



DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA RECORDS CENTER

RCRA Corrective Action

FACILITY CIBA SPECIALTY
I.D. NO. MED 001037126
FILE LOC. R-13
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Environmental Indicator (EI) RCRIS code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: Ciba Specialty Chemicals
Facility Address: 55 Crowley Rd. Lewiston, ME
Facility EPA ID #: MED 001037126

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 ground water 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

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. 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.

Rationale and Reference(s): _____

_____ Nine groundwater monitoring wells on site have concentrations of VOCs that are orders of
_____ magnitude above the associated exposure guidelines for drinking water (Table 1). Maine uses the
_____ lower of either the Maximum Exposure Guidelines developed by the Maine Bureau of Health or the
_____ EPA MCL as drinking water guidelines.

_____ At the Ciba site chemicals were received by bulk in trucks and rail cars. The chemicals
_____ were then repackaged into drums and smaller containers. Chemicals were stored in eight
_____ underground storage tanks, two above ground tanks, and in three buildings on site. All chemical
_____ repackaging activities have ceased.

_____ Discharges of chemicals onto the ground were documented in 1989 and since that time
_____ investigation and remediation actions have been ongoing at the site.

_____ References: Year 2001 Site Operations Report – Ciba 4/02
_____ Compliance Order by Consent – MEDEP 3/97

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

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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.

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

Rationale and Reference(s):

Groundwater contamination at the Ciba site is expected to stay within the present aerial extent of the plume, both in terms of horizontal direction as well as vertical direction. Monitoring wells located at the outside edge of the contaminant plume have consistently remained non-detect for site contaminants or at very low trace levels since groundwater sampling began in 1991. The designated shallow aquifer monitoring wells located outside of the plume are MW-102, MW-201, MW-202, and MW-208.

In addition, there are several monitoring locations for the deep aquifer that have consistently shown sampling results for site contaminants remaining at non-detect or very low trace levels. The designated deep aquifer monitoring wells are MW-406A, PZ-12, PZ-14, PZ-15, PZ-16, PZ-18, and PZ-19.

The contaminant plume is located in the upper silty clay formation and is underlain by marine clay. The Marine clay is expected to prevent the contaminants from migrating down to the sand and gravel aquifer beneath the site. Also, the silty clay in the upper formation is very tight and does not allow the contaminants to migrate easily. This condition is expected to protect outlying areas from receiving the contaminants, but also creates a situation in which removal by the pump and treat system is exceedingly inefficient and slow.

References: Year 2001 Site Operations Report – Ciba 4/02
Compliance Order by Consent – MEDEP 3/97

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.

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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): _____

Contaminated groundwater from the Ciba site discharges into surface water located along the southwest edge of the site (Figure 2). No Name Brook originates from No Name Pond approximately 3 miles upstream, flows from the northwest to the southeast along the edge of the site, and discharges to the Sabattus River approximately two miles southeast of the site. No Name Brook is classified as a Class B surface water body by the State of Maine. As such, it must be of quality suitable for drinking water supply after treatment, fishing, water recreation in and on the water, as habitat for fish and aquatic life, for use as industrial process water or hydroelectric power generation, and for navigation.

References: Compliance Order by Consent – MEDEP 3/97

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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.

Rationale and Reference(s): _____

The discharge of contaminants in groundwater to No Name Brook is not likely to be significant. To determine if contaminants entering a body of water are going to impact the environment, a calculation is made which takes into account the volume of water entering the stream, the dilution which occurs in the stream, and the concentration of contaminants in the groundwater (Please see attached worksheets). The Maine Ambient Water Quality Criteria (AWQC) are applied to each separate component to determine if the concentration present in the stream are protective of human health.

Attached is a listing of all contaminants found in seepage samples entering No Name Brook and their respective limits for discharge. In order for a compound to meet AWQC, the value in the "Limit for Discharge" column must be higher than the value in the "Highest Discharge Concentration" column. This is true for all site contaminants listed; therefore, it can be concluded that discharge into No Name Brook is not causing a significant impact to the receiving surface water, sediments, or eco-system.

There is no evidence that the concentrations of contaminants in the monitoring wells near the brook are increasing, and there are no contaminants discharging at greater than 10 times the appropriate groundwater levels.

References: Year 2001 Site Operations Report – April 2002
Supplemental Program Sampling and Quality Assurance Plan – 1990
Revised Remedial Action Evaluation plan – 2001

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

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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.

Rationale and Reference(s): _____

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.

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2. 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 Ciba Specialty Chemical facility, EPA ID # ME0001037126, located at 55 Crowley Rd. Lewiston, ME. 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) Diana McKenzie Date 11-5-03
(print) DIANA MCKENZIE
(title) Environmental Specialist III

Supervisor (signature) Stacy A. Ladner Date 11/5/03
(print) Stacy/A. Ladner
(title) Unit Manager
(EPA Region or State) State - ME

Locations where References may be found:

Maine DEP File Room - Augusta, ME

Contact telephone and e-mail numbers

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Table 1
Summary of Volatile and Semi Volatile Organic Compounds
Detected in Groundwater
And Corresponding Drinking Water Guidelines
Ciba Geigy Site, Lewiston, Maine

<u>Contaminant</u>	<u>Maximum Detection (ug/Kg)</u>	<u>Risk Based Concentration</u>
Naphthalene	190	14
Methylene Chloride	450,000	5
Acetone	1,100,000	700
Trichlorofluoromethane	1,900	2100
1,1-Dichloroethane	310	70
1,1,1-Trichloroethane	2,100,000	200
Carbon Tetrachloride	6,200	3
Trichloroethene	4,300	5
Tetrachloroethene	940,000	5
Benzene	15,000	5
1,1-Dichloroethene	65	0.6
Toluene	150,000	1000
Trans 1,2-Dichloroethene	1,400	100
Ethylbenzene	320,000	70
Total Xylenes	2,600,000	10,000

Value is the lower of EPA MCL or Maximum Exposure Guidelines,
Maine Department of Human Services, January 20, 2000.

Calculations for AWQC for Groundwater entering No Name Brook

Ciba site - Lewiston, Maine

Width of Plume: 1129 ft

Estimated from Figure 5, 2001 Operations Report

Saturated Thickness:

640 feet of 20 ft saturated thickness
128 feet of 15 ft saturated thickness
128 feet of 10 ft saturated thickness
233 feet of 5 ft saturated thickness

Calculated from Figures 3-3, 3-5, and 3-7 Supplemental Program Sampling & QAP 1990.
Also, Figures 4,5,6 and Section 2.2 Revised Remedial Action Evaluation Plan 2001.

Area of Plume (A) = Width * Saturated Thickness

$$(640*20)+(128*15)+(128*10)+(233*5) = 17,165 \text{ Feet}^2$$

Groundwater Velocity: 1.59×10^{-6} ft/sec

$$v = K \cdot I / N_e$$

where: K is the hydraulic conductivity, I is the gradient and N_e is effective porosity.
From section 3.3.4 of the Supplemental Program Sampling & QAP 1990.

$$v = (8.86 \times 10^{-6}) \cdot (.054) / (0.3) = 1.59 \times 10^{-6} \text{ ft/sec}$$

Discharge to the River (Q):

$$Q = V \cdot A = (1.59 \times 10^{-6}) \cdot (17165) = .027 \text{ cubic feet per second}$$

$$Q = .027 \text{ cfs}$$

Using the harmonic mean value for flow as calculated by Bureau of Land & Water
 Harmonic Mean = 2.2 cfs

$$\text{Dilution Factor (DF)} = [Q(\text{river}) + Q(\text{groundwater})] / Q(\text{groundwater})$$

$$DF = (2.2 + .027) / (.027)$$

$$DF = 82.48$$

Ambient Water Quality Criteria for Ingestion of Organisms and Untreated Water:

Contaminant	AWQC	Limit for Discharge	Highest Discharge Concentration
Chloroethane	NA (4.6)**	379	76.1
Benzene	1.2	99	0.9
Vinyl Chloride	2	165	28.4
Methylene Chloride	4.65	384	0.9
1,1-DCA	NA (70)*	5774	14.5
cis 1,2-DCE	NA (70)*	5774	11.7
Toluene	6800	560864	1653
Xylenes	NA (10000)*	824800	0.6
1,1,1-TCA	NA (200)*	16496	0.6
Ethylbenzene	3100	255688	0.2

Note: * = Where no AWQC are available, the MEG is used
 ** = Where no AWQC or MEG is available, EPA Region 9 tap water remedial goal is used
 All values in ppb