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: Hamilton Sundstrand
Facility Address: One Hamilton Road, Windsor Locks, CT 06096-1010
Facility EPA ID #: CTD 001145341

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

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

_____ If no - re-evaluate existing data, or

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

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)?

	Yes	No	?	Rationale / Key Contaminants
Groundwater	X			VOCs (TCE, PCE) Hex. Cr above CT RSRs
Air (indoors)[2]	X			Groundwater data > CT RSRs (on-site)
Surface Soil (e.g., <2 ft)	X			PCBs > Connecticut RSRs
Surface Water	X			TCE > Connecticut RSRs
Sediment	X			PCBs > Connecticut RSRs - soils
Subsurf. Soil (e.g., >2 ft)	X			PCBs, chromium, cadmium, nickel, VOCs > CT RSRs
Air (outdoors)		X		Based on monitoring data

____ 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 principal documents supporting the conclusions above and throughout this determination of Current Human Exposures Under Control are located in EPA's files and include, but are not limited to, the following documents: RCRA Facility Investigation Proposal (RFIP) Current Assessment Summary (CAS) (1990), the RFI Phase I Report (1992), Consent Order RCRA-I-94-1046, various RFI Phase 2 / Supplemental investigation Reports (1996-2001), Quarterly Indoor Air Monitoring Reports (1994-2003), Quarterly Groundwater Hydraulic Control and Seep Collection System Reports (1996-2003), the Spring 1998 Site-Wide Groundwater Monitoring Report (1999), the Draft Final Human Health and Ecological Risk Assessment (2001) and the 2002 Site-Wide Groundwater Monitoring Report (2003).

To answer Question #2, site chemical quality data was compared to the State of Connecticut Remediation Standard Regulations (RSRs) Criteria to conservatively screen releases from SWMUs and ACs. The analysis is discussed below.

Groundwater contamination by VOCs and chromium above State of Connecticut Remediation Standard Regulations (RSRs) Criteria has been detected, including the most recent groundwater sampling events (2003). Contamination detected in groundwater exceeds the RSR Groundwater Protection Criteria, volatilization criteria and surface water protection criteria. Exceedances of the volatilization and surface water protection criteria are further discussed in the indoor air and

surface water media, respectively.

Off-site **indoor air** monitoring results were most recently reported in the First Quarter and Third Quarter 2003 Indoor Air Monitoring Reports. Although the groundwater in this area exceeds the State of Connecticut RSR Residential Volatilization Criteria, volatilization does not adversely impact indoor air due to the presence of structures/foundations/mitigation measures. Effectiveness of these barriers to volatilization have been documented through long-term indoor air monitoring. This monitoring has demonstrated that the indoor air concentrations in all sampled homes is in compliance with the requirements of the Consent Order and the Connecticut RSRs.

On-site groundwater VOC concentrations exceed the State of Connecticut RSR Industrial / Commercial Volatilization Criteria, without consideration of the State's the depth to groundwater limitation. Therefore it is inferred that **indoor air** may be contaminated.

Surface soils contaminated with PCBs have been detected at select SWMUs/ACs at the facility in excess of the Connecticut RSR Industrial / Commercial Direct Exposure Criteria.

TCE in excess of Connecticut RSR Groundwater Criteria was detected in **surface water** samples during the Phase I investigation (1990/91) in Watts Pond and Rainbow Brook and in Phase 2 and supplemental sampling of Watts Pond in 1996/7. TCE at low levels above federal MCLS was detected in a surface water seep location in the 2002 site-wide groundwater monitoring sampling event.

Sediments contaminated with PCBs were collected in the Phase I investigation in Watts Pond and Rainbow Brook and in Phase 2 sampling of Watts Pond. These concentrations were compared to the Connecticut RSR Residential and Industrial / Commercial Direct Exposure Criteria for Soils to assess the potential human exposure.

Subsurface soils contaminated with VOCs, PCBs and inorganics (chromium, cadmium, nickel) in excess of the Connecticut RSR Industrial / Commercial Direct Exposure Criteria have been detected at select SWMUs/ACs at the facility.

Air (outdoors) was evaluated during the Phase I RFI by both modeling and sampling. Modeling and ambient air sampling assessed the potential for impact of VOCs. It was determined that the air pathway was an insignificant exposure pathway. Long-term particulate monitoring at the worst case locations (AC 4, SWMU 25) indicated that the site did not pose any additional risk beyond that observed at local state monitoring network locations. Based on these evaluations, outdoor air was not contaminated above protective risk levels.

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.

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

__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): Question #2 served the basis for the media discussed in Question #3. To answer Question #3, pathways were addressed differently than those highlighted in the First and Second Interim Deliverable for the Human Health and Ecological Risk Assessment (1997, 1998), Hamilton Sundstrand's response to EPA comments (1999) and the Draft Final Human Health and Ecological Risk Assessment (2002).

There were no complete pathways for day-care, recreation or food identified at this facility. These are not discussed further within this document. There are no known or suspected day care facilities or significant agricultural / food stock activities, adjacent to, or downgradient of the facility. While the facility does have a recreation area, it is a remote area removed from the documented areas of releases and not downgradient of these releases.

Groundwater

Groundwater contamination exceeding regulatory criteria (MCLs, RSRs) has been demonstrated since the early 1980's. Long-term monitoring has demonstrated plume stability and the overall attenuation of contaminant concentrations is attributed to on-site source removal efforts. In addition, groundwater at the facility and off-site downgradient areas has been reclassified to a GB aquifer where the groundwater contaminant plume has been documented, meaning the groundwater is not available for public consumption. Residents receive potable water from the local public water company, therefore residents are not considered a complete pathway because no groundwater is used as a potable water source in the area of the plume.

The only employees with potential exposure to groundwater are those working on the groundwater hydraulic control / seep collection system equipment. These individuals are OSHA health and safety trained to work with contaminated media and the pathway is eliminated through the use of proper personal protection equipment (PPE).

Construction workers scenario is a potential complete pathway because they could work on the groundwater system or in areas of contaminated groundwater. However, the Windsor Locks facility EH&S management system has established procedures that prohibit any facility modifications without internal reviews and consideration of exposure to environmental media. Thus, any construction workers with a potential for exposure to contaminated groundwater would be OSHA health and safety trained and the pathway is eliminated through the use of proper PPE.

Indoor Air

Off-site indoor air monitoring results were most recently reported in the First Quarter and Third Quarter 2003 Indoor Air Monitoring Reports. Although the groundwater in this area exceeds the State of Connecticut RSR Residential Volatilization Criteria, volatilization does not adversely impact indoor air due to the presence of structures/foundations/mitigation measures. Effectiveness of these barriers to volatilization has been documented through long-term indoor air monitoring. This monitoring has demonstrated that the indoor air concentrations are in compliance with the requirements of the Consent Order and the RSRs and therefore there is no pathway.

On-site groundwater VOC concentrations exceed the State of Connecticut RSR Industrial / Commercial Volatilization Criteria without considering the depth to groundwater limitation. Therefore it is inferred that indoor air may be contaminated and potentially a complete pathway exists for workers and construction people. On-site indoor air sampling results have detected low concentrations (ppb) of VOCs in indoor air in the workplace.

Surface Soil

Off-site surface soils do not represent a complete pathway off-site because there are no releases to surface soil in the off-site area. On-site, there are no exposures because mitigation efforts (emplacement of a cap and three inches of crushed stone) to prevent direct contact with contaminated surface soils have taken place. In addition, caution signs have been posted at surface soils locations reminding employees and construction workers of the EH&S policy that prohibits disturbance at any facility area without internal EH&S review. All contractors (e.g. landscapers, construction) at the facility will receive the contractor EH&S program, which will be updated to

reference designated remediation areas and cautions (e.g. PPE) associated with these areas, as necessary. Otherwise, any employees / construction workers with a potential for exposure to contaminated surface soils would be OSHA health and safety trained and the pathway is eliminated through the use of proper PPE. A surface soil pathway to trespassers is possible in areas within the security fence, which is posted with "caution no trespassing" signs.

Surface water

Surface water remains a complete pathway to residents in off-site areas for Rainbow Brook and the uncollected seeps. A surface water pathway to trespassers is possible in areas within the security fence, which is posted with "caution no trespassing" signs. Any workers / construction workers with a potential for exposure to contaminated surface water would be OSHA health and safety trained and the pathway is eliminated through the use of PPE.

Sediments

Sediments remain a complete pathway to residents in off-site areas at Rainbow Brook. A complete pathway to sediments exists for trespassers in areas outside of the high security fence. Any workers / construction workers with a potential for exposure to contaminated sediments would be OSHA health and safety trained and the pathway is eliminated through the use of proper PPE.

Soils, Subsurface

Off-site subsurface soils do not represent a complete pathway because there are no releases to these soils in the off-site area. On-site, there are no exposures because Windsor Locks' site-specific EH&S policy prohibits disturbance at any facility area without internal EH&S reviews. Any employees / construction workers with a potential for exposure to contaminated subsurface soils would be OSHA health and safety trained and the pathway is eliminated through the use of PPE.

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

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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."

_X_ 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 "No" determination, exposures can not be reasonably expected to be significant, by the following analysis:

Groundwater: As stated in the previous question, there are no complete pathways.

Indoor Air: Off-site indoor air is not a complete pathway as discussed in the prior question

A potential indoor air pathway was identified in the workplace for workers and construction workers. Based solely on the RSR Groundwater Volatilization Criteria, exposures could be considered significant.

Surface soils: Potential on-site surface soil exposures to trespassers are possible in areas within the site security fence, which is posted with "caution no trespassing" signs. Although the pathway is complete, using the RSR criteria to assess the exposures to contaminated surface soils is considered protective. Contaminated areas are within the site's security fence, are monitored by site security and are posted with signs. The limited duration of potential exposure and lessened frequency of exposure (compared to the assumptions in the development of the RSR standard) make exposures identified in question #3 to be reasonably considered to be insignificant.

Surface water: Surface water could remain a complete pathway to residents in off-site areas for Rainbow Brook and the uncollected seeps. Rainbow Brook exposures (TCE up to 14 ppb) are based on 1990/1991 data, and based on the recent groundwater sampling results, it is reasonably expected that concentrations in Rainbow Brook are significantly lower as a result of the remediation of VOCs at the site and the hydraulic control system operation. Surface water exposure for trespassers is possible in areas within the site security fence, which is posted with "caution no trespassing" signs. Uncollected seeps sampling results had one detection in 2002 of TCE at 8.5 ppb. Although these potential pathways are complete, exposure to contaminated surface water is considered to be predominantly dermal, and therefore the RSR Groundwater Criteria for TCE at 5 ppb, which is based on water ingestion, is a conservative benchmark. The pathways identified in question #3 are reasonably considered to be insignificant, based on the limited duration, the lessened frequency and the type of exposure.

Sediments: Sediments could remain a complete pathway to residents in off-site areas for Rainbow Brook (PCBs at an average concentration of 0.89 ppm, with a 2.2 ppm maximum). In addition, sediment exposure to trespassers is possible in areas within site's security fence, which is posted with "caution no trespassing" signs. Although these pathways could be complete, the exposures to contaminated sediment could reasonably be considered of a lesser magnitude as exposure to soils (less frequent and less duration of contact). Therefore use of the RSR criteria for direct exposure to soils, a human health standard established at one ppm for PCBs, as a benchmark is considered protective. Based on the limited duration and reduced frequency of exposure, exposures identified in question #3 are reasonably considered to be insignificant.

Soils, Subsurface: As stated in question #3, subsurface soils do not represent a complete pathway because there are no potential unacceptable exposures.

[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?

__X__ 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):

Indoor Air: A potential pathway could exist in the workplace for workers and construction workers based on a comparison of on-site groundwater concentrations to State of Connecticut RSR Industrial / Commercial Groundwater Volatilization Criteria. Again, based on this RSR screening criteria, the potential exposure could be significant. However, on-site indoor air sampling was performed in the manufacturing areas at / near identified or potential source areas; low part per billion levels of VOCs were detected in indoor air. These detected concentrations are orders of magnitude lower than OSHA workplace standards. Therefore, these indoor air exposures are within acceptable limits and are reasonably considered to be insignificant.

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

_X_ YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Hamilton Sundstrand, Windsor Locks, Connecticut facility, EPA ID # CTD 00114534, located at One Hamilton Road in Windsor Locks, Connecticut 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 (signature) Aaron Gilbert Date 9/30/03
(print) Aaron Gilbert, P.E.
(title) RCRA Facility Manager

Supervisor (signature) Matt Hoagland Date 9/30/03
(print) Matt Hoagland
(title) Chief, RCRA Corrective Action Section
(EPA Region or State) EPA New England, Region 1

Locations where References may be found:

USEPA Region 1, One Congress Street, Boston, MA
Connecticut Department of Environmental Protection, 79 Elm Street, Hartford, CT
Hamilton Sundstrand, One Hamilton Road, Windsor Locks, CT

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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.