminants in groundwater via vapor intrusion. However, additional groundwater data needs to be compiled to fully delineate the plume of chlorinated volatile organic compounds in groundwater detected in the southern portion of the Central Yard. After completion, further assessment of the potential for vapor intrusion in the off-site area to the east of the Central Yard must be performed to further confirm no potential for vapor intrusion.

Day Care

There are no day care facilities within the refinery property boundary.

Workers and Construction

Some classes of on-site refinery workers (employees) and construction workers (contractors) are expected to encounter contaminated surface soil and subsurface soil. Therefore, these pathways (worker-surface soil; worker-subsurface soil; construction-surface soil; and construction-subsurface soil) are potentially complete in the absence of protective controls. Adequate protective controls have been implemented to bring potential exposure scenarios to within acceptable limits, and are discussed further in Question 4, below.

Because the water table at the facility is shallow, construction workers have the added potential to be exposed to contaminated ground water during excavation and remediation activities. Therefore, the construction-ground water pathway is potentially complete in the absence of protective controls. Adequate protective controls have been implemented to bring potential exposure scenarios to within acceptable limits, and are discussed further in Question 4, below.

Refinery workers do not regularly enter excavations or directly contact ground water; therefore, the worker-ground water exposure pathway is not complete.

Exposure to contaminants in sediments is not expected for refinery or construction workers at this site under current conditions. Therefore, the workers-sediment and construction-sediment pathways are not complete. Dredging is occasionally performed in the Arthur Kill adjacent to the Refinery. However, prior to dredging, samples are collected and controls are put in place as part of the Army Corp of Engineers permit process.

For the West Yard, contaminated surface or subsurface soil has been remediated through excavation or institutional and engineering controls. Periodic reporting is required by NJDEP in order to ensure that they continue to be protective of workers in this area. Excavation of contaminated soil to levels at a

minimum below the NJDEP non-residential soil cleanup criteria is presently ongoing in Amboy Field. Appropriate institutional and engineering controls will be implemented in Amboy Field if necessary. Currently, the same security and work permit requirements apply to the NFE and Amboy Field as the rest of the Refinery.

The results of the soil gas investigation, as part of the phased investigations performed from August 2003 to February 2005, appeared to show that there was no potential for exposure to off-site workers of Chevron's contaminants in groundwater via vapor intrusion. However, additional groundwater data needs be compiled to fully delineate the plume of chlorinated volatile organic compounds in groundwater detected in the southern portion of the Central Yard. After completion, further assessment for the potential for vapor intrusion in the off-site area to the east of the Central Yard must be performed to further confirm no potential for vapor intrusion.

Trespassers and Recreation

The Chevron Perth Amboy Refinery is an active industrial facility, and operates 24-hours a day, 365-days a year. The refinery maintains a comprehensive site security system that includes perimeter fencing with warning signs, video surveillance, controlled gate access and 24-hour on-site security. This includes the NFE and Amboy Field areas. The refinery also has a security policy establishing locations and procedures for admittance to the site, including maritime security. Because of these measures, trespassers and/or recreators do not have access to the facility. Since access is prevented, human exposure to any contaminants in surface soil and sediments is not possible. Therefore, the trespasser and recreation exposure pathways are not complete.

Food

There are no food crops (e.g., vegetables, fruits, crops, meat and dairy products) grown within the refinery property boundary.

Crabs have been noted in the lower section of Woodbridge Creek, adjacent to the Arthur Kill, and are the only organisms that could be potentially consumed. The NJDEP and Department of Health and Senior Services (DHSS) have issued an advisory prohibiting taking, eating or harvesting blue crab from the Newark Bay Complex. The Newark Bay Complex includes the Arthur Kill and tidal portions of all rivers and streams that feed into the Arthur Kill; all tidal surface water bodies located within and adjacent to the Refinery are located in the Newark Bay Complex. This advisory also includes striped bass, American eel, white perch and white catfish from the Newark Bay Complex. NJDEP and DHSS have issued statewide advisories against eating American lobster, American eel, bluefish, and striped bass.

References

References reviewed to prepare this EI determination are identified in the appendices that follow Question 6.

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

- X If no (exposures can not be reasonably expected to be significant (i.e., potentially “unacceptable”) for any complete exposure pathway) - skip to #6 and enter “YE” status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”
- _____ If yes (exposures could be reasonably expected to be “significant” (i.e., potentially “unacceptable”) for any complete exposure pathway) - continue after providing a description (of each potentially “unacceptable” exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”
- _____ If unknown (for any complete pathway) - skip to #6 and enter “IN” status code.

RATIONALE AND REFERENCE(S):

Workers and Construction Exposure Pathways

As discussed in Question 3, above, exposure of on-site workers (employees) to contaminated surface soil and subsurface soil, and exposure of construction workers (contractors) to contaminated ground water, surface soil and subsurface soil is expected in the absence of protective controls. However, protective controls have been implemented to bring potential exposure scenarios to within acceptable limits.

Extensive training programs and detailed safety and work practices have been implemented at the Refinery. OSHA health and safety training is required for employees and contractors at the facility. Employees and contractors receive an initial training and annual refresher training thereafter. Appropriate personal protection equipment (PPE) is utilized by employees and contractors when working at the refinery.

Work permits are required before any work is conducted at the facility. Work permits are only obtained from the lead Unit Operator, and must be obtained daily. An additional permit is required for excavations that are greater than 6 inches below ground surface (bgs).

Footnotes:

⁴ If there is any question on whether the identified exposures are “significant” (i.e., potentially “unacceptable”) consult a human health Risk Assessment specialist with appropriate education, training and experience.

Until permanent remedial measures are implemented, several interim measures have been taken to bring any exposures to within acceptable limits. For example, signs have been posted throughout the refinery to identify areas with exceedances in soil of NJDEP's NRDCSCC (Figure 5). Additionally, maps and tables showing exceedances of NJDEP's NRDCSCC in surface and subsurface soil, and exceedances of applicable NJDEP's GWQS (Class II-A) in ground water (Attachment 2) have been distributed to the operators of the various units within the refinery. These maps and tables will be used when issuing a work permit to identify areas where additional PPE may be required. Note that the exceedances to the NJDEP GWQS (Class II-A) shown on the maps and tables in Attachment 2 represent the "worst case" sampling event. Some of the exceedances shown were not repeatable in later groundwater sampling rounds. The data for the NFE is presented in a different fashion because not all the data from this area has been loaded into the database.

For the West Yard, contaminated surface or subsurface soil has been remediated through excavation or institutional and engineering controls. Periodic maintenance and monitoring of the engineering controls are required by NJDEP in order to ensure that they continue to be protective of workers. The maintenance and monitoring of the engineering control must be documented and reported to NJDEP. Excavation of contaminated soil to levels at a minimum below the NJDEP non-residential soil cleanup criteria is presently ongoing in Amboy Field. Appropriate institutional and engineering controls will be implemented in Amboy Field if necessary. Currently, the same security and work permit requirements apply to the NFE and Amboy Field as the rest of the Refinery.

Therefore, exposure of on-site workers to contaminated surface and subsurface soil, and exposure of construction workers to contaminated ground water, surface and subsurface soil is expected to be within acceptable limits.

References

References reviewed to prepare this EI determination are identified in the appendices that follow Question 6.

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

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

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

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

RATIONALE AND REFERENCE(S):

This question is not applicable. See response to Question 4.

References

References reviewed to prepare this EI determination are identified in the appendices that follow Question 6.

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

- YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the **Chevron Perth Amboy Refinery facility, EPA ID # NJD081982902**, located at **1200 State Street, Perth Amboy, New Jersey** under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.
- NO - "Current Human Exposures" are NOT "Under Control."
- IN - More information is needed to make a determination.

References

References reviewed to prepare this EI determination are identified in the appendices that follow Question 6.

Completed by	<u>Chevron U.S.A., Inc.</u>	
Reviewed by	<u>(signature)</u>	Date _____
	<u>(print) Andrew Y. Park</u>	
	<u>(title) Project Manager, EPA Region 2</u>	
	<u>(signature)</u>	Date _____
	<u>(print) Barry R. Tornick</u>	
	<u>(title) Section Chief, EPA Region 2</u>	
Approved by	<u>Original signed by:</u>	Date <u>9/30/2005</u>
	<u>(print) Adolph Everett</u>	
	<u>(title) Branch Chief, EPA Region 2</u>	

Locations where References may be found:

EPA Region 2, RCRA Records Center, 290 Broadway, 15th Floor, NY, NY 10007-1866
NJDEP, Office of Records Custodian, Attn: Public Records Requests, 401 East State Street, P.O. Box 442, Trenton, New Jersey 08625-0442, (609) 341-3121, <http://www.nj.gov/dep/opra>

Contact telephone and e-mail numbers

EPA	<u>Andrew Park, 212-637-4184, park.andy@epa.gov</u>
NJDEP	<u>Anthony Cinque, 609-633-1416, anthony.cinque@dep.state.nj.us</u>
Merck	<u>Robert Lavorario, 732-738-2207, rlav@chevron.com</u>

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

APPENDICES

Figures, Tables and Attachments

The following figures, tables and attachments have been provided to support this EI determination:

- Figure 1 – Site Location Map
- Figure 2 – Aerial Photograph
- Figure 3 – Refinery Base Map
- Figure 4 – LNAPL Areas
- Figure 5 – Example of Sign (posted to identify areas with exceedances in soil of NJDEP's NRDCSCC)

Table 1 – Site-Wide List of Contaminants of Concern (COCs)

Attachment 1 – Maps and Tables Showing Exceedances of NJDEP's NRDCSCC in Surface and Subsurface Soil, and Exceedances of NJDEP's GWQC in Ground Water. (Included in Volume 2 of 2)

References Cited

- Chevron U.S.A., Inc., October 1991, Surface Impoundments and Landfarm Closure Plan, Perth Amboy, Refinery, Perth Amboy, New Jersey.
- Chevron U.S.A., January 1999, West Yard Site Investigation Report.
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- Chevron U.S.A., March 2001, West Yard Groundwater Remedial Action Workplan.
- Chevron U.S.A., April 2001, West Yard Baseline Ecological Evaluation.
- Chevron U.S.A., June 2001, West Yard Remedial Action Report.
- Chevron U.S.A., July 2001, West Yard Sewer System Investigation Report.
- Chevron U.S.A., November 2001, West Yard Sewer System Investigation Addendum.
- Chevron U.S.A., May 2002, West Yard RI/RA/RAWP Addendum.
- Chevron U.S.A., April 2003, Response to NJDEP Letter Dated September 17, 2002 and Revised RAWP for the West Yard Groundwater.
- Chevron U.S.A., May 2003, Former Gas Station Remedial Action Report.

Chevron U.S.A., June 2003, West Yard Final Remedial Action Workplan for Soil and Revised Draft Deed Notice.

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Chevron U.S.A., October 2003, Amboy Field SI/RI Report.

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United States Environmental Protection Agency (US EPA), 2003, Information posted on Web Site regarding USEPA and OSHA jurisdictional agreement regarding indoor air quality.

Chevron U.S.A., Inc., January 2004, Remedial Action Selection Report Ammonia in West Yard Groundwater.

TRC Raviv Associates, Inc., February 2005, North Field Extension, Results of Total Petroleum Hydrocarbon Soil and Chlorinated Groundwater Investigations, Chevron Perth Amboy Refinery, Perth Amboy, New Jersey.

Chevron U.S.A., Inc., March 2005, West Yard Final Sewer System Investigation. Roux Associates Inc., March 2005, Remedial Investigation Report, North Field Extension Site, Woodbridge, New Jersey.

Chevron U.S.A., April 2005, Amboy Field Remedial Action Report.

Chevron U.S.A., June 2005, West Yard Off-Site Ditch Supplemental Remedial Investigation Report.

Chevron U.S.A., Inc., August 25, 2005, Central Yard Area of Concern (AOC) 36, Triad-Based Approach Chlorinated Plume Investigation, Chevron Perth Amboy Facility, NJ