

**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:** Osram Sylvania Products, Incorporated  
**Facility Address:** 1 Jackson Street, Wellsboro, Pennsylvania 16901  
**Facility EPA ID #:** PAD 00 304 6794

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).

**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”**<sup>1</sup> 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	<b>X</b>			<b>Arsenic and Hexavalent Chromium.</b>
Air (indoors) <sup>2</sup>		X		
Surface Soil (e.g., <2 ft)		X		
Surface Water		X		
Sediment		X		
Subsurf. Soil (e.g., >2 ft)		X		
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):** Groundwater contains hexavalent chromium and arsenic in excess of EPA’s Maximum Contaminant Levels (MCLs). Concentrations of hexavalent chromium in the groundwater measured during the RFI ranged from non detect to 4.72 mg/l. Arsenic levels in the groundwater ranged from non detect to 0.168 mg/l, and were found exceeding MCLs at only one well, monitoring well (MW-13). The MCLs for hexavalent chromium and arsenic are 0.11 mg/l and 0.05 mg/l, respectively.

Footnotes:

<sup>1</sup> “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).

<sup>2</sup> 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.

**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**

<b><u>“Contaminated” Media</u></b>	Potential <b><u>Human Receptors</u></b> (Under Current Conditions)						
	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food <sup>3</sup>
Groundwater	NO	NO	NO	NO	NO	NO	NO
Air (indoors)	---	---	---				
Soil (surface, e.g., <2 ft)	---	---	---	---	---	---	---
Surface Water	---	---			---	---	---
Sediment	---	---			---	---	---
Soil (subsurface e.g., >2 ft)				---			---
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.

**X** 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):** Historical groundwater monitoring data demonstrates that the hexavalent chromium plume has not substantially moved in the past ten years, and that the plume remains within the Facility’s boundaries. The Charleston Creek is located approximately 550 feet away from the former dry well in the direction of groundwater flow. Given the average hydraulic conductivity (23 feet/day) and gradient (0.017), measured as part of the RFI, and the typically high mobility of hexavalent chromium in groundwater, the fact that chromium concentrations have remained stable over the past ten years is indicative of natural geochemical processes, which are deterring the mobility of the chromium plume at the Facility. Under normal subsurface conditions where the potential for oxidation-reduction is favorable, hexavalent chromium can be reduced to the less toxic trivalent chromium, which then precipitates out of the groundwater as an immobile, insoluble mineral.

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

Page 4

This process is enhanced by the presence of organic matter or clays in the subsurface and a neutral to slightly alkaline soil pH, such as is found at the Osram Facility. Once hexavalent chromium has been reduced to trivalent chromium and then precipitated as a mineral through this oxidation-reduction-precipitation process, it is no longer considered to be a threat to human health or the surrounding environment. EPA believes this process is occurring at Osram, given the low levels of hexavalent chromium in downgradient wells. Given the available information, hexavalent chromium in groundwater beneath the Facility is not expected to impact the water quality of Charleston Creek in the future.

An assessment of potential contaminant migration pathways, as well as current and future human exposure scenarios, was performed for the groundwater contamination at the Facility, as part of the RFI. It was determined through groundwater flow monitoring and groundwater data collected from onsite wells, that there are no pathways for human exposure to contamination in the groundwater at the Facility. Furthermore, no exposure to contamination originating from the groundwater beneath the Facility is expected to occur in the future. Human exposure to the groundwater contamination at the Facility is under control for the following reasons:

1. RFI results indicated that subsurface conditions are acting to remove dissolved hexavalent chromium from the groundwater beneath the Facility, essentially immobilizing the contaminant plume within the Facility's boundaries. Further study of this reductive process at the Facility shows that hexavalent chromium in the groundwater will drop to concentrations below the Method Detection Limit of 0.003 mg/l prior to reaching Charleston Creek;
2. Groundwater contamination at the Facility is limited to the overburden aquifer. This is evident given the absence of contamination in the deep wells within the shallow (overburden) aquifer onsite, and the lower permeability of the underlying bedrock formation, which would deter groundwater from moving into the deeper bedrock aquifer. Vertical gradients measured in the shallow (overburden) aquifer beneath the Facility, verify that Charleston Creek is acting as a hydraulic boundary for the shallow aquifer, and that water in this aquifer is being discharged to Charleston Creek;
3. Groundwater flow modeling was used to simulate the effects of pumping of the offsite residential wells on groundwater beneath the Osram facility. These studies revealed that none of the water within the overburden aquifer flows into the bedrock aquifer beneath the Creek. Therefore, none of the groundwater in the overburden aquifer reaches any of the residential wells;
4. Concentrations of hexavalent chromium and arsenic in Charleston Creek, sampled in 1994, were found to be well below the Water Quality Criteria established by the Pennsylvania Department of Environmental Protection (PADEP); and,
5. Groundwater is not being used at the Facility.

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

Page 5

**Future Exposure Assessment**

Potential future exposure scenarios were also considered and investigated as part of the RFI using fate and transport analysis for both hexavalent chromium and arsenic in the groundwater. Results of this analysis indicated that the concentration of hexavalent chromium in the groundwater is reduced through natural processes to below 0.003 mg/l (or undetectable) before reaching Charleston Creek. Future in stream arsenic concentrations were predicted using the PADEP calculation for diffuse flow of contaminated groundwater. The future average arsenic concentration in Charleston Creek was predicted to be 0.00245 mg/l, which is considerably lower than the allowable ambient Water Quality Criteria of 0.190 mg/l as established by the PADEP. These predicted concentrations are supported by the fact there is no ongoing source of either hexavalent chromium or arsenic to the groundwater and the length of time since the initial release (at least 20 years).

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

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

Page 6

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **“significant”**<sup>4</sup> (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): **NOT APPLICABLE.**

<sup>4</sup> 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)**

Page 7

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): **NOT APPLICABLE.**

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

Page 8

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 **Osram Sylvania Products, Incorporated** facility, EPA ID # **PAD 00 304 6794**, located at **1 Jackson Street, Wellsboro, Pennsylvania 16901** 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) \_\_\_\_\_ Date 03-09-01  
                          (print)     Hilary Livingston  
                          (title)     Remedial Project Manager

Supervisor        (signature) \_\_\_\_\_ Date 03-13-01  
                          (print)     Paul Gotthold  
                          (title)     PA Operations Branch Chief  
                          (EPA Region or State) EPA, Region 3

**Locations where References may be found:**

Facility RCRA Project File  
EPA, Region III  
1650 Arch Street  
Philadelphia, PA 19103-2029

**Contact telephone and e-mail numbers:**

(name)            Paul Gotthold  
(phone #)        215-814-3410  
(e-mail)         gotthold.paul@epa.gov

**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.**