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 – Montville
Facility Address: 74 Lathrop Road
Facility EPA ID #: CTD 049181654

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?

   _X_ 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).

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): 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"[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): See notes under Section 750-3 in attached text

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).

[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.

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): 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[3] 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)?

__X__ 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[3] 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[3] 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[3] 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):): See notes under Section 750-5 in attached text

[3] 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[4])?

____ 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): In accordance with the instructions for Section 5, this section is not applicable for "insignificant" discharges.

[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.

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): 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).**

   __X__ 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 – Montville facility**, EPA ID # **CTD049181654**, located at **Montville 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) _____ Date 9/29/00
(print) JUAN A PEREZ
(title) Environmental Scientist

Supervisor (signature) _____ Date 12/8/00
(print)
(title) Section Ch. of, RCRA Corrective Action Section
EPA Region or State) Region I

Locations where References may be found:

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 Montville Station ("the Site") in November, 1988, 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 Thames River. These wastewaters were determined to be RCRA hazardous due to corrossivity, as well as the occasional presence of chromium and/or lead.

EB-2 was constructed in 1978, in an area formerly used for coal ash storage. As required by federal regulations, the basin was identified as a RCRA surface impoundment since the majority of discharges of hazardous waste went to the EB-2 basin. In November of 1988, CL&P notified the USEPA that it intended to close EB-2. After the removal of the sludge and liner, soil samples from the 18-inches immediately below the liner were collected from two (2) depths at seven locations. Samples were analyzed for Closure Performance Standard Parameters (CPSP). The results of the analyses indicate that none of the CPSP concentrations in the subliner soil exceeded the CPSP standards for clean closure. However, three (3) volatile compounds (PCE, TCE and toluene), not part of the CPSPs, were detected in the subsoils. The detection of these compounds has been attributed to the historic use of the site and the nature of the site subsurface materials. However, at the request of the EPA, these compounds were added to the groundwater monitoring program. The RCRA groundwater detection monitoring program was initiated on a quarterly basis, and is continued at present on a semi-annual basis. Certification of closure documentation was submitted to U.S.EPA, and to the CTDEP on January 30, 1991. To date, neither the U.S.EPA nor the CTDEP have approved the closure documentation.

An network of twelve (12) groundwater monitoring wells was installed in 1985. Eleven of the wells (MW-1S, MW-2 through MW-11) were advanced to shallow groundwater between the depths of 10' to 40', and were screened within the upper 10-feet of the overburden aquifer. One (1) well (MW-1D) was installed into shallow bedrock (approximately 40 feet below ground surface). The majority of the monitoring wells are located surrounding the former equalization basin, with two of the wells (MW-1S and MW-1D) located in the southwest corner of the site.

Corrected date Clarified on July 3, 2001

In March of 1999, a Phase I Environmental Site Assessment ("ESA"), was completed to identify potential areas of environmental concern ("AOCs") at the Montville facility, and to review prior environmental investigations. Subsequently, a limited Phase II ESA was completed 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.

Areas of concern (AOC) investigated as part of the groundwater sampling activities of the Phase II investigation activities were as follows:

- Former Gasoline UST - one groundwater sample.
- Petroleum Bulk Storage Tanks - six groundwater samples.
- Diesel Internal Combustion Units - three groundwater samples.
- Former Ash Disposal Lagoons - six groundwater samples.
- Former Coal Storage Area - one groundwater samples.
- Hazardous Materials Storage Areas - seven groundwater samples.
- Abutters of Concern - two groundwater samples.
- Regional Groundwater Plume (offsite) - two groundwater samples.

The site is situated with two groundwater classification areas designated by the CTDEP. The western portion of the site classified as GA/GAA contain the former ash disposal lagoons, while the remaining AOCs are located within a GB groundwater classification area.

The only areas where contaminants were found in excess of applicable CTDEP Remediation Standard Regulations (RSRs) were the following:

Petroleum Bulk Storage Tanks - Phenanthrene, arsenic, beryllium, and zinc were detected at concentrations above the SWPC in one of six groundwater samples.

Former Ash Disposal Lagoons - Arsenic was detected above the GA/GAA groundwater protection criteria (GPC) in three (3) groundwater samples. Total petroleum hydrocarbons (TPH) were detected above the GA/GAA GPC in one groundwater sample.

- As a result of the site being located in two (2) groundwater classification areas, NRG Energy prepared a reclassification application to the CTDEP to reclassify the portion of the site presently as GA/GAA to GB. As part of that application, groundwater investigation activities have been on-going at the site since September, 1999. Nine (9) groundwater monitoring wells (six installed in August, 1999 and three (3) existing wells) were sampled for full priority pollutant compounds in September, 1999 and March, 2000. Two additional monitoring wells were installed in April, 2000 and eleven (11) groundwater samples were collected in May, 2000. An additional round of groundwater sampling from monitoring wells selected by the CTDEP was collected in October, 2000.

750-2 Groundwater Contamination Determination

As previously stated, the CTDEP classification of groundwater at the site is divided between "GA/GAA", suitable for drinking and "GB"; not suitable for drinking. The dividing line between the two

classification areas is located along the New England Central Railroad right-of-way. The site is also bordered to the east by the Thames River. Consequently, the CTDEP's GA/GAA GPC and the SWPC are of primary importance when evaluating groundwater contamination west of the railroad right-of-way while SWPC is of primary importance when evaluating groundwater contamination east of the railroad right-of-way. Therefore, groundwater quality data obtained from wells located west of the railroad right-of-way will be compared to the GA/GAA GPC and SWPC, while groundwater data obtained from wells located east of the railroad will be compared to the SWPC.

As a result of the site being located in two (2) groundwater classification areas, NRG Energy prepared a reclassification application to the CTDEP to reclassify the portion of the site presently as GA/GAA to GB. However, the reclassification application was withdrawn based upon the CTDEP's opinion that the groundwater analytical results did not find any demonstrated groundwater contamination on that portion of the site. As part of that application, groundwater investigation activities have been on-going at the site since September, 1999. Nine (9) groundwater monitoring wells (six installed in August, 1999 and three (3) existing wells) were sampled for full priority pollutant compounds in September, 1999 and March, 2000. Two additional monitoring wells were installed in April, 2000 and eleven (11) groundwater samples were collected in May, 2000. An additional round of groundwater sampling from monitoring wells selected by the CTDEP was collected in October, 2000. The results of the four (4) rounds of groundwater samples revealed the following:

Monitoring wells located within the GA/GAA classification area:

Monitoring Well Number	Contaminant Name	Contaminant Conc. (mg/l)	GA/GAA PMC (mg/l)	SWPC (mg/l)
MW-1	Beryllium	0.006	0.004	0.004
MW-1R	Cadmium	0.0109	0.005	0.006
MV-1S	Arsenic	0.004	0.05	0.004
	Nickel	0.29	0.1	0.88
	Zinc	0.26	5	0.123
MW-5	Arsenic	0.021 - 0.082	0.05	0.004

Monitoring wells located within the GB classification area:

Monitoring Well Number	Contaminant Name	Contaminant Conc. (mg/l)	SWPC (mg/l)
MW-4	PCBs	5.4 / 5.9	0.004 0.0005
	Arsenic	0.004	0.004
MW-6	Arsenic	0.138 - 0.211	0.004
	Beryllium	0.012	0.004
	Cadmium	0.012	0.008 0.006
	Copper	0.0675	0.048
	Nickel	1.0	0.88
	Zinc	0.30 - 0.51	0.123
MW-7	Arsenic	0.014 - 0.036	0.004
MV-3	Arsenic	0.006	0.004
	Zinc	0.25	0.123
MV-6	Arsenic	0.004	0.004

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. In 1988, CL&P initiated closure of EB2 in accordance with RCRA standards. Certification of closure documentation was submitted to U.S.EPA, and to the CTDEP on January 30, 1991. To date, neither the U.S.EPA nor the CTDEP have approved the closure documentation.

750-4 Contaminated Groundwater Discharge to Surface Water Evaluation

The entire eastern portion of the facility is bordered by the Thames River; a few miles upstream from its discharge into the Long Island Sound. According to past groundwater measurements conducted as part of the groundwater reclassification activities, groundwater elevations in monitoring wells close to the Thames River vary only by 0.5 feet within a few hours, indicating limited tidal influence. Groundwater flow was determined from five (5) rounds of groundwater elevation measurements to be west to east towards the Thames River.

The data table at 750-2 shows a limited number of contaminants above SWPC, raising the possibility that contaminants may be discharging to the Thames River in excess of SWPC levels. It is important to note, however, that the Thames River, in the vicinity of Montville, CT, is saline, and is classified by the CTDEP as SC/SB, SD/SB. It is unsuitable for shellfish harvesting, or as a fish/shellfish habitat. The

Thames River does not meet the water quality criteria for supporting one or more assigned designated uses due to pollution.

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 Thames River at or above those concentrations. Based upon the groundwater monitoring activities conducted for the groundwater reclassification application, flow calculations indicate that, due to the high base flow in the Thames River, it is highly unlikely that groundwater contaminated in excess of SWPC would adversely impact the Thames River.

Based upon the location of the previous goundwater samples collected at the site, seven monitoring wells located closest to the Thames River were chosen to evaluate the potential impact of contaminated groundwater on the river.

The estimated flow of groundwater to the river was calculated between 0.0003 ft^3/sec and 0.0008 ft^3/sec based upon the site's physical settings and estimated hydrogeological values. There is no flow data available for the Thames River near the generating station. However, data was obtained from the USGS at their gauging stations located in two tributaries of the Thames River (Quinebaug River and the Shetucket River) located approximately 10 miles upstream from the site. The minimum seven day flows from these two rivers combined into the Thames River was calculated at a combined rate of 81 ft^3/sec. Therefore, assuming that this flow is the minimum within the river downstream of the gauging stations, the volume of water flowing in the Thames River would provide a dilution factor between 101,000 and 270,000 for groundwater discharging from this site. The high flow in the Thames River 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."