

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: CRRRA Shelton Landfill
Facility Address: 866 River Road, Shelton Ct.
Facility EPA ID #: CTD000604546

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?

Y 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

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):

Groundwater: Contamination exists in excess of Connecticut's Remediation Standard Regulations (RSR) groundwater protection criteria (gwpc) as measured in several onsite wells. Contaminants are: iron, sodium, manganese, arsenic, cadmium, lead, chromium, aluminum, gross alpha, gross beta, radium, benzene, 1,1,1-trichloroethane, 1,1-dichloroethylene, tetrachloroethylene, trichloroethylene. Reference: HRP Associates, Inc., Annual Report of Groundwater Quality Monitoring, CRRA Shelton Landfill, Shelton, Connecticut, March 15, 2000.

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): *See Attachment 4*

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 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 CRRA Shelton Landfill facility, EPA ID # CTD000604546, located at 866 River Road (Route 110), Shelton, Ct. 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) David Lin Date 9/29/00
(print) David Lin
(title) Env. Engineer

Supervisor (signature) Matthew R. Hughes Date 9/29/00
(print) Matthew R. Hughes
(title) Section Chief
(EPA Region or State) EPA - NE

Locations where References may be found:

CTDEP 79 Elm St. Hartford

Contact telephone and e-mail numbers

(name) David Ringquist
(phone #) 860-424-3573
(e-mail) david.ringquist@po.state.ct.us

Attachment 1
Current Human Exposures Under Control
Are Media Contaminated? Rationale and References

Groundwater: Contamination exists in excess of Connecticut's Remediation Standard Regulations (RSR) groundwater protection criteria (gwpc) as measured in several onsite wells. Contaminants are: iron, sodium, manganese, arsenic, cadmium, lead, chromium, aluminum, gross alpha, gross beta, radium, benzene, 1,1,1-trichloroethane, 1,1-dichloroethylene, tetrachloroethylene, trichloroethylene. Reference: HRP Associates, Inc., Annual Report of Groundwater Quality Monitoring, CRRA Shelton Landfill, Shelton, Connecticut, March 15, 2000.

Indoor Air: Although landfill gas migrated into several offsite buildings including businesses and homes during a period in August 1999, this arose from operation and maintenance problems associated with the landfill gas collection and treatment system. This has since been corrected as documented by DEP personnel site visit and several correspondences received from the landfill owner, Connecticut Resources and Recovery Authority. A Landfill Gas Remediation and Repair Plan, dated October 22, 1999, documents the temporary and permanent modifications to the landfill gas system that were made and are proposed to be made.

Surface Soil: All surface soils (<2ft) are components of completed cover systems for the municipal solid waste/ash landfill, the two lined ash landfills and the hazardous waste landfill. These cover soils were imported to the site as clean fill and clean topsoil and are presently vegetated. Certification reports documenting the placement of this soil for closure of each waste unit are on file at DEP.

Surface Water: The Far Mill River, the Housatonic River and the Housatonic River lagoon surface waters have been sampled. Comparison of samples taken from upstream of the Far Mill River to those taken downstream of the Far Mill and to samples from the Housatonic River and lagoon shows an increase in turbidity, iron, manganese and sodium. Aluminum and zinc were also detected but did not exceed the RSR surface water protection criteria (swpc). Reference: HRP Associates, Inc., Report of Environmental Monitoring, CRRA Shelton Landfill, Route 110, Shelton, Connecticut, April 1999 Sampling Event, Second Quarter 1999.

Sediment: Sediment was sampled during 1997 and 1999. Attachment ^{1 A} X contains copies of the sediment data and written summary from the 1999 Annual Report. Sediment samples were taken from upstream and downstream of the Far Mill River and from the Housatonic River lagoon and tested for metals, volatiles and semi-volatiles. The 1999 Annual Report shows that the contaminants in the sediment are below all RSR direct exposure criteria.

Subsurface Soil: Municipal solid waste, hazardous waste and municipal solid waste incinerator ash residue are disposed of in this landfill. Subsurface soil is therefore contaminated.

Air Outdoors: The collected landfill gas is thermally treated in a flare located at the southern end of the landfill site. The flare emits combustion gases to the ambient air. The DEP Waste and Air Bureaus have permitted this emission point.

Attachment 1A

close to or at the surface of the water. "M" indicates a sample taken at an approximate depth of 5'-10' below the water surface and, samples marked "B" were taken at approximately 10'-19' below the water surface. The Far Mill River flow rate, measured during all four quarters of 1999, was approximately 2 feet per second with clear water clarity.

Surface water samples were analyzed for leachate indicator parameters and metals during all four sampling events in 1999. During 1999, the downstream samples in the Far Mill River (sampling location SW-2) exhibited higher levels of specific conductance, turbidity, alkalinity, aluminum, chloride, phosphorus, total dissolved solids, iron, manganese, sodium, and zinc than the upstream samples (sampling location SW-1). However, the downstream samples exhibited typically lower or comparable levels of ammonia, biologic oxygen demand, chemical oxygen demand, nitrate, arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, and silver. This data, therefore, indicates that most of the metals concentrations are higher upstream of the landfill, although there is some downstream increase in typical leachate parameters. However, with regards to the parameters which typically increased in concentration downstream, many of these parameters are not regulated by Standards. Those which do have standards are almost exclusively secondary standards.

5.1 Sediment Sampling

The second of two rounds (the first round was conducted in July 1997) of physical and chemical characterization of sediment quality was conducted proximal to the Shelton Landfill in the Far Mill River and the Housatonic Lagoon in August of 1999. The monitoring locations are described as follows:

S-1: Monitoring location is in the depositional area immediately upstream of the dam at River Road (Connecticut Route 110).

S-2: Monitoring location is a transect across the Farmill River downstream of the O&G expansion area, but upstream of the confluence of the Farmill and Housatonic Rivers. The transect is comprised of three stations.

S-2S: Sample to be collected mid-way between the southern waterline and S-2M.

- S-2M: Sample to be collected at the mid-point of the transect across the Farmill River, and coincides with the surface water monitoring location SW-2.
- S-2N: Sample to be collected mid-way between the northern waterline and S-2M.
- S-3: Monitoring location is in the Housatonic River Lagoon inlet. Station is located in the southern side of the inlet and coincides with the surface water monitoring location SW-3.
- S-4: Monitoring location is in the Housatonic River Lagoon and coincides with the surface water monitoring location SW-4.
- S-5: Monitoring location is in the Housatonic River Lagoon and coincides with the surface water monitoring location SW-5.
- S-6: Monitoring location is mid-stream in the Farmill River south of the Leachate Treatment Facility and the discharge from Sediment Pool No. 3.

The detected chemical results and grain size fractionation of the sediment analysis and concurrent surface water sampling results are present in Appendix F. Results from the 1999 sediment sampling are comparable to the 1997 results. The S-1 (upstream, Far Mill River) sampling location sediment results indicate lower levels of copper, lead, and zinc than those detected in the S-6 (midstream, Far Mill River) and S-2 (downstream, Far Mill River) sampling locations. Semi-volatile constituents were also detected in S-2, S-3, S-4 and S-5 sediment at low levels. Higher levels of copper, lead and zinc were identified in sediment sample S-2(M) than in S-2(S) and S-2(N). As with the 1997 sediment sampling results, the highest levels of metals identified in sediment in 1999 were noted in Housatonic Lagoon sediment sample locations S-3, S-4, and S-5; as well as in the Far Mill River locations. Sample location S-3 is located at the inlet to the Housatonic Lagoon; S-4 and S-5 are located within the lagoon. In 1997, all of the detected analyzed constituents were identified at lower levels in the S-3 sediment sample than at the S-4 and S-5 locations. In 1999, with the exception of the semi-volatiles, cadmium, and copper, all of the detected analyzed constituents were identified at lower levels in the

Shelton Landfill 1997 Annual Report

DETECTED RESULTS OF SEDIMENT SAMPLING									
	S-1	S-2 (comp)	S-2 (S)	S-2 (N)	S-2 (M)	S-3	S-4	S-5	S-6
Copper (mg/kg)	4.6	NA	13.1	17.7	12.9	188	424	406	14.7
Lead (mg/kg)	6.2	NA	13.2	8.4	12.5	37.6	102	107	13.7
Zinc (mg/kg)	20.1	NA	41	60.4	38.9	177	372	357	62.1
PCBs (total)	ND	ND	NA	NA	NA	ND	ND	ND	ND
Copper (ug/g)	4.6	23.3	NA	NA	NA	130	318	477	28.9
Lead (ug/g)	6	6.1	NA	NA	NA	27.9	97.8	113	4.9
Zinc (ug/g)	25.4	21.6	NA	NA	NA	151	363	860	39
Cadmium (ug/g)	ND	ND	NA	NA	NA	1.5	3.8	3.4	ND
Nickel (ug/g)	ND	4.6	NA	NA	NA	13.7	24.7	39.9	3.7
TOC (%)	0.16	NA	0.14	2.19	0.37	0.88	1.56	1.22	0.51
TIC (%)	0.00	NA	0.00	0.68	0.00	0.06	0.10	0.00	0.00
TC (%)	0.16	NA	0.14	2.87	0.37	0.94	1.66	1.22	0.51
AVS (uM)	0.00	16.10	NA	NA	NA	343.00	1166.00	2998.00	0.00
Phenanthrene (ppb)	ND	ND	NA	NA	NA	ND	ND	ND	41.0
Anthracene (ppb)	ND	ND	NA	NA	NA	ND	ND	ND	49.0
Fluoranthene (ppb)	ND	39.0	NA	NA	NA	ND	ND	ND	86.0
Pyrene (ppb)	ND	39.0	NA	NA	NA	ND	ND	ND	85.0
mg/kg = milligrams per kilogram									comp = composite of three locations at this transect
ug/g = micrograms per gram									(S) = mid-point between southern waterline and S-2(M)
% = percent									(N) = mid-point between northern waterline and S-2(M)
ppb= parts per billion									(M) = mid-point of transect, coincides with surface water location S-2 (T)
AVS = Acid Volatile Sulfide									TIC = Total Inorganic Carbon
TOC = Total Organic Carbon									PCBs = Polychlorinated Biphenyls
uM = micromoles									NA = Not Analyzed
ND = Not Detected									TC = Total Carbon (sum of TOC & TIC)

Shelton Landfill 1999 Annual Report

DETECTED RESULTS OF SEDIMENT SAMPLING									
	S-1	S-2 (comp)	S-2 (S)	S-2 (N)	S-2 (M)	S-3	S-4	S-5	S-6
Copper (mg/kg)	15.9	NA	216	28.9	286	390	477	462	141
Lead (mg/kg)	5.4	NA	37	8.5	42.6	55.4	75.6	77.2	71.2
Zinc (mg/kg)	40.7	NA	147	34.4	193	235	308	275	195
PCBs (total)	ND	ND	NA	NA	NA	ND	ND	ND	ND
Copper (ug/g)	5.5	47.6	NA	NA	NA	139.7	112.4	227.6	69.1
Lead (ug/g)	9.29	35.8	NA	NA	NA	70.6	73.7	78.4	81.2
Zinc (ug/g)	25.4	76.8	NA	NA	NA	221.1	260.1	274.9	146.7
Cadmium (ug/g)	ND	0.38	NA	NA	NA	3.26	3.71	2.78	2.32
Nickel (ug/g)	ND	4.6	NA	NA	NA	12	15.3	23.2	16.7
TOC (%)	0.10	NA	0.29	1.15	1.00	1.24	1.50	1.47	1.24
TIC (%)	ND	NA	ND	0.09	0.08	0.10	0.15	0.14	0.07
TC (%)	0.10	NA	0.29	1.24	1.08	1.34	1.65	1.61	1.31
AVS (uM)	ND	29.4	NA	NA	NA	85.1	124.2	104.1	3.22
Phenanthrene (ppb)	ND	ND	NA	NA	NA	ND	ND	ND	ND
Anthracene (ppb)	ND	ND	NA	NA	NA	ND	ND	ND	ND
Fluoranthene (ppb)	ND	18	NA	NA	NA	12	22	11	ND
Pyrene (ppb)	ND	18	NA	NA	NA	12	21	11	ND

<p>mg/kg = milligrams per kilogram</p> <p>ug/g = micrograms per gram</p> <p>% = percent</p> <p>ppb= parts per billion</p> <p>AVS = Acid Volatile Sulfide</p> <p>TOC = Total Organic Carbon</p> <p>uM = micromoles</p> <p>ND = Not Detected</p>	<p>comp = composite of three locations at this transect</p> <p>(S) = mid-point between southern waterline and S-2(M)</p> <p>(N) = mid-point between northern waterline and S-2(M)</p> <p>(M) = mid-point of transect, coincides with surface water location S-2 (T)</p> <p>TIC = Total Inorganic Carbon</p> <p>PCBs = Polychlorinated Biphenyls</p> <p>NA = Not Analyzed</p> <p>TC = Total Carbon (sum of TOC & TIC)</p>
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Attachment 2
Current Human Exposures Under Control
Summary Exposure Pathway Evaluation Table
Rationale and References

Groundwater Pathway to Residents: There are several domestic groundwater wells located within 200 to 900 feet to the west of the landfill as shown on the site map attached. The following rationale supports the conclusion that there is not a complete pathway between contamination and human receptors. The groundwater classification system used by DEP classifies the groundwater beneath the landfill as “GC”, meaning a known release has occurred to the groundwater and it is not suitable for use as a potable water supply. The GC designation is an institutional control in that CTDEP law requires that CRRA obtain ownership of the land/groundwater plume, which they have done, in order to preclude placement of drinking water wells within that plume in the future. The domestic wells are located in a groundwater area classified as “GA” which means the water is suitable for drinking without treatment. Several hydrogeologic studies have been conducted at the site to define the direction of groundwater flow in the overburden and bedrock aquifers. All studies conclude that the groundwater flows southeast toward the Housatonic and Far Mill Rivers, away from the domestic wells, even when considering tidal effects. Potential contaminant migration toward domestic wells through bedrock fractures is considered unlikely based on the absence of contaminants in two drinking water wells located just west of Route 110 and considered the most likely to be impacted by the landfill due to their location. As part of a discharge permit application, the landfill owner plans to sample a representative number of the domestic wells to further support the conclusion that a complete pathway does not exist. References are listed in the bibliography attached.

Groundwater Pathway to all other Receptors: There are no complete pathways for any of the other receptors listed because groundwater is not withdrawn or used for any purpose at the site.

Surface Water Pathway to all Receptors: The DEP surface water classification for the Housatonic River including the lagoon is SC/SB, meaning certain Water Quality Criteria and not currently met due to point or non-point sources of pollution, but with a goal to restore the water to SB classification. The pollution sources include historic releases to the upstream Naugatuck River, sewage problems in upstream towns, river dredge holes from road construction and, to a lesser degree, the Shelton landfill. The designated use for the type of water is recreational fish and wildlife habitat; shellfish harvesting for transfer to approved areas for purification prior to human consumption, agricultural and industrial supply and other legitimate uses including navigation. Since recreational boaters use the river and lagoon, there is a complete pathway between contaminants and those who swim or eat fish caught there. All other potential human receptors are not exposed.

Subsurface Soil: All areas of concern at the site have either been closed by installation of a cover system or removed. Therefore no pathway exists between the contaminated subsurface soil and any receptor.

Air Outdoors: There is a pathway between receptors and the emissions from the landfill gas flare and a limited amount of landfill gas that goes uncaptured by the gas collection system. A temporary permit has been issued by the DEP for the flare/collection system and CRRA is required by DEP to propose a permanent flare system. Emission testing will be conducted and a final permit issued after the permanent system is installed.

Attachment 3
Shelton Landfill
Bibliography

HRP Associates, Inc., Annual Report of Groundwater Quality Monitoring for 1999, CRRA Shelton Landfill, Shelton Connecticut, March 15, 2000

Environmental Risk Limited, Letter in support of permit application for the Northeast Expansion Area, September 18, 1995

Environmental Risk Limited, Hydrogeological Investigation in the Northeast Expansion Area for the Shelton Landfill and two Contiguous Properties to the North, Shelton, Connecticut, October, 1995

Connecticut DEP, Sandra Brunelli, Environmental Indicator Evaluation Report, CRRA Shelton Landfill, 866 River Road (Route 110), Shelton, Connecticut, September 24, 1998

Fuss & O'Neill, Inc., CRRA Shelton Landfill, Shelton, Connecticut, Discharge Permit Reapplication, DEP/WCU 126-104, July 1989

Environmental Risk Limited, CRRA Shelton Landfill, 1993 Annual Report, Municipal Solid Waste, Groundwater Monitoring Summary, CRRA/Shelton Landfill Shelton, Connecticut, December 1993

Connecticut DEP, Groundwater Discharge Permit, Shelton Landfill, Permit No. LF0000052, August 27, 1996

Attachment 4

The following is a summary of the physical evidence that supports the fact that migration of contaminated groundwater is stabilized

A hydrogeological investigation (referenced below) was conducted at the Shelton Landfill in 1995 in support of an application to the CTDEP for a modification to Shelton Landfill's groundwater discharge permit, necessary to operate an expanded area of the landfill known as the Northeast Expansion Area. The objective of this work was to determine the vertical and horizontal direction of a theoretical plume of contaminated groundwater released at the Northeast Expansion Area. This investigation concludes that a plume "would apparently remain within the property of the Shelton Landfill, for both the overburden or bedrock aquifers, and during both low or high tide conditions". While the investigation focuses on one area of the landfill, this information, combined with approximately 20 years of groundwater monitoring of the entire landfill, provides evidence that groundwater is expected to remain within the horizontal and vertical dimensions of the existing area of groundwater contamination. The following provides a summary of the evidence supporting the above conclusion:

- "The fluctuations in the Housatonic River elevations caused by tidal changes influence groundwater elevations in both the unconsolidated zone monitoring wells and the bedrock monitoring wells...and demonstrates the interconnectedness of the system and the certainty that the discharge is ultimately to the Housatonic River" Environmental Risk Limited, Hydrogeological Investigation in the Northeast Expansion Area of the Shelton Landfill and Two Contiguous Properties to the North, Shelton, Connecticut, October 1995.
- During the tidal cycle there is a temporary reversal in the overburden and bedrock groundwater flow during a rising tide however the "falling tide would return the (groundwater flow) to a southeastern path toward a discharge to the river.
- The bedrock surface elevation, fracture zones and foliation have been determined to dip down in a southeasterly direction.
- "For 1999, groundwater flow in both the bedrock and overburden aquifers are generally from west-northwest to east-southeast, toward the Far Mill and Housatonic Rivers, via the Housatonic River lagoon". HRP Associates, Inc., 1999 Annual Report of Groundwater Quality Monitoring, CRRA Shelton Landfill, route 110, Shelton, Connecticut, March 15, 2000.
- "Domestic wells at lots 151 and 153 (located in bedrock near Route 110, west of Route 110) did not exceed National Primary or Secondary drinking water standards during 1993 for any parameters". "Groundwater at the domestic wells upgradient of the landfill, which are believed to be bedrock wells, does not appear to be impacted by the landfill". Environmental Risk Limited CRRA Shelton Landfill, 1993 Annual Report, Municipal Solid Waste, Groundwater Monitoring Summary, CRRA/Shelton Landfill, Shelton, Connecticut, December 1993.

Attachment 5

Is the discharge of contaminated groundwater into surface water likely to be insignificant as measured in groundwater prior to entry to the groundwater surface water?

The maximum concentration of key contaminants discharging into surface water as measured in the groundwater prior to entry to the surface water is summarized as follows:

The key contaminants (leachate indicators) are chloride, sodium, TDS, manganese and iron.

The maximum concentrations (ppm) and the water standards are presented below: See the site map (attached) for well locations.

The maximum chloride level is at well MW-BR2, located just west of the Housatonic lagoon and down gradient of the landfill, is approximately 4500 ppm compared to a standard of 250.

The maximum sodium level is at well MW-QB, located between the closed metal hydroxide cell and the closed Northeast Expansion Ash Disposal area. The level is approximately 1400 ppm compared to standard of 28 ppm

The maximum TDS level is at well MW-QB at approximately 25000 ppm compared to a standard of 500 ppm.

The maximum manganese level is at well MW-100, located south of the Northeast Expansion area, at approximately 15 ppm compared to a standard of 0.05 ppm.

The maximum iron level is at well MW-QB at approximately 250 ppm compared to a standard of 0.3 ppm.

The more toxic heavy metals and volatile organics in general seldom exceed 10 times the respective water quality standard as measured in the wells as summarized in the 1999 annual groundwater monitoring report by HRP (see reference above).

A reference to 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-systems is the 1999 annual report above, at Section 5.0 Impacts to Adjacent Surface Waters. This section summarizes the surface water sample results taken during four quarterly sampling events in 1999. With the exception of aluminum, iron and manganese, all heavy metals and volatile organics were below the comparative water standards. Chloride, pH, turbidity, sodium, chloride, alkalinity, hardness TDS exceeded federal secondary MCLs.

**US EPA New England
RCRA Document Management System (RDMS)
Image Target Sheet**

RDMS Document ID# 742

Facility Name: CT Resource Recovery Auth (CRRRA Shelton Landfill)

Phase Classification: R-13

Document Title: Environmental Indicator (EI) Determination, Migration of Contaminated Groundwater Under Control (CA 750 YE) - CT Resource Recovery Auth (CRRRA Shelton Landfill)

Date of Document: 09-29-2000

Document Type: EI Determination

Purpose of Target Sheet:

- Oversized** **Privileged**
 Page(s) Missing **Other** (Please Provide Purpose Below)

Comments:
Oversized Map of Inferred Ground Water Contour Map, 7/99

* Please Contact the EPA New England RCRA Records Center to View This Document *

Cr. 1/2

Jim F.



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION



PERMIT

Connecticut Resources Recovery Authority
179 Allyn Street
Hartford, Connecticut 06103

Attention: Mr. William R. Darcy
President

Re: Facility ID: 126-104
City of Shelton
Housatonic River Watershed

This permit is issued in accordance with Section 22a-430 of Chapter 446k, Connecticut General Statutes, and regulations adopted thereunder, as amended.

Your permit application (Application No. 199502403 received on June 28, 1995), supporting documents, addenda, letters and plates identified in Appendix A attached to this permit; and supplemental documents have been reviewed by the Connecticut Department of Environmental Protection.

The Commissioner of Environmental Protection (hereinafter "the Commissioner") has found that the proposed system to treat the discharge to ground water of leachate from an existing 6.3-acre lined ash residue disposal area (the southeast expansion area), if the liner and collection system fail, and a proposed 3.1-acre lined ash residue disposal area (the northeast expansion area), if the liner and collection system fail, both located at 866 River Road, Shelton, will protect the waters of the state from pollution. The proposed system includes the construction of a new, 3.1 acre, lined municipal solid waste ash residue disposal area.

The Commissioner, acting under Section 22a-430, hereby permits the Connecticut Resources Recovery Authority (CRRRA) (hereinafter "the permittee") to discharge leachate from the southeast expansion area and the proposed northeast expansion area, both located at 866 River Road, Shelton, Connecticut, to the ground waters of the state in accordance with the following conditions:

- 1) Permitted discharges:
 - (A) Discharge Serial No. 301 (southeast expansion area)
Description - Leachate from Municipal Solid Waste Ash Residue (Discharge code 305002d)

S:\SRP\LANDFILL\SHLTNPRM.15

Discharge Location - Ground water in the watershed of the Housatonic River (Basin Code 6000) and the Farmill River (Basin Code 6025).

Disposal Area Design Size - 6.3 acres, lined, municipal solid waste ash residue

(B) Discharge Serial No. 302 (northeast expansion area)
Description - Leachate from Municipal Solid Waste Ash Residue (Discharge code 305002a)

Discharge Location - Ground water in the watershed of the Housatonic River (Basin Code 6000) and the Farmill River (Basin Code 6025).

Disposal Area Design Size - 3.1 acres, lined, municipal solid waste ash residue

- 2) The southeast expansion area shall be operated and maintained in accordance with the permit to construct a solid waste disposal area No. 1260181 issued on August 5, 1992, and in accordance with plans and specifications described in application No. 90-579, approved by the Commissioner on April 19, 1994. The northeast expansion area shall be operated and maintained in accordance with the permit to construct a solid waste disposal area No. 1260181 issued on August 5, 1992, and in accordance with plans and specifications described in the application, and the detailed plans and specifications identified in Appendix A.
- 3) The surface and groundwaters shall be monitored in accordance with the following submittals listed below and collectively identified as the "Groundwater and Surface Water Monitoring Program":

Groundwater and Surface Water Monitoring Program

Pages 1 to 39 from "Groundwater and Surface Water Quality Monitoring Program for the Northeast Expansion Area and Southeast Expansion Area in Support of an Amendment of the CTDEP Groundwater Discharge Permit No. LF0000052," prepared by CRRA, submitted to the Commissioner on September 18, 1995, as revised to June 12, 1996.

Tables No. 1 and 2 from submittal dated May 31, 1996 prepared by CRRA.

Table No. 3 from "Groundwater and Surface Water Quality Monitoring Program for the Northeast Expansion Area and Southeast Expansion Area in Support of an Amendment of the CTDEP Groundwater Discharge Permit No.

LF0000052," prepared by CRRA, submitted to the Commissioner on September 18, 1995, as revised to June 12, 1996.

Figures No. 1, 2, and 3 from "Groundwater and Surface Water Quality Monitoring Program for the Northeast Expansion Area, Southeast Expansion Area and MSW/Ash Area in Support of the CTDEP Groundwater Discharge Permit," submitted to the Commissioner on September 18, 1995, as revised to May 1996.

Appendices A, B, C, D, E, F, G, H, and I from submittal dated May 31, 1996 prepared by CRRA.

Appendix J from letter and attachments submitted by CRRA dated June 14, 1996 and facsimile submitted by CRRA dated June 17, 1996.

(A) Surface Water Quality Monitoring

- (i) Locations - Surface water quality monitoring shall be conducted at the following locations as shown on Figure 2, entitled "Water Quality Monitoring Site Plan," (sic) contained in the "Groundwater and Surface Water Monitoring Program" identified in paragraph 3 above.

SW-1: Farmill River upstream of the CRRA Shelton Landfill. Samples to be collected from mid-stream and mid-depth.

SW-2: Farmill River downstream of the O&G expansion area, but upstream of the confluence of the Farmill and Housatonic Rivers.

SW-2T: Samples to be collected from mid-stream and within 0.5 meter of the water surface.

SW-2B: Samples to be collected from mid-stream and within 0.5 meter of the stream bed.

SW-3: Housatonic River Lagoon inlet. Station is located to the southern side of the inlet.

SW-3T: Samples to be collected within 0.5 meter of the water surface.

SW-3M: Samples to be collected from mid-depth.

- SW-3B: Samples to be collected within 0.5 meter of the bottom of the lagoon.
- SW-4: Housatonic River Lagoon mid-point. Station is located about 200 feet east of the shoreline opposite MW-BR8 and Sediment Pool No. 2.
- SW-4T: Samples to be collected within 0.5 meter of the water surface. This location was formerly known as S-4.
- SW-4M: Samples to be collected from mid-depth. This location was formerly known as S-5, and prior to that was known as S-2.
- SW-4B: Samples to be collected within 0.5 meter of the bottom of the lagoon. This location was formerly known as S-6.
- SW-5: Housatonic River Lagoon northeast. Station is located approximately 200 feet south of MW-100 and MW-BR1.
- SW-5T: Samples to be collected within 0.5 meter of the water surface.
- SW-5M: Samples to be collected from mid-depth.
- SW-5B: Samples to be collected within 0.5 meter of the bottom of the lagoon.
- (ii) Each surface water sample collected from the stations designated in paragraph 3(A)(i) shall be sampled quarterly between the 15th and 30th day of January, April, July, and October, except as provided by paragraph 3(A)(iv)(f).
- (iii) Each surface water sample shall be analyzed for the following parameters:
- (a) Surface water samples collected from SW-1, SW-2T and SW-2B, SW-3T and SW-3B, SW-4T and SW-4B, and SW-5T and SW-5B shall be analyzed for the parameters numbered 1-32.
- (b) Surface water samples collected from SW-3M, SW-4M and SW-5M shall be analyzed for the parameters numbered 1-10.

<u>Parameter</u>	<u>Minimum Level</u>
1. Specific Conductance	
2. pH	
3. Total Dissolved Solids	
4. Total Suspended Solids	
5. Chloride	
6. Alkalinity	
7. Hardness as CaCO ₃	
8. BOD, 5-day	
9. COD	
10. Ammonia-N, total	
11. Kjeldahl-N, total	
12. Nitrate-N, total	
13. Nitrite-N, total	
14. Phosphorus, total	
15. Aluminum, total	10 µg/L
16. Arsenic, total	5 µg/L
17. Barium, total	10 µg/L
18. Cadmium, total	0.5 µg/L
19. Chromium, total	5 µg/L
20. Copper, total	5 µg/L
21. Copper, dissolved	5 µg/L
22. Iron, total	5 µg/L
23. Iron, dissolved	5 µg/L
24. Lead, total	5 µg/L
25. Lead, dissolved	5 µg/L
26. Manganese, total	1 µg/L
27. Manganese, dissolved	1 µg/L
28. Mercury, total	0.2 µg/L
29. Nickel, total	5 µg/L
30. Silver, total	1 µg/L
31. Zinc, total	10 µg/L
32. Zinc, dissolved	10 µg/L

(iv) Sampling Conditions

- (a) The Farmill River flows shall be gauged and reported for each day of sample collection.
- (b) Surface water samples shall be collected only when no measurable precipitation has fallen on the site during the previous 72 hours.

- (c) Sampling locations that are tidally influenced, (e.g. SW-2, SW-3, SW-4, and SW-5) shall be sampled at low ebb, defined here as between one-half hour and two hours after the published time of low tide for Bridgeport corrected to local mean time (NOAA Tide Tables).
- (d) Except as provided by sub-paragraph (f) of this section, all samples to be collected from the monitoring locations identified in paragraph 3(A)(i) shall be collected on the same day.
- (e) Time of collection, water clarity, sample depth, total water column depth (distance to river bottom), water and air temperature, pH, specific conductance, salinity and dissolved oxygen shall be measured in the surface water body for each sample collected in accordance with the requirements of paragraph 3(A). Results shall be reported together with the results of laboratory analyses, and for those parameters required to be measured in the field and in the laboratory, both values shall be reported.
- (f) During periods when surface water conditions would be unsafe for field personnel (e.g. icing conditions in the lagoon), DEP shall be contacted to discuss whether a particular surface water sampling event may be rescheduled.

(B) Ground Water Quality Monitoring

- (i) Locations - Ground water quality monitoring shall be conducted at the following locations as shown on Figure 2, entitled "Water Quality Monitoring Site Plan," (sic) contained in the monitoring plan contained in the "Groundwater and Surface Water Monitoring Program" identified in paragraph 3 above.
 - (a) Upgradient Monitoring Wells
 - U-1: MW-GP4
 - U-2: MW-BR4
 - U-3: MW-E
 - U-4: MW-ED
 - U-5: MW-BR6
 - U-6: MW-QB

(b) Compliance Monitoring Wells:

C-1: MW-RS
C-2: MW-RD
C-3: MW-BR12
C-4: MW-BR9
C-5: MW-D2D
C-6: MW-BR7

(c) Plume Characterization Wells:

W-1: MW-SD (formerly MW-Js old)
W-2: MW-SS
W-3: MW-TS
W-4: MW-TD
W-5: MW-100
W-6: MW-BR1
W-7: MW-C
W-8: MW-CD
W-9: MW-CS
W-10: MW-BS
W-11: MW-BD
W-12: MW-BR2
W-13: MW-D2
W-14: MW-I2S (formerly MW-Js new)
W-15: MW-BR8
W-16: MW-A
W-17: MW-HS
W-18: MW-H2D

(d) The following wells have also been designated as Surface Water Protection Wells:

W-3: MW-TS
W-5: MW-100
W-9: MW-CS
W-16: MW-A
W-13: MW-D2

(e) Water Supply Wells:

PW-1: 153 River Road

(ii) Parameter list

Parameter

1. Total Dissolved Solids
2. Total Suspended Solids
3. Alkalinity
4. COD
5. Iron (Total)
6. Manganese (Total)
7. Specific Conductance
8. Nitrate (as N)
9. Chloride
10. Hardness (as CaCO₃)
11. pH
12. Ammonia (as N)
13. Sodium (Total)
14. Potassium (Total)
15. Sulfate (Total)
16. All inorganics identified in Appendix I of 40 CFR Part 258 of the Federal Register, Vol. 56, No. 196, October 9, 1991, beginning page 51032 using EPA method 6010.
17. Volatile Organic Compounds identified in Appendix I of 40 CFR Part 258 of the Federal Register, Vol. 56, No. 196, October 9, 1991, beginning page 51032 using EPA method 8260
18. Beginning the first quarter after the Commissioner's approval of the report required under paragraph 3(C)(iv), any supplemental parameters identified in accordance with the requirements of paragraph 3(C).

- (iii) Schedule - The ground water quality monitoring program shall begin 30 days after confirmation that all monitoring wells, sampling devices and associated appurtenances have been installed, but not later than 90 days after permit issuance. Thereafter, the ground water quality monitoring locations in paragraph 3(B)(i) shall be monitored four times per year in accordance with the following schedule:

Sampling Periods

January
April
July
October

- (a) Each ground water sample collected from the monitoring wells designated in paragraph 3(B)(i)(a) as U-1, U-2, U-3, U-4, U-5, and U-6 shall be analyzed for the parameters listed in paragraph 3(B)(ii), items 1 through 17.
 - (b) Each ground water sample collected from the monitoring wells designated in paragraph 3(B)(i)(b) as C-1, C-2, C-3, C-4, C-5, and C-6 shall be analyzed for the parameters identified in paragraph 3(B)(ii), items 1 through 18.
 - (c) Each ground water sample collected from the monitoring wells designated in paragraphs 3(B)(i)(c) as W-1, W-2, W-4, W-6, W-7, W-8, W-10, W-11, W-12, W-14, W-15, W-17, and W-18 shall be analyzed for the parameters listed in paragraph 3(B)(ii), items 1 through 17.
 - (d) Each ground water sample collected from the monitoring wells designated in paragraphs 3(B)(i)(c) and 3(B)(i)(d) as W-3, W-5, W-9, W-13, and W-16 shall be analyzed for the parameters identified in paragraph 3(B)(ii), items 1 through 17, with the exception that for those parameters in item 16 for which a lower minimum level is specified in paragraph 3(A)(iii), laboratory analyses shall be performed using the lower minimum level.
 - (e) Each ground water sample collected from the water supply well designated in paragraph 3(B)(i)(e) as PW-1 shall be analyzed for the parameters listed in paragraph 3(B)(ii), items 1 through 17.
- (iv) Sampling Conditions - Field measurement of pH, temperature, specific conductance, turbidity, and Oxidation Reduction Potential shall be performed at all ground water monitoring locations in paragraph 3(B)(i) prior to each sample collection. In addition, the water level elevation shall be measured at all ground water monitoring locations in paragraphs 3(B)(i)(a), 3(B)(i)(b), 3(B)(i)(c), and 3(B)(i)(d). These field measurements shall be reported together with the results of analyses of the samples in accordance with paragraph 5.

- (v) Ground water monitoring shall be performed as described in the monitoring plan contained in the "Groundwater and Surface Water Monitoring Program" identified in paragraph 3 above, subject to the modifications listed below. Where the requirements of the permittee's monitoring plan conflict with those of this permit, the permit requirements shall be used.

Where specific sampling or redevelopment procedures are not specified in the monitoring plan or in the following paragraphs, the permittee shall follow applicable procedures identified in the following EPA guidance documents. "Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells", U.S. EPA, EPA/600/4-89/034, 1991; "RCRA Ground-Water Monitoring: Draft Technical Guidance", U.S. EPA, EPA/530-R-93-001, 1992; and the draft document "Low Flow (Minimum Stress) Purging and Sampling Procedure for the Collection of Ground Water Samples From Monitoring Wells", Revision Number 1 draft, U.S. EPA, dated August 3, 1995.

- (a) Redevelop all monitoring wells identified in paragraph 3(B)(i) of this permit, with the exception of well MW-HS.
- (1) Schedule - Redevelopment shall be completed within 60 days of issuance of this permit.
- (2) Methods - Redevelopment shall be performed for each well, using the procedure described below.

Measure the static water level and total well depth.

Set a pump in the well, and begin pumping. The pump must be capable of removing all sediment from the well. Monitor turbidity of the pump discharge using a field turbidimeter, and continue pumping until the turbidity decreases to 5 Nephelometric Turbidity Units (NTU) or stabilizes (defined as less than 10 percent variance in 3 consecutive measurements, taken 3 to 5 minutes apart).

Surge the well using a properly designed surge block and proper surging technique. Perform surging throughout the screened or open interval. Record total well depth.

Continue alternating cycles of pumping and surging as described above until the initial turbidity during the second of two consecutive pumping cycles, separated by a sufficient period of well recharge (with the pump shut off and left in place), does not exceed 5 NTU. The recharge period shall be at least the period of time needed for the water level in the well to return to within 0.5 feet of the static level, as corrected for tidal fluctuations.

Record static water level, total well depth, starting and ending time of each pumping and each surging cycle, volume of water pumped during each pumping cycle, water level at the start of each pumping cycle, initial and final turbidity of pump discharge during each pumping cycle, the manufacturer's name and model number of all equipment and instruments used in well development, and the name and address of all contractors and / or consultants involved in the work.

- (3) If, after redevelopment a well still yields water with turbidity exceeding 5 NTU, the permittee shall either abandon the well and replace it with a new well constructed in accordance with the "Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells", U.S. EPA, EPA/600/4-89/034, 1991, or demonstrate to the Commissioner's satisfaction that the well was properly completed and adequately developed, and that turbidity is an artifact of the geologic materials in which the well is installed. Information to be used in such a demonstration shall include, but be limited to, geologic logs, well construction diagrams, grain size analyses, calculations for sizing the sand pack and well screen to the geologic formation, and water quality data including turbidity and total suspended solids.
- (4) Within 90 days of issuance of this permit, the permittee shall submit a report for the Commissioner's review and approval which (1) summarizes all well redevelopment efforts, (2) identifies wells which must be replaced in accordance with paragraph 3(B)(v)(a)(3), (3) proposes a schedule, methods, and materials for old well abandonment

and new well construction, and (4) presents any demonstrations of well adequacy vs. persistent turbidity as a geologic artifact..

- (b) Within 90 days of issuance of this permit, the permittee shall install permanently dedicated, submersible sampling pumps in all monitoring wells identified in paragraph 3(B)(i) of this permit. All pumps and ancillary support cables, electrical wiring, and discharge tubing shall be new, clean material, constructed and installed such that all parts which may contact groundwater samples contain only stainless steel and / or fluoropolymers. The pumping rate shall be adjustable by means of a controller which controls the operating rate of the pump, and the pump / controller system shall be capable of a minimum flow rate no greater than 100 milliliters per minute with the discharge tubing unobstructed. Each pump shall be installed with the pump intake set at the midpoint of the saturated portion of the screened / open interval of the well.
- (c) The maximum pumping rate during purging and sampling shall not exceed 300 milliliters per minute.
- (d) During well purging and sample collection, the drawdown induced by pumping shall not exceed a depth of 0.3 feet below the static water level in the well. The following procedure shall be used to maintain a drawdown of less than 0.3 feet:
 - (1) Using a water level indicator, measure the static depth to water in the well, and set the indicator probe to a depth 0.3 feet below the static water level.
 - (2) During purging and sampling, verify that the water level indicator produces a continuous audible signal.
 - (3) If the signal from the water level indicator is interrupted, adjust the pumping rate downward as necessary until the signal returns.
 - (4) If, at the lowest possible pumping rate, the drawdown still exceeds 0.3 feet, modify the purging and / or sampling procedure by stopping the pump, waiting for the well to recharge, and then operating the pump intermittently such

that drawdown does not exceed 0.3 feet, until purging and / or sampling are completed.

- (e) Monitoring of field parameters shall not begin until a minimum volume equivalent to one pump volume plus one discharge tubing volume has been purged from the well. Successive field parameter measurements shall be conducted at time intervals no less than three minutes apart. Purging shall continue until turbidity stabilizes (defined as ten percent variance or, if less than ten NTU, differences of no greater than two NTU) for three successive measurements.

(C) Supplemental Ground Water Quality Monitoring

- (i) Location - Supplemental ground water quality monitoring shall be conducted at the following locations identified in paragraph 3(B)(i)

W-1: MW-SD (formerly MW-Js old)
W-2: MW-SS
W-3: MW-TS
W-4: MW-TD
W-5: MW-100
W-6: MW-BR1
W-7: MW-C
W-8: MW-CD
W-9: MW-CS
W-10: MW-BS
W-11: MW-BD
W-12: MW-BR2
W-13: MW-D2
W-14: MW-JS (formerly MW-Js new)
W-15: MW-BR8
W-16: MW-A
W-17: MW-HS
W-18: MW-H2D

- (ii) Schedule - Supplemental ground water quality monitoring shall be conducted for two consecutive quarterly sampling periods beginning the first scheduled quarterly sampling period after permit issuance.

- (iii) Parameters - Samples collected for supplemental monitoring shall be analyzed for the compounds identified in Appendix II of 40 CFR Part 258 of the Federal Register, Vol. 56, No. 196, October 9, 1991, beginning page 51033.
- (iv) Subsequent supplemental monitoring - On or before sixty (60) days after the second supplemental ground water quality monitoring event, the permittee shall submit for the review and approval of the Commissioner a report describing the results of the Appendix II monitoring required by this paragraph, and a plan for amending the ground water quality monitoring parameters at the compliance monitoring wells C-1, C-2, C-3, C-4, C-5, and C-6 identified in paragraph 3(B)(i)(b), and schedule listed in paragraph 3(B)(iii)(b) to include Appendix II compounds detected.
- (v) The samples shall be collected from each ground water monitoring location in accordance with the monitoring plan contained in the "Groundwater and Surface Water Monitoring Program" identified in paragraph 3 above.

(D) Precipitation Monitoring

- (i) Precipitation data to be used in preparing precipitation hydrographs shall be obtained from the Department of Environmental Protection's Flood Alert Center, for monitoring location No. 510, located along the Merritt Parkway in Orange.
- (ii) Reporting - The first reporting period shall be the period from the date of permit issuance to the following October 30. Thereafter, the reporting period shall be the period from November first to October 30 of the following year. The data to be reported shall be a precipitation hydrograph (in inches of precipitation per hour) for the station identified in paragraph 3(D)(i) above, for the reporting period. Precipitation hydrographs are to be prepared as follows: First, the instantaneous precipitation rate R_t (inches per hour) shall be calculated for each increment I (in inches) of precipitation measured during the reporting period using the formula

$$R_t = \frac{I}{T_t - T_{t-1}}$$

where T_t and T_{t-1} are the time values at which two consecutive increments are recorded. Second, the instantaneous rates shall be plotted using

straight lines joining the data points, but no symbol for the data points themselves. Third, each storm event on the hydrograph shall be labeled with the total precipitation (in inches of water) for that event. The x-axis of the precipitation hydrograph shall be referenced to the date (November first) and year of the start of the monitoring period, and scaled in months. The Y-axis shall be scaled and labeled in inches per hour. The data shall be reported in accordance with paragraph 5(B)(ii) of this permit.

(E) Ground Water Zone of Influence Compliance Monitoring

- (i) For ground water, the ground water zone of influence of the discharges for the southeast and northeast expansion areas, as identified in paragraphs 1(A) and 1(B) of this permit, which is hereby permitted shall not extend beyond property owned by the permittee. The ground water zone of influence of the discharge is defined as the soil and ground water area within which the treatment of leachate by soils and mixing of leachate with ground waters occurs and could reasonably be expected to occur and, therefore, within which some degradation of ground water quality has occurred or is anticipated to occur.
- (ii) The following requirements of this section will be used to determine whether the discharge of leachate has exceeded the boundaries of the permitted ground water zone of influence. All sampling shall be conducted in accordance with the monitoring plan contained in the "Groundwater and Surface Water Monitoring Program" identified in paragraph 3 above.
 - (a) **Background Data Base** - The compliance ground water quality monitoring wells identified in paragraph 3(B)(i)(b) of this permit shall be sampled monthly for twelve months, beginning with the first ground water quality monitoring event required in paragraph 3(B) of this permit. Sampling shall be conducted in accordance with the sampling conditions in paragraph 3(B)(iv) of this permit. Samples shall be analyzed for alkalinity, ammonia, chemical oxygen demand, chloride, hardness, total iron, potassium, sodium, specific conductance, and total dissolved solids. The results of all sampling and analyses during this twelve month period shall be reported in accordance with paragraph 5 of this permit. No later than 45 days after the collection of the final sample, a report shall be submitted for the review and approval of the Commissioner which describes the results of all sampling and analyses conducted

pursuant to this paragraph, proposes maximum background levels for all ten parameters, and recommends selection of at least four parameters for the ground water zone of influence compliance monitoring program. These parameters will be designated as compliance parameters. The maximum background level is defined for each parameter at each well as the maximum concentration measured during the twelve month monitoring period.

- (b) Exceedance - Any analytical result from any sample obtained from the compliance wells for each of the four compliance parameters which exceeds the maximum background level for that parameter as defined in paragraph 3(E)(ii)(a), shall constitute an exceedance.
- (c) Confirmed Exceedance - Any well for which an exceedance occurs shall be resampled within forty-five (45) days of the sampling event which established the exceedance and shall be analyzed for the parameter(s) causing the exceedance. If the second result is found to exceed the maximum background level for the same parameter(s), such result will constitute a confirmed exceedance. If the second result for the parameter(s) causing an exceedance does not exceed the maximum background level for that parameter, the ground water zone of influence compliance monitoring program shall resume its normal quarterly schedule. If the next quarterly sampling result is found to exceed the maximum background level for the same parameter(s) at the same compliance well, such result will constitute a confirmed exceedance. The permittee shall assure that the results of all sampling necessary to confirm an exceedance is received from the laboratory no more than 30 days from the date of sample collection.
- (d) Within 7 days of becoming aware of an occurrence of a confirmed exceedance as defined in paragraph 3(E)(ii)(c), the permittee shall notify the Commissioner in writing and within 60 days shall submit a report for the Commissioner's review and approval which explains the source and cause of the confirmed exceedance and provides a description of any extenuating circumstances.

(F) Leachate Monitoring

- (i) Leachate quality monitoring shall be conducted at the following locations as shown on Figure 2, entitled "Water Quality Monitoring Site Plan," (sic) contained in the monitoring plan contained in the "Groundwater and Surface Water Monitoring Program" identified in paragraph 3 above.

L-1S: Leachate collected in the liner system of the Southeast Expansion Area prior to the equalization tank.

L-1N: Leachate collected in the liner system of the Northeast Expansion Area prior to the equalization tank.

- (ii) Samples of leachate shall be analyzed for the parameters listed in paragraph 3(A)(iii), and with the addition of the following parameters:

33. Volatile organics by EPA Method 8260

34. Polychlorinated Biphenyls (PCBs) by EPA Method 608

35. dioxins and furans by EPA Method 8280

- (iii) Leachate samples shall be analyzed for parameters listed in paragraphs 3(A)(iii) and 3(F)(ii) numbered 1-33 between the 15th and 30th day of January, April, and October, and for the parameters numbered 1-35 between the 15th and 30th day of July.

(G) Sediment Monitoring

- (i) Two rounds of physical and chemical characterization of sediment quality and chemical analysis of the overlying water column shall be conducted; the first one in July 1997 and the second one in July 1999. Samples shall be collected at the following locations as shown on Figure 2, entitled "Water Quality Monitoring Site Plan," (sic) contained in the monitoring plan contained in the "Groundwater and Surface Water Monitoring Program" identified in paragraph 3 above.

S-1: Monitoring location is in the depositional area immediately upstream of the dam at River Road (Connecticut Route 110).

S-2: Monitoring Location is a transect across the Farmill River downstream of the O&G expansion area, but upstream of the confluence of the Farmill and Housatonic Rivers. The transect is comprised of three stations.

- S-2S: Sample to be collected mid-way between the southern waterline and S-2M.
 - S-2M: Sample to be collected at the mid-point of the transect across the Farmill River, and coincides with the surface water monitoring location SW-2. .
 - S-2N: Sample to be collected mid-way between the northern waterline and S-2M.
 - S-3: Monitoring location is in the Housatonic River Lagoon inlet. Station is located in the southern side of the inlet and coincides with the surface water monitoring location SW-3.
 - S-4: Monitoring location is in the Housatonic River Lagoon and coincides with the surface water monitoring location SW-4.
 - S-5: Monitoring location is in the Housatonic River Lagoon and coincides with the surface water monitoring location SW-5.
 - S-6: Monitoring location is mid-stream in the Farmill River south of the Leachate Treatment Facility and the discharge from Sediment Pool No.3.
- (ii) Sediment samples from each of the six sampling locations identified in (C)(i) shall be analyzed (on a dry weight basis) for the following parameters:
- (a) Samples from S-1, S-3, S-4, S-5, and S-6 shall be analyzed for the parameters 1s - 12s.
 - (b) Samples from S-2S, S-2M and S-2N shall be analyzed separately for parameters 1s - 9s, but may be composited for parameters 10s - 12s.
 - 1s. Percent Moisture
 - 2s. Grain Size Fractionation (including fines)
 - 3s. Depth to Redox Potential Discontinuity (RPD)
 - 4s. Total Carbon
 - 5s. Total Inorganic Carbon
 - 6s. Total Organic Matter
 - 7s. Copper, total

- 8s. Lead, total
- 9s. Zinc, total
- 10s. Acid Volatile Sulfides, and SEMs by trace-ICP
- 11s. Polynuclear Aromatic Hydrocarbons
- 12s. Polychlorinated Biphenyls

(c) Analyses for total copper (7s) and total lead (8s) may be by Graphite Furnace Atomic Absorption Spectroscopy (GFAA) or Inductively Coupled Plasm analysis/Mass Spectroscopy (IAP/MS). Analyses for total zinc (s) may be by Inductively Coupled Plasm analysis (IAP) or IAP/MS. Results of analyses for 7s, 8s and s shall be reported together with the SEM results for these same metals (10s).

(iii) Water samples shall be collected from above each sediment sampling location in accordance with the conditions specified in 3(A)(iv) and the following conditions.

- (a) Water samples shall be collected within 0.5m of the sediment/water interface.
- (b) Water samples from above each sediment sampling station shall be collected when the sediment samples are collected.
- (c) Water samples from above each sediment sampling station shall be analyzed, at a minimum, for the parameters numbered 1 - 10, 20, 21, 24, 25, 31 and 32 in paragraph 3(A)(iii).

(H) Habitat Characterization

- (i) A detailed site map of the area in which the Shelton landfill is situated, at a scale of 1 inch equals 100 feet, shall be prepared to depict and identify the Farmill and Housatonic Rivers, flood boundaries, wetlands, anthropogenic structures (e.g. roads, dams, bridges, rail lines, sewer crossings), existing and potential pollutant sources (e.g. sewage treatment plants, gravel mining operations, existing and abandoned or closed landfills, highway garages, storm drainage, etc.). The map shall also depict all current and historical surface water, sediment, and biological monitoring locations, habitat characterization locations, and shall plot submerged aquatic vegetation and sediment type in the Farmill River. Permittee may refer to, and incorporate aerial photographs, local wetlands maps, sewer and

highway department plans, Coastal Area Management maps, etc. This map shall be included in the first annual report, and shall be updated for inclusion in each subsequent annual report, as required in paragraph 5(A).

- (ii) Two qualitative habitat characterizations of the area in which the Shelton landfill is situated shall be conducted; the first one in August 1997 and the second one in August 1999. The qualitative habitat characterization shall describe, in particular, the entire area in the vicinity of the Farmill River from River Road (Connecticut Route 110) east to its confluence with the Housatonic River, the shoreline along the Housatonic River Lagoon, and wetland areas in or near the landfill. A descriptive report of upland areas as they contribute to the ecology of the surface water system, and a description of nearby influences shall be included.
- (iii) The first annual report shall include the results of a bathymetric survey of the Housatonic River Lagoon. Results shall be presented in the form of a site map, prepared at a scale of one inch equal to one hundred feet, depicting depth contours within the lagoon at a minimum contour interval of five feet.
- (iv) Two quantitative habitat evaluations of the area within the statistical mean annual floodplain of the Farmill River shall be conducted; the first one in August 1997 and the second one in August 1999. The habitat characterizations shall be conducted using standardized and reproducible protocols that follow those recommended by Platts et al. (DA GTR INT-138) and incorporate the metrics required by the RBP III described by Plafkin, et al. (EPA/444/4-89-001), and shall include, at a minimum, Stream width; Stream depth and shore water depth; Location and extent of pool, riffle, run, and glide areas; Stream velocity; General channel morphology, elevation, gradient, and sinuosity; Stream bank, stability, vegetation; Stream bottom; Canopy; Submerged and emergent aquatic vegetation (%-cover, type).
- (v) Two benthic macro invertebrate community assessments of the Farmill River shall be conducted; the first one during August and October 1997, and the second in August and October 1999. The benthos shall be evaluated using U.S. EPA's Rapid Bioassessment Protocol, Level 3 (RBP III) as described by Plafkin, *et al.*, 1989. At least one kicknet and rock basket sampling location in riffle/run habitat shall be established. Rock baskets shall be deployed during the middle of August, and shall be retrieved during the first week of October. Concurrent with retrieval, kicknet and CPOM samples shall be collected from streambed locations

representative of the channel cross-section at each station. Samples shall be identified to species as required by RBP III and analysis of community structure. The permittee shall consult with DEP prior to initiating the first of the benthic macro invertebrate community assessments to establish the appropriate reference site and conditions.

- (vi) Results of the analyses of community structure, and of each habitat evaluation, including field and laboratory data sheets and updating of the map required by paragraph 3(H)(i) shall be submitted for the review and approval of the commissioner by inclusion in the annual reports in accordance with the requirements of paragraph 5(B)(i)(c)

4. Sample Analysis

- (A) All sample analyses required by this permit shall be performed by a laboratory certified for such analyses by the Connecticut Department of Public Health or approved in writing for monitoring at this facility by the Connecticut Department of Environmental Protection.
- (B) Analytical results for each parameter shall be reported together with the actual method detection limits achieved during the analysis. The value of each parameter shall be reported to the maximum level of accuracy and precision possible. Failure to submit data in accordance with the procedures and protocols set forth in this permit shall constitute a permit violation.
- (C) Chemical analyses for surface water, ground water, and leachate shall be performed using methods approved pursuant to the Code of Federal Regulations, Part 136 of Title 40, except where otherwise specified in paragraphs 3(B)(ii), 3(C)(iii), and 3(F)(ii), or unless an alternative method has been specifically approved in writing by the Commissioner for monitoring at this facility. Failure to use approved methods shall constitute a permit violation.
- (D) Analyses required by paragraphs 3(A), 3(B), and 3(F) shall be conducted to achieve the minimum levels for each of those parameters for which minimum levels are identified in 3(A)(iii), unless an alternative method that is capable of achieving the minimum levels has been specifically approved in writing by the Commissioner.

- (E) The minimum levels specified in paragraph 3(A)(iii) represent the concentration at which quantification must be achieved and verified during the chemical analyses for these compounds. Analyses for these compounds must include calibration points at least as low as the specified minimum level. Check standards within ten percent of the specified minimum level may be used in lieu of a calibration point equal to the minimum level.

- (F) If any sample analysis indicates that quantification for a particular parameter can not be verified at or below the specified minimum level, a second sample shall be collected and analyzed for that parameter according to the above specified methodology as soon as practicable. The results of the first and subsequent sample analyses shall be submitted to the Commissioner verifying that the appropriate methodology was employed, the minimum level was achieved for quality-control samples and that failure to quantify the parameter at or below the minimum level specified for the analysis was a result of matrix effects which could not be compensated for as part of sample analysis allowed pursuant to 40 CFR Part 136.

- (G) If any three (3) samples collected in a twelve-month period indicate that the specified minimum level was not achieved for a particular parameter when using the specified test methodology, the permittee shall submit a report for the review and approval of the Commissioner which justifies and defines the matrix effect upon analyses for that parameter, identifies the level at which quantification can be verified for those specific test conditions, and recommends modification to the method or an alternative method that is sufficiently sensitive and free of the identified matrix effect.

5. Reporting

(A) Schedule

The results of all sampling and analyses required by this permit, unless otherwise specified in writing by the Commissioner, shall be reported in accordance with the following schedule:

<u>Sampling periods</u>	<u>Reporting Dates</u>
January	March 21

April	June 21
July	September 21
October	December 21

(B) Annual Reports

- (i) Beginning on the first March 21 following permit issuance, and annually on or before that date thereafter, a summary report for the preceding one year period of the monitoring and inspection programs required by this permit shall be submitted for the review and written approval of the Commissioner.
 - (a) The report shall include but not be limited to a) an evaluation of leachate quality and quantity, including graphical representation of monitoring results, b) the condition of all monitoring wells and the need for repair or replacement of any wells, c) an evaluation of the extent and potential extent of the ground water zone of influence and whether any impact on the surface water quality of the Housatonic River or Far Mill River, or any other surface waters was detected or could reasonably be expected to occur, and d) a detailed site map of the area in which the Shelton landfill is situated, at a scale of 1 inch equals 100 feet.
 - (b) For the first annual report only, additional reporting of work required under paragraph 3(H)(iii) shall include a map showing the Housatonic River Lagoon bathymetry with a minimum contour interval of five feet, at a scale of one inch equal to one hundred feet.
 - (c): For the second and fourth annual reports, the following additional reporting of work required under paragraphs 3(G)(i), 3(H)(ii), 3(H)(iv), and 3(H)(v) shall be included: 1) results of the physical and chemical sediment analyses and accompanying water quality analyses; 2) a qualitative habitat characterization, 3) a quantitative habitat evaluation; and 4) benthic macro invertebrate community assessments.
 - (d) The second annual report and subsequent annual reports may propose modifications to the monitoring program for the Commissioner's review and written approval.

(ii) For the parameters and monitoring locations identified in this paragraph, additional annual reporting shall be required. The additional reporting shall consist of preparing graphs of parameter history versus precipitation hydrograph.

(a) Parameters and Locations -

One graph shall be prepared for each of the four compliance parameters identified in paragraph 3(E)(ii)(a) of this permit, for each of the following five pairs of wells: MW-TS and MW-TD; MW-BS and MW-BD; MW-CS and MW-CD; MW-D2D and MW-BR7; MW-E and MW-ED. In addition, one graph shall be prepared for ground water elevation measurements for each of the five well pairs listed above.

(b) Graph construction -

The graphs shall be constructed by plotting all values for a specific parameter at a specified pair of monitoring locations along the Y - axis, time along the X - axis, and the precipitation hydrograph along a second Y - axis. Data to be used for constructing the precipitation hydrograph shall be that required in paragraph 3(D). The following units shall be used: Parameters shall be plotted using the appropriate units, time shall be plotted as calendar months and years, and precipitation hydrograph shall be plotted in inches per hour. Beside each precipitation event, the graph shall be labeled with the total precipitation (in inches) for that event.

(C) The results of all analyses and measurements required by this permit shall, unless otherwise specified in writing by the Commissioner, be reported to the following three divisions of the Connecticut Department of Environmental Protection at 79 Elm Street, Hartford, Connecticut 06106-5127: 1) the Bureau of Waste Management, Waste Engineering and Enforcement Division; 2) the Bureau of Water Management, Permitting, Enforcement, and Remediation Division, State Remediation Program; and 3) the Bureau of Water Management, Planning and Standards Division, Aquatic Toxicity Program.

(D) The results of all analyses and measurements required by this permit shall also be reported to the Naugatuck Valley Health Department.

The permittee shall pay the annual compliance determination fee as set forth in the Regulations of Connecticut State Agencies including but not limited to Section 22a-430-7.

This permit is issued under Section 22a-430 of the Connecticut General Statutes and shall expire on August 27, 2001.

The Commissioner reserves the right to make appropriate revisions to this permit in order to establish any appropriate effluent limitations, schedules of compliance, or other provisions which may be authorized under federal or state law. This permit as modified or reissued under this paragraph may also contain any other requirements of federal or state law then applicable.

This permit shall be subject to the following sections of the Regulations of Connecticut State Agencies which are hereby incorporated into this permit:

Section 22a-430-3 General Conditions

- (a) Definitions
- (b) General
- (c) Inspection and Entry
- (d) Effect of a Permit
- (e) Duty
- (f) Proper Operation and Maintenance
- (g) Sludge Disposal
- (h) Duty to Mitigate
- (i) Facility Modifications; Notification
- (j) Monitoring, Records and Reporting Requirements
- (k) Bypass
- (l) Conditions Applicable to POTWs
- (m) Effluent Limitation Violations (Upsets)
- (n) Enforcement
- (o) Resource Conservation
- (p) Spill Prevention and Control
- (q) Instrumentation, Alarms, Flow Recorders
- (r) Equalization

22a-430-4 Procedures and Criteria

- (a) Duty to Apply
- (b) Duty to Reapply
- (c) Application Requirements

- (d) Preliminary Review
- (e) Tentative Determination
- (f) Draft Permits, Fact Sheets
- (g) Public Notice, Notice of Hearing
- (h) Public Comments
- (i) Final Determination
- (j) Public Hearings
- (j) Public Hearings
- (k) Submission of Plans and Specifications. Approval.
- (l) Establishing Effluent Limitations and Conditions
- (m) Case by Case Determinations
- (n) Permit issuance or renewal
- (o) Permit Transfer
- (p) Permit revocation, denial or modification
- (q) Variances
- (r) Secondary Treatment Requirements
- (s) Treatment Requirements for Metals and Cyanide
- (t) Discharges to POTWs - Prohibitions

Your attention is especially drawn to the notification requirements of subsection (i)(2), (i)(3), (j)(6), (j)(9)(C), (j)(11)(C), (D), (E), and (F), (k)(3) and (4) and (l)(2) of Section 22a-430-3.

Entered as a Permit of the Commissioner of the Department of Environmental Protection on 27 Aug 96.


Sidney J. Holbrook, Commissioner

Application No. 199502403

Permit No. LF0000052

APPENDIX A

LIST OF APPLICATION SUBMITTALS

CRRA Shelton Landfill Northeast Expansion Area Permit No. LF0000052

“Shelton Landfill Groundwater Assessment, Shelton, Connecticut,” August 1988, Fuss & O’Neill, Inc. (APP-11)

“Connecticut Resources Recovery Authority, Shelton, Connecticut, Discharge Permit Reapplication, DEP/WCU 126-104,” July 1989, Fuss & O’Neill, Inc. (APP-12)

“Connecticut Resources Recovery, Shelton Landfill, 1990 Annual Summary Report,” January 1991, Fuss & O’Neill, Inc. (APP-13)

“Connecticut Resources Recovery Authority, Shelton Landfill, Hazardous Waste Disposal Area, 1990 Annual Summary,” February 1991, Fuss & O’Neill, Inc. (APP-14)

“Shelton Landfill Horizontal Expansion Development/Design Report Ash Monocells, 866 River Road (Route 110), Shelton, Connecticut, Volume I, Book I of II,” July 1990, revised to January 1992, Fuss & O’Neill, Inc. (APP-3A)

“Shelton Landfill Horizontal Expansion Development/Design Report Ash Monocells, 866 River Road (Route 110), Shelton Connecticut, Volume I, Book II of II,” June 1990, Revised to January 1992, Fuss & O’Neill, Inc. (APP-3B)

“Certificate of Need Information and Documentation,” July 1990, revised to June 1992. (APP-4)

“Shelton Landfill Horizontal Expansion State Discharge Permit Application (SPDES) Pretreated Ash Leachate, 866 River Road (Route 110), Shelton, Connecticut, Volume III,” June 1990, Revised to January 1992, Fuss & O’Neill, Inc. (APP-5)

“State Discharge Permit Application (SPDES) Groundwater Discharge, Volume IV,” June 1990, Revised to January 1992, Fuss & O’Neill, Inc. (APP-6)

“Shelton Landfill Horizontal Expansion, 866 River Road (Route 110), Shelton, Connecticut, National Pollutant Discharge Elimination System Permit Application (NPDES) Storm Water Discharge, Volume V,” January 1991, Revised to January 1992, Fuss & O’Neill, Inc. (APP-7)

“State Structure and Dredging Permit Application, Volume VI,” July 1990, Revised to January 1992, Fuss & O’Neill, Inc. (APP-8)

“Future Public Use and Recreation Plan, Volume VII,” July 1990, Revised to January 1992, Fuss & O’Neill, Inc. (APP-9)

“Quality Assurance/Quality Control Documentation, Geomembrane Liner Installation, Volume VIII,” February 1991, Revised to January 1992, Fuss & O’Neill, Inc. (APP-10)

“Technical Review for Landfill Permit Application for the Shelton Landfill Horizontal Expansion, Shelton, Connecticut,” prepared by Roy F. Weston, Inc., January 1992. (APP-15)

Letter from Chris Recchia, CRRA, to Mike Harder, CTDEP, dated September 15, 1995.

Letter from Natural Resources Center, CTDEP, to Chris Recchia, CRRA, dated September 25, 1995.

Letter and attachments to Jim Fitting, CTDEP, from Debbie Denfeld, CRRA, dated September 29, 1995.

“Permit Application for Wastewater Discharge,” September 1995, CRRA.

“Groundwater and Surface Water Monitoring Program for the Northeast Expansion Area,” September 1995, CRRA.

“Leachate Prevention Plan for the Shelton Landfill,” September 1995, CRRA.

“Compilation of Historical Analytical Monitoring Results,” September 1995, CRRA.

“Hydrogeologic Investigation in the Northeast Expansion Area of the Shelton Landfill and Two Contiguous Properties to the North, Shelton Landfill,” October 1995, Environmental Risk Limited.

“Precipitation Hydrographs, Northeast Expansion Area Shelton Landfill,” October 1995, CRRA.

“Supplemental Information, Northeast Area Horizontal Expansion, CRRA Shelton Landfill Modification to Permit LF0000052,” January 1996, CRRA.

“Groundwater and Surface Water Quality Monitoring Program for the Northeast Expansion Area, Southeast Expansion Area and MSW/Ash Area in Support of the CTDEP Groundwater Discharge Permit,” September 1995, Revised May 1996, CRRA.

Table No. 1 and No. 2, and Appendices A, B, C, D, E, F, G, H, and I of “Groundwater and Surface Water Quality Monitoring Program for the Northeast Expansion Area, Southeast Expansion Area and MSW/Ash Area in Support of the CTDEP Groundwater Discharge Permit,” submitted September 1995, revised to May 1996, May 31, 1996, CRRA.

“Groundwater and Surface Water Quality Monitoring Program for the Northeast Expansion Area and Southeast Expansion Area in Support of an Amendment of the CTDEP Groundwater Discharge Permit No. LF0000052,” September 1995, revised June 12, 1996, CRRA.

Groundwater Discharge Permit
Shelton Landfill

Page 30

Letter and attachments to Jim Fitting, CTDEP, from Debbie Denfeld, CRRA, dated June 14, 1996.

Facsimile to Jim Fitting, CTDEP, from Debbie Denfeld, CRRA, dated June 17, 1996.

