DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures Under Control

Facility Name: **Sunoco, Inc. (R&M) Eagle Point Facility**
Facility Address: **Junction Rt. 130 and I-295, Westville, NJ 08093**
Facility EPA ID #: **NJD990753162**

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.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

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

Definition of "Current Human Exposures Under Control" EI

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

Relationship of EI to Final Remedies

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

Duration / Applicability of EI Determinations

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

Facility Information

Texaco constructed the refinery in 1949 and sold the refinery complex to the Coastal Corporation on May 20, 1985. Following the 1985 transaction Texaco retained portions of land outside the western and eastern fenceline of the main refinery complex. The portion of land outside the eastern fenceline was subsequently sold by Texaco to SES Wheelabrator, under the current name of Wheelabrator Environmental Systems, who operate the Wheelabrator Gloucester Company L.P. facility. Coastal acquired the undeveloped western portion of land from Texaco on August 24, 1994. After acquisition of the refinery in 1985, Coastal purchased adjacent residential properties to expand the buffer zone around the refinery perimeter, including the home directly west of the Sales Terminal located at 1006

Crown Point Road (West Deptford Block 1, Lot 5), and several properties located southeast of the Tank Farm. Southeast of the Tank Farm, Coastal purchased properties located at 1044, 1048, and 1063 Milton Avenue (Ref 1). In January 2004, Sunoco Inc. purchased the refinery complex and associated real property from Coastal/El Paso. The active refinery complex and surrounding areas encompass approximately 1000 acres.

The active refinery complex is secured with a chain link fence on the northern, southern, eastern, and western property boundaries (Attachment A, Figure A-1). Eight gates allow restricted access through the fenced areas. The western fenceline divides the active refinery complex from Sunoco-owned undeveloped land to the west. The undeveloped land along the western edge of the refinery complex consists of woodlands and open fields and serves as an effective buffer between the active refinery and the residential areas in the towns of Verga and Red Bank. The northern property boundary is marked by the eastern bank of the Delaware River. Located north, across the Delaware River in Pennsylvania, is the Philadelphia Naval Business Center.

The land adjacent to Sunoco's eastern property boundary is owned by SES Wheelabrator, under the current name of Wheelabrator Environmental Systems. Wheelabrator operates the Wheelabrator Gloucester Company L.P. facility, a power plant that accepts industrial solid waste, medical waste, and municipal solid waste for use as fuel (Ref 1). With the exception of a few commercial and residential properties immediately adjacent to the southern fenceline, U.S. Route 130 is the southern property boundary of the main facility. Located south of Route 130 is a small tank farm owned by Sunoco, and a residential area. During the property transaction in January 2004, Sunoco acquired from Coastal several properties immediately adjacent to the southern fence line at 1044, 1048, and 1063 Milton Avenue in addition to four vacant tracts.

The refinery has an approximate refining capacity of 140,000 barrels per day of both hydrocarbon fuels and petrochemical feedstocks. Fuels produced include gasoline, jet fuel, kerosene, distillates and residual fuels. Petrochemical feedstocks and refinery by-products include butane, propane, benzene, toluene, xylene, propylene, cumene, and sulfur (Ref 1). Above-ground and below-ground piping networks connect the process units with tanks in the Tank Farm. A series of four docks and a supporting infrastructure transfers the petroleum/products to and from ships and barges on the Delaware River along the northern boundary of the refinery. Pipelines, ships, barges, and tanker trucks ship the finished products off-site.

The Eagle Point Refinery has been working within a remedial program for over 20 years, first under the Coastal Eagle Point Oil Company, then under El Paso and, during the past year, under Sunoco. There are 41 Areas of Concern (AOCs) identified by the NJDEP on the refinery property (Ref 1). Over the years, three major investigations and numerous focused studies have been conducted to determine the nature and extent of contamination in site soils and groundwater. As a result, there are over 200 monitoring wells on-site (Figure A1) and over 1,000 soil and/or groundwater samples have been collected. These wells and samples have provided detailed site characterization information on the nature and extent of contamination.

At the present time, Sunoco is operating 18 remediation wells and/or sumps in 10 areas of the facility where LNAPL has been discovered, as interim remedial measures (Ref 2, and 3). These systems, which are designed to recover LNAPL and/or restrict groundwater flow, are operated to prevent off-site migration of dissolved phase constituents of concern (COCs) and LNAPL.

Since acquiring the Eagle Point facility in early 2004, Sunoco has undertaken a significant effort to compile and analyze site information from the previous 19 years of work. The analysis of this enormous body of data has incorporated state-of-the–art data technology to display and evaluate environmental conditions across the site. The result is a site conceptual model that allows Sunoco to prioritize remedial actions within AOCs that have ever had concentrations of a particular COC above an applicable standard. It can also be used to locate sample points and remediation systems within relevant areas of investigation. Sunoco has used the model to identify the recovery and monitoring points within 150 feet of the Delaware River and evaluate the absence or presence of LNAPL at these locations.

Sunoco also operates under a HSWA Permit (No. NJD990753162 – Coastal Eagle Point Oil Company), which EPA Region II issued to CEPOC, effective February 18 1992, under the authority of RCRA and HSWA of 1984 [U.S.C. 6901 et. seq]. The permit briefly described each of the units at the refinery, except the landfarm which is discussed further below, and outlined the recommended investigative strategy to be implemented at each unit. The permit also included modules describing the components of RCRA Facility Investigations (RFIs) and a Corrective Measures Study (CMS) (Ref 1).

A NJPDES-DGW permit (no. NJ0084841), effective July 30, 1989, was issued to Coastal on June 30, 1989 to establish closure/post closure soils and groundwater sampling requirements for the hazardous waste land treatment unit (Landfarm). The permit was issued pursuant to the NJPDES Regulations [N.J.A.C 7:14A-1 et seq.] and the Hazardous Waste Regulations [N.J.A.C. 7:26-1 et seq.] (Ref. 1). A Final Major Modification to the NJPDES-DGW Permit (No. NJ0084841), effective March 1, 1992, was issued to CEPOC on January 29, 1992, under the authority of the New Jersey Water Pollution Control Act, N.J.A.C 7:14A-1 et. Seq. A draft revised NJPDES-DGW permit for the landfarm was issued in 2005; however, the NJDEP is reconsidering the necessity for a permit and is deferring a final decision until the new NJPDES rule is in effect.

A Title V BOP (No. 050007) was issued to Sunoco on June 16, 2005, under the authority of the New Jersey Department of Environmental Protection, Division of Environmental Regulation, Air Quality Permitting Program, Bureau of Operating Permits to regulate air emissions from all process equipment at the site.

A NJPDES permit (No. NJ0005401) was issued to Sunoco on June 15, 1999 by the New Jersey Department of Environmental Protection pursuant to N.J.A.C. 7:14A to regulate the operation of the refinery's five million gallons per day (MGPD) Waste Water Treatment Plant.

Water Allocation Permit (No. 2205P) was issued to Sunoco by the Water Resources Management section of the authority of the Bureau of Water Allocation under the New Jersey Water Supply Management Act [58:1A-1] pursuant to N.J.A.C. 7:19-1 et seq on March 1, 2005. The permit regulates the amount of surface water and groundwater diverted for industrial processing and cooling at the facility.

References:

1. Remedial Investigation Report, Prepared by MWH Americas. Dated November 7, 2002.
2. Sunoco Eagle Point Refinery LNAPL IRM Systems Current Conditions Summary Report, Prepared by Sunoco Inc. Dated February 2004.
3. Letter from James R. Oppenheim, Sunoco, Inc (R&M), to Murdo Morrison, NJDEP, re: Interim Remedial Measures Status Update. Dated December 1, 2004.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

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

	Yes	No	?	Rationale / Key Contaminants
Groundwater	✓			Petroleum hydrocarbons and Priority Pollutant (PP) Metals. Key contaminants include VOCs (BTEX,MTBE,TBA), SVOCs (benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, bis(2-ethylhexyl)phthalate, phenanthrene), PP Metals (beryllium, copper, arsenic, cadmium, lead, chromium, mercury, nickel, zinc, antimony)
Air (indoors)[2]		✓		Indoor Air Sampling Program results are below PELs
Surface Soil (e.g., <2 ft)	✓			Petroleum hydrocarbons and PP Metals. Key contaminants include VOCs(benzene, ethylbenzene, xylenes, methylene chloride),SVOCs (naphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene), and PP Metals (beryllium, copper, zinc, arsenic)
Surface Water	✓			Petroleum Hydrocarbons and PP Metals. Key contaminants include benzene, vinyl chloride, antimony, arsenic, cadmium, chromium, lead, mercury, and selenium.
Sediment	✓			Petroleum Hydrocarbons and PP Metals. Key contaminants include benzo(a)anyhracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, antimony, arsenic, lead and zinc.
Subsurf. Soil (e.g., >2 ft)	✓			Petroleum Hydrocarbons and PP Metals. Key contaminants include VOCs (methylene chloride, ethylbenzene, benzene, xylenes), SVOCs (benzo(a)anthracene, benzo(a)pyrene, debenzo(a,h)anthracene) and PP Metals (Arsenic)
Air (outdoors)		✓		See below

_____ 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.

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

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

Rationale and Reference(s):

Groundwater:

There are two distinct water bearing units beneath the Eagle Point refinery. Water table zone (WTZ) groundwater at the site is generally encountered an average of seven feet below grade. The Potomac-Raritan-Magothy (PRM) formation lies beneath the water table zone aquifer and is separated from the WTZ groundwater by either the Delaware River Alluvium (in the northern portion of the site) or the Merchantville formation (in the southern portion of the site) (Ref 1).

Groundwater flow direction in the WTZ is generally North toward the Delaware River (Figure A1). Due to the influence of offsite pumping, groundwater within the Upper PRM flows to the southeast, away from the Delaware River (Attachment A, Figure A-2).

An annual groundwater sampling program has been implemented for the WTZ aquifer at the site. During the September 2004 WTZ sampling event, Sunoco collected groundwater samples from 80 monitoring wells located

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] [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.

throughout the site (Attachment A, Table A-1). During the sampling event, limited petroleum hydrocarbons and priority pollutant metals (PP Metals) were detected at concentrations exceeding their respective NJ GWQS.

To further characterize the potential distribution of dissolved phase contaminants of concern (COCs) Sunoco installed additional WTZ monitoring wells in 2004 and 2005 along the eastern and western property boundaries to assess the potential for offsite migration. The results of sampling from these wells are summarized in Attachment A on Tables A-2 and A-3, respectively.

Presently, Sunoco is operating 18 remediation wells and/or sumps in 10 areas of the facility (Attachment A, Figure A-3), some of which are located near the eastern and northern property boundaries. The remediation wells and sumps are designed to recover LNAPL and/or restrict groundwater flow, are operated to prevent off-site migration of dissolved phase constituents of concern (COCs) and LNAPL in the WTZ

Sunoco completed groundwater sampling from each of the 46 UPRM monitoring wells in July of 2004 and seven of the UPRM monitoring wells in December 2004 (Attachment A, Table A-4). Prior to July 2004, Coastal had completed five rounds of sampling on the UPRM wells between May 2001 and October 2003 (Ref 2). Samples collected during both the July and December 2004 events were analyzed for volatile organic compounds (VOCs). In addition to VOCs, at the request of the NJDEP, the wells sampled during December 2004 were also analyzed for chromium. Based on the results of the sampling completed by Coastal and the subsequent sampling completed by Sunoco, COCs in exceedance of the NJ GWQS for the UPRM include benzene, MTBE, TBA, total xylene, and chromium (Table A-4). To further characterize the distribution of dissolved phase COCs in the UPRM, Sunoco is currently installing 23 additional UPRM wells. Upon completion of installation activities, these UPRM wells will be sampled (Figure A-1). The sampling event is tentatively scheduled for Fall 2005.

Refer to Attachment A which contains the results of the 2004 water table zone (WTZ) groundwater sampling (Table A-1), 2005 WTZ sampling events along the eastern and western fence lines (Tables A-2 and A-3, respectively), and the 2004 UPRM groundwater sampling (Table A-4). The locations of the wells sampled are shown on Figure A-1. All data are compared to New Jersey's Class IIA Groundwater Quality Standards. Historical data are presented in the 2004 UPRM RIR Addendum (Ref 2).

Indoor Air:

In accordance with the NJDEP Draft Vapor Intrusion Guidance (Ref 3), Sunoco utilized the September 2004 WTZ groundwater sampling results to complete a screen for potential indoor air issues (Attachment B, Table B-1). Based on a comparison of the groundwater data to the NJDEP Groundwater to Indoor Air Screening Levels (GWIASL) approximately one third of the wells sampled had concentrations of VOCs at levels indicating a potential risk to indoor air quality. Although samples at these concentrations are located throughout the facility, none of the locations are within 100 feet of an occupied building (Attachment B, Figure B-1). In addition, Sunoco reviewed the proximity of wells with non-aqueous phase liquid (NAPL) to occupied buildings (Figure B-1). Because wells with NAPL have been observed within 100 feet of an occupied building, indoor air samples have been collected on three separate occasions since 1997. Because the refinery is regulated by OSHA's Industrial Safety Procedures, the indoor air samples, collected as part of the vapor monitoring program, were compared to the OSHA PELs (Attachment B, Table B-2). As indicated by Table B-2, no exceedances of the applicable PELs have been detected at any of the locations sampled to date.

As mentioned, Sunoco has actively implemented a vapor monitoring program. Indoor air sampling has been completed in July 1997, February 1999 and June 2003. Also, based on the close proximity of an occupied building to NAPL, the facility installed a vapor remediation system (VRS) within the Environmental Health & Safety building located near the main gate of the refinery. The VRS is monitored on a weekly basis and sampled biweekly. To date, none of the sampled compounds have been detected above the OSHA PELs.

In addition to the indoor air monitoring, the facility conducts air monitoring during intrusive subsurface activities (excavation, well installation), in which direct read air monitoring devices are used to monitor VOCs in the breathing zone. In addition, if any reports of nuisance odors are reported, Sunoco has a program to investigate the odors and complete the appropriate air sampling to ensure no unacceptable exposure issues exist at the site. The next site wide vapor monitoring event is scheduled for 2006. On site procedures and PPE eliminate the pathway from site soils and groundwater to potential receptors.

Surface and Subsurface Soil:

From 1994 to present, over 200 soil samples have been collected and analyzed during environmental investigations. As presented previously to the NJDEP in the 2002 Remedial Investigation Report (RIR) (Ref 1) and 2003 Sales Terminal RIR Addendum (Ref 4) soil sample results were compared to the NJDEP Impact to Groundwater Soil Cleanup Criteria (IGWSCC). Based on the results of the evaluation benzene, ethylbenzene, methylene chloride, trichloroethylene, cis-1,2-dichloroethylene, vinyl chloride, xylene, benzo(a)anthracene, benzo(a)pyrene,

benzo(b)fluoranthene, chrysene, naphthalene, dibenzo(a,h)anthracene, arsenic, beryllium, copper, and zinc have been detected at concentrations exceeding their respective human health criteria. Refer to Attachment C which contains the soil data tables from the Montgomery Watson Harza 2002 Remedial Investigation Report (RIR)(Ref 1) and 2003 Sales Terminal RIR Addendum (Ref 4). The soil sampling locations are shown on Figure C-1 of Attachment C.

Surface Water:

The bank of the Delaware River forms the northern property boundary for the Eagle Point facility and drains a large area of New York, New Jersey and Pennsylvania prior to passing the Eagle Point site. The Delaware is tidally influenced in the vicinity of the site. The main channel of the Delaware River from Big Timber Creek (River Mile 95.0) to the Pennsylvania Delaware state line (River Mile 78.8) is classified as Zone 4 in the Surface Water Quality Standards (N.J.A.C. 7:9B), and is tidally influenced. This section of the Delaware River is under the jurisdiction of the Delaware River and Basin Commission (DRBC), per N.J.A.C. 7:9B-1.14(d), and includes the entire portion of the Delaware River that flows past the site.

Results of studies completed to date indicate that WTZ groundwater along the northern property boundary is hydraulically connected to the Delaware River. In August 2004 Sunoco completed a tidal study utilizing monitoring wells distributed within two AOCs (AOC-7 and AOC-1) located along the Delaware River. For one week groundwater fluctuations were monitored within wells located within these AOCs demonstrating that although the elevation of the Delaware River surface fluctuates greater than six feet per tidal cycle, tidal influence at the site is limited to approximately 60 feet south of the bank of the Delaware River. To determine the tidal influence of the unnamed tributary to the Big Timber Creek (located along the eastern edge of AOC 14) tidal studies were conducted in November 2001 and May 2002 within the Sales Terminal (AOC 14). This study indicated that while the tidal range of Big Timber Creek also fluctuated over six feet, none of the AOC 14 monitoring wells nor the stilling well located in the wetlands showed any influence.

Although surface water samples have not been collected from the Delaware River, Sunoco has completed an assessment of shallow groundwater within approximately 200 feet of the Delaware River to determine whether current groundwater dissolved concentrations may cause impact to the Delaware River. Based on groundwater data collected from these areas immediately adjacent to the river, concentrations of a limited number of inorganics, including arsenic, cadmium and lead, have been detected above their respective GWQS. In addition to the inorganics listed above, one additional groundwater sample location (WTZ 18-19), located approximately 200 feet from the Delaware River, had concentrations of volatiles (including benzene, MTBE, and TBA), and PAHs (including benzo(a)anthracene and benzo(a)pyrene) detected above their respective GWQS. Based on the low level concentrations of these compounds, their proximity to the River and flow within the Delaware River, these data do not indicate potential surface water impacts above the New Jersey Surface Water Criteria within the Delaware River as a result of groundwater discharge. The Delaware River in the area of the site does not attract recreational use and Homeland Security measures prohibit the presence of recreational boaters along the refinery shoreline. The refinery shoreline is patrolled by Sunoco Security, the United States Coast Guard and the New Jersey State Police; therefore, surface water does not pose a significant human health risk because there is no complete pathway.

Surface water samples collected from the wetlands located east of the Sales Terminal AOC-14 were collected in December 2004 and analyzed for volatiles, PAHs, and PP metals. A single offsite surface water sample location detected (14SW21) extremely low concentrations of benzene and lead at concentrations above their respective SWQC. Onsite, low concentrations of volatile organics (benzene and vinyl chloride) and inorganic compounds (antimony, arsenic, cadmium, chromium, lead, nickel and selenium) are above the SWQS.

Attachment D contains a summary of the 2004 surface water sampling results (Table D-1) and the locations of the surface water samples (Figure D-1). All surface water data are compared to the NJDEP surface water quality criteria

Sediment:

In December 2004, sediment sampling was completed in the vicinity of the wetland east of the Sales Terminal (AOC 14) to assess the potential impacts from site operations. Eleven sediment samples were collected and analyzed for volatiles, PAHs, and PP Metals. Results of laboratory analysis were compared to the more conservative screening value of the EPA Region 3 Residential Risk Based Concentrations and NJDEP Non-residential Direct Soil Cleanup Criteria. Based on the sediment evaluation of the offsite sample locations low levels of PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) and metals (arsenic, and lead) exceeded their respective referenced screening criteria. In addition to the above listed offsite constituents, zinc exceeds its respective referenced screening criteria in one onsite location (14SED06). Attachment D contains a summary of the 2004 sediment sampling results (Table D-2). The locations of the sediment samples are shown on Figure D -1.

Air (outdoors):

Based on the fact that there are no indoor air vapor issues, there is no reasonable expectation of outdoor air concentration to be above risk based levels. In addition, the entire Eagle Point facility is monitored under Sunoco's EH&S protocols, Industrial Safety Procedures (OSHA, TWA PEL), and engineering controls.

References:

1. Remedial Investigation Report, Prepared by MWH Americas. Dated November 7, 2002.
2. UPRM Remedial Investigation Report Addendum, Prepared by MWH Americas, Inc. September 12, 2003.
3. Draft Vapor Intrusion Guidance, Prepared by the New Jersey Department of Environmental Protection. Dated June 2005.
4. Sales Terminal AOC 14 Remedial Investigation Report, Prepared by MWH Americas, Inc. September 30, 2003.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

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	N/A	No	No	No	N/A
~~Air (indoors)~~							
Soil (surface, e.g., <2 ft)	No	No	N/A	No	No	No	N/A
Surface Water	No	No	N/A	No	Yes	No	N/A
Sediment	No	No	N/A	No	Yes	No	N/A
Soil (subsurface e.g., >2 ft)	No	No	N/A	No	No	No	N/A
~~Air (outdoors)~~							

Instructions for Summary Exposure Pathway Evaluation Table:

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

2. *Enter "yes" or "no" for potential "completeness" under each "Contaminated" Media – Human Receptor combination (Pathway).*

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

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

__✓__ 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

Rationale and Reference(s):

Groundwater:

Although contaminants of concern including benzene, ethylbenzene, MTBE, TBA, toluene, TCE, vinyl chloride, and total xylene, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, bis(2-ethylhexyl)phthalate, phenanthrene, arsenic, cadmium, chromium, lead, mercury, nickel, and zinc have been detected in the WTZ groundwater at the site, migration offsite is controlled by interim remedial measures implemented in areas where the potential for offsite migration exists (Figure A-3). Although concentrations of TBA are noted in the monitoring wells along the eastern property boundary a complete pathway is not considered likely because this portion of the refinery is undeveloped and unused, characterized as a wetland with saturated soils, and dense vegetation with access restricted by a chain link fence and locked gate. Compounds with concentrations above the GWQC along the western fence line, within Sunoco's property line, are restricted to inorganics, therefore no volatile pathway exists. Furthermore, the groundwater flow direction along the western portion of the facility flows northerly, towards the Delaware River rather than the residential properties located to the west. Additionally, this portion of the property is undeveloped and largely unused, therefore, a complete exposure pathway is considered unlikely.

Compounds with concentrations above the GWQC in the UPRM wells onsite include benzene, MTBE, TBA, total xylene, and chromium. Dissolved phase compounds that may have potentially migrated offsite in the UPRM include

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

MTBE, TBA, and chromium. Currently Sunoco is installing 23 additional UPRM wells to monitor the contaminant plume.
While the interim remedial measures seem to be effective, EPA & NJDEP have not made the determination that groundwater contamination is under control. Nevertheless, based on a well search that was conducted in 1999 no potable water table zone groundwater use was identified within 1000 feet of the facility's boundaries (Ref. 1). In addition, according to the Public Works Department of the Borough of Westville, all residents of Westville, Westville Grove, and portion of West Deptford Township are serviced by public water supply (Ref. 2). Therefore, exposure to contaminants in groundwater through potable use is not potentially complete exposure pathway.

During intrusive activities at the site, contractors use proper health and safety protocol to prevent exposure to site groundwater. These procedures include the use of PPE in accordance with Sunoco's EH&S protocols, Industrial Safety Procedures (OSHA, TWA PEL), and engineering controls. Based on the well documented groundwater concentrations as well as the implementation of site protocol and engineering controls, there is not a complete pathway from site groundwater in either the WTZ or UPRM to human receptors.

Surface and Subsurface Soil:

As discussed above, COCs in site soils detected above the NJ Impact to Groundwater Soil Cleanup Criteria (IGWSCC) include benzene, ethylbenzene, methylene chloride, trichloroethylene, cis-1,2-dichloroethylene, vinyl chloride, xylene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, naphthalene, dibenzo(a,h)anthracene, arsenic, beryllium, copper, and zinc and are limited to the limits of the refinery property boundary. Offsite soil contamination is considered unlikely and an incomplete pathway because no processes have occurred offsite. Additionally, because the depth to the WTZ groundwater table averages six feet below grade, no surficial soils are expected to have been impacted.

To limit exposure to onsite soils, Sunoco has implemented a strict security program for restricting site access and strictly enforces EH&S protocols, Industrial Safety Procedures (OSHA, TWA PEL), and engineering controls (fencing). Due to the site security and operational procedures as well as through implementation of engineering controls there is not a complete pathway for soils to human receptors.

Surface Water and Sediment:

The active portion of the refinery is completely fenced and monitored by security personnel. In addition, security personnel monitor and prohibit access to the bank of the Delaware River, and the river itself, immediately adjacent to the Sunoco Eagle Point property boundary. All activities within the active portion of the refinery that involve surface water or sediment are addressed by Sunoco's EH&S protocols, Industrial Safety Procedures (OSHA, TWA PEL), and engineering controls. With the exception of an inactive portion of the refinery, which is located immediately east of AOC-14 (Sales Terminal), access to areas of impacted surface water or wetlands associated with the refinery is restricted. As such, no potential exposure pathway from site surface water and sediment to human health receptors is complete with the possible exception of the offsite area east of the Sales Terminal (Figure D-1).

The area east of the Sales Terminal is bound on the west and north by a fence and to the south and east by privately owned properties, zoned, respectively, commercial and industrial. Based on site and surrounding site use, it is unlikely that a trespasser would gain access to this inactive portion of the refinery. This portion of the refinery is characterized as a low lying wetland by its saturated, heavily textured soils and dense vegetation. The only potential viable scenario for exposure to surface water and sediment are through a trespasser scenario. In light of these factors, and the low level of contaminant concentrations which were detected and the limited number of samples that exceeded the criteria as summarized in Attachment D, pathways from surface water and sediment to human health receptors are unlikely to be complete in this area. Despite the unlikely occurrence of the trespasser scenario occurring, this pathway was further evaluated and discussed in response to Questions 4 and 5 below.

References:

1. Well Search results and maps, Prepared by Coastal. Dated September 16, 1999.
2. Letter from Roger Lanouette, Coastal, to Murdo Morrison, NJDEP, re: Off-site UPRM Well Status for the Coastal Eagle Point Oil Company Refinery. Dated April 4, 2003.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

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)?

   __ 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):

The only identified potentially complete pathways are from off-site surface water and sediment to potential trespassers. The off-site surface water and sediment samples were collected immediately east of the Sunoco Eagle Point Refinery boundary, as shown in Figure D-1 in Attachment D. The area east of the refinery is a low lying wetland characterized by its saturated, heavily textured soils and dense vegetation. The area in question is located on private property and is not immediately accessible through adjoining properties. Additionally, the nearest residential neighborhood is located on the opposite side of NJ Route 130. The only potential viable scenario for exposure to surface water and sediment are through a trespasser scenario. Based on these factors, the extremely low level of contaminant concentrations which were detected and the limited number of samples that exceeded the criteria as summarized in Attachment D, these pathways are not anticipated to be significant.

Although exposure through the trespasser scenario is not anticipated to be significant, a quantitative evaluation was completed for the compounds which exceeded the relevant risk based criteria. This quantitative assessment is discussed below in response to question 5.

[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.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

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):

As indicated in part 4 of the EI, the only identified potentially complete exposure pathways present at the site are pathways associated with off-site surface water and sediment. Based on recommendations from U.S. EPA contractor, Booz Allen (Ref 1), the only anticipated exposure from these media would be to potential trespassers at the site.

Based on the low level of contaminant concentrations, and the qualitative assessment described in Question 4, potential trespasser exposure is anticipated to be insignificant; however, to further evaluate this scenario, a quantitative analysis was conducted to support a weight of evidence approach to demonstrate insignificant risk from off-site surface water and sediment.

To assess potential trespasser exposure to surface water and sediment in the offsite wetland area, located east of the active refinery, summary screening tables were organized on Tables E-1 and E-2, respectively. Refer To Attachment E for Tables E-1, E-2, E-3, E-4 and E-5.

Tables E-1 and E-2, sediment and surface water respectively, identify the constituents evaluated during the December 2004 sampling activities, the maximum offsite exposure concentration (e.g., the maximum detected concentration or the maximum detection limit for constituents not reported), the constituent specific reference screening value and the constituent-specific site specific screening level (SSSL). If the maximum offsite exposure concentration was detected by the analytical laboratory, the concentration is underlined; otherwise, the value represents the maximum laboratory detection limit.

Prior to calculating the SSSL, the maximum offsite exposure concentration was screened against the referenced screening values established by the NJDEP and/or EPA Region 3. For sediment, the maximum exposure concentration was screened against the most conservative of the NJDEP Non-Residential Soil Cleanup Criteria (Ref 2) and EPA Region 3's Residential Risk Based Criteria (Ref 3). The maximum surface water exposure concentration was screened against the NJDEP's Surface Water Quality Standards (Ref 4). The values that exceeded the referenced standard are shown in bold in Tables E-1 and E-2.

If the bolded value (the maximum offsite exposure concentration) was a laboratory detected concentration a SSSL was developed using the standardized equations in Table E-3. However, if the bolded value (the maximum offsite exposure concentration) was not detected in any of the sediment or surface water samples (respectively), these constituents were not being evaluated because they are not currently reported in the medium and are thus not currently a concern for purposes of the CA725 EI Determination. Constituents in excess of the referenced screening standard that were carried forward for additional evaluation, include PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) and metals (arsenic, and lead) in sediment and benzene and lead in surface water.

To assess trespasser exposure in sediment and surface water, SSSLs were developed based on exposure parameters recommended by the U.S. EPA contractor, Booz Allen (Ref 1). As summarized in Table E-4, Booz Allen recommended,

- an exposure frequency of 32 days a year (based upon four available summer months for routine outdoor activities, two days per week);
- an exposure duration of 6 years (based on a youth trespasser age 12 to 18); and,
- an exposure time of 2 hours a day (based upon Booz Allen's best professional judgment).

Table E-3 presents the standardized risk based equations used to calculate the SSSLs and Tables E-4 and E-5 summarize the generic input parameters and chemical specific input parameters, respectively.

When developing the SSSLs, direct inhalation, dermal contact, and ingestion pathways were incorporated into the standardized risk based equations (Table E-3), which is considered to be highly conservative based on the qualitative assessment presented in Question 4. The standardized equations used for calculating the risk-based criterion for the above compounds were based on U.S. EPA's Risk Assessment Guidance for Superfund: Volume I, Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals) (RAGS, Part B) (Ref 6), EPA Region 9's Preliminary Remediation Goals (PRGs) Background Technical Document (Ref 7), and EPA Region 3's Risk Based Concentration (RBCs) Technical Background Document (Ref 8). In addition, default input parameters were based on values from the EPA Exposure Factors Handbook (Ref 9 and 10), U.S. EPA's RAGS, Part A (Ref 11), U.S. EPA's 1996 Soil Screening Guidance (Ref 12 and 13), and U.S. EPA's 2004 Dermal Assessment (Ref 14). As summarized in Tables E-1 and E-2, with the exception of lead, none of the offsite sediment or surface water maximum exposure concentrations exceed the SSSL.

Because lead risk values are calculated differently than the other compounds, additional steps were conducted in order to assess the acceptable risk level for lead. Assuming a youth trespasser (age 12-18) would be exposed to lead in the surface water and sediment two days each week during the summer months (32 days/year) for two hours a day, the applicability of both the Integrated Exposure Uptake Biokinetic (IEUBK) model and Society of Environmental Geochemistry and Health (SEGH) model were evaluated. Because the IEUBK model is driven by a residential scenario for a child age 6-months to 7 years and is recommended for a minimum exposure of three months, Booz Allen agreed that the IEUBK model may not be the best approach for developing a site specific, lead based, risk value.

Because the IEUBK model is applicable only to young residential children for a minimum exposure time of three months, the trespasser risk based screening criteria for sediment was calculated according to the method developed by the SEGH and used by the New Jersey Department of Environmental Protection (NJDEP) and Pennsylvania Department of Environmental Protection (PADEP) to develop their respective non-residential soil screening values. However, based on conversations with Booz Allen concerning the site specific exposure scenario and the lack of generic screening criteria provided by either Region III or Region 9, no SSSL models were found to accurately assess exposure to lead from surface water. As discussed in question 4, based on the topography, limited access, and relatively low concentration no significant exposure to lead in surface water under the trespasser scenario is expected.

The model developed by SEGH was used to calculate a site specific risk based criterion for sediment dependent upon the target blood lead concentration and the slope of the empirical relationship between blood lead concentration and soil lead concentration (δ). Based on the SEGH model and Pennsylvania default parameters (Ref 15 and 16), PADEP's non-residential MSC for lead in soil is 1,000 mg/kg. Based on the method developed by SEGH, PADEP assumes the target blood level (T) is 20 ug/dL blood and the slope of blood lead to soil lead (δ) is 7.5 ug/dL.

To calculate an acceptable risk level for lead at the Sunoco Eagle Point Refinery, PADEP's default blood lead to soil lead slope value (δ) was adjusted based on site specific information and recommendations by the U.K. Environment Agency (Ref 17) and SEGH. SEGH considered that the reasonable range of δ values was 2 – 5 ug/dL per 1000 ug/g and should be selected based on site specific information. As stated by the U.K. Environment Agency, low values of δ relate primarily to groups of older children, well maintained (dense) vegetative cover, low bioavailability, heavier textured soils, and good personal grooming habits. Higher values of δ tend to be found in groups of children between the ages of 18 and 24 months, sparse vegetation, soluble lead salts, light textured or soils with low organic matter, and poor personal grooming habits.

Because the target area at the Sunoco Eagle Point Refinery is characterized as a wetland with dense vegetation and heavy, saturated soils, the PADEP default blood lead to soil lead slope value (δ) was adjusted from 7.5 ug/dL to 5.0 ug/dL. Based on the discussion above this value is considered highly conservative. As presented in Table E-1, the SSSL for lead in sediment based on the above outlined parameters is 1,500 mg/kg. As presented in Table E-1, the maximum offsite exposure concentration is 1030 mg/kg, well below the SSSL for sediment.

References:

1. Email correspondence from Kristin McKenney, Booz Allen Hamilton, to Colleen Costello, Langan Engineering and Environmental Services, Inc., re: Coastal Eagle/Sunoco CA725 EI Determination. Dated March 31, 2005.
2. New Jersey Department of Environmental Protection and Energy's February 3, 1992 Cleanup Standards for Contaminated Sites, NJAC 7:26D, Soil Cleanup Criteria (http://www.nj.gov/dep/srp/regs/scc/). Revised May 12, 1999.
3. EPA Region III RBC Table, (http://www.epa.gov/reg3hwmd/risk/human/rbc/rbc0405.pdf), Dated April 7, 2005.
4. Surface Water Quality Standards (N.J.A.C. 7:9B), New Jersey Department of Environmental Protection. Dated August 2004.

5. U.S. EPA 1989. Risk Assessment Guidance for Superfund. Human Health Evaluation Manual: Part A. Interim Final. Office of Solid Waste and Emergency Response, Washington, DC (EPA/540/1-89/002).
6. U.S. EPA. 1991a. Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). Publication 9285.7-01B. Office of Emergency and Remedial Response, Washington, DC. NTIS PB92-963333.
7. EPA Region 9. User's Guide and Background Technical Document for USEPA's Region 9's Preliminary Remediation Goals (PRGs) Table, Dated 2004.
8. EPA Region 3 Risk-Based Concentration Table: Technical Background Information originally developed by Roy L. Smith, Ph.D., Toxicologist; revised 4/16/2003 by Jennifer Hubbard, Toxicologist.
(http://www.epa.gov/reg3hwmd/risk/human/info/tech.htm)
9. U.S. EPA. 1991b. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Publication 9285.6-03. Office of Emergency and Remedial Response, Washington, DC. NTIS PB91-921314.
10. U.S. EPA. 1997a. Exposure Factors Handbook. Office of Research and Development, Washington,D.C. EPA/600/P-95/002Fa.
11. U.S. EPA 1989. Risk Assessment Guidance for Superfund. Human Health Evaluation Manual: Part A. Interim Final. Office of Solid Waste and Emergency Response, Washington, DC (EPA/540/1-89/002).
12. U.S. EPA. 1996a. Soil Screening Guidance: Technical Background Document. EPA/540/R-95/128. Office of Emergency and Remedial Response, Washington, DC. PB96-963502.
13. U.S. EPA. 1996b. Soil Screening Guidance: User's Guide. EPA/540/R-96/018. Office of Emergency and Remedial Response, Washington, DC. PB96-963505.
14. U.S. EPA. 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final. EPA/540/R/99/005. Office of Solid Waste and Emergency Response, Washington, DC. PB99-963312.
15. P.A. State Code, Title 25, Chapter 250.306 (http://www.pacode.com/secure/data/025/chapter250/chap250toc.html)
16. P.A. State Code, Title 25, Chapter 250, Appendix A, Table 7
(http://www.dep.state.pa.us/dep/subject/eqb/1997/Table_7.htm).
17. UKEA 2002. Soil Guideline Values for Lead Contamination, Department for Environment, Food, and Rural Affairs. The Environment Agency, March 2002.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

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 Sunoco Eagle Point Refinery, EPA ID **#NJD-990-753-162**, located at **Junction Rt. 130 And I-295, Westville, NJ 08093** under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

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

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

Completed by: James R. Oppenheim,
Sr. Environmental Consultant
Sunoco, Inc. (R&M)
Date: August 15, 2005

Reviewed by: _____ Date _____
Sameh Abdellatif, Remedial Project Manager
RCRA Programs Branch
USEPA Region 2

_____ Date _____
Barry Tornick, Section Chief
RCRA Programs Branch
USEPA Region 2

Approved by: original signed by: _____ Date: August 19, 2005
Adolph Everett, Chief
RCRA Programs Branch
USEPA Region 2

Locations where References may be found:

References reviewed to prepare this EI determination are identified after each response. Reference materials are available at USEPA Region 2, RCRA Records Center, located at 290 Broadway, 15th Floor, New York, New York, and the New Jersey Department of Environmental Protection Office located at 401 East State Street, Records Center, 6th Floor, Trenton, New Jersey.

Contact telephone and e-mail numbers: Sameh Abdellatif, USEPA RPM
(212) 637-4103
abdellatif.sameh@epa.gov

Note: Attachments A, B, C, D and E available upon request.

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.