

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

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

Migration of Contaminated Groundwater Under Control

Facility Name: Danbury Landfill
Facility Address: Plumtrees Road, Danbury, Connecticut
Facility EPA ID #: CTD00841163

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).

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

Page 2

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?

 X 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): Ground water is known or reasonably suspected to be contaminated above appropriately protective levels. During the 1998 sampling year, data indicated that Cu, Pb, Zn and vinyl chloride were detected in excess of the CT DEP Surface Water Protection Criteria and/or the Residential Volatilization Criteria at monitor wells MHD-83, B3-M, NW-2, B2, MHU-84, B6, 7M, and 7D located at the landfill.

According to the 1998 Solid Waste Annual Summary, Ground Water Monitoring Program, Closed Danbury Landfill, Cu, Zn, Pb and vinyl chloride were detected sporadically in up to eight monitor wells at the facility at concentrations that exceed either the Connecticut Surface Water Protection Criteria or Connecticut Residential Volatilization Criteria. A maximum concentration of Zn was detected at NW-2 at a concentration of 790 ug/l exceeding the Surface Water Protection Criteria of 123 ug/l. A maximum concentration of Cu was detected at NW-2 at a concentration of 60 ug/l exceeding the Surface Water Protection Criteria of 48 ug/l. A maximum concentration of Pb was detected at NW-2 at a concentration of 160 ug/l exceeding the Surface Water Protection Criteria of 13 ug/l. A maximum concentration of vinyl chloride was detected at B6 at a concentration of 42 ug/l exceeding the Residential Volatilization Criteria of 2 ug/l.

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).

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

Page 3

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)?

 X 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): The migration of contaminated ground water stabilized such that contaminated ground water is expected to remain within “existing area of contaminated ground water” as defined by the monitoring locations designated at the time of this determination.

The landfill has been located at this site for approximately 70 years. Over the past 20-25 years, extensive ground water data has been collected for the site. Site hydrology and hydrogeology are static in that closure of the MSW and Subtitle C facilities have stabilized conditions. The surface water points including the Limekiln Brook and the unnamed tributary create the lateral boundaries and discharge points of on-site ground water.

Data collected from quarterly measurements of water levels in monitor wells established that ground water flows radially away from the landfills and discharges to surrounding surface water bodies.

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.

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

Page 4

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

 X 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): The wastewater treatment plant effluent channel to the west, Limekiln Brook to the east and intervening wetlands to the north and south receive ground waters emanating from the landfills at the site.

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

Page 5

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 judgment/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.

 X 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 “contaminated” ground water into surface water does not seem to be insignificant. The maximum concentrations of lead and vinyl chloride are greater than ten times the appropriate ground water level.

1. The maximum known or reasonably suspected concentration of each contaminant discharged above its ground water level is:

Lead	160 ug/l
Vinyl Chloride	42 ug/l

Appropriate levels; (10x standard)

Lead	130 ug/l
Vinyl Chloride	20 ug/l

There is no evidence that the concentrations are increasing. The concentrations of those contaminants have been shown to fluctuate throughout the 1998 sampling events in response to seasonal variations.

2. There are no contaminants discharging into surface water in concentrations greater than 100 times their appropriate ground water levels.

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

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

Page 6

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)?

 X 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): Discharge of “contaminated” ground water into surface water has been shown to be “currently acceptable”. At the surface water monitoring points S-5, S-10 and S-13, which are closest to the landfills, levels of key contaminants have been found to either be not detected or below applicable criteria during the 1998 sampling year.

The MSW landfill stopped accepting wastes in 1996 and underwent final closure in 1997. The metal hydroxide landfill has been closed in accordance with an approved closure plan. A monitoring program was developed by the City of Danbury to comply with post closure monitoring requirements of permits issued to the landfill by the CT DEP.

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.

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

Page 7

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?”

X 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): Ground water and surface water monitoring will continue to be collected from the Danbury Landfill site. The monitoring program will continue to be conducted by the City of Danbury to comply with post closure monitoring requirements of the permits issued to the landfill by the CT DEP.

Two monitoring programs are currently being conducted at the landfill. The first program includes monitoring to detect a release of hazardous material from the metal hydroxide sludge cell (MHSC); the second program includes monitoring impacts to nearby ground water and surface water by the municipal solid waste landfill.

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

Page 8

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 Danbury Landfill facility, EPA ID # CTD000841163, located at Plumtrees Road, Danbury, Connecticut. 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.

Reviewed
Completed by

(signature) David Lim
(print) David Lim
(title) Environmental Engineer

Date 4/4/2000

Supervisor

(signature) Matthew R. Hoggland
(print) Matthew R. Hoggland
(title) Section Chief
(EPA Region or State) EPA-NE

Date 4/13/00

Locations where References may be found:

Marin Environmental, Inc., Haddam, Connecticut
Connecticut Department of Environmental Protection, Hartford, Connecticut
City of Danbury, Department of Public Works, Danbury, Connecticut

Contact telephone and e-mail numbers

(name) _____
(phone #) _____
(e-mail) _____

Attachment A
Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)
Question 2

- 2) Ground water at the site is classified as GB by the Connecticut Department of Environmental Protection (CT DEP). Therefore, the only state regulations that apply to ground water quality are the Surface Water Protection Criteria and the Residential Volatilization Criteria. There are no water supply wells on-site or on adjacent properties.

Data from the post closure water quality monitoring programs of the closed municipal solid waste and metal hydroxide landfills provide the rationale for this assessment. Specific information from the most recent (1998) annual water quality summary report entitled, *1998 Solid Waste Annual Summary Ground Water Monitoring Program, Closed Danbury Landfill*, was used to evaluate media contamination.

Four contaminants, Cu, Zn, Pb and vinyl chloride, were detected sporadically in ground water at up to eight monitor wells at the facility at concentrations that exceed either the Connecticut Surface Water Protection Criteria or the Connecticut Residential Volatilization Criteria. The monitor wells noted on Figure 1, include MHD-83, B3-M, NW-2, MHU-84, B6, 7M and 7D.

Surface water collected from sampling points S-5 and S-13, located on Limekiln Brook and the unnamed tributary, respectively, may be characterized by previously mentioned monitor wells. During the 1998 sampling events, levels of key contaminants at these sampling points were found to either be not detected or below applicable criteria.

Subsurface soils (>2 ft.) at the closed landfills may be contaminated by contact with leachate or contain waste materials disposed at the facility during its active life.

- / Sediments in adjacent surface water bodies receiving ground water discharges may be in contact with key contaminants contained in landfill leachate. No sediment samples have been collected for analysis. Therefore, this media is evaluated as unknown.

Air, indoors and outdoors, is not contaminated due to the inert nature of material in the closed metal hydroxide landfill and the presence of an active decomposition gas collection system in the closed municipal solid waste landfill. The gas collection system is permitted under the CT DEP Permit # 034-0092.

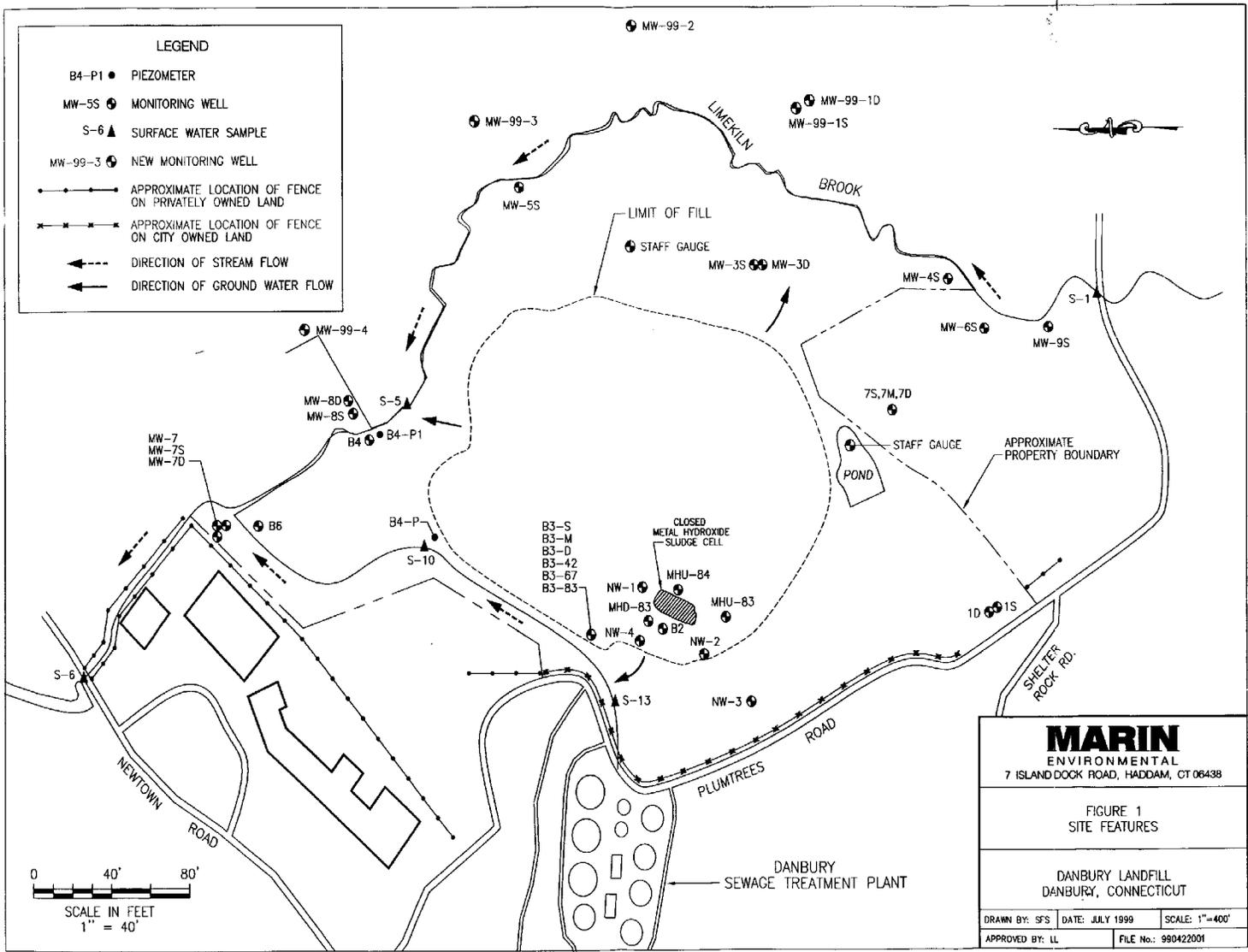
Soil (< 2ft.) is not contaminated due to the use of natural soil layers as components of the closure systems at both landfills.

Attachment B
Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)
Question 3

- 3) Pathways are not complete for any contaminated media-receptor combination and can not be reasonably expected under current conditions. Both the Municipal Solid Waste (MSW) landfill and metal hydroxide landfills are closed and covered with a combination synthetic membrane earthen material cap. An active gas recovery system collects decomposition gases from the closed MSW landfill. A fence and locked gate along the Plumtrees Road property line isolates the areas where human exposure to ground water and surface water media exceedences would occur.

Ground water impacted by key contaminants is not within the zone of contribution of any water supply well, as no such wells are located on the site or any adjacent parcels.

Restricted access to the site inhibits exposure to surface water bodies for recreational or food use.



4-17-2001

Dave,

The Danbury Landfill appears secure with respect to exposure to contaminated sediments. Landfill boundaries close to site boundaries are fenced. Extensive wetlands on unfenced boundaries likely limit transport of contaminated sediments away from the site. Along part of the southern and all of the eastern boundary Lime^{stone} Block limits trespass into the vicinity of the site. These same boundaries are the only areas where the site is bordered by residential land use.

The site does generate leachate. I observed a seep near the entry road and the detention basin near the site entry was discharging cloudy, orange tinged water and its channel was lined with rust stained rocks. This discharge had no visible effect on the receiving stream (Stillwater Brook)

Site representatives (Mario Ricozzi & Jim Dziuba) said they would forward current surface water data collected for state & an area wide map showing site drainage & contours. I will go over this map with you when it arrives.

Eric W.

5-8-01

I've reviewed the surface water data for S1, S5, S6, S10 and S13 from 1998 - 2000. All the data were either non-detected or below the CT Surface water protection criteria.

David Lim

