

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: Honeywell International Inc.
Facility Address: Route 10 & Industrial Street, Hopewell, VA 23860
Facility EPA ID #: VAD065385296

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, GPRAs). 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			TCE, PCE, Vinyl chloride, BTEX, Phenols, Caprolactam, Metals, Cyclohexanol, Cyclohexanone, Kepone
Air (indoors) ²	X			Benzene, Chloroform, cis-1,2-Dichloroethene, PCE, TCE, Vinyl Chloride
Surface Soil (e.g., <2 ft)	X			BTEX, methylene chloride, Caprolactam, Phenols, Metals
Surface Water	X			BTEX, Metals
Sediment	X			Metals
Subsurf. Soil (e.g., >2 ft)	X			BTEX, methylene chloride, Caprolactam, Phenols, Metals
Air (outdoors)		X		

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

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

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

Rationale and Reference(s):

Honeywell owns and operates an industrial chemical and fertilizer manufacturing facility in Hopewell, VA, located 1 mile southeast of the confluence of the James and Appomattox Rivers. The primary product is caprolactam, which is the raw material for Nylon 6. Caprolactam is produced from phenol and results in the co-products of adipic acid and ammonium sulfate. The surrounding area is industrial with some residential areas to the north and west. In August 1989, the EPA issued a RCRA Administrative Order directing Honeywell (then AlliedSignal) to proceed with investigation and site cleanup. The order included Interim Remedial Measures (IRM), a RCRA Facility Investigation (RFI) and a Corrective Measures Study (CMS), if warranted. Of the 37 SWMUs identified in the Facility Assessment, 14 required further evaluation during the RFI. A Phase I RFI and Phase II RFI were conducted. The 14 SWMUs are grouped into 4 study areas. Constituents of concern for specific environmental media are listed in the above table.

References Include:

“Phase II RCRA Facility Investigation Report,” AlliedSignal, Inc., Hopewell Plant, Hopewell, Virginia, Dated November 1997

¹ “Contamination” and “contaminated” describes media containing contaminants (in any form, NAPL

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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	Yes	No	No	No
Air (indoors)	No	Yes	No	No	No	No	No
Soil (surface, e.g., <2 ft)	No	Yes	No	Yes	Yes	No	No
Surface Water	No	Yes	No	Yes	Yes	Yes	No
Sediment	No	Yes	No	Yes	Yes	Yes	No
Soil (subsurface e.g., >2 ft)	No	No	No	Yes	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):

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Groundwater: There are no groundwater receptors on or downgradient of the facility property. Groundwater discharges to the James River or the tributaries of Gravelly Run or Poythress Run. (Construction workers could potentially contact contaminated groundwater if deep excavations were required.)

Air (Indoor): A complete exposure pathway potentially exists for office workers in the Admin Building. Detected contaminants in underlying groundwater could impact building (indoor) air quality from vapor intrusion.

Surface Soils: Complete exposure pathways exist for plant workers/construction workers with contaminated soils via normal plant maintenance or planned construction projects. This pathway potentially exist for a trespasser if security measures (currently in place at the facility) were bypassed.

Surface Water and Sediments: Complete exposure pathways exist for plant workers/construction workers with surface water and sediments. Examples of plant activities where work is done in close proximity to surface water and sediment include James River dredging, underground utility repair or service, outfall inspections, etc. This pathway potentially exist for a trespasser/recreational receptor if security measures (currently in place at the facility) were bypassed.

Subsurface Soils: Complete exposure pathways exist for plant workers/construction workers with contaminated soils if excavations are required.

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)?

 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):

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Plant Workers and Construction Workers:

There are complete exposure pathways for plant workers and construction workers to surface and deep soils, surface water and sediment. These exposure pathways cannot be reasonably expected to be significant due to the infrequency of exposure and the short duration of potential exposure events. Examples of plant activities where work is done in close proximity to surface water and sediment include James River dredging, underground utility repair or service, outfall inspections, and other miscellaneous, infrequent activities. During all activities in or near soils, surface water and sediment, workers are required to wear PPE, such as gloves, boots and safety glasses, as outlined in the plant Health and Safety Plan. Therefore, complete exposure pathways for plant workers are not reasonably expected to be significant.

Office Workers:

It is possible for a complete pathway for human exposure via vapor intrusion from underlying groundwater into the Admin Bldg. (Building 1). To evaluate this pathway results from groundwater samples collected in June 2004 were used in a site specific computer model. The results of this site specific computer modeling exercise indicate that the risk levels for office workers within the Admin Building are within EPA's acceptable cancer and non-cancer risk range.

Trespassers:

There are complete exposure pathways for trespassers to surface soil, surface water and sediment. These exposure pathways cannot be reasonably expected to be significant due to the extensive, 24-hour, 365 day per year, site security procedures. Plant security procedures are based on the OSHA Process Safety Management (PSM) program, the EPA's Risk Management Program (RMP), and American Chemistry Council (ACC) Codes of Practice. The facility maintains strict control over access, including the use of fences, signage, cameras, and regular perimeter patrols. Due to the plant's high level of security, unauthorized entry is uncommon and infrequent. Therefore, complete exposure pathways for trespassers are not reasonably expected to be significant.

Recreation and Food:

There are complete exposure pathways for recreational activities, including boating on the James and Appomattox Rivers. These exposure pathways apply to surface water and sediment for boating on the rivers and the potential, however unlikely due to the restricted access, for boating in Gravelly Run. As discussed above, the plant's stringent security measures minimize the potential for unauthorized entry to Gravelly Run as it abuts the plant property. The bathymetry of Gravelly Run (i.e., mud flats, high velocity flow, etc.) and the surrounding steep terrain severely limit the potential for unauthorized access to Gravelly Run for recreation and food users. In addition, "No Trespassing" signs restricting access to Gravelly Run are posted along the waterway. These conditions and security measures deter boating and fishing activities along Gravelly Run. Access to Gravelly Run downstream of the Honeywell plant is also unlikely due to limited public access, topographical barriers (e.g., steep slopes, thick vegetation, fast-moving water) and due to adjacent property owners with similar security provisions. For these reasons, a scenario involving boating and fishing from Gravelly Run is unlikely.

Kepones has been a significant historical issue for the James River resulting in the 1975 – 1988 fishing restrictions from Richmond to the Chesapeake Bay. Studies in the mid-1980s and late 1980s concluded that kepones concentrations in surface water, sediment, and fish had declined over time. The studies showed that kepones concentrations were below federal health and environmental standards. In 1988, the Commonwealth of Virginia reopened the James River to fishing. Therefore, complete exposure pathways for recreation and food are not reasonably expected to be significant.

Based on the above rationale, no exposures are reasonably expected to be significant for any complete exposure pathway.

References Include: Memo report entitled "Vapor Intrusion from Groundwater to Indoor Air Analysis in Support of the Human Health Environmental Indicator: dated September 22, 2004.

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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):

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 **Honeywell Hopewell** facility, EPA ID # **VAD065385296**, located at **Route 10 & Industrial Street, Hopewell, Virginia 23860** 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) _____ /s/ _____ Date 9/28/04
(print) Russell H. Fish
(title) Remedial Project Manager

Supervisor (signature) _____ /s/ _____ Date 9/28/04
(print) Robert E. Greaves
(title) Chief, RCRA General Oper. Branch
(EPA Region or State) EPA Region III

Locations where References may be found:

U.S. EPA Region III RCRA File Room

Contact telephone and e-mail numbers

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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.