

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures Under Control

Facility Name: Reichhold Chemicals, Inc.
Facility Address: 3320 Lincoln Avenue, Tacoma, WA 98421
Facility EPA ID #: WAD 00925 2891

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)?

	<u>Yes</u>	<u>No</u>	<u>?</u>	<u>Rationale / Key Contaminants</u>
Groundwater	<u>X</u>	<u> </u>	<u> </u>	<u>see</u>
Air (indoors) ²	<u> </u>	<u>X</u>	<u> </u>	<u>below</u>
Surface Soil (e.g., <2 ft)	<u> </u>	<u>X</u>	<u> </u>	<u> </u>
Surface Water	<u> </u>	<u> </u>	<u> </u>	<u>X</u>
Sediment	<u> </u>	<u>X</u>	<u> </u>	<u> </u>
Subsurf. Soil (e.g., >2 ft)	<u>X</u>	<u> </u>	<u> </u>	<u> </u>
Air (outdoors)	<u> </u>	<u> </u>	<u> </u>	<u>X</u>

 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.

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.

Rationale and Reference(s):

Site Description

The Reichhold facility is a former chemical manufacturing site located on 52 acres in Tacoma's Commencement Bay tidelands. The area is predominantly heavy industry. The facility is approximately 800 feet from Blair Waterway and 1000 feet from Hylebos Waterway. Although there is a groundwater mound under the site - particularly in the shallow aquifer, groundwater flow is generally towards the Blair Waterway. Reichhold manufactured chemicals, including pentachlorophenol, from the mid-1950s through the early 1990s. There are currently no manufacturing activities at the site. Soils and groundwater have been contaminated due to past site practices. A groundwater pump and treat system and shallow interceptor drain have operated at the site since 1993. A few of the contaminated source areas have been excavated and the soils removed or placed in a lined bioremediation cell for treatment.

Groundwater:

HIGHEST LEVEL OF CONSTITUENTS FOUND IN GROUNDWATER
(all units ug/l)

Constituent	GWPS*	Historical**	Late 90's***	More Recent****
		Level (well#)	Level (well#)	Level (well#)
Pentachlorophenol	50	13,000 (30I)	27,000 (14S)	3500 (14S)
Formaldehyde	50	200,000 (2S)	150 (50I)	63 (30I)
Molybdenum	15	52,000 (56S)	4500 (56S)	1900 (56S)
2,4-Dichlorophenol	100	950 (14S)	1100 (14S)	200 (14S)
2,4,6-Trichlorophenol	1.2	1200 (14S)	23,000 (14S)	3400 (14S)
Trichloroethene	5	180 (30I)	46 (14S)	60 (14S)
Benzene	5	130 (2I)	14 (30I)	4 (30I)
Vinyl Chloride	2	65 (53I)	310 (48I)	38 (53I)

*Groundwater Protection Standard in 1988 permit

** Historical: Highest concentration of constituent reported between 1986 and 1992. The groundwater treatment system became operational in 1993.

*** Late 1990's: Highest concentration of constituent reported in 1997-1999 groundwater sampling events (Apr97, Aug97, Apr98, Jul99).

**** More Recent: Highest concentration of constituent reported in recent groundwater sampling events (Jul02, July03)

In addition to the compounds listed in the above table, the following constituents are currently (within the past two years) found in the groundwater exceeding the groundwater performance standards: 2,3,4,6-tetrachlorophenol, antimony, arsenic, beryllium, cadmium, chromium, copper, manganese, nickel, zinc, and cyanide.

Surface Soil/Subsurface Soil

Both surface soils and subsurface soils at the facility contain contaminants in excess of the soil clean up standards included in the 1988 permit. The contaminants driving cleanup at the site are pentachlorophenol and PCBs. These contaminants have been reported as high as 3,660,000 ug/kg (penta) and 1,022,000 ug/kg (PCBs). Other contaminants in the soil include other semi-volatile compounds, especially phenols (2,4,6-Trichlorophenol, 2,4-Dichlorophenol, phenol, etc); volatile compounds; and metals.

Surface Water

It is believed that surface water contamination has been minimized due to ongoing measures controlling surface runoff and groundwater discharge to surface water. However, complete control of the groundwater

plume has not been demonstrated. It is unknown how much, if any, contaminated groundwater reaches Blair Waterway.

Outdoor Air

Outdoor Air sampling results have not been reported or required for this facility. At times there is a phenolic odor on site, particularly after any recent excavating. It is unknown whether releases to the air exceed appropriately protective risk based levels, particularly during soil excavations.

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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	___	___	___	<u>_x_</u>			___
Air (indoors)	___	___	___				
Soil (surface, e.g., <2 ft)	___	<u>_x_</u>	___	<u>_x_</u>			___
Surface Water	___	___			___	<u>_?_</u>	___
Sediment	___	___			___	___	
Soil (subsurface e.g., >2 ft)	___	<u>_x_</u>	<u>_x_</u>			___	
Air (outdoors)	___	<u>_x_</u>	___	<u>_x_</u>		___	

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

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):

Pathways

Workers: Workers on site may be exposed to contaminated surface soils which have not been covered or from areas where the cover has been removed for site remediation activities. Additionally, the presence of and manipulation of excavated surface and subsurface soils in the bioremediation cells may cause workers to be exposed to contaminants in soils, dust, and in the air. Workers are exposed to what contaminants may exist in the outdoor air.

Construction: Construction and remediation activities on site or nearby may expose workers to contaminants in groundwater, surface soils, subsurface soils, and outdoor air.

Recreation: There are no recreation activities on site. Recreational use of the nearby waterways is limited, but present. Complete control of the groundwater plume has not been demonstrated. It is unknown whether any contaminated groundwater reaches nearby waterways.

Food: As per agreement with EPA, Reichhold no longer allows food products to be stored on site. There may be some subsistence and other fishing and or food collection activities in and along the nearby waterways. Complete control of the groundwater plume has not been demonstrated. It is unknown whether any contaminated groundwater reaches nearby waterways.

Residences: No pathways are complete to residences because there are no residential areas on site, immediately adjacent to the site, or above the contaminated groundwater plume.

Day Care: No pathways are complete to day care centers because there are no known day cares on site or nearby.

Trepassers: No pathways are complete to trespassers because the site is fenced and locked at all times. While there is a chance that trespassers could gain access to the facility by climbing the fence, it was determined that this institutional control satisfies the criteria for interrupting this pathway.

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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

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.

Rationale and Reference(s):

Complete Pathways/Significant Exposure

Workers: It is assumed the exposure to workers from surface soils is not significant because ingestion due to dust is limited by surface cover, vegetation, and the NW’s wet climate. Exposures from outdoor air contaminants are not likely to be significant, but must be addressed during excavation of contaminated soils. The periodic mixing/turning of soils in the bioremediation cells could pose a significant risk to workers. These soils contain high levels of site contaminants. Although the beds are maintained at high water content, dust from dryer surface areas or volatiles may be released during mixing in the cells. The facility has prepared a health and safety plan which addresses worker safety during this activity. If worker activities change or the health and safety plan becomes obsolete or otherwise not implemented, this pathway may need to be re-examined.

Construction: There are not ongoing construction activities at the site. Construction workers exposed to site contamination are likely to be exposed for such a short duration that the exposure would not be significant. If construction activities increase at the site due to redevelopment, this pathway may need to be re-examined.

Recreation: Exposures to recreational users of the nearby waterways are not significant due to limited duration of exposure, uncertainty regarding whether any contaminants reach the waterway, and mixing of any contaminants in the waterway.

Food: It is unknown whether any contaminants reach the waterways via the groundwater. Given this uncertainty and the fact that at least a majority of the groundwater plume is under control, exposure from consumption of food taken in or near the waterway is unlikely to be significant. If further studies show that the groundwater plume is not controlled, this pathway must be reassessed.

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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):

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 Reichhold Chemicals, Inc. facility, EPA ID #**WAD 00925 2891**, located at 3320 Lincoln Avenue, Tacoma, WA, 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 copy available in site file) Date _____
Stan Leja
Hydrogeologist

Supervisor (signature copy available in site file) Date _____
Kay Seilert
Supervisor, Hazardous Waste and Toxic Reduction
Program Washington State Department of Ecology

Locations where References may be found:

Site Files
Washington State Department of Ecology _____
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Contact telephone and e-mail numbers

Stan Leja
360/407-6345
slej461@ecy.wa.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.

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)

Migration of Contaminated Groundwater Under Control

Facility Name: Reichhold Chemicals, Inc.

Facility Address: 3320 Lincoln Avenue, Tacoma, WA 98421

Facility EPA ID #: WAD 00925 2891

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, 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 #8 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 "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "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 "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated groundwater and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

El 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).

**Migration of Contaminated Groundwater Under Control
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2. Is **groundwater** known or reasonably suspected to be **"contaminated"**¹ above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

If unknown - skip to #8 and enter "IN" status code.

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 appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

Rationale and Reference(s):

HIGHEST LEVEL OF CONSTITUENTS FOUND IN GROUNDWATER
(all units ug/l)

Constituent	GWPS*	Historical** Level (well#)	Late 90's*** Level (well#)	More Recent**** Level (well#)
Pentachlorophenol	50	13,000 (30I)	27,000 (14S)	3500 (14S)
Formaldehyde	50	200,000 (2S)	150 (50I)	63 (30I)
Molybdenum	15	52,000 (56S)	4500 (56S)	1900 (56S)
2,4-Dichlorophenol	100	950 (14S)	1100 (14S)	200 (14S)
2,4,6-Trichlorophenol	1.2	1200 (14S)	23,000 (14S)	3400 (14S)
Trichloroethene	5	180 (30I)	46 (14S)	60 (14S)
Benzene	5	130 (2I)	14 (30I)	4 (30I)
Vinyl Chloride	2	65 (53I)	310 (48I)	38 (53I)

*Groundwater Protection Standard in 1988 permit

** Historical: Highest concentration of constituent reported between 1986 and 1992. The groundwater treatment system became operational in 1993.

*** Late 1990's: Highest concentration of constituent reported in 1997-1999 groundwater sampling events (Apr97, Aug97, Apr98, Jul99).

*** More Recent: Highest concentration of constituent reported in recent groundwater sampling events (Jul02, July 03)

In addition to the compounds listed in the above table, the following constituents are currently (within the past two years) found in the groundwater exceeding the groundwater performance standards: 2,3,4,6-tetrachlorophenol, antimony, arsenic, beryllium, cadmium, chromium, copper, manganese, nickel, zinc, and cyanide.

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3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"² as defined by the monitoring locations designated at the time of this determination)?

_____ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"²).

_____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"²) - skip to #8 and enter "NO" status code, after providing an explanation.

 x If unknown - skip to #8 and enter "IN" status code.

² "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

Rationale and Reference(s):

The facility has designed and installed corrective measures intended to control the migration of groundwater on and from the site. These measures include an interceptor drain for the shallow aquifer and pump and treat extraction for the intermediate aquifer. While these measures are largely successful, Ecology does not believe the facility has fully demonstrated containment of the plume in these two aquifers.

There are numerous monitoring wells at the facility, but some are not sampled and there are some gaps in the spacing that make it difficult to use them to definitively state that no migration of the plume is occurring. Current and future efforts, including the implementation of a focused RI/FS with the installation of additional monitoring wells, removal of source terms and the replacement of certain extraction wells, are anticipated to lead to a change from "unknown" to "yes" in this groundwater migration stabilized designation.

References:

Quarterly Groundwater Monitoring Results, Reichhold, Inc., Tacoma Facility - multiple reports
Comprehensive Groundwater Monitoring Evaluation, Tetra Tech EM Inc., 11/9/98

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4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

_____ If yes - continue after identifying potentially affected surface water bodies.

_____ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

**Migration of Contaminated Groundwater Under Control
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5. Is the **discharge** of “contaminated” groundwater into surface water likely to be “**insignificant**” (i.e., the maximum concentration³ of each contaminant discharging into surface water is less than 10 times their appropriate groundwater “level,” and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

_____ If yes - skip to #7 (and enter “YE” status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration³ of key contaminants discharged above their groundwater “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

_____ If no - (the discharge of “contaminated” groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration³ of each contaminant discharged above its groundwater “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations³ greater than 100 times their appropriate groundwater “levels,” the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

_____ If unknown - enter “IN” status code in #8.

³ As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

Rationale and Reference(s):

**Migration of Contaminated Groundwater Under Control
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6. Can the **discharge** of “contaminated” groundwater into surface water be shown to be “**currently acceptable**” (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented⁴)?

- _____ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site’s surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR
2) providing or referencing an interim-assessment,⁵ appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment “levels,” as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.
- _____ If no - (the discharge of “contaminated” groundwater can not be shown to be “**currently acceptable**”) - skip to #8 and enter “NO” status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.
- _____ If unknown - skip to 8 and enter “IN” status code.

⁴ Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

⁵ The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

Rationale and Reference(s):

**Migration of Contaminated Groundwater Under Control
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7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

If no - enter "NO" status code in #8.

If unknown - enter "IN" status code in #8.

Rationale and Reference(s): The implementation of a focused RI/FS during 2004 will result in the installation of additional downgradient monitoring wells in the intermediate aquifer with to ensure that contaminated ground water is not migrating beyond the existing area of ground water contamination. In addition, the decommissioning of offsite extraction wells and the increased pumping by new extraction wells installed in 2002 should pull downgradient plumes back toward the facility.

The northern segment of the surface interceptor drain (SID) will be investigated to ensure that capture of contaminated ground water in the shallow aquifer, along that segment is being achieved. Details of corrective actions can be found in the new RCRA Permit for corrective action WAD 00925 2891 and agreed order No. 1577 and agreed interim action administrative order No. 1578.

Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)

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8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the _____ facility, located at _____. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

NO - Unacceptable migration of contaminated groundwater is observed or expected.

IN - More information is needed to make a determination.

Completed by (signature copy available in site file) Date _____
Stan Leja
Hydrogeologist

Supervisor (signature copy available in site file) Date _____
Kay Seiler
Supervisor, Hazardous Waste and Toxics Reduction Program
Washington State Department of Ecology - Southwest Regional Office

Locations where References may be found:

Site Files
Washington State Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Contact telephone and e-mail numbers:

Stan Leja _____
360/407-6345 _____
slej461@ecy.wa.gov _____