

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action

Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures Under Control

Facility Name: Sunoco, Inc. - Frankford Plant
Facility Address: Margaret and Bermuda Streets, Philadelphia, PA 19137
Facility EPA ID #: PAD002312791

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

Relationship of EI to Final Remedies

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

Duration / Applicability of EI Determinations

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

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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)?

	<u>Yes</u>	<u>No</u>	<u>?</u>	<u>Rationale / Key Contaminants</u>
Groundwater	X			Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs) Metals, Pesticides
Air (indoors) ²	X			VOCs
Surface Soil (e.g., <2 ft)	X			VOCs, SVOCs
Surface Water	X			VOCs, SVOCs, Metals
Sediment	X			VOCs, SVOCs, Metals
Subsurf. Soil (e.g., >2 ft)	X			VOCs, SVOCs
Air (outdoors)	X			VOCs

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

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

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

Rationale and Reference(s):

The Sunoco Chemicals Frankford Plant is located in northeast Philadelphia, Pennsylvania and has been in operation under several different owners since 1884 as a chemical manufacturer. The facility currently manufactures phenol, acetone, and alpha-methyl-styrene from the raw material cumene. The property is bound on the west by Margaret Street, on the north by Interstate 95, on the east by Bridge Street, and on the south by the Frankford Inlet, the Frankford Inlet sewer right-of-way, and Almond, Pratt, Belgrade, Ash, and Gaul Streets. A mix of manufacturing facilities and densely populated residential neighborhoods surround the facility.

During the past two decades, environmental investigations and subsequent remedial actions have been conducted. Remedial activities for the containment and recovery of LNAPL are being conducted in response to the requirements outlined in the RCRA Permit for Corrective Action, which was issued by the United States Environmental Protection Agency (USEPA) in September 1990.

GROUNDWATER:

As discussed in the Phase I and Phase II RCRA Facility Investigation (RFI) Reports, analytical samples collected from the site groundwater contain Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), metals and pesticides. The groundwater constituent concentrations are summarized in Tables 4-2, 4-3, 4-4, 4-5, 4-6, 4-7 and 4-8 of the Phase II RFI Report. Subsequent groundwater sampling was conducted in 1996, 2000, and 2001 (see Brown & Root Letter Report, September 1996; Report of Findings, Baseline Groundwater Gauging, Sampling and Product Delineation, RCC, July 1999; Tetra Tech NUS Letter Report, October 2000; Tetra tech NUS Letter Report January 2002).

SURFACE AND SUBSURFACE SOIL:

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The Phase I RFI Report included results of soil boring samples. VOCs and SVOCs were detected at elevated concentrations (see Table 4-1 of Phase II RFI Report). The Phase I RFI Report concluded that the soil beneath the plant should be considered as One unit because the vadose zone/fill contamination is relatively continuous throughout the facility. Phase II RFI activities included additional soil sampling that indicated elevated concentrations of VOCs and SVOCs. Samples collected outside the boundaries of the facility also contained concentrations of VOCs and SVOCs. Naphthalenic crystalline material with naphthalenic odor was observed in soil borings collected along Lefevre Street and the adjacent F.P. Woll property at depths ranging from 2 to 17 feet below ground surface (see Section 4.1.2 and Figure 4-6 of the Phase II RFI Report).

SURFACE WATER AND SEDIMENT:

Surface water and sediment analytical data have not been collected at the site. Based on the analytical results for groundwater and soil, there is the potential for these media to be impacted as well. The 2002 Groundwater Monitoring Report (Tetra Tech NUS, January 2002) indicated that impacted groundwater was migrating into the Frankford Inlet. Periodic visual inspections of the NPDES Outfall into Frankford Inlet are conducted. The interaction between the groundwater and the surface water drainage channel (Frankford Inlet) may require the presence or absence of impact to these media. For purposes of this Environmental Indicator Determination, surface water and sediment could reasonably be expected to be contaminated.

INDOOR AND OUTDOOR AIR:

The RCRA Facility Investigation did not specifically investigate indoor and outdoor air. However, because the results of the RFI indicated that impacted groundwater is infiltrating into sewer lines, there exists the potential for volatilized chemical emissions from the manholes. In addition, because the LNAPL and impacted groundwater plume is located beneath existing building structures, there exists the potential for volatilized chemical emissions through building foundations.

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

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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.

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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)

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

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors’ spaces for Media which are not “contaminated” as identified in #2 above.
2. enter “yes” or “no” for potential “completeness” under each “Contaminated” Media -- Human Receptor combination (Pathway).

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

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

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

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

Rationale and Reference(s):

Current complete exposure pathways potentially exist for residents, typical plant workers, and construction workers. There are no day-care facilities, food production or recreation activities in the immediate vicinity of the property. Trespassing is minimized since the facility is fenced, patrolled and maintains strict access control.

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GROUNDWATER:

Groundwater is not used as a domestic or industrial water supply so all pathways associated with groundwater, except facility workers who are required to enter sewer areas and construction workers in excavated area, are also considered incomplete. Construction workers engaged in excavation activities below the groundwater table are subject to the Health and Safety procedures of the facility, including PPE. (See AlliedSignal memoranda dated November 16 and December 29, 1993 for documentation of this policy.

INDOOR AND OUTDOOR AIR:

There is evidence that impacted groundwater is infiltrating the sewer system (See Section 4.3 of the Phase II RFI Report). Constituents in groundwater that have infiltrated into the City Sewer may be volatilized into outdoor air via manholes (See Section 6.1 of the Phase II RFI Report). The potential pathway is therefore considered complete for residents, workers, and construction workers. Backflow of sewer vapors into residences through pipes is prevented by drain traps and similar plumbing fixtures though not all residential piping is equipped with these plumbing fixtures. In addition, because the LNAPL and impacted groundwater plume is located beneath the facility buildings, the pathway for indoor air to workers and construction worker is considered complete.

SURFACE AND SUBSURFACE SOIL:

Nearly the entire area of the facility is covered by gravel and asphalt capping. Therefore, the pathways associated with surface soil and subsurface soil for non-intrusive activities (residents and typical plant workers) are considered incomplete. For LNAPL-impacted areas within the site boundaries and the area where the naphthalenic substance was observed in the subsurface soil outside the property boundary, a complete pathway exists for construction workers who may be required to excavate, repair, and replace utility lines and street sections. Construction workers engaged in excavation activities, either on-site or adjacent to the property where naphthalenic substance was observed, are subject to the Health and Safety procedures of the facility, including use of PPE. (See AlliedSignal memoranda dated November 16 and December 29, 1993 for documentation of policy).

SURFACE WATER AND SEDIMENT:

The only location for surface water and sediment is the Frankford Inlet. Access to the Frankford Inlet waterway is limited at the site. However, access points exist at downstream locations, including the Rohm and Haas chemical production facility, the Arsenal Business Center, and a boat launch to the Delaware River. The only surface water pathways considered complete for this facility are workers and construction workers who may, on occasion, be required to work on or inspect facility outfalls to the Frankford Inlet. The only sediment pathway considered complete for this facility is for construction workers who may, on occasion, be required to work on or inspect facility outfalls to the Frankford Inlet. Typical plant workers do not perform any work activities where there may be complete exposure pathways to sediment.

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

GROUNDWATER (WORKERS AND CONSTRUCTION WORKERS):

Constituents are present in groundwater at concentrations that potentially could pose a health concern if construction workers work in excavations and sewer areas where groundwater is encountered. The Frankford facility requires that all excavation and sewer entry activities follow plant health and safety policies. Personnel from the facility Health and Safety Department review and approve all excavation activities at the facility. Because site workers and construction workers are required to follow these plant procedures, exposures are not expected to be significant. In addition, initial results from the recent installation of a grout barrier have indicated infiltration of impacted groundwater to the sewer system has been reduced and results from the latest Semi-Annual Wastewater Discharge Report (June 2002) were in compliance with the facility permit.

INDOOR AND OUTDOOR AIR (RESIDENTS, WORKERS, CONSTRUCTION WORKERS):

For the indoor and outdoor air pathways, vapor emissions modeling was conducted to estimate exposure concentrations for potential chemicals of concern via inhalation (See Section 6.1 of the Phase II RFI Report). The conservative assumptions of the modeling include, use of maximum concentrations of the chemicals detected in the monitoring wells and complete volatilization and escape of vapors at manholes. Table 6-2 of the Phase II RFI Report summarizes the results of the air emission modeling. The model generated chemical vapor concentrations that were compared to OSHA Permissible Exposure Limits, the ACGIH Threshold Limit Values, and the NIOSH Recommended Exposure Limits. Results of the modeling indicate that air emissions from sewer manholes containing potential chemicals of concern were not above

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the criteria levels and any exposure would not reasonably be expected to be significant. In addition, initial results from the recent installation of a grout barrier have indicated that infiltration of impacted groundwater to the sewer system has been reduced.

SURFACE AND SUBSURFACE SOIL (CONSTRUCTION WORKERS):

Surface water modeling was conducted to estimate the magnitude of potential impact to the Frankford Inlet and the Delaware River (See Section 6.2 of the Phase II RFI Report). Table 6-9 of the Phase II RFI summarizes the results of the surface water modeling. The model generated surface water concentrations based on dilution and tidal influences that were compared to one or more of the following surface water criteria: Pennsylvania human health criteria, Pennsylvania aquatic life criteria (chronic/continuous), New Jersey surface water quality criteria for Delaware River Zone 3, USEPA AWQC for protection of fresh water aquatic life - chronic and acute values. Results of the surface water modeling indicate that all chemical results were below the criteria except phenolics, anthracene, fluorene and phenanthrene (see Table 6-9 of the phase II RFI Report).

Sediment is not known to be contaminated at the site or in the Frankford Inlet. However, there is the potential for release of contaminated groundwater to the inlet which could effect sediment quality. It is anticipated that the discharge of impacted groundwater would be small compared to the flow of the receiving water bodies and the transport of surficial sediment into and out of the inlet. In addition, sediments may be deposited from the Delaware River into the Frankford Inlet due to tidal influences. For these reasons, it is unlikely that surface water or sediment would pose a human health concern and any potential exposure would be of limited frequency and short duration for workers and construction workers.

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.

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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):

