

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: Putnam Municipal Landfill
 Facility Address: 344 River Road, Putnam, CT.
 Facility EPA ID #: CTD 991288622

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" 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)?

Table with 4 columns: Media, Yes, No, ?, Rationale/Key Contaminants. Rows include Groundwater, Air (indoor), Soil Vapor, Surface Soil, Surface Water, Sediment, Subsurf. Soil, and Air (outdoors).

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):

See CA725, Item 2 Addendum

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

Contaminated Media	Potential Human Receptors (Under Current Conditions)						
	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food ¹
Groundwater	No	No	No	No			No
Air (indoor)/Soil Vapor	No	No	No				
Soil (surface e.g., < 2 ft)							
Soil (surface)							
Sediment	No	No			No	No	No
Soil (subsurface e.g., > 2 ft)				No			No
Air (outdoor)							

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):
 See CA 725, Item 3 Addendum.

¹ 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" (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):

 See CA 725, Item 4 Addendum.

* 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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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 Putnam Municipal Landfill facility, EPA ID # CTD 991288622, located at 344 River Road, Putnam 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) Marina Crawford Date 8/1/01 Reviewed by: David Lim
(print) Marina Crawford
(title) Sanitary Engineer 3

Supervisor (signature) John England Date 8/1/01
(print) John England
(title) Supervising Environmental Analyst
(EPA Region or State) CT
Matthew R. Hagland
Section Chief
EPA Region I
9/5/01

Locations where References may be found:

- 1. State of CT DEP, 79 Elm Street, Hartford, CT
- 2. Griffin Engineering Group
100 Cummings Center, Suite 222G, Beverly, MA

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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.

PUTNAM MUNICIPAL LANDFILL, EPA ID #: CTD991288622
FORM CA725 – Current Human Exposures Under Control

ITEM 2 ADDENDUM

Groundwater: Yes. The most recent assessment (*Putnam Landfill Closure and Post-Closure Plan*, Putnam, Connecticut, prepared by Metcalf & Eddy, 1998), and quarterly groundwater monitoring reports (*Groundwater Monitoring Results, Putnam Municipal Landfill*, prepared by Geotoxi Associates, Inc.), document that groundwater at the site is “contaminated” at concentrations exceeding Federal and State Primary Drinking Water Standards.

The following table indicates the maximum concentration detected for each primary pollutant contaminant that has been detected in the groundwater at a concentration exceeding an applicable drinking water standard during the period of 1999 - 2000. Despite the landfill being classified as a hazardous waste disposal facility for accepting lead carbonate contaminated button dust, to date, lead has not been detected in the groundwater at concentrations exceeding the applicable drinking water standard.

<u>Contaminant</u>	<u>Conc. of Concern</u>	<u>Max. Conc. Detected</u>	<u>Factor above Standard</u>	<u>Location</u>	<u>Date</u>
Arsenic	50 ug/l ^(1,2)	560 ug/l ⁽³⁾	11.2	OW-16S	7/20/99
Selenium	50 ug/l ^(1,2)	91 ug/l	1.8	OW-2E	7/27/00
Thallium	5 ug/l ⁽²⁾	17 ug/l	3.4	OW-2E	10/26/00
Silver	36 ug/l ⁽²⁾	45 ug/l	1.2	OW-1	4/18/00
Benzene	1 ug/l ⁽²⁾	17 ug/l	17	OW-2E	1/19/00
Vinyl Chloride	2 ug/l ^(1,2)	19 ug/l	9.5	OW-2E	1/19/00
cis-1,2-DCE	70 ug/l ^(1,2)	75 ug/l	1.1	OW-2E	7/19/99
3-&4-Methylphenol	35 ug/l ⁽²⁾	60 ug/l	1.7	OW-2E	1/19/00

- (1) 40 CFR Part 141, Federal Clean Water Act Maximum Concentration Limit (MCL)
 (2) Connecticut Department of Environmental Protection, Significant Environmental Hazard Condition Notification Threshold Concentrations, Drinking Water Well/Groundwater Protection Criteria
 (3) ug/l = micrograms per liter

Soil Vapor: Yes. Landfill gas monitoring, conducted quarterly by Geological Field Services, Inc., detects the presence of methane (up to 59%), in gas monitoring wells located along the southeastern boundary of the landfill property. The concentrations detected exceed the State’s Solid Waste regulatory limit [Sec. 22a-209-7(n)(2)(B)] of the Lower Explosive Limit for methane (5%).

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Surface Water: No. The CTDEP-designated water quality classification for the Quinebaug River in the vicinity of the landfill is C/Bc, which indicates that water quality, or designated uses, are not being met due to pollution. However, comparison of upstream and downstream water quality data, collected by the USGS and presented in *Water Resources Data - Connecticut, Water Year 1999*, prepared by the USGS, does not indicate that the landfill has had a noticeable impact on surface water quality in the river. It is noted that the surface water monitoring points are located approximately 6 miles apart, 3 miles upstream and 3 miles downstream of the landfill, with numerous possible contaminant sources, located between the two sampling locations.

Sediment: Unknown. The most recent (February 2001) analytical data for sediment samples, collected at the surface water sampling locations approximately 3 miles upstream and downstream of the landfill, indicate similar concentrations of PAHs at the two locations. It is noted that the downstream sediments are considerably finer (7.1 % vs. 0.2 % passing the #200 sieve), and contain more organic material (12,600 mg/kg vs. 1980 mg/kg), than the upstream samples. These results are most likely indicative of a lower energy, depositional environment, where fine-grained sediments, contaminated or otherwise, may more readily accumulate. Given the distance of the downstream sampling location from potential contaminant sources, the concentrations of PAHs are most likely affected more by the depositional environment than by proximity to a particular contaminant source.

In addition, Metcalf & Eddy (1998) indicated the presence of “reddish oxidized sediments along the side of the Quinebaug River channel during periods of low water level.” This area appears to be an area of groundwater discharge to the river. Dissolved metals are known to precipitate out of solution on contact with an oxidizing environment, and could be the source of the red sediments. To date, these sediments have not been characterized. It is noted that the solubility of many metals (e.g. iron, manganese, and arsenic) is increased in a reducing environment, as is created by the decomposition of organic material in a solid waste landfill. This appears to be borne out at the Putnam Landfill, as the groundwater samples with the highest COD levels have the highest dissolved iron, manganese, and arsenic concentrations. These metals tend to precipitate out of solution when reaching an oxidizing environment. Therefore, the previously identified reddish sediments, while most-likely high in iron content, may also contain elevated concentrations of other metals, including arsenic.

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Subsurface Soil: Yes. Though not found during waste relocation and closure of the facility, lead carbonate button dust, which reportedly tested positive for Extraction Procedure Toxicity (EP TOX), was disposed at the landfill prior to 1984. In addition, unknown quantities of unregulated household hazardous wastes were disposed at the landfill.

Air (outdoor): No. As designed, landfill gas is allowed to passively vent through the composite landfill cap. As quantified during the quarterly gas monitoring program, the primary components of the landfill gas are methane and carbon dioxide with trace amounts of hydrogen sulfide, VOCs, and mercaptans. It is noted that the sulfide compounds have very low odor thresholds, and are often noticed by workers on the landfill, particularly near the gas vents. However, ambient air monitoring, conducted as part of the quarterly gas monitoring program, has not detected methane, VOCs using a PID, or hydrogen sulfide in the ambient air at the landfill.

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Groundwater: Contaminated. No complete pathway.

Though groundwater has been identified as contaminated, there are no on-site water supply wells. The nearest identified public water supply wells are located approximately 1 mile northeast of the landfill across the Quinebaug River. The distance between the landfill and the wells, along with the presence of the river, which flows from the wells towards the landfill, prevents the development of a complete pathway. Also, the contaminated groundwater plume has been defined, and is limited in area. For the area of the plume that underlies private property, the Town of Putnam has acquired a groundwater easement, preventing access to the contaminated groundwater.

Soil Vapor: Contaminated. No complete pathway.

Landfill gas monitoring detects the presence of methane (up to 59%) in the gas monitoring wells located along the southeastern boundary of the landfill property at concentrations exceeding the Lower Explosive Limit (LEL) for methane (5%). While the detected concentrations are above the State's regulatory limit, currently there are no buildings within 1,000 feet on the adjacent property that could result in a completed pathway. This could change if development of the adjacent parcel occurred.

Surface Soil: Not contaminated.

All known areas of waste disposal and contaminated soil have been capped, or relocated and capped. Therefore, surface soils are not contaminated. Documentation of the landfill closure waste relocation project is presented in *Lead Soil Sampling, Landfill Closure, Putnam Landfill, Putnam, Connecticut*, prepared by Geotoxi Associates, dated September 1999.

Surface Water: Not contaminated by site.

Surface water monitoring of the Quinebaug River, conducted by the USGS (*Water Resources Data - Connecticut, Water Year 1999*), does not indicate that the surface water quality has been impacted by groundwater discharge. Solid waste leachate parameters (e.g. iron and alkalinity) are similar in the downstream sampling location as the upstream location. The concentration of dissolved arsenic, the primary inorganic groundwater contaminant at the landfill, is the same at the downstream location as the upstream location for all sampling events conducted in 1999.

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ITEM 3 ADDENDUM, CONT.

Sediments: Media is not characterized. However there is not a complete pathway. There are visual indications of reddish oxidized sediments alongside of the Quinnebaug River channel during periods of low water level. Access to the River at this point is very difficult and historically there have not been any recreational users.

Subsurface Soils: Contaminated. Not a complete pathway. All known wastes have been capped with a two impermeable barriers cap, and are not accessible at all.

Outdoor Air: Complete pathway
The landfill has a 6-foot high chain link fence that restricts access to the landfill on three sides, and the fourth side (the eastern side) is extremely difficult to traverse because of a very steep slope. Therefore, exposure is limited to on-site workers conducting occasional routine maintenance and monitoring.

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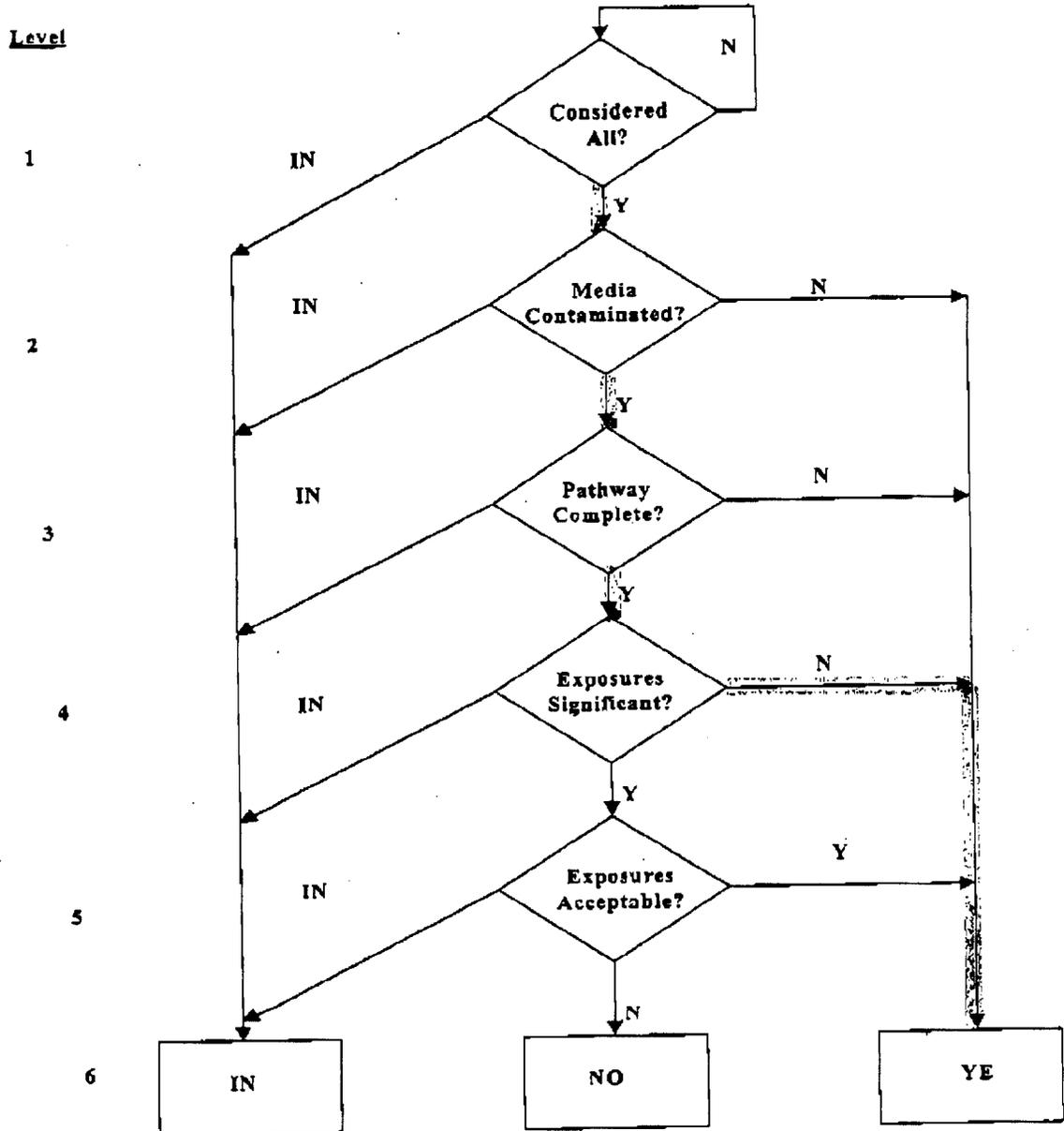
ITEM 4 ADDENDUM

Outdoor Air:

The exposure from the completed pathway with outdoor air is not considered to be significant. The pathway could potentially be complete for on-site workers conducting occasional routine maintenance and monitoring. However, as indicated in Item 2, landfill gas odors detected on the landfill are at concentrations below the detection limit for the field screening technology.

Facility Name: Putnam Municipal Landfill
EPA ID#: CTD 991288622
City/State: Putnam, CT

CURRENT HUMAN EXPOSURES UNDER CONTROL (CA 725)



PUTNAM MUNICIPAL LANDFILL, EPA ID #: CTD991288622
References for CA725 and CA750

1. *Putnam Landfill Closure and Post-Closure Plan, Putnam, Connecticut* prepared by Metcalf & Eddy, 1998.
2. Groundwater Monitoring, Reports prepared by Geotoxi Associates, Inc.
Second Quarter 1999, Groundwater Monitoring Results, Putnam Municipal Landfill
Third Quarter 1999, Groundwater Monitoring Results, Putnam Municipal Landfill
Fourth Quarter 1999, Groundwater Monitoring Results, Putnam Municipal Landfill
First Quarter 2000, Groundwater Monitoring Results, Putnam Municipal Landfill
Second Quarter 2000, Groundwater Monitoring Results, Putnam Municipal Landfill
Third Quarter 2000, Groundwater Monitoring Results, Putnam Municipal Landfill
Fourth Quarter 2000, Groundwater Monitoring Results, Putnam Municipal Landfill
3. Landfill Gas Monitoring, Letter reports prepared by Geological Field Services, Inc., reports dated: March 2, 2000; May 26, 2000; August 22, 2000; October 20, 2000; February 22, 2001; May 4, 2001.
4. *Water Resources Data - Connecticut, Water Year 1999*, prepared by the USGS, 2000.
5. *Putnam Sediment Data*, Summary Data Table for 1999 - Feb, 2001, prepared by Geotoxi Associates. March 15, 2001.
6. Sediment Data for Putnam Landfill, samples collected on Feb. 23, 2001, laboratory report prepared by Severn Trent Services, March 19, 2001.
7. *Lead Soil Sampling, Waste Relocation, Putnam Landfill, Putnam, Connecticut*, prepared by Geotoxi Associates, May 20, 1999.
8. *Lead Soil Sampling, Landfill Closure, Putnam Landfill, Putnam, Connecticut*, prepared by Geotoxi Associates, September 1999.
9. EPA Region 4 Ecological Risk Assessment Bulletin, Table 1 Region 4 Waste Management Division Freshwater Surface Water Screening Values for Hazardous Waste Sites, updated August 11, 1999.

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