

**DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION**

Draft: September 29, 2000

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

**Migration of Contaminated Groundwater Under Control**

**Facility Name:** NRG Fossil Fuel Plant - Devon Station  
**Facility Address:** Naugatuck Ave  
**Facility EPA ID #:** CTD 000845248

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

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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).

2. Is groundwater known or reasonably suspected to be "contaminated" 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): See notes under Section 750-2 in attached text

3. Has the migration of contaminated groundwater stabilized (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"<sup>2</sup> 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"<sup>2</sup>.
- If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"<sup>2</sup>) - 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): See notes under Section 750-3 in attached text

**Footnotes:**

<sup>1</sup>"Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

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<sup>2</sup> "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.

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): See notes under Section 750-4 in attached text

5. Is the discharge of "contaminated" groundwater into surface water likely to be "insignificant" (i.e., the maximum concentration<sup>3</sup> 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 concentration<sup>3</sup> 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 concentration<sup>3</sup> 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 concentrations<sup>3</sup> 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.

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**Rationale and Reference(s):** See notes under Section 750-5 in attached text

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

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 implemented<sup>4</sup>)?

\_\_\_\_\_ 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,<sup>5</sup> 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):** In accordance with the instructions for Section 5, this section is not applicable for "insignificant" discharges.

<sup>4</sup> 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.

<sup>5</sup> 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

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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.

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): See notes under Section 750-7 in attached text.

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).

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 NRG Fossil Fuel - Devon Station facility, EPA ID # CTD000845248, located at Milford 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.

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Completed by (signature) [Signature] Date 9/29/00  
(print) JUAN A PEREZ  
(title) Environmental Scientist

Supervisor (signature) [Signature] Date 9/29/00  
(print) Matthew R. Hoagland  
(title) Section Chief RCRA  
EPA Region or State) Region I - New England Corrective Action

Locations where References may be found:

- RCRA Groundwater Monitoring Program 1997 Annual Report (CL&P)
- March, 1999 Phase I Environmental Site Assessment (Metcalf & Eddy, Inc.)
- April, 1999 Phase II Environmental Field Investigation Report (Metcalf & Eddy, Inc.)
- November, 1999 Supplemental Site Investigation Report (Metcalf & Eddy, Inc.)

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**Rationale and References**  
**For**  
**Documentation of Environmental Indicator Determination**  
**RCRA Corrective Action Environmental Indicator Code CA 750**

Groundwater monitoring was initiated at Devon Station ("the Site") in July, 1985, in order to determine the impact of a single-membrane-lined surface impoundment (EB-2), operated as part of its NPDES-permitted wastewater treatment system, on groundwater quality in the facility's uppermost aquifer. The unit was designed to receive boiler chemical cleaning solvents, demineralizer regeneration wastewaters, and other maintenance washwater, prior to its eventual discharge to the Housatonic River. These wastewaters were determined to be RCRA hazardous due to corrosivity, as well as the occasional presence of chromium and/or lead.

EB-2 was constructed in 1979, in an area formerly used for coal storage. In August of 1987, CL&P notified the USEPA that it intended to close EB-2 by "clean closure". After approval of a clean closure plan, it was determined that clean closure would not be feasible. CL&P obtained approval to close the unit in-place by installing a modified low-permeability cap. Final closure was completed by April 15, 1991.

An initial network of seven (7) groundwater monitoring wells (DV-1 through DV-7) was installed during July, 1985. In March 1989, two additional wells were installed to further define background groundwater quality (DV-8 & DV-9). The wells were advanced to depths of 12.5' to 26', and were screened within the upper 10-feet of the overburden aquifer. Wells DV-9 through DV-6 represent "background conditions down-gradient of the former ash landfill," and upgradient of the remainder of the facility. Wells DV-1, 2, 4 & 5 are located downgradient of the former surface impoundment. DV-3 is a crossgradient well.

In March of 1999, a Phase I Environmental Site Assessment ("ESA"), was prepared to identify potential areas of environmental concern ("AOCs") at the Devon facility, and to review prior environmental investigations. Subsequently, a limited Phase II ESA was prepared in April, 1999, in order to investigate potential contamination at the AOCs identified during the Phase I ESA. A direct push Geoprobe® unit was used to collect soil and groundwater samples from various locations throughout the facility. Due to shallow refusal, groundwater samples were collected from only three (3) of the Geoprobe® borings.

No contaminants were found in excess of applicable CTDEP Remediation Standard Regulations (RSRs) in two (2) of the Geoprobe® groundwater samples, while dissolved zinc and copper were detected above the RSR Surface Water Protection Criteria (SWPC) in the single groundwater sample collected from the Petroleum Bulk Storage Tank area.

M&E's Phase I ESA also identified a former gasoline UST which had been removed in 1991. As part of the limited Phase II Investigation, one (1) groundwater sample was collected from a groundwater monitoring well installed in this area at the time of the UST closure. Phenanthrene was

*→ correct date - classified July 3, 2001 via Conference Call JP*  
*correct date, classified July 3, 2001 JP*

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found in this sample in excess of the SWPC.

**750-2 Groundwater Contamination Determination**

The CTDEP classification of groundwater at the site is "GB"; not suitable for drinking. The site is bordered by the Housatonic River. Consequently, the CTDEP's Surface Water Protection Criteria ("SWPC") is of primary importance when evaluating groundwater contamination at the site. Groundwater quality data will, therefore, be compared to the SWPC.

The 1995 Groundwater Monitoring Annual Report indicated that elevated concentrations of several groundwater constituents were found in upgradient as well as downgradient monitoring wells, while the 1997 Groundwater Monitoring Annual Report noted that, during that sampling year, no wells failed the AR t-test for TOC, TOX, and specific conductance. Two wells failed the AR t-test for pH, as had been noted in previous annual reports. These reports had concluded that prior waste disposal practices, rather than surface impoundment impacts, were responsible for the pH statistical test failures. Finally, the 1997 Report concluded that the monitoring network was capable of providing groundwater samples representative of water quality in the uppermost aquifer and downgradient of the impoundment. Analytical results from the 11/13/97 groundwater sampling round were compared to the Connecticut Department of Environmental Protection's current Surface Water Protection Criteria. Contaminant levels in the following groundwater samples met or exceeded those criteria.

Monitoring Well Number	Contaminant Name	Contaminant Conc. (mg/l)	SWPC (mg/l)
DV-2	Arsenic	0.006	0.004
DV-5	Beryllium	0.004	0.004
	Copper	0.149	0.048
	Zinc	0.302	0.123
DV-6	Beryllium	0.005	0.004
	Cadmium	0.006	0.006
	Zinc	0.34	0.123
DV-7	Cadmium	0.012	0.004
	Copper	0.136	0.048
	Silver	0.019	0.012
	Zinc	0.341	0.123

As part of the supplemental investigations conducted in September, 1999, groundwater samples were collected from two of the existing on-site RCRA monitoring wells. These samples exhibited the following contaminants above the SWPC in the two wells sampled.

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Monitoring Well Number	Contaminant Name	Contaminant Conc. (mg/l)	SWPC (mg/l)
DV-2	Copper	0.15	0.048
	Zinc	0.46	0.123
DV-4	Copper	0.05	0.048

Finally, the results of the groundwater samples collected by M&E from the temporary well inserted in the Geoprobe® boring and the UST groundwater monitoring well in January, 1999 are shown in the following table.

Monitoring Well Number	Contaminant Name	Contaminant Conc. (mg/l)	SWPC (mg/l)
ME-DEV-36	Phenanthrene	5.4	0.3
M&E-DEV-04 (temporary well)	Copper	0.065	0.048
	Zinc	0.28	0.123

### 750-3 Migration Stabilization Evaluation

As stated, the initial monitoring well network was installed in 1985, in order to evaluate groundwater quality in the vicinity of the EB-2 surface impoundment. CL&P initiated removal of known and potential groundwater contamination sources from the site in 1989, when a "Hilltop Disposal Area", formerly used to dispose of coal fly ash, bottom ash and coal, was closed. While not RCRA regulated, this area of approximately 4.5 acres was capped with a one-foot clay layer, to restrict precipitation infiltration, and minimize groundwater migration.

In 1991, EB-2 was closed in accordance with RCRA standards. In addition, the facility closed its RCRA container storage area in 1992.

### 750 - 4 Contaminated Groundwater Discharge to Surface Water Evaluation

The entire western portion of the facility is bordered by the Housatonic River ("the Housatonic"); a few miles upstream from its discharge into the Long Island Sound. According to past groundwater measurements, groundwater elevations in monitoring wells have varied hourly and monthly. The hourly range of approximately two feet in several wells was attributed to the tidal influence of the Housatonic. Groundwater flow was determined to be to the west and southwest, where it discharges into the Housatonic.

The data table at 750-2 shows a limited number of contaminants above SWPC, raising the possibility that contaminants may be discharging to the Housatonic in excess of SWPC levels. It is important to note, however, that the Housatonic River, in the vicinity of Milford, CT, is saline, and is classified by the CTDEP as SC/SB. This classification indicates that the water does not meet water quality criteria which supports one or more SB designated uses; typically due to such factors as combined sewer overflows, urban runoff, inadequate municipal or industrial wastewater treatment, or community-wide septic system failures

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**750 – 5 Evaluation of Significance of Contaminated Groundwater Discharge to Surface Water**

While contaminants have been detected in groundwater in excess of SWPC, it is not known whether contaminants have actually discharged to the Housatonic River at or above those concentrations. Based upon RCRA groundwater monitoring results, it appears that contaminant concentrations have decreased during the course of that monitoring, and will continue to decrease with further monitoring. In addition, flow calculations indicate that, due to the high base flow in the Housatonic River, it is highly unlikely that groundwater contaminated in excess of SWPC would adversely impact the Housatonic River.

Based upon the location of the previous groundwater samples collected at the site, two (2) existing monitoring wells and two (2) temporary wells installed in Geoprobe® borings, located closest to the Housatonic River, were chosen to evaluate the potential impact of contaminated groundwater on the River.

The estimated flow of groundwater to the river is 0.00425 ft<sup>3</sup>/sec based upon the site's physical settings and estimated hydrogeological values. There is no flow data available for the Housatonic River near the generating station. However, data obtained from the USGS at its gauging station located near the Connecticut Light & Power Stevenson Hydroelectric facility (located 14 miles upstream of the station) indicates that the annual seven-day minimum flow is 56 ft<sup>3</sup>/sec. Therefore, assuming that this flow is the minimum within the river downstream of the gauging station, the volume of water flowing in the Housatonic River would provide a minimum dilution factor of over 13,000 for groundwater discharging from this site. The maximum exceedance of a SWPC was detected in one of the Geoprobe® samples for phenanthrene, which was 18 times the SWPC. However, it should be recognized that a Geoprobe® sample typically contains high turbidity, and the actual groundwater discharge to the River probably has much lower contaminant levels. In any event, the high flow in the Housatonic is sufficient to make any potential surface water impacts insignificant.

**750 – 7 Future Groundwater Monitoring**

The facility is currently under the purview of the CT Property Transfer Act. It is also subject to the groundwater monitoring requirements of RCRA. These programs will provide for further , on-going groundwater monitoring, and verify that contaminated groundwater has remained within the dimensions of the “existing area of groundwater contamination.”