



# UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

14777

## DECLARATION FOR THE RECORD OF DECISION

CENTRAL LANDFILL SITE  
JOHNSTON, RHODE ISLAND

### STATEMENT OF PURPOSE

This Decision Document presents the selected remedial action for the Central Landfill Superfund Site in Johnston, Rhode Island, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended, 42 U.S.C. §§ 9601 et seq. and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), as amended, 40 C.F.R. Part 300. The Environmental Protection Agency, New England Division Administrator has been delegated the authority to approve this Record of Decision (ROD).

### STATEMENT OF BASIS

This decision is based on the Administrative Record which has been developed in accordance with Section 113 (k) of CERCLA and which is available for public review at the Marion J. Mohr Memorial Library, 1 Memorial Avenue, Johnston, Rhode Island, and at the New England Division Records Center, 90 Canal Street, Boston, Massachusetts. The Administrative Record Index (Appendix E to the ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

### ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to the public health or welfare or to the environment.



DESCRIPTION OF THE SELECTED REMEDY

The components of the selected source control remedy are presented and discussed in Section VIII of this ROD. In summary, the selected source control remedy consists of:

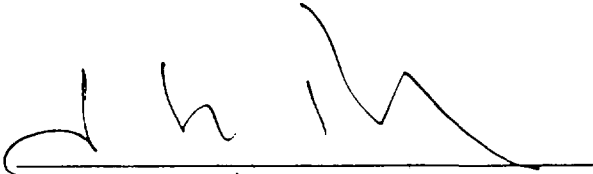
- Constructing a multi-layer RCRA C cap over the existing 121 acre Phase I area and incorporating the existing 32 acres of RIDEM approved cap on the side slopes;
- Hydraulic containment and treatment of groundwater in the hot spot area of the landfill and discharging the treated groundwater to either on-site surface water or the Cranston Waste Water Treatment Plant;
- Implementing deed restrictions on groundwater use and land development within property owned by the RISWMC;
- Initiating a long-term program of sampling and analysis of groundwater, surface water and air;
- Conducting a detailed evaluation of the existing landfill gas collection and combustion system; and
- Installing a chain link fence to prevent access.

DECLARATION

The selected source control remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate for this remedial action, and is cost effective. This source control remedy satisfies the statutory preference for remedies that utilize treatment as a principal element to reduce the toxicity, mobility, or volume of hazardous substances. In addition, this source control remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Date

4/17/94

  
John P. DeVillars  
Regional Administrator  
U.S. EPA, Region I

U.S. ENVIRONMENTAL PROTECTION AGENCY  
Region I

RECORD OF DECISION

CENTRAL LANDFILL SUPERFUND SITE  
JOHNSTON, RHODE ISLAND

OPERABLE UNIT ONE  
SOURCE CONTROL

JUNE 1994

RECORD OF DECISION  
CENTRAL LANDFILL SUPERFUND SITE

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## I. SITE NAME, LOCATION AND DESCRIPTION

The Rhode Island Solid Waste Management Corporation (RISWMC) owns and operates the active Central Landfill which is situated on a 610-acre parcel located at 65 Shun Pike in Johnston, Rhode Island. The Central Landfill is about 10 miles southwest of Providence Rhode Island. The Superfund Site is defined as the 154 acres located in the central portion of RISWMC property which has been licensed for landfilling by the State of Rhode Island. The 154 acre Central Landfill Site is comprised of two areas: a 121 acre area also known as the Phase I area; and a 33 acre expansion area also known as the Phase II and III areas (see Figure 1, Appendix A). The 121 acre Phase I area is the area of the Site where disposal of hazardous and nonhazardous wastes historically took place. Waste disposal activities in the Phase I area stopped in April 1993. Twelve acres of the 33 acre expansion area are currently being used for the disposal of nonhazardous municipal solid waste.

The area surrounding the Site is composed of undeveloped property, residential development, and small businesses. Scattered and single clustered single family dwellings are present along all sides of the Site.

The State has classified the groundwater in this area in general as GA (suitable for public or private drinking water use without treatment). The groundwater under the 154 acre Site is classified as GC (areas which, because of present or past land use or hydrological conditions, the Director of the RIDEM has determined to be more suitable for certain waste disposal practices than for development as a drinking water supply). The State has also established a GB (groundwater resources which the Director has designated not suitable for public or private drinking water use) buffer zone around the landfill. The limit of the GB classification was set at 100 feet from the GC boundary in the up-gradient direction. In the down-gradient direction, the GB classification is defined as the closest of the following: property boundary, surface water boundary or wetland, or 500 feet from the GC boundary. The Federal groundwater classification is, however, more stringent. For groundwater at and beyond the edge of the waste management area the Site groundwater is classified as Class II, current or potential drinking water.

A more complete description of the Site can be found in Section 3.10 of the March 1993 Remedial Investigation Report and Section 2.10 of the December 1993 Feasibility Study Report.

## II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

### A. Land Use and Response History

The Central Landfill, has been owned and operated by the Rhode Island Solid Waste Management Corporation (RISWMC) since 1980, and currently receives approximately 85% of Rhode Island's municipal solid waste. Prior to 1980, the Site was owned by the Silvestri Brothers who, from 1952 to 1955 used a portion of the current Central Landfill Site as a combination sand and gravel/quarry stone operation. From 1955 to 1962 the Site was operated as a refuse burning dump. The Site has been used as a solid waste disposal area since 1962. Also shown in Figure 1, Appendix A, is an approximate 0.5 acre area, located within the Phase I area, where large volumes of liquid industrial waste were accepted for disposal by the Silvestri Brothers in the mid to late 1970's in trenches excavated into bedrock. This area is commonly referred to in the Remedial Investigation/Feasibility Study Reports (RI/FS) as HWDA2 or the hot spot.

Waste manifests on file at the Rhode Island Department of Environmental Management (RIDEM) indicate that during the period of December 3, 1976 to May 30, 1979 industrial wastes were accepted and disposed of in the hot spot. Because neither federal nor state hazardous waste regulations were in effect at this time, there is limited information available concerning the types and quantities of waste accepted for disposal prior to January 1978.

Between January 1978 and May 1979, Industrial Waste Manifests were submitted to the RIDEM. The manifests indicate that wastes disposed of at the Site include aqueous solutions of latex waste, acid waste, corrosive waste, water soluble oils and waste solvents, such as methylene chloride, toluene, 1,1,1-trichloroethane and tetrachloroethylene.

From May, 1979 to February, 1981, approximately 5-10 acres in the northeast portion of the Site in the vicinity of the hot spot received large volumes of untreated liquid sewerage sludge. That area was subsequently covered with about fifteen feet of landfill debris and daily soil cover. Since RISWMC took over operation of the landfill in 1980, the waste stream has been as high as 6,000 tons per day. In 1991 solid waste disposal averaged approximately 2,500 tons per day.

In 1984, the Central Landfill Site was proposed for inclusion on EPA's National Priorities List (NPL). The Site was added to the NPL in June 1986 and field work for the completed on-site Remedial Investigation (RI) commenced in 1987, after the RISWMC signed an agreement with the EPA to

study the nature and extent of contamination at the Site. During the field work, on-site investigations were divided into two operable units: Operable Unit 1 (OU1) addresses source control; Operable Unit 2 (OU2) addresses management of off-site migration of contamination.

In 1986, RISWMC, in conjunction with the RIDEM and the Town of Johnston initiated a project to provide public drinking water to area residents. The project was completed in 1990. A 12-megawatt landfill gas to electricity facility has been constructed at the Site and has been in operation since 1990. RISWMC has expended approximately \$23,000,000 acquiring residentially zoned property located within 1,000 feet of the licensed landfill area and offered residents within the next 1,000 feet the option of selling their property to RISWMC. This property acquisition was mandated by the Rhode Island Legislature.

## **B. Enforcement History**

### State Enforcement Activities

On December 10, 1979, RIDEM advised the Silvestri Brothers that the Site must comply with the newly adopted Hazardous Waste Facility Rules and Regulations to maintain its status as an existing but inactive hazardous waste management facility. In response, the Silvestri Brothers applied for continued status as an existing hazardous waste management facility.

In December 1980, the RISWMC purchased the Silvestri Brothers Landfill renaming it the Central Landfill. After the Site was transferred to the RISWMC, RIDEM determined that the Site was and is a hazardous waste management facility and in February, 1981, ordered RISWMC to close the hazardous waste disposal area. The hazardous waste disposal area (HWDA1) was identified and closed in July 1982 in accordance with closure plans developed by RISWMC. Subsequent Site work indicated that the closure did not cover the actual hazardous waste disposal area. Consequently, a second area was located and designated as HWDA2, or the hot spot, and is now being addressed as part of this remedy.

RIDEM/Wetlands Division issued a Notice of Violation to RISWMC on November 9, 1983, for violations of the Fresh Water Wetlands Act. This violation related to excavation and stream diversion of Cedar Swamp Brook and placement of earth fill in and within 100 feet of Cedar Swamp Brook and its associated wetlands.



On December 9, 1983, the Solid Waste Management Facility License for the Central Landfill expired. RIDEM did not renew the license for the facility because RISWMC was not in compliance with various solid waste management facility regulations including the violations identified in the November 9th Notice of Violation.

On August 10, 1984, and again on August 28, 1984, RIDEM and RISWMC entered into Consent Agreements to remedy violations of the state Rules and Regulations for Solid Waste Management Facilities. The August 10 Agreement addressed several solid waste violations including the need for a closure plan for the entire Site. The August 28 Agreement addressed the concerns of the November 9, 1983 Notice of Violation.

RIDEM issued a Notice of Violation and Order to RISWMC on March 15, 1985, for alleged violations of R.I.G.L. 2-1-21. RISWMC was ordered to take certain corrective actions and pay an administrative fine. By an amended Consent Agreement executed on November 3, 1986, RISWMC agreed to resolve the issues in the Notice of Violation and Order.

By a Notice of Intent to Enforce dated April 3, 1989, RISWMC was again notified of alleged violations of R.I.G.L. 2-1-21. The Notice required RISWMC to take specific actions to stop alterations of wetlands and to submit necessary reports and studies relating to the restoration of alleged altered wetlands. By Consent Agreement executed on July 6, 1989, RISWMC agreed to resolve the issues raised in the Notice of Intent. A Consent Agreement dated July 23, 1991, supersedes the above mentioned Consent Agreements dated November 3, 1986, and July 6, 1989.

On March 3, 1988, RIDEM/Division of Air and Hazardous Materials issued a Decision and Order associated with RISWMC's application for an interim license to continue operations at the Site. The Order granted the operating permit to RISWMC and contained significant operational/management requirements. In response, RISWMC prepared a work plan for sediment and surface water sampling of surface water on or near the Site as well as a groundwater monitoring plan.

#### Federal Enforcement Activities

In June 1984, EPA issued an Administrative Order to RISWMC pursuant to the authority granted the Agency under Section 3013 of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6934. The Order required RISWMC to produce a proposal for the monitoring, sampling, testing, analysis,

and reporting at the Central Landfill. The Order was based on EPA's determination that the landfill may have presented and may present a substantial hazard to human health and the environment. This proposal formed the basis for the performance of the Remedial Investigation under the Administrative Order on Consent between RISWMC and EPA in 1987.

The Site was added to the NPL in June 1986. The EPA and RISWMC entered into a Consent Order to perform a Remedial Investigation and Feasibility Report (RI/FS) in April 1987. The RI for OU1 was completed in March 1993. The FS for OU1 was completed in December 1993. Both documents are part of the Administrative Record for OU1. The RI for OU2 is currently underway and will be the subject of a separate Record of Decision.

The current owner, RISWMC, has expressed a willingness to conduct the remedial design and remedial action (RD/RA) for the OU1, source control remedy. EPA is currently conducting negotiations with RISWMC and, in a limited capacity, with the State of Rhode Island to voluntarily perform the remedial design and remedial action for OU1.

### **III. COMMUNITY PARTICIPATION**

Throughout the Site's history, community concern and involvement has been high. EPA has kept the community and other interested parties apprised of the Site activities through informational meetings, fact sheets, press releases and public meetings.

In February, 1994, EPA made the administrative record available for public review at EPA's offices in Boston and at the Marion J. Mohr Library in Johnston, Rhode Island. EPA published a notice and brief analysis of the Proposed Plan in the Providence Journal on February 8, 1994 and made the plan available to the public at the Marion J. Mohr Library.

In September 1993, EPA issued a fact sheet which summarized the results of the Remedial Investigation. On February 22, 1994, EPA held an informational meeting to discuss the results of the Remedial Investigation and the cleanup alternatives presented in the Feasibility Study Report and to present the Agency's Proposed Plan. Also during this meeting, the Agency answered questions from the public. From February 13 to March 14, 1994, the Agency held a 30 day comment period to accept public comment on the alternatives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public.

On February 28, 1994, the Agency held a informal public hearing to again discuss the Proposed Plan and to accept any oral comments. A transcript of this meeting and the comments and the Agency's response to comments are included in Appendix D of this ROD.

#### **IV. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION**

The selected remedy is the first operable unit of at least a two operable unit approach to remediation of the environmental contamination caused by the Site. The first operable unit will control the sources of contamination at the Site. Source control remedies prevent or minimize the continued release of hazardous substances to the environment. Source control alternatives rely on the prevention of exposure for the protection of human health and the environment. The second operable unit will address any impacts to off-site areas caused by contaminants that have already migrated from the Site and beyond the RISWMC property boundary. During the second operable unit additional studies will be undertaken to characterize the extent of off-site contamination and to develop and evaluate alternatives for remediation should it be required.

In summary, the selected source control remedy for the first operable unit consists of the following components: capping the landfill; extracting and treating contaminated groundwater from the hot spot area; implementing deed restrictions on groundwater and land use; an evaluation of the existing landfill gas collection and combustion system; long-term environmental monitoring; and preventing access.

Exposure to and ingestion of contaminated groundwater is the principal threat posed by the Site. The combination of capping the landfill and extracting and treating groundwater from the hot spot area will prevent or minimize this threat by containing contaminants on-site. Long-term environmental monitoring will ensure that the selected source control remedy remains protective of human health and the environment.

#### **V. SUMMARY OF SITE CHARACTERISTICS**

Chapter 2 of the Feasibility Study contains an overview of the Remedial Investigation. A summary of the Remedial Investigation field activities and the major findings are summarized below.

The RISWMC under EPA direction and oversight, conducted field activities during the RI to determine the nature and extent of contamination at the Site. These activities included:

1. Surface and sub-surface geological and hydrogeological studies designed to locate bedrock faults and fracture zones (commonly called lineaments), describe subsurface geologic conditions, and determine the direction of groundwater movement;
2. Extensive sampling and analysis of Site groundwater from 67 monitoring wells at 41 locations surrounding the existing landfill within the property owned by RISWMC to determine the concentration of groundwater contaminants including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and inorganics;
3. Sampling and analysis of sludges in the hot spot area and Dense Non Aqueous Phase Liquid (DNAPL) found in the fractured bedrock below the hot spot area;
4. Air sampling and analysis for VOCs on-site and adjacent to the Site; and
5. Limited sampling and analysis of surface water and sediments in Cedar Swamp Brook, Upper Simmons Reservoir, and Almy Reservoir.

The major findings of the field activities are summarized below:

1. **Hydrogeological Studies:** Groundwater flow in bedrock was identified as the major pathway for migration of contaminated groundwater. Results of studies undertaken during the remedial investigation found no evidence to suggest that contaminated groundwater underneath the Site is migrating to the Scituate Reservoir located about 2.5 miles west of the 121 acre landfill. Rather, the studies concluded that the Upper Simmons Reservoir, located about 1,200 feet southeast of the landfill, is the major receptor of groundwater which passes beneath the Central Landfill. The studies also indicate that a small portion of the flow beneath the landfill migrates to the Almy Reservoir, located about 2,400 feet northeast of the landfill.
2. **Groundwater Sampling and Analysis:** Groundwater samples were taken from 67 on-site monitoring wells at 41 locations. The chemical analysis of groundwater

samples collected around the perimeter of the landfill area showed elevated concentrations of many volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and inorganics. The analysis of groundwater samples collected in the vicinity of the hot spot area showed much higher concentrations of VOCs and SVOCs. The chemical analysis of groundwater taken from monitoring wells close to the Central Landfill property line detected only slightly elevated levels of a few VOCs, SVOCs, and inorganics.

3. **Hot Spot Area Studies:** The Remedial Investigation identified the relatively small hot spot area (about 0.5 acre) near the eastern perimeter of the 121 acre Phase I area (see Figure 1, Appendix A). Large volumes of liquid industrial hazardous waste are known to have been accepted for disposal by the previous owner in several trenches that were excavated into the bedrock in this area. The liquids have long since penetrated into the underlying fractured bedrock leaving behind an approximately one foot thick layer of a rubbery chemical sludge. Presently, the trenches and chemical sludge are covered with about thirteen feet of septage sludge and fifteen feet of landfill debris and daily soil cover.

**Dense non-aqueous phase liquids (DNAPLs)** were found in the fractured bedrock beneath the trenches at the hot spot. The presence of these DNAPLs are the result of the disposed liquids penetrating into the underlying fractured bedrock. These DNAPLs are believed to be a major source of contamination found in the groundwater at the Site.

4. **Air Sampling:** The studies included air quality sampling on-site and adjacent to the Central Landfill Site. As presented in the RI report, air monitoring for VOCs on-site and adjacent to the Central Landfill was completed in three phases. Phase I occurred between September 1987 and March 1988, prior to the existence of the landfill gas collection and combustion system. Phase I monitoring data indicated that 14 of 132 analyzed compounds were detected in the samples. Since Phase I data was collected prior to the installation of the landfill gas collection and combustion system, the data is not indicative of current Site conditions.

Phase II and III data was collected at the request of RIDEM after the landfill gas collection and combustion system was installed. EPA analyzed this data to evaluate any potential on-site or off-site impacts.

Phase II involved fifteen consecutive monthly sampling rounds that occurred between June 1989 and August 1990. Phase III involved two quarterly sampling rounds conducted in April and July 1991. Of the 156 compounds analyzed for, 144 substances were found as constituents in both upwind and downwind samples. A statistical comparison of on-site, upwind and downwind data indicated that on-site concentrations of twelve compounds were statistically higher than upwind concentrations; downwind perimeter concentrations of two compounds were higher than upwind concentrations; and no compounds were detected at concentrations at downwind residential locations that were higher than detected concentrations at upwind, off-site locations. Air monitoring results are presented in Appendix H of the RI Report and summarized in Table 2-17 of the Risk Assessment Report. The significance of these findings are discussed in Section VI of this ROD.

5. **Surface Water and Sediment Sampling:** A limited amount of surface water and sediment samples were collected and analyzed from Cedar Swamp Brook, Upper Simmons Reservoir and Almy Reservoir. Trace levels of VOCs, SVOCs and metals were detected in both surface water and sediment samples. Sufficient data has not been collected to properly characterize contaminant distribution in the surface water and sediments. Additional data is being collected as part of the off-site studies currently being conducted by the RISWMC for OU2.

## **VI. SUMMARY OF SITE RISKS**

A human health Risk Assessment (RA) was performed to estimate the probability and magnitude of potential adverse human health effects from exposure to contaminants associated with the Site. The human health RA followed a four step process: 1) contaminant identification which identified those hazardous substances which, given the specifics of the Site, were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and 4) risk characterization, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the Site, including carcinogenic and non-carcinogenic risks

to human health. A summary of the results of the RA at the Central Landfill Site is presented in this Section of the ROD.

Twenty six (26) groundwater contaminants of concern, listed in Table 1 were selected for evaluation in the RA. The contaminants of concern include nine VOCs, six SVOCs, and eleven inorganics. These contaminants constitute a representative subset of the groundwater contaminants identified at the Site during the Remedial Investigation. The groundwater contaminants identified in the Remedial Investigation are presented in Tables 1 thru 5 in Appendix B. The twenty-six contaminants of concern were selected to represent potential Site related hazards based on concentration, frequency of detection, and mobility and persistence in the environment. A summary of the health effects of each of the contaminants of concern can be found in Section 4.2 and Appendix D of the RA.

Potential human health effects associated with exposure to the contaminants of concern were estimated either quantitatively or qualitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the Site. The Site is presently an active solid waste management facility. The expected future use of the landfill itself is continued use as a solid waste management facility. EPA does not consider the future use of the landfill as residential property to be a plausible scenario. The future use of the 1,000 to 2,000 foot area surrounding the landfill is assumed to continue as presently zoned for mixed residential and commercial use. Each of the residences within the 1,000 to 2,000-foot buffer zone are considered to be potentially habitable. The following is a discussion of the rationale for selecting those exposure pathways that may be potentially complete under current and future use Site conditions.

### Soils

Contaminants that may be present in surficial soils and wastes within the landfill may pose conditions for direct contact exposure, if accessible to human receptors (including Site workers and trespassers) and ecological receptors (including terrestrial plants and animals). A limited number of surficial soil samples have been collected from the landfill, with low levels of a small number of contaminants detected. Under current conditions, the locations at which surface soil samples were collected appear to be capped with vegetated soil cover or liner

TABLE 1  
CONTAMINANTS OF CONCERN  
CENTRAL LANDFILL SITE  
CONCENTRATION (ug/l)

CHEMICALS	EXPOSURE POINT CONCENTRATION		FEDERAL(1)		Status(2)
	AVERAGE	MAXIMUM	MCLs	MCLGs	
<u>Volatile Organic Compounds</u>					
Benzene	13*	31*	5	zero	F
Chlorobenzene	383*	610*	100	100	F
1,1-Dichloroethane	15	140	--	--	L
Methylene Chloride	12*	50*	5	zero	F
Methyl Ethyl Ketone	--	--	--	--	L
Toluene	9	39	1000	1000	F
1,1,1-Trichloroethane	--	--	200	200	F
Trichloroethene	--	--	5	zero	F
Vinyl Chloride	--	--	2	zero	F
<u>Semi-Volatile Organic Compounds</u>					
Bis(2-ethylhexyl)Phthalate	80*	200*	6	zero	F
1,2-Dichlorobenzene	19	79	600	600	F
1,4-Dichlorobenzene	16	23	75	75	F
2,4-Dichlorophenol	--	--	--	--	--
Naphthalene	12	30	--	--	--
1,2,4-Trichlorobenzene	--	--	70	70	F
<u>Inorganics</u>					
Arsenic	8.5	28	50	--	R
Beryllium	11*	15*	4	4	F
Cadmium	--	--	5	5	F
Chromium	54	130	100	100	F
Cyanide	35	109	200	200	P
Lead	53	102	TT(3)	zero	F
Manganese	15956*	127000*	--	200	L
Mercury	0.29	0.73	2	2	F
Nickel	101*	160*	100	100	F
Nitrates	120	580	10000	10000	F
Vanadium	51	270	--	--	L

**Notes:**

1. US EPA, 1993. Drinking Water Regulations and Health Advisories. Office of Water. May 1993.
2. Status: F- Final; P - Proposed; L - Listed for regulation; R - Under review.
3. TT - Treatment technique. Action level of 15 ug/l.
4. -- - Not detected/Not available.
5. \* - Exceeds MCL or Non-zero MCLG on toxicity,



material. Only a small portion of the wastes in the landfill at the working face, which is currently receiving refuse, is exposed.

Access to the Site by vehicle is limited to a secured entrance gate located on Shun Pike. The landfill could potentially be accessed by foot. Since the landfill is an operating facility, persons trespassing on the Site during the day are likely to be noticed. Landfill workers employed to pick up fugitive refuse may incidentally contact soils. Refuse transporters are not likely to contact soils. Given the limited potential access to possibly contaminated surficial soils, it is not likely that direct contact with soils is a significant exposure pathway. Contaminants in subsurface soils and wastes would be a potential source of exposure only if soils are exposed during excavation, such as during remediation activities. These potential exposures would be expected to be controlled by worker health and safety procedures as potential risks during remediation and are evaluated as part of the Feasibility Study.

Plants may uptake contaminants present in the root zone of on-site surficial soils or off-site soils receiving runoff. Animals and birds may directly contact soils or ingest plants or smaller organisms at the landfill. Presently not enough data is available on the identification and characterization of biota at the Site to evaluate the significance of these pathways. These pathways will be further evaluated in the OU2 RI.

### Groundwater

Under past conditions, residential wells located in areas surrounding the Site may have received groundwater migrating from the Site as well as from several off-site sources of contamination in the area. Under current conditions, all residences and businesses surrounding the Site have been offered public water and almost all have accepted. Therefore, the exposure pathway of Site groundwater used as a current water supply is not complete for most locations surrounding the Site under present conditions.

As previously described, although the State has classified the groundwater underlying the landfill and areas immediately surrounding the landfill as GC and GB, respectively, under the federal classification, all groundwater at and beyond the edge of the waste management area is considered current or potential drinking water. As part of the risk assessment, the risks associated with the potential potable use of groundwater in off-site areas downgradient of the Site were evaluated. Exposure routes associated with this use include ingestion of water,

inhalation of volatiles during showering, and dermal absorption during showering.

The RI found no evidence to suggest that contaminated groundwater underneath the Site is migrating to the Scituate Reservoir. Therefore, this pathway is not considered to be complete.

#### Surface Water and Sediment

As previously discussed, the Upper Simmons Reservoir is a receptor of the majority of shallow groundwater flow from the Site and the Almy Reservoir a receptor of a small component of shallow groundwater flow. These reservoirs are classified by RIDEM for primary and secondary recreation, such as swimming, fishing and boating, and could be used for these activities. Potential exposure routes that may be associated with these activities are direct contact with and incidental ingestion of surface water and sediments, and ingestion of fish. To a lesser extent, VOCs may be released from surface water and inhaled.

Sufficient data has not been collected to characterize the contamination caused by past Site activities in off-site surface water, sediment, and fish; therefore, current exposure to these media cannot be adequately evaluated. Additional data will be collected in the OU2 RI to allow for an adequate evaluation of the current exposure to these media. However, using on-site groundwater contamination data collected in the OU1 RI, the future impacts of the Site on the Upper Simmons and Almy Reservoirs, assuming no remedial action was taken at the Site, was estimated. These estimates were used to evaluate the potential future exposure to human receptors caused by releases from the Site as it exists today. The estimate of future exposures does not account for historical impacts from the Site or other sources of contamination in the vicinity of the Site to the Upper Simmons and Almy Reservoirs. Characterization of ecological habitats and biota associated with these surface waters has not been completed. Therefore, exposure pathways including uptake of and contact with contaminants from surface water and sediments, and transfer through the food chain cannot be addressed at this time and will be evaluated in the OU2 RI.

#### Air

Volatiles and dusts may be released into the ambient air from refuse and soils and as emissions from the gas recovery facility on the landfill. These emissions may potentially be transported to on-site or off-site receptors. As

previously discussed, RI monitoring data for volatiles do not indicate an impact on air quality at off-site residential areas. On-site concentrations were below limits established under the Occupational Safety and Health Act (OSHA) to be protective of worker exposures. Therefore, under present conditions, the exposure to VOCs potentially released from the Site does not appear to be a significant pathway.

#### Possible Exposure Pathways

There are no complete exposure pathways for human receptors under present Site conditions. The potentially complete exposure pathways evaluated for human receptors under future use conditions at the Central Landfill Site are:

1. Ingestion and dermal absorption of compounds and inhalation of volatiles in shower air from groundwater originating from the Site that supplies off-site wells located in areas outside the toe of the landfill (future), and
2. Direct contact with and incidental ingestion of surface water in the Upper Simmons Reservoir and Almy Reservoir (future).

For each pathway evaluated, an average and a reasonable maximum exposure point concentrations (EPC) was generated corresponding to exposure to the average and the maximum concentration detected or calculated in that particular medium. The EPC represents the amount of a chemical in an environmental medium to which a receptor may be exposed at the location of potential contact. EPCs are determined based on site sampling data or on modeling results specific to the exposure pathway of concern. A summary of the method used to estimate EPCs for groundwater and surface water is provided below. A more detailed explanation of EPC estimates is provided in Sections 3.3 and 3.4 of the RA report.

Exposure estimates for the use of groundwater were based on on-site groundwater sampling results from selected monitoring wells located outside the toe of the landfill. The wells include MW-B, MW-B1, MW-C, MW-C1, WE87-4, MW90-28 (A&B), and MW90-34B. Exposure estimates for groundwater were conservatively assumed to be present in a theoretical supply well at these on-site measured concentrations for an exposure period of 30 years.

Exposure estimates for contact with surface water (Upper Simmons and Almy Reservoirs) were estimated using contaminant loading calculations presented in Section 9.30

and Appendix G of the RI Report. The two methods, described in Section 9.31 of the RI report were used to estimate the reasonable worst-case and average exposure concentrations in Upper Simmons Reservoir since it is the major receptor of shallow groundwater flow from the Site. An average exposure concentration was also estimated for Almy Reservoir using a different but similar method as that used for Upper Simmons. As explained above, sufficient data has not been collected to characterize the contamination caused by past Site activities in off-site surface water, sediment, and fish, therefore, current exposure to these media cannot be adequately evaluated. This characterization will be performed as part of OU2.

As presented in the RI report, Method 1 flux calculations were based on an estimation of the size and distribution of contaminants in the subsurface of the hot spot area. Since the remaining mass and distribution of unknown quantities of wastes disposed in the area are not known, the method is somewhat speculative. The method did not incorporate attenuation mechanisms and did not rely on the establishment of steady state conditions. The method likely provides upper bound estimates of the probable annual flux to the Upper Simmons Reservoir. Estimates of concentrations derived from this method were used to represent EPCs in the reasonable worst-case exposure scenario.

As described in the RI report, Method 2 assumes that steady state conditions have been established and that the combination of biodegradation, volatilization, and dilution processes were reducing, and would continue to reduce, the concentrations of contaminants originating in hot spot area and migrating with groundwater to Cedar Swamp Brook and the toe of the landfill. Estimates derived from this method were used to represent EPCs in the average case exposure scenario.

Average Exposure concentrations were calculated for the Almy Reservoir using a method similar to Method 2 described above. No reasonable worst-case estimates were made for the Almy Reservoir. Operable unit 2 will further evaluate the human health risks in Upper Simmons and Almy Reservoirs and also evaluate the ecological risks.

Excess lifetime cancer risks were determined for the exposure pathways by multiplying the exposure level with the chemical specific cancer factor. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific

notation as a probability (e.g.  $1 \times 10^{-6}$  for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater than a one in one million chance of developing cancer over 70 years as a result of Site-related exposure as defined to the compound at the stated concentration. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

The hazard index was also calculated for each pathway as EPA's measure of the potential for non-carcinogenic health effects. A hazard quotient is calculated by dividing the exposure level by the reference dose (RfD) or other suitable benchmark for non-carcinogenic health effects for an individual compound. Reference doses have been developed by EPA to protect sensitive individuals over the course of a lifetime and they reflect a daily exposure level that is likely to be without an appreciable risk of an adverse health effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. The hazard quotient is often expressed as a single value (e.g. 0.3) indicating the ratio of the stated exposure as defined to the reference dose value (in this example, the exposure as characterized is approximately one third of an acceptable exposure level for the given compound). The hazard quotient is only considered additive for compounds that have the same or similar toxic endpoint and the sum is referred to as the hazard index (HI). (For example: the hazard quotient for a compound known to produce liver damage should not be added to a second whose toxic endpoint is kidney damage).

Table 6, Appendix B presents a summary of the carcinogenic and non-carcinogenic risks for the contaminants of concern in groundwater and surface water to reflect potential future exposures corresponding to the average and the reasonable worst case scenarios. Separate risk calculations for each contaminant of concern are presented in Appendix C of the risk assessment.

Carcinogenic and non-carcinogenic risk estimates were evaluated relative to the EPA's risk management criteria. The carcinogenic risks or ILCR (Incremental Lifetime Cancer Risks) are compared to a risk range of  $10^{-6}$  ("Point of departure") to  $10^{-4}$ . Non-carcinogenic risks, or HIs (Hazard Indices), are compared to a value of one (1), below which adverse health effects from exposures are not anticipated.

The aggregate risk and hazard index were almost solely attributable to risks associated with the ingestion of groundwater. The carcinogenic risks are primarily from six (6) of the contaminants of concern: arsenic, beryllium,

bis(2-ethylhexyl)phthalate, benzene, 1,2-dichlorobenzene and 1,2-dichloroethane. A risk greater than  $1 \times 10^{-6}$  was calculated for each of these six contaminants. The non-carcinogenic risks are primarily from manganese, vanadium and arsenic. A hazard index greater than 1.0 was calculated for each of these three contaminants. The hazard quotient for manganese contributed greater than 98% to the total hazard index for the average case, and 99% for the reasonable worst case.

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment. The risk assessment concluded that there is a potential risk to human health from ingestion of groundwater at the Site and if contaminated groundwater was allowed to continue to migrate off-site, and off-site groundwater was developed as a source of drinking water, then there would remain a potential human health risk in the future due to the ingestion of the contaminated groundwater. The 121 acre Phase I landfill area is the source of the groundwater contamination, therefore, the remedial action will focus on controlling this source of groundwater contamination.

## **VII. DEVELOPMENT AND SCREENING OF ALTERNATIVES**

### **A. Statutory Requirements/Response Objectives**

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences including: A requirement that EPA's remedial action, when complete, must comply with all federal and more stringent state environmental standards, requirements, criteria or limitations, unless a waiver is invoked; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these Congressional mandates.

Using the information gathered during the RI and RA, EPA identified several source control response objectives to use in developing source control alternatives to prevent or

minimize the continued release of contaminants from the existing 121 acre Phase I area into the environment. These remedial action objectives were developed to mitigate existing and future potential threats to public health and the environment. These source control response objectives are:

1. Minimize the effects of landfill contaminants on groundwater quality; specifically, reduce to a minimum the amount of precipitation allowed to leak through the waste column and infiltrate to the groundwater;
2. Eliminate potential future risks to human health through direct contact with landfill contaminants by maintaining a physical barrier;
3. Minimize migration of contaminants in groundwater so that groundwater is not injurious to the aquatic ecological system of receiving water bodies (Upper Simmons Reservoir, Cedar Swamp Brook and Almy Reservoir);
4. Minimize risks to human health associated with potential future consumption of and direct contact with groundwater;
5. Comply with state and federal ARARs; and
6. Minimize potential impacts of implementing the selected source control alternative on adjacent surface waters and wetlands.

#### **B. Technology and Alternative Development and Screening**

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. Because many CERCLA municipal landfill sites share similar characteristics, they lend themselves to remediation by similar technologies. EPA has established a number of expectations as to the types of technologies that should be considered and alternatives that should be developed; they are listed in the National Contingency Plan (40 CFR 300.430(a)(1)). For CERCLA municipal landfill sites, it is expected that;

1. The principal threats posed by a site will be treated wherever practical, such as in the case of remediation of a hot spot.

2. Engineering controls such as containment will be used for waste that poses a relatively low long-term threat or where treatment is impractical.
3. A combination of methods will be used as appropriate to achieve protection of human health and the environment. An example of combined methods for municipal landfill sites would be treatment of hot spot in conjunction with containment (capping) of the landfill contents.
4. Institutional controls such as deed restrictions will be used to supplement engineering controls, as appropriate, to prevent exposure to hazardous wastes.
5. Innovative technologies will be considered when such technologies offer the potential for superior treatment performance or lower costs for performance similar to that of demonstrated technologies.
6. Groundwater will be returned to beneficial uses whenever practical, within a reasonable time, given the particular circumstances of the site.

In accordance with these expectations and the response objectives previously described, a range of technologies/processes were developed for the Site to treat contamination associated with four distinct media; landfill waste, hot spot solids, groundwater (in refuse, soil and rock), and hot spot groundwater.

As discussed in Chapter 5 of the Feasibility Study Report, technologies/processes were first identified, assessed and screened based on their short- and long-term effectiveness, implementability, and cost. The purpose of the initial screening was to eliminate from further consideration those technologies/processes which in general may be suitable at CERCLA municipal landfills but were not considered suitable for implementation at the Central Landfill Site. The technologies/processes that remained after the initial screening process were then used to develop source control (SC) alternatives for the four distinct media previously discussed. Chapter 6 of the Feasibility Study Report presented the media specific Source Control (SC) alternatives. Sitewide SC alternatives were then developed by combining alternatives from each of the four media specific SC alternatives. The Sitewide SC alternatives and their detailed analyses are presented in Section 7 of the Feasibility Study Report.



In summary, twenty-two (22) media specific SC alternatives were developed in Section 6 of the Feasibility Study Report consisting of four alternatives for landfill wastes, six alternatives for hot spot solids, seven alternatives for groundwater, and five alternatives for hot spot groundwater. From these 22 media specific SC alternatives, nine (9) Site-wide SC alternatives were developed for detailed analysis in Section 7 of the Feasibility Study Report.

#### VIII. DESCRIPTION OF SOURCE CONTROL ALTERNATIVES

This Section provides a narrative summary of each alternative evaluated. There are several activities which are common to all the Sitewide source control alternatives considered except the No Action alternative. These common activities include:

1. Implementing deed restrictions on groundwater use and land development within property owned by the RISWMC.
2. Initiating a long-term program of sampling and analysis of groundwater, surface water and air.
3. Conducting a detailed evaluation of the existing landfill gas collection and combustion system.
4. Installing a chain link fence to prevent access.

**Alternative OU1-1: No Action:** This alternative was evaluated in detail in the FS to serve as a baseline for comparison with the other alternatives under consideration. Under this alternative no treatment or containment of solid waste or groundwater would occur and no effort would be made to restrict potential exposure to Site contaminants. A schematic of this alternative is shown in Figure 2, Appendix A.

*Estimated Time for Design and Construction:* N/A  
*Estimated Time of Operation:* N/A  
*Estimated Capital Cost:* N/A  
*Estimated Operations and Maintenance Costs (net present worth):* N/A  
*Estimated Total Cost (net present worth):* N/A

Alternative OU1-2: Capping of Solid Waste with a Single-Barrier Cap in Accordance with RIDEM Solid Waste Regulations and Hydraulic Containment and Treatment of Hot Spot Groundwater: This alternative, in addition to the activities common to all the alternatives would require: 1) construction of a single-barrier cap over the 121-acre Phase I area which would meet the Rhode Island Department of Environmental Management (RIDEM) Rules and Regulations for Solid Waste Management closure standards and; 2) require hydraulic containment and treatment of groundwater in the hot spot area of the landfill. A schematic of this alternative is shown in Figure 3, Appendix A.

The cap proposed in this alternative would be a single-barrier cap system meeting the requirements of the RIDEM Solid Waste Rules and Regulations. The components of the RIDEM solid waste single barrier cap design are illustrated in Figure 4, Appendix A.

Currently, 32 acres of the 121 acre Phase I area are capped with a RIDEM approved single-barrier cap. The remaining 89 acres are covered with one foot of compacted granular fill. Also, there are 33 acres of lined expansion areas designated as Phase II and III which, when completed, will overlap about 48.4 acres of the western portion of the Phase I area. The proposed single-barrier cap will be placed directly over those portions of the Phase I area that have not already been covered with a single-barrier RIDEM cap and those portions which will not be impacted by the Phase II and III expansion. The existing 32 acre single-barrier RIDEM approved cap would be integrated into the new single-barrier cap. Once the phase II and III expansion areas reach their capacity, the proposed single-barrier cap will be placed directly over that portion of the expansion area which overlies the Phase I area.

Each layer of the proposed single-barrier cap is described below. There may be some modifications in the thickness and composition of these layers during the design process.

1. A 6-inch thick granular bedding layer to allow for placement of the synthetic barrier and to establish the landfill base grade which will be about 3:1 (horizontal:vertical), which is equivalent to a slope of 18.4 degrees above the horizontal.
2. A synthetic barrier consisting of a 60 mil textured geomembrane to prevent water from infiltrating through the landfill.

3. A 12 inch thick drainage layer will be placed above the geomembrane to allow water to drain off this synthetic barrier and to prevent the ponding of water over this synthetic barrier. This layer will consist of sand or a sand and gravel mix.
5. The top layer of the cap is a vegetative soil layer comprised of 6 inches of subsoil and 6 inches of topsoil. This layer allows vegetation to grow on the cap. A filter fabric is often placed between this layer and the drainage layer to prevent fine material in the top layer from clogging the drainage layer. Only short rooted species of plants resistant to drought will be selected for planting in the topsoil. Deep rooted plants could damage the drainage and barrier layers.
6. Surface water drainage controls will be constructed to prevent erosion of the cap. Drainage controls will include perimeter swales spaced vertically about 25 feet ringing the landfill in a terrace configuration in the same manner currently used at the Site. The perimeter swales will consist of bermed soil with a crushed stone bed. The perimeter swales will drain to downchutes (drainage channels) to channel runoff away from the landfill.

The groundwater collection system will consist of several deep wells (at least 200 feet into bedrock) extracting an estimated 30,000 gallons of contaminated groundwater per day from the hot spot area. The results of a pump test to be conducted in the hot spot area during the design phase will help determine the exact location and number of extraction wells necessary to contain hot spot groundwater. The source control remedy includes a comprehensive groundwater monitoring program. To measure the performance of the hot spot groundwater containment system, hydraulic flows and groundwater contaminant concentrations will be carefully monitored. Given the uncertainties associated with the limits of the hot spot area, placement of the wells as effective locations may be difficult. Therefore, the location of the wells may require adjustments or modifications if data collected during operation warrants such adjustments or modifications.

The extracted groundwater will be treated on-site to remove metals and organic compounds so that clean water may be discharged to either on-site surface water or the Cranston Waste Water Treatment Plant. The final discharge location will be selected during the remedial design phase. Groundwater treatability studies will be conducted during

the design phase to determine the appropriate number and size of treatment units and treatment techniques to optimize the effectiveness of the treatment system.

The components of the groundwater treatment system are shown in Figure 5, Appendix A and described below:

1. The groundwater would first be sent to an equalization/settling tank to allow mixing and equalization of the flows from the various extraction wells. Any DNAPL or solids extracted along with the groundwater will settle out and be removed and properly disposed of.
2. Extracted groundwater would then be treated for the removal of metals (primarily iron and manganese), and other dissolved inorganics. The metals removal process will consist of a chemical precipitation/sand filtration process. Many of the metals dissolved in the groundwater can be converted to corresponding insoluble salts by direct pH adjustment with lime, sodium hydroxide, sodium sulfide, or a combination of these materials. Many other chemicals, including polymers, have also been demonstrated to be effective precipitating agents. Sand filtration, one of the most widely used processes in water treatment, involves passing an aqueous stream containing suspended solids through a sand bed. Various physical and chemical forces cause the solids to be retained within the sand bed; and
3. After the groundwater is treated to remove the inorganic contaminants, the organic contaminants will be treated using a UV/Chemical Oxidation system. This treatment technology uses a chemical reaction (oxidation) to convert the hazardous organic contaminants to nonhazardous or less hazardous compounds by introducing hydrogen peroxide, ozone or both into the contaminated water in the presence of ultraviolet light (UV). If the oxidation reaction is carried to completion, the end products from the oxidation of non-chlorinated hydrocarbons are carbon dioxide and water. The oxidation of chlorinated hydrocarbons may produce small amounts of hydrochloric acid and/or inorganic chlorides which may require additional treatment.

The cost of the alternative is summarized as follows by the two potential discharge options evaluated, either to surface water or to the Cranston POTW.

### Surface Water Discharge Option

Estimated Time for Design and Construction: 5 years  
Estimated Time of Operation: 30 years  
Estimated Capital Cost: \$ 20,450,000  
Estimated Operations and Maintenance Costs (net present worth): \$ 1,160,000  
Estimated Total Cost (net present worth): \$ 27,160,000

### POTW Discharge Option

Estimated Time for Design and Construction: 5 years  
Estimated Time of Operation: 30 years  
Estimated Capital Cost: \$ 20,450,000  
Estimated Operations and Maintenance Costs (net present worth): \$ 1,760,000  
Estimated Total Cost (net present worth): \$ 32,590,000

**Alternative OU1-3: Capping of Solid Waste with a Single-Barrier Cap in Accordance with RIDEM Solid Waste Regulations and Hydraulic Containment of Groundwater Along the Southern Perimeter of the Landfill:** This alternative, in addition to the activities common to all the alternatives would require: 1) construction of a single-barrier cap over the 121-acre Phase I area which would meet the Rhode Island Department of Environmental Management (RIDEM) Rules and Regulations for Solid Waste Management closure standards and; 2) require hydraulic containment and treatment of groundwater along the southern perimeter of the landfill. A schematic of this alternative is shown in Figure 6, Appendix A.

This alternative would use the same capping scenario as that described in alternative OU1-2. Instead of extracting and treating groundwater from the hot spot area, groundwater would be extracted from along the southern perimeter of the landfill and treated before being discharged to either on-site surface water or the Cranston Waste Water Treatment Plant.

The groundwater extraction system would extend over a length of approximately 3,600 feet and consist of an estimated thirty-six extraction wells installed to a depth of about 230 feet. About 200,000 gallons of contaminated water per day would be extracted from the ground.

The system used to treat the extracted groundwater would depend on the discharge option selected. If the groundwater is discharged to on-site surface water, the treatment system would be identical to the system used to remove the

inorganic and organic contaminants in groundwater extracted from the hot spot area. This system was discussed previously under alternative OU1-2. If the groundwater is discharged to the Cranston Waste Water Treatment Plant (POTW), only treatment to remove inorganic contaminants would be needed. Removal of organic contaminants would not be required. Therefore the UV/Oxidation process would not be part of the treatment system if the POTW discharge option is selected.

All the other treatment steps used for treatment of inorganic contaminants would be the same as that described previously under alternative OU1-2. The decision to forgo organics treatment for the POTW discharge option was based on available information, without pilot studies, and on the requirements for organic contaminant loadings in discharges to the Cranston Waste Water Treatment Plant. The primary requirement for organics is that the total toxic organics (TTO) be below 2.13 parts per million (ppm). Based on the results of groundwater analyses, the average concentration of TTO in groundwater extracted from all of the landfill, other than the hot spot area, is expected to be about 1 ppm. Treatment for inorganic removal is expected to further reduce this concentration.

#### *Surface Water Discharge Option*

*Estimated Time for Design and Construction: 5 years*  
*Estimated Time of Operation: 30 years*  
*Estimated Capital Cost: \$ 22,930,000*  
*Estimated Operations and Maintenance Costs (net present worth): \$ 820,000*  
*Estimated Total Cost (net present worth): \$ 27,160,000*

#### *POTW Discharge Option*

*Estimated Time for Design and Construction: 5 years*  
*Estimated Time of Operation: 30 years*  
*Estimated Capital Cost: \$ 22,930,000*  
*Estimated Operations and Maintenance Costs (net present worth): \$ 1,550,000*  
*Estimated Total Cost (net present worth): \$ 32,950,000*

Alternative OU1-4: Capping of Solid Waste with a Single-Barrier Cap in Accordance with RIDEM Solid Waste Regulations and Hydraulic Containment of Groundwater Along the Southern Perimeter of the Landfill and in the Hot Spot Area: This alternative, in addition to the activities common to all the alternatives would require: 1) construction of a cap over the 121-acre Phase I area which would meet the Rhode Island Department of Environmental Management (RIDEM) Rules and Regulations for Solid Waste Management closure standards and; 2) hydraulic containment and treatment of groundwater extracted along the southern side of the landfill and in the hot spot area. A schematic of this alternative is shown in Figure 7, Appendix A.

This alternative would use the same capping scenario as that described in alternative OU1-2. Groundwater would be extracted from two locations: 1) along the southern perimeter of the landfill (peak flow of 230 gpm) and; 2) from the hot spot area (20 gpm). These groundwater extraction systems would be identical to those described in Alternatives OU1-2 and OU1-3.

If the Cranston POTW is selected as the discharge option, the groundwater extracted from the two locations would be treated separately. The treatment system for the hot spot groundwater and southern perimeter of the landfill downgradient groundwater were described in Alternatives OU1-2 and OU1-3.

If on-site surface water is selected as the discharge option, then the two treatment systems would be combined. The combined system would consist of pre-treating the extracted hot spot groundwater for metals removal and the effluent of this pretreatment step would become a component of the influent to the southern perimeter groundwater treatment system for organics. The southern perimeter treatment system would consist of a metals precipitation step for the southern perimeter groundwater and an organics treatment step (UV/oxidation) for the combined hot spot and south side extracted groundwaters. The treatment technologies for on-site surface water discharge were described in Alternatives OU1-2 and OU1-3.

#### *Surface Water Discharge Option*

*Estimated Time for Design and Construction: 5 years*  
*Estimated Time of Operation: 30 years*  
*Estimated Capital Cost: \$ 25,500,000*  
*Estimated Operations and Maintenance Costs (net present worth): \$ 1,400,000*  
*Estimated Total Cost (net present worth): \$ 34,330,000*

### POTW Discharge Option

Estimated Time for Design and Construction: 5 years  
Estimated Time of Operation: 30 years  
Estimated Capital Cost: \$ 25,760,000  
Estimated Operations and Maintenance Costs (net present worth): \$ 2,900,000  
Estimated Total Cost (net present worth): \$ 48,180,000

**Alternative OU1-5: Capping of Solid Waste with a Multi-Layer RCRA C Cap and Hydraulic Containment and Treatment of Hot Spot Groundwater:** This alternative, in addition to the activities common to all the alternatives would require: 1) Constructing a multi-layer RCRA C cap over the existing 121 acre Phase I area and incorporating the existing 32 acres of RIDEM approved cap on the side slopes; and 2) hydraulic containment and treatment of groundwater in the hot spot area of the landfill. A schematic of this alternative is shown in Figure 8, Appendix A.

This alternative would use the same capping scenario as that described in alternative OU1-2; however, the proposed cap would be a multi-layer RCRA C cap instead of a single-barrier RIDEM approved cap. As in alternatives OU1-2, 3, and 4, the existing 32 acre single-barrier RIDEM approved cap would be retained and integrated into the new multi-layer cap. Additional cover over the existing 32-acre cap area for frost protection may be required. The decision whether or not additional cover material is needed will be decided during the remedial design phase. There may be some modifications in the thickness and composition of these layers during the design process.

Each layer of the multi-layer cap is described below (from the bottom layer contiguous to the waste, to the top vegetative layer). A cross section of the proposed multi-layer cap for both the top, flat area and side slopes of the landfill is provided in Figure 9, Appendix A. There may be some modifications in the thickness and composition of these layers during the design process.

1. A base layer comprised of approximately 6 inches of fill material. This material will establish the landfill base grade which will be about 3:1 (horizontal:vertical), which is equivalent to a slope of 18.4 degrees above the horizontal.
2. A bottom low hydraulic conductivity layer to minimize any potential leakage through the upper low hydraulic conductivity layer located immediately above this layer



as discussed below. The bottom low hydraulic conductivity layer is often made with clay or a manufactured clay-like material. On the top, flat portions of the landfill, this bottom layer may consist of a bentonite geocomposite mat (manufactured clay layer). However, clay and manufactured clay substitutes can't be placed on steep slopes such as the side slopes at Central Landfill. Therefore, at this Site, on the side slopes, the bottom low hydraulic conductivity layer will consist of 18 inches of a material that is more resistant to sliding than clay, yet has similar low hydraulic conductivity characteristics. This material will likely be a silty soil.

3. The upper low hydraulic conductivity layer will be a synthetic barrier. This will be the main barrier for preventing water from infiltrating through the landfill. This synthetic barrier will be either a 40-mil (.04 inch) VLDPE plastic membrane or a 60-mil (.06 inch) HDPE plastic membrane.
4. A 12 inch thick drainage layer will be placed above the synthetic barrier to allow water to drain off the synthetic barrier and to prevent the ponding of water over the synthetic barrier. This layer will consist of sand or a sand and gravel mix.
5. The top layer of the cap is a vegetative soil layer comprised of 18 inches of subsoil and 6 inches of topsoil. This layer adds frost protection and allows vegetation to grow on the cap. A filter fabric is often placed between this layer and the drainage layer to prevent fine material in the top layer from clogging the drainage layer. Only short rooted species of plants resistant to drought will be selected for planting in the topsoil. Deep rooted plants could damage the drainage and barrier layers.
6. Surface water drainage controls will be constructed to prevent erosion of the cap. Drainage controls will include perimeter swales spaced vertically about 25 feet ringing the landfill in a terrace configuration in the same manner currently used at the Site. The perimeter swales will consist of bermed soil with a crushed stone bed. The perimeter swales will drain to downchutes (drainage channels) to channel runoff away from the landfill.

The hot spot groundwater collection system is identical to the system described previously under alternative OU1-2.

The cost of the alternative is summarized below by the two potential discharge options evaluated, to surface water or to the Cranston POTW.

#### Surface Water Discharge Option

Estimated Time for Design and Construction: 5 years  
Estimated Time of Operation: 30 years  
Estimated Capital Cost: \$ 27,260,000  
Estimated Operations and Maintenance Costs (net present worth): \$ 1,160,000  
Estimated Total Cost (net present worth): \$ 32,110,000

#### POTW Discharge Option

Estimated Time for Design and Construction: 5 years  
Estimated Time of Operation: 30 years  
Estimated Capital Cost: \$ 27,260,000  
Estimated Operations and Maintenance Costs (net present worth): \$ 1,760,000  
Estimated Total Cost (net present worth): \$ 37,540,000

Alternative OU1-6: Capping of Solid Waste with a Multi-Layer RCRA C Cap and Hydraulic Containment of Groundwater along the Southern Side of the Landfill: This alternative, in addition to the activities common to all the alternatives would require: 1) Construction of a multi-layer cap over the 121 acre Phase I area and incorporates the existing 32 acres of RIDEM approved cap; 2) hydraulic containment and treatment of groundwater extracted along the southern perimeter of the landfill. A schematic of this alternative is shown in Figure 10, Appendix A.

The capping scenario and design would be identical to that described for alternative OU1-5. The groundwater extraction and treatment system for this alternative would be identical to the system previously described for alternative OU1-3.

#### Surface Water Discharge Option

Estimated Time for Design and Construction: 5 years  
Estimated Time of Operation: 30 years  
Estimated Capital Cost: \$ 29,750,000  
Estimated Operations and Maintenance Costs (net present worth): \$ 820,000  
Estimated Total Cost (net present worth): \$ 32,110,000

### *POTW Discharge Option*

*Estimated Time for Design and Construction: 5 years*  
*Estimated Time of Operation: 30 years*  
*Estimated Capital Cost: \$ 30,420,000*  
*Estimated Operations and Maintenance Costs (net present worth): \$ 1,550,000*  
*Estimated Total Cost (net present worth): \$ 37,900,000*

**Alternative OU1-7: Capping of Solid Waste with a Multi-Layer RCRA C Cap, Hydraulic Containment of Groundwater Along the Southern Perimeter of the Landfill and in the Hot Spot Area:** This alternative, in addition to the activities common to all the alternatives would require: 1) Construction of a multi-layer cap over the 121 acre Phase I area and incorporates the existing 32 acres of RIDEM approved cap; 2) hydraulic containment and treatment of groundwater which passes beneath both the hot spot and the southern perimeter of the landfill. A schematic of this alternative is shown in Figure 11, Appendix A.

The capping scenario and design would be identical to that described previously for alternative, OU1-5. The groundwater extraction and treatment system for this alternative would be identical to the system previously described for alternative OU1-4.

### *Surface Water Discharge Option*

*Estimated Time for Design and Construction: 5 years*  
*Estimated Time of Operation: 30 years*  
*Estimated Capital Cost: \$ 32,280,000*  
*Estimated Operations and Maintenance Costs (net present worth): \$ 1,400,000*  
*Estimated Total Cost (net present worth): \$ 39,280,000*

### *POTW Discharge Option*

*Estimated Time for Design and Construction: 5 years*  
*Estimated Time of Operation: 30 years*  
*Estimated Capital Cost: \$ 32,580,000*  
*Estimated Operations and Maintenance Costs (net present worth): \$ 2,900,000*  
*Estimated Total Cost (net present worth): \$ 53,120,000*

Alternative OU1-8: Capping of Solid Waste with a Multi-Layer RCRA C Cap, Hydraulic Containment of Groundwater Along the Southern Perimeter of the Landfill and in the Hot Spot Area and Heated Vapor Extraction of Volatile Organics from the Chemical Sludges Buried in the Hot Spot Area: This alternative, in addition to the activities common to all the alternatives, would require: 1) Construction of a multi-layer cap over the 121 acre Phase I area; 2) hydraulic containment and treatment of groundwater which passes beneath both the hot spot and the southern perimeter of the landfill; and 3) heated vapor phase extraction of organics from the chemical sludges buried in the hot spot area. A schematic of this alternative is shown in Figure 12, Appendix A.

The capping scenario and design would be identical to that described for the OU1-5. However, for this alternative, the existing 32 acres of RIDEM approved capping would be removed rather than incorporated and replaced with the multi-layer cap design. The groundwater extraction and treatment system for this alternative would be identical to the system previously described for Alternative OU1-4.

The heated vapor extraction system would consist of an estimated 25 vapor injection and extraction wells installed in the hot spot area. Heated (above 150 degrees centigrade) air would be injected and recovered from above, below and within the chemical sludge layer. The contaminated return air would be treated using (to be verified by testing) a catalytic oxidation process.

#### *Surface Water Discharge Option*

*Estimated Time for Design and Construction: 5 years*  
*Estimated Time of Operation: 30 years*  
*Estimated Capital Cost: \$ 41,290,000*  
*Estimated Operations and Maintenance Costs (net present worth): \$ 1,800,000*  
*Estimated Total Cost (net present worth): \$ 50,420,000*

#### *POTW Discharge Option*

*Estimated Time for Design and Construction: 5 years*  
*Estimated Time of Operation: 30 years*  
*Estimated Capital Cost: \$ 41,590,000*  
*Estimated Operations and Maintenance Costs (net present worth): \$ 3,300,000*  
*Estimated Total Cost (net present worth): \$ 64,270,000*

Alternative OU1-9: Capping of Solid Waste with a Multi-Layer RCRA C Cap, Hydraulic Containment of Groundwater Along the Southern Perimeter of the Landfill and in the Hot Spot Area Excavation of the Chemical Sludges Buried in the Hot Spot Area: This alternative, in addition to the activities common to all the alternatives would require: 1) Construction of a multi-layer cap over the 121 acre Phase I area; 2) hydraulic containment and treatment of groundwater which passes beneath both the hot spot and the southern perimeter of the landfill; and 3) excavation and off-site disposal of the chemical sludge from the hot spot area. A schematic of this alternative is shown in Figure 13, Appendix A.

The capping scenario and design would be identical to that described for Alternative, OU1-8. The groundwater extraction and treatment system for this alternative would be identical to the system previously described for Alternatives OU1-4.

An estimated 1,000 cubic yards of chemical sludge would be removed from the hot spot area. In order to remove the sludge it would be necessary to brace the excavation and remove the overlying sand and gravel, municipal refuse and septage sludge. The excavated chemical sludges would be transported off-site for treatment in a hazardous waste incinerator.

#### *Surface Water Discharge Option*

*Estimated Time for Design and Construction: 5 years*  
*Estimated Time of Operation: 30 years*  
*Estimated Capital Cost: \$ 56,550,000*  
*Estimated Operations and Maintenance Costs (net present worth): \$ 1,400,000*  
*Estimated Total Cost (net present worth): \$ 59,790,000*

#### *POTW Discharge Option*

*Estimated Time for Design and Construction: 5 years*  
*Estimated Time of Operation: 30 years*  
*Estimated Capital Cost: \$ 56,850,000*  
*Estimated Operations and Maintenance Costs (net present worth): \$ 2,890,000*  
*Estimated Total Cost (net present worth): \$ 73,640,000*

## IX. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the National Contingency Plan articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a Site remedy. The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria. These criteria are summarized as follows:

### Threshold Criteria

The two threshold criteria described below must be met in order for the alternatives to be eligible for selection in accordance with the NCP.

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.
2. **Compliance with applicable or relevant and appropriate requirements (ARARS)** addresses whether or not a remedy will meet all of the ARARs of other Federal and State environmental laws and/or provide grounds for invoking a waiver.

### Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of one alternative to another that meet the threshold criteria.

3. **Long-term effectiveness and permanence** addresses the criteria that are utilized to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.
4. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the Site.

5. **Short term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.
6. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.
7. **Cost** includes estimated capital and Operation Maintenance (O&M) costs, as well as present-worth costs.

#### Modifying Criteria

The modifying criteria are used on the final evaluation of remedial alternatives generally after EPA has received public comment on the RI/FS and Proposed Plan.

8. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.
9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS report.

A detailed tabular assessment of each alternative according to the nine criteria can be found in Table 6-21A thru 6-27B of the Feasibility Study.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted.

The section below presents the nine criteria and a brief narrative summary of the alternatives and the strengths and weaknesses according to the detailed and comparative analysis.

#### *1. Overall Protection of Human Health and the Environment*

The preamble to the National Contingency Plan (NCP) identifies municipal landfills as a type of site where treatment of the waste may be impracticable because of the size and heterogeneity of the contents. EPA generally considers containment to be an appropriate response action

for large municipal landfills. Because the Central Landfill Site is a large municipal landfill, the alternatives evaluated consider containment to be the appropriate response action for source control.

The no action alternative (OU1-1) is not protective of human health and the environment. The no action alternative would allow a continued release of contaminants and a possible spreading of contamination through the groundwater to currently uncontaminated areas.

Alternative, OU1-2 through OU1-9 are protective of human health and the environment however, those alternatives which include a double-barrier RCRA C cap on the top, flat portions of the landfill (OU1-5, 6, 7 8 and 9) provide an added degree of protectiveness against infiltration of storm water into the waste over those alternatives which include a single-barrier RIDEM cap (OU1-2, 3 and 4). The RCRA C capping alternatives do, however, pose a slightly greater short-term impact to the community than the RIDEM cap because it will require trucking in more off-site material for cap construction resulting in greater short-term impacts to local traffic.

Alternatives OU1-8 and OU1-9 have a greater potential than all the other alternatives to impact on-site workers, nearby residents and the environment. This impact results from removing the existing 32 acres of RIDEM approved capping, constructing the new RCRA C cap, and from potential contaminant releases resulting from treating the hot spot chemical sludges.

Alternatives which include southern perimeter or southern perimeter plus hot spot groundwater extraction (OU1-3, 4, 6, 7, 8, and 9) may adversely impact nearby wetlands from the water table drawdown while those with hot spot groundwater extraction only (OU1-2 and 5) do not impact wetlands. EPA believes that alternatives which combine hot spot groundwater extraction and treatment and capping (OU1-2 and OU1-5) will be effective in protecting human health and the environment because these alternatives will 1) contain groundwater that has contaminant concentrations exceeding MCLs and non-zero MCLGs from migrating beyond the compliance boundary (refer to Table 15, Appendix B of this ROD), or, in the absence of MCLs or non-zero MCLGs, contain groundwater that has contaminant concentrations above levels that are protective of human health (refer to Table 16, Appendix B of this ROD) from migrating beyond the compliance boundary and; 2) prevent the degradation of surface waters below the identified surface water standards. EPA does not believe those alternatives which include southern perimeter and hot spot groundwater extraction will significantly increase



protection of human health and the environment beyond that which will be provided by alternatives extracting groundwater at only the hot spot. Alternatives involving only hot spot collection are believed to provide sufficient long-term effectiveness since they contain groundwater closer to the major source of groundwater contamination.

Alternatives OU1-2, OU1-3, and OU1-4 do not meet the closure requirements for hazardous waste landfills. Alternatives OU1-5, OU1-6, and OU1-7 will meet the closure requirements for hazardous waste landfills on the top, flat portions of the landfill. For the side slopes, the existing 32 acres of RIDEM approved capping appears to meet the performance standards for the closure of a hazardous waste landfill. Alternatives OU1-8 and OU1-9 are in complete compliance with all ARARs.

## *2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)*

The no action alternative (OU1-1) does not comply with the ARARs identified because it would allow groundwater which exceeds MCLs to migrate beyond the compliance boundary.

Alternatives OU1-2, 3, and 4, would not be in complete compliance with the closure requirements for a hazardous waste landfills. That is, the single barrier RIDEM cap does not minimize infiltration of precipitation as effectively on the top, flat portion of the landfill as a double barrier RCRA C cap. However, on the landfill side slopes, the existing 32 acres of RIDEM approved capping appears to meet the performance criteria for hazardous waste caps to the extent EPA can determine at this time. That is, the existing 32 acre cap requires minimum amount of maintenance; promotes drainage and minimizes erosion; accommodates settling and subsidence of the landfill; and has a permeability less than the permeability of the natural subsoils present. Also, the EPA has no data to suggest that the existing 32 acre cap will not provide long-term minimization of the infiltration of liquids through the closed landfill. The existing 32 acre cap would be monitored over time to ensure that it is meeting the RCRA C performance standards for the closure of a hazardous waste landfill. All of the other ARARs would be met.

Alternatives OU1-5, 6, and 7 will meet the closure requirements for hazardous waste landfills on the top, flat portions of the landfill. Again, on the landfill side slopes, the existing 32 acres of RIDEM approved capping appears to meet the closure requirements for a hazardous waste landfills as explained in the previous paragraph. All of the other ARARs would be met.

Alternatives OU1-8 and OU1-9 were judged to be in complete compliance with all of the identified capping ARARs.

For alternatives OU1-2 through OU1-9 EPA has not identified groundwater cleanup levels; rather, ARARs have been identified to monitor the performance of these alternatives. These ARARs include instituting groundwater monitoring programs and identify MCLs and non-zero MCLGs and surface water standards as a measure of performance for groundwater containment. Each of these alternatives includes a comprehensive groundwater monitoring program. For groundwater containment performance, hydraulic flows and groundwater and surface water contaminant concentrations will be carefully monitored to determine whether or not the remedy 1) is effective at containing groundwater that has contaminant concentrations exceeding MCLs and non-zero MCLGs from migrating beyond the compliance boundary (refer to Table 15, Appendix B of this ROD), or in the absence of MCLs or non-zero MCLGs contaminant concentrations above levels that are protective of human health (refer to Table 16, Appendix B of this ROD) from migrating beyond the compliance boundary and; 2) prevents the degradation of surface waters below surface water standards.

### 3. *Long-term Effectiveness and Permanence*

With the exception of the no-action alternative, OU1-1, all of the alternatives evaluated would provide long-term effectiveness.

Although all of the alternatives, except the no action alternative, include capping the 121 acre Phase I area and a groundwater containment system, alternatives OU1-5, 6, 7, 8, and 9 have more long-term effectiveness than alternatives OU1-2, 3, and 4 because they include a double-barrier RCRA C cap rather than a single-barrier RIDEM cap. Alternatives OU1-8 and 9 treat the chemical sludges in the hot spot area in addition to capping and groundwater containment; however, treatment of the chemical sludges will not provide any significant additional long-term effectiveness since this treatment does not address the DNAPLs in the fractured bedrock underlying the hot spot area. DNAPLs have been identified as the major source of contamination at the hot spot area.

Those alternative which include southern perimeter groundwater extraction and treatment in addition to hot spot groundwater extraction and treatment (OU1-4, 7, 8 and 9) may not provide significant additional long-term effectiveness over those involving only hot spot groundwater extraction and treatment (OU1-2 and 5). EPA believes that the combination of hot spot groundwater extraction and treatment

and capping will 1) contain groundwater that has contaminant concentrations exceeding MCLs and non-zero MCLGs from migrating beyond the compliance boundary or, in the absence of MCLs or non-zero MCLGs contain groundwater that has contaminant concentrations above levels that are protective of human health from migrating beyond the compliance boundary and; 2) prevent the degradation of surface waters below surface water standards. The reason for this is 1) hot spot groundwater extraction and treatment should prevent the continued migration of high levels of contamination currently existing at the hot spot; and 2) the additional capping component should minimize infiltration of precipitation into the landfill thereby effectively minimizing any future migration of contaminated groundwater caused by the existing 121 acre Phase I area. These alternatives also provide sufficient long-term effectiveness since they contain groundwater close to what is believed to be the major source of groundwater contamination at the Site. Alternative OU1-5 has more long term effectiveness than OU1-2 because it includes the double-barrier RCRA C cap instead of the single-barrier RIDEM cap.

#### *4. Reduction of Toxicity, Mobility, or Volume through Treatment*

The no-action alternative, OU1-1, provides neither containment of nor treatment of contaminants and consequently provides no reduction of toxicity, mobility or volume of contaminants migrating from the source area. The remaining alternatives, OU1-2 through OU1-9, include capping (either a single-barrier RIDEM cap or a double-barrier RCRA C cap) as a component of the alternatives and will reduce the mobility of contaminants by minimizing the amount of precipitation that infiltrates the waste mass. Those alternatives that include a double-barrier RCRA C cap on the top, flat portions of the landfill (OU1-5, 6, 7, 8 and 9) will be more effective in minimizing infiltration.

Those treatment technologies that do remove contaminants from the hot spot area (either directly or through vapor or groundwater extraction) provide the greatest reduction in volume and toxicity of contaminants. Alternative OU1-9, which involves excavation of hot spot chemical sludges, and extraction and treatment of groundwater from both the hot spot area and landfill perimeter, provides the greatest reduction in volume and toxicity of Site contamination. Alternative OU1-8 which also involves groundwater extraction and treatment from both the hot spot area and the landfill perimeter and in-situ treatment of chemical sludges provides similar, though somewhat less, reduction in the volume and toxicity of Site contaminants than OU1-9.

Alternatives OU1-4 and OU1-7, involve groundwater extraction from both the hot spot area and the southern perimeter of the landfill but with no treatment or excavation of the hot spot area chemical sludges, thus providing somewhat less reduction of volume and toxicity than OU1-8 and OU1-9. Alternatives OU1-4 and 7 may provide a slightly greater reduction in the volume and mobility of Site contaminants than alternatives OU1-2 and 5, which involve the extraction of groundwater at just the hot spot area. Alternatives OU1-3 and OU1-6 which include the extraction of groundwater at just the southern, downgradient side of the landfill provide the least reduction in the volume and toxicity of contaminants because extraction of groundwater at the southern perimeter of the landfill is not as effective in treating the hot spot area which is the major source of groundwater contamination identified at the Site.

#### 5. *Short-term Effectiveness*

Since the no action alternative does not include construction, there are no short-term effects.

The remaining alternatives, OU1-2 through OU1-9, include capping (either a single-barrier RIDEM cap or a double-barrier RCRA C cap) as a component of the alternatives. Those alternatives that include a double-barrier RCRA C cap on the top, flat portions of the landfill (OU1-5, 6, 7, 8 and 9) will require bringing on-site a greater amount of cap construction material than that required for a single-barrier RIDEM cap (OU1-2, 3 and 4) resulting in greater short-term local traffic impacts. Those alternatives that include either the removal of the hot spot chemical sludges or in-situ treatment of the hot spot chemical sludges (OU1-8 and OU1-9) will result in the greatest short-term risk to on-site workers and area residents due to potential exposures to released contaminants during these more intrusive activities. That is, OU1-9 requires excavating an estimated 1000 cubic yards of hot spot chemical sludges and OU1-8 requires heated vapor extraction of the hot spot chemical sludges. Both of these activities increase the potential for on-site workers and area residents to be exposed to Site contaminants. Further, these two alternatives require the removal of the existing 32 acres of single-barrier RIDEM approved capping. This action requires bringing on-site even greater amount of cap construction material resulting in additional short-term local traffic impacts.

All of the alternatives except the no-action alternative (OU1-1) require groundwater containment systems via extraction and treatment of groundwater. Alternatives OU1-

3, 4, 6, 7, 8 and 9, which include extraction and treatment of large volumes of groundwater from the southern, downgradient perimeter of the landfill may result in a significant lowering of the water table which could potentially impact adjacent wetlands. Extraction of large volumes of groundwater from the southern perimeter of the landfill may also cause a migration of contaminants from identified off-site source areas to the Central Landfill Site. Alternatives OU1-2 and OU1-5 which involve extraction and treatment of groundwater from only the hot spot area should not impact any wetlands. Therefore, the groundwater containment system used in alternatives OU1-2 and OU1-5 is slightly more short-term effective than the other alternatives.

Based on the short-term risk to on-site workers, area residents and the environment from treatment of the chemical sludges, cap removal and construction, and from groundwater containment as explained above, alternatives OU1-8 and 9 provide the least short-term effectiveness. Alternatives OU1-2 and OU1-5 which involve extraction and treatment of groundwater from only the hot spot area will not impact any wetlands; therefore, they have more short-term effectiveness than the groundwater containment alternatives which may impact wetlands (OU1-3, 4, 6, 7, 8 and 9). Alternative OU1-2 is slightly more effective than alternative OU1-5 because less off-site material is required for construction of the single-barrier RIDEM cap than the double-barrier RCRA C cap. This results in less short-term local traffic impacts.

## 6. *Implementability*

All of the alternatives evaluated are implementable. Cap construction and groundwater extraction and treatment are commonly used at landfill sites. Those alternatives that involve the in-situ treatment or excavation of the hot spot chemical sludges (OU1-8 and OU1-9) are technically more difficult to implement than the other alternatives due to the difficulties encountered with in-situ treatment (OU1-8) of sludges with very low pneumatic permeabilities, such as the hot spot chemical sludges, and the difficulties encountered in excavation of the hot spot chemical sludges (OU1-9) given the uncertainties of the areal extent of the chemical sludges and the amount of overburden material which would have to be excavated.

Alternatives which include extraction and treatment of hot spot groundwater (OU1-2, 4, 5, and 7) would be slightly more difficult to implement than alternatives which involve the extraction and treatment of groundwater from only the southern perimeter (OU1-3 and OU1-6). This is due to the

difficulties in handling and treating the more highly contaminated hot spot groundwater and the difficulties involved in handling and disposing of the residual hazardous sludges that would be generated. The treatment of groundwater extracted from the southern perimeter of the landfill with the POTW discharge option is easier to implement because the water would be treated for metals removal only. However, the POTW must be shown to be in compliance with its permitting requirements before any discharge of treated groundwater is allowed. Treatment of southern perimeter groundwater will have to include UV oxidation for the treatment of VOCs if the surface water discharge option is selected. Hot spot groundwater will have to be treated for both metals and VOCs.

## 7. Cost

Alternatives OU1-8 and 9, while treating the hot spot chemical sludges by either in-situ heated vapor extraction or excavation, do not provide any additional treatment for the major source problem, DNAPLS, than would alternatives OU1-2 and OU1-5, which include only hot spot groundwater extraction and treatment. Therefore, the added cost for in-situ treatment or excavation of the hot spot chemical sludges provides no significant additional benefit for the protection of human health. Alternatives which include solely double barrier RCRA C caps (OU1-8 and 9) include the additional cost of removing the existing 32 acres of single barrier RIDEM capping currently in place on portions of the side slopes. EPA believes that the existing 32 acre RIDEM cap will meet the performance standards of a RCRA C cap on the side slopes, therefore, the difficulties of implementation and the additional cost of removing the existing 32 acres of RIDEM capping is not necessary to protect human health and the environment.

Since EPA believes that the combination of capping and hot spot groundwater extraction and treatment is sufficient to contain groundwater exceeding MCLs/non-zero MCLGs or health based levels from migrating beyond the compliance boundary, the additional cost of installing a perimeter groundwater collection and treatment system, when compared to the insignificant benefit gained, is not cost effective.

## 8. State Acceptance

The State's comments on the Proposed Plan are provided in Appendix D, the Responsiveness Summary. In summary, the State believes that the remedy selection as outlined in the Proposed Plan accurately defines, recognizes and complies

with all environmental regulations promulgated by the Department of Environmental Management. The State of Rhode Island concurs with the Selected Remedy. Their letter of concurrence, documenting the State's position on the Selected Remedy is provided in Appendix C of this ROD.

#### 9. *Community Acceptance*

The comments received from the community on the RI/FS and the Proposed Plan during the public comment period and EPA's responses to these comments are summarized in the Responsiveness Summary in Appendix D.

Many of the comments received from the community raised serious objections to EPA allowing RISWMC to continue landfilling operations in the Phase II and III areas. There was concern that a delay in closing the Phase I area caused by the Phase II and III operations would allow for infiltration of precipitation through any un-capped areas of Phase I resulting in continued leachate generation. Many commenters felt that closing Central Landfill should have been a component of EPA's preferred alternative. There was also some objections to not excavating the chemical sludges in the hot spot area and not including southern perimeter groundwater collection and treatment in the preferred alternative.

#### X. **THE SELECTED REMEDY**

The selected remedy is source control alternative OU1-5. The components of the selected source control remedy are presented and discussed in Section VIII of this ROD. In summary, the selected source control remedy consists of:

1. Constructing a multi-layer RCRA C cap over the existing 121 acre Phase I area and incorporating the existing 32 acres of RIDEM approved cap on the side slopes;
2. Hydraulic containment and treatment of groundwater in the hot spot area of the landfill and discharging the treated groundwater to either on-site surface water or the Cranston Waste Water Treatment Plant;
3. Implementing deed restrictions on groundwater use and land development within property owned by the RISWMC;
4. Initiating a long-term program of sampling and analysis of groundwater, surface water and air;

5. Conducting a detailed evaluation of the existing landfill gas collection and combustion system; and
6. Installing a chain link fence to prevent access.

The costs of the selected remedy are summarized as follows.

#### *Surface Water Discharge Option*

*Estimated Time for Design and Construction: 5 years*  
*Estimated Time of Operation: 30 years*  
*Estimated Capital Cost: \$ 27,260,000*  
*Estimated Operations and Maintenance Costs (net present worth): \$ 1,160,000*  
*Estimated Total Cost (net present worth): \$ 32,110,000*

#### *POTW Discharge Option*

*Estimated Time for Design and Construction: 5 years*  
*Estimated Time of Operation: 30 years*  
*Estimated Capital Cost: \$ 27,260,000*  
*Estimated Operations and Maintenance Costs (net present worth): \$ 1,760,000*  
*Estimated Total Cost (net present worth): \$ 37,540,000*

The selected remedy is the first operable unit of a two operable unit approach to remediation of the environmental contamination caused by the Central Landfill Site. The selected remedy as well as all the other alternatives described in Section VIII and evaluated in Section IX of this ROD, except the no action alternative, are source control remedies. The purpose of the selected source control remedy is to prevent or minimize the continued effects of contamination within the 121 acre Phase I area on groundwater quality. The second operable unit will address any impacts to off-site areas caused by contaminants that have already migrated from the Phase I area and beyond the edge of the waste management area. During the second operable unit, additional studies will be undertaken to better characterize the extent of off-site contamination and to develop and evaluate alternatives for remediation should it be required.

#### **A. Groundwater Containmentment**

This is a source control remedy intended to prevent or minimize the continued release of hazardous substances to the groundwater. That is, the selected remedy is expected to 1) prevent groundwater that has contaminant



concentrations exceeding MCLs and non-zero MCLGs from migrating beyond the compliance boundary (refer to Table 15, Appendix B of this ROD) or; in the absence of MCLs or non-zero MCLGs, prevent groundwater that has contaminant concentrations above levels that are protective of human health from migrating beyond the compliance boundary (refer to Table 16, Appendix B of this ROD) and; 2) prevent the degradation of surface waters below surface water standards. The National Contingency Plan requires the compliance boundary for groundwater containment remedies to be established at and beyond the edge of the waste management area. Therefore, the compliance boundary for groundwater issues at the Central Landfill Site is the toe of the 154-acre (Phase I, II and III) waste management area. The selected remedy includes a comprehensive groundwater monitoring program. To measure the performance of the source control remedy, groundwater and surface water contaminant concentrations will be carefully monitored.

#### **B. Design and Construction Issues**

The time required to design and construct the selected remedy has been estimated in the Feasibility Study Report to be five (5) years from design start. As discussed in Section VIII of this ROD, the Phase II and III expansion area, when completed will overlap about 48.4 acres of the western portion of the Phase I area. The selected remedy requires covering, with a multi-layer cap, that portion of the Phase II and III expansion area that overlies the Phase I area once the Phase II and III areas reach their capacity. If activities in the Phase II and III areas result in extending the design and construction schedule beyond the five (5) year estimate provided in the Feasibility Study Report, an impermeable barrier will be designed and installed to prevent or minimize infiltration of precipitation and leachate through the uncapped areas of the Phase I area. Once Phases II and III filling activities are completed, a RCRA C cap will cover that portion of the Phase II and III areas that overly the Phase I area as originally planned. The design of the impermeable barrier will be included as a component of the remedial design. None of the other components of the selected remedy will be impacted by the Phase II and III expansion.

Since there is some uncertainty associated with the limits of the hot spot area groundwater, exact placement of the extraction wells to contain the hot spot area groundwater may be difficult. As discussed previously, through groundwater monitoring, the effectiveness of the hot spot groundwater extraction and treatment system will be monitored over time. The extraction and treatment system may require adjustments or modifications if data collected

during its operation warrants such adjustments or modifications.

As provided in the NCP, EPA will review the Site at least once every five years after the initiation of remedial action at the Site since hazardous substances, pollutants and contaminants remain at the Site. This will ensure that the remedial action continues to protect human health and the environment.

## **XI. STATUTORY DETERMINATIONS**

The remedial action selected for implementation at the Central Landfill Site is consistent with CERCLA and, the NCP. The selected remedy is protective of human health and the environment, attains ARARs and is cost effective. The selected remedy also satisfies the statutory preference for treatment which permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element. Additionally, the selected remedy utilizes alternate treatment technologies or resource recovery technologies to the maximum extent practicable.

### **A. The Selected Remedy is Protective of Human Health and the Environment**

The remedy at this Site will permanently reduce the risks posed to human health and the environment by controlling exposures to human and environmental receptors through treatment, engineering controls, and institutional controls. Specifically, the risk presented by this Site is the possible exposure to and ingestion of contaminated groundwater. The selected containment remedy uses a combination of capping and collecting and treating groundwater in the hot spot area to prevent or minimize the continued release of hazardous substances from the 121 acre Phase I area to the groundwater. Over time, the combination of capping and containment of hot spot groundwater is expected to 1) prevent groundwater that has contaminant concentrations exceeding MCLs and non-zero MCLGs from migrating beyond the compliance boundary (refer to Table 15, Appendix B of this ROD) or; in the absence of MCLs or non-zero MCLGs, prevent groundwater that has contaminant concentrations above levels that are protective of human health (refer to Table 16, Appendix B of this ROD) from migrating beyond the compliance boundary and; 2) prevent the degradation of surface waters below surface water standards. The hot spot containment system should prevent the continued migration of high levels of contamination currently existing in the hot spot area. The capping component will prevent or

minimize the continued infiltration of precipitation into the landfill thereby minimizing any future migration of contaminated groundwater caused by the 121 acre landfill area. Under current conditions, all residences and businesses surrounding the Site have been offered public water and almost all have accepted; therefore, there is no current risk associated with the ingestion of contaminated groundwater. On property owned by the RISWMC, institutional controls will be implemented to prevent the current or future use of contaminated groundwater.

#### **B. The Selected Remedy Attains ARARs**

This remedy will attain all applicable or relevant and appropriate federal and state requirements that apply to the Site. Environmental laws from which ARARs for the selected remedial action are derived, and the specific ARARs include:

#### **Action-Specific**

##### **Federal Requirements**

- o Safe Drinking Water Act, Maximum Contaminant Levels (MCLs), 40 CFR, Part 141.
- o Safe Drinking Water Act; Non-zero Maximum Contaminant Level Goals, (Non-zero MCLGs) 40 CFR, Part 141.
- o Clean Water Act (CWA)- National Pollutant Discharge Elimination System (NPDES) Regulation, 40 CFR Parts 122, 123, and 124 November 16, 1990.
- o CWA - Federal Ambient Water Quality Criteria (FAWQC), 40 CFR 122.44.
- o Resource Conservation and Recovery Act (RCRA)- Releases from Solid Waste Management Units, 40 CFR, Part 264, Subpart F.
- o RCRA - Criteria for Municipal Solid Waste Landfills, 40 CFR, Part 258, Subpart E.
- o RCRA - Interim Status; Thermal Treatment, 40 CFR, Part 265, Subpart P.
- o RCRA - Air Emissions Standards for Process Vents, 40 CFR, Part 264, Subpart AA.
- o RCRA, Air Emissions Standards for Equipment Leaks, 40 CFR, Part 264, Subpart BB.

- o RCRA, Identification and Listing of Hazardous Waste, 40 CFR, Part 261.
- o RCRA, Interim Status TSDF Standards; Thermal Treatment, 40 CFR Part 265, Subpart P.
- o RCRA, Interim Status TSDF Standards; Chemical Physical and Biological Treatment, 40 CFR Part 265, Subpart Q.
- o RCRA, Land Disposal Restrictions, 40 CFR Part 268.
- o RCRA, Closure and Post-Closure, 40 CFR Part 264, Subpart G.
- o Clean Air Act, National Emissions Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61.

#### State Requirements

- o Rhode Island Rules and Regulations for Groundwater Quality, RIDEM 7/93, Sections 12.02 and 12.03.
- o Rhode Island Rules and Regulations for Groundwater Quality, RIDEM 7/93, Section 5.06.
- o Rhode Island Rules and Regulations for Hazardous Waste Management, RIDEM 4/92, Section 9.03.
- o Rhode Island Rules and Regulations for Solid Waste Management, RIDEM 4/92, Sections 7.08 and 15.11.
- o Rhode Island PDES Regulations (RIPDES), RIDEM, adopted 7/20/84, amended 2/9/93.
- o Air Pollution Control Regulations, Rhode Island Department of Health, Division of Air Pollution Control, Effective 8/2/67, amended 5/20/91, Regulation No. 1 Visible Emissions.
- o Rhode Island Air Pollution Control Regulation No. 5, Fugitive Dust.
- o Rhode Island Air Pollution Control Regulation No. 7, Emissions Detrimental to Persons or Property.
- o Rhode Island Air Pollution Control Regulation No. 9, Approval to Construct, Install, Modify, or Operate.
- o Rhode Island Air Pollution Control Regulation No. 13, Particulate Emissions.

- o Rhode Island Air Pollution Control Regulation No. 15, Control of Organic Solvent Emissions.
- o Rhode Island Air Pollution Control Regulation No. 17, Odors.
- o Rhode Island Air Pollution Control Regulation No. 20, Burning of Alternative Fuels.
- o Rhode Island Air Pollution Control Regulation No. 22, Air Toxics.
- o Rhode Island Rules and Regulations for Solid Waste Management, Section 8, 4/19/92.
- o Rhode Island Rules and Regulations for Solid Waste Management, Section 9, 4/19/92.
- o Rhode Island Rules and Regulations for Solid Waste Management, Section 10, 4/19/92.
- o Rhode Island Rules and Regulations for Solid Waste Management, Section 13, 4/19/92.

### Chemical Specific

#### Federal Requirements

- o Safe Drinking Water Act, Maximum Contaminant Levels (MCLs), 40 CFR, Part 141. (Used as guidelines during risk assessment.)
- o Safe Drinking Water Act, Maximum Contaminant Level Goals (MCLGs), 40 CFR Part 141. (Used as guidelines during risk assessment.)

#### State Requirements

- o Rhode Island Water Quality Standards, effective 1/9/85, amended 10/28/88.
- o Rhode Island Water Quality Regulations, effective 1/9/85, amended 10/28/88.
- o Rhode Island Pretreatment Regulations, June 15, 1984.

## Location-Specific

### Federal Requirements

- o Protection of Wetlands, Executive Order No. 11990, 40 CFR Part 6, Appendix A.

### State Requirements

- o Rules and Regulations Governing the Enforcement of the Freshwater Wetlands Act, 8/90.

The following policies, criteria, and guidance will also be considered (TBCs) during the implementation of the remedial action:

### Action Specific

- o RCRA, Air Emissions from Treatment, Storage and Disposal Facilities, 40 CFR Part 264, Subpart CC (Proposed 56 FR 33490-33598, 7/22/91)
- o Clean Air Act (CAA), Non-Methane Organic Compounds.
- o May 30, 1991 proposed rule CAA Amendments (56 FR 24468-24528 to 40 CFR Part 60 Subpart WWW).
- o Control of Air Emissions from Air Strippers at Superfund Groundwater Sites. OSWER Directive 9355.0.28, 6/15/89.
- o USEPA Region I Memo, July 12, 1989, Louis Gitto to Merrill Hohman regarding Air Stripper Emissions.
- o Technical Guidance for Final Covers on Hazardous Waste Landfills and Surface Impoundments, EPA/530-SW-047, 7/89.
- o Rhode Island Guidance for Air Quality/Air Toxics Substances.

### Chemical Specific

- o USEPA Human Health Assessment Cancer Slope Factors.
- o USEPA Reference Doses.

### Location Specific

- o None Identified.

All the listed ARARs can be found in Tables 7 thru 14, in Appendix B of this Record of Decision. These tables provide a brief synopsis of the ARARs and an explanation of the actions necessary to meet the ARARs. These tables also indicate whether the ARARs are applicable or relevant and appropriate to the actions to be taken at the Site. In addition to ARARs, the tables describe standards that are To-Be-Considered (TBC) with respect to remedial actions. The principal ARARs are also discussed below.

### Principal ARARs for Groundwater Protection

The purpose of the remedy selected in this ROD is to control the sources of contamination; therefore, no groundwater cleanup levels are established in this ROD. Since no cleanup levels are established, no chemical specific ARARs for groundwater have been identified.

The action specific ARARs for groundwater include groundwater requirements set out in the Rhode Island Rules and Regulations for Groundwater Quality, the Rhode Island Rules and Regulations for Hazardous Waste, 40 CFR 264 Subtitle F, and 40 CFR 258 Subtitle E. Because groundwater cleanup levels are not established in this ROD, only those provisions related to implementing a groundwater monitoring program will be complied with. In addition, maximum contaminant levels and non-zero maximum contaminant level goals (MCLs/non-zero MCLGs) in the Safe Drinking Water Act have been identified as action specific ARARs solely for the purpose of measuring the performance of the source control remedy. MCLs/non-zero MCLGs do not establish cleanup levels for groundwater; rather, the source control remedy is expected to contain groundwater exceeding MCLs/non-zero MCLGs within the compliance boundary. For contaminants of concern for which MCLs/non-zero MCLGs do not exist, health-based levels have been established (refer to Tables 15 and 16, Appendix B of This ROD).

### Principal ARARs for Surface Water Protection

Chemical and action specific ARARs address the protection of surface water bodies (including wetlands which are addressed separately below). Chemical specific ARARs include Rhode Island Pretreatment regulations for the Cranston POTW

discharge option. This regulation adopts a state and local pretreatment system for wastewater based on federal regulations.

Action specific ARARs include the substantive requirements of the NPDES provisions of the Clean Water Act, and those of the RIPDES program if they are more stringent than the federal requirements if the surface water discharge option is selected. Additionally, the Rhode Island Water Quality Standards and Water Quality Regulations define the water quality antidegradation policy of the state. The Rhode Island Water Quality Standards are based on Federal Ambient Water Quality Criteria which set standards for surface water quality for the protection of human health and aquatic life. Any state standards which are more stringent than federal standards must be complied with if the surface water discharge option is selected.

#### Principal ARARs for Wetland Protection

State and Federal regulations for the protection of wetlands are closely linked with those for the protection of surface water bodies; however, the emphasis on wetlands are typically location specific criteria. Generally, actions are required to minimize or prevent the destruction, degradation, alteration or net loss of wetlands as defined under the State of Rhode Island Department of Environmental Management Freshwater Wetlands Act and Federal Protection of Wetlands Executive Order regulations.

#### Principal ARARs for Air Quality Protection

Air quality protection requirements are action specific. Federal National Ambient Air Quality Standards (NAAQS) are not ARARs but are guidelines for specific criteria pollutants for air emission sources. NAAQS define levels of air quality which the EPA judges are necessary to protect public health. The State Air Pollution Control Regulations must contain, at a minimum, the federal air quality requirements. Proposed federal air regulations also require the collection, control and monitoring of Non-Methane Organic Compounds (NMOCs) such as benzene and ethane. RCRA requirements for air emissions from thermal units, process vents and equipment leaks are also included as potential ARARs.

State Air Pollution Control Regulations mandate compliance with specific standards for such parameters as particulate emissions, installation of air pollution control and monitoring equipment and adherence to the Federal NAAQS.



Included in the State Air Pollution Control Regulations are the State Air Toxics Regulations. This regulation prohibits emission of specified contaminants at rates which would result in ground level concentrations greater than acceptable ambient levels set in the regulation. Acceptable ambient levels are specified as maximum contaminant concentrations contributed by a stationary air toxic source, at or beyond the facility property line.

#### Principal Hazardous Waste ARARs

Hazardous Waste Management ARARs are action specific. The federal ARARs are derived from the Resource Conservation and Recovery Act (RCRA). Regulations generated as a result of this Act set specific standards and protocols for hazardous waste management. As a RCRA authorized state, the RIDEM has adopted the federal requirements within the recently amended RIDEM Rules and Regulations for Hazardous Waste Management. These regulations govern the management of hazardous waste activities and set operational standards for hazardous waste management facilities.

#### Principal Solid Waste Management ARARs

The RIDEM Rules and Regulations for Solid Waste Management Facilities are applicable requirements for capping of solid waste landfills. These regulations specify the minimum type of final landfill cap to be installed during closure of a solid waste landfill in the State of Rhode Island.

#### Principal To Be Considered Requirements

EPA Policy on Controlling Air Emissions from Superfund Air Strippers provides guidance on air emissions from air strippers and distinguishes between sites located in ozone attainment and non-attainment areas. Also identified is EPA's Technical Guidance Document on Final Covers on Hazardous Waste Landfills and Surface Impoundments which provides guidance on constructing landfill caps to meet the requirements of RCRA subtitle C.

In addition, proposed amendments are included in the category. These amendments include RCRA subpart CC for air emissions from treatment, storage, and disposal facilities, the proposed amendments to the Rhode Island Rules and Regulations for Groundwater, and the proposed amendments to the Clean Air Act for NMOCs from landfills.

**C. The Selected Remedial Action is Cost-Effective**

In the Agency's judgment, the selected remedy is cost effective, i.e., the remedy affords overall effectiveness proportional to its costs. In selecting this remedy, once EPA identified alternatives that are protective of human health and the environment and that attain, or, as appropriate, waive ARARs, EPA evaluated the overall effectiveness of each alternative by assessing the relevant three criteria--long term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short term effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs. The costs of this remedial alternative are summarized in Table 2.

**TABLE 2**  
**Selected Source Control Remedy (OU1-5)**  
**Cost Summary**

---

<i>Capital Costs</i>	<b>\$27,260,000</b>
<i>Operation &amp; Maintenance Costs</i> <i>(net present worth)</i>	
Surface Water Discharge	<b>\$ 1,160,000</b>
POTW Discharge	<b>\$ 1,760,000</b>
<i>Total Present Worth Costs</i>	
Surface Water Discharge	<b>\$32,110,000</b>
POTW Discharge	<b>\$37,540,000</b>

---

Alternatives OU1-8 and 9, while treating the hot spot chemical sludges by either in-situ heated vapor extraction or excavation, do not provide any additional treatment for the major source problem, DNAPLS, than would alternatives OU1-2 and OU1-5, which include only hot spot groundwater extraction and treatment. Therefore, the added cost for in-situ treatment or excavation of the hot spot chemical sludges provides no significant additional benefit for the protection of human health.

Alternatives which include solely double barrier RCRA C caps (OU1-8 and 9) include the additional cost of removing the existing 32 acres of single barrier RIDEM capping currently

in place on portions of the side slopes. EPA believes that the existing 32 acre RIDEM cap will meet the performance standards of a RCRA C cap on the side slopes; therefore, the difficulties of implementation and the additional cost of removing the existing 32 acres of RIDEM capping is not necessary to protect human health and the environment. However, alternatives which include only RIDEM caps (OU1-2, 3, and 4) do not minimize infiltration of precipitation as effectively on the top, flat portion of the landfill as alternatives with a double barrier RCRA C cap and therefore, the added cost of installing a RCRA C cap on the landfill (and incorporating the existing 32 acre RIDEM cap) is justified.

EPA believes that the combination of capping and hot spot groundwater extraction and treatment is sufficient to 1) prevent groundwater that has contaminant concentrations exceeding MCLs and non-zero MCLGs from migrating beyond the compliance boundary or; in the absence of MCLs or non-zero MCLGs, prevent groundwater that has contaminant concentrations above levels that are protective of human health from migrating beyond the compliance boundary and; 2) prevent the degradation of surface waters below surface water standards. Therefore, the additional cost of installing a perimeter groundwater collection and treatment system, when compared to the insignificant benefit gained, is not cost effective.

**D. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable**

Once the Agency identified those alternatives that attain or, as appropriate, waive ARARs and that are protective of human health and the environment, EPA identified which alternative utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which one of the identified alternatives provides the best balance of trade-offs among alternatives in terms of: 1) long-term effectiveness and permanence; 2) reduction of toxicity, mobility or volume through treatment; 3) short-term effectiveness; 4) implementability; and 5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment; and considered the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives.

The no action alternative, OU1-1, is not protective of human health and the environment. Alternatives OU1-2, 3, and 4, which include a single-barrier RIDEM approved cap, do not comply with the RCRA C capping ARAR. EPA evaluated the remaining alternatives, OU1-5, 6, 7, 8, and 9 to determine which one provided the best balance in terms of the criteria presented above. Alternative OU1-5 was selected as the remedy because of its long-term effectiveness, ability to reduce toxicity, mobility and volume of contaminants and was the most efficient in light of implementability and cost concerns.

Alternatives OU1-8 and 9 treat the chemical sludges in the hot spot area in addition to capping and groundwater containment; however, treatment of the chemical sludges will not provide any significant additional long-term effectiveness since this treatment does not address the DNAPLs in the fractured bedrock underlying the hot spot area. DNAPLs have been identified as the major source of contamination at the hot spot area.

Alternatives OU1-7, 8 and 9, which include southern perimeter groundwater extraction and treatment in addition to hot spot groundwater extraction and treatment, may not provide significant additional long-term effectiveness over the selected remedy, OU1-5, which requires extraction and treatment of groundwater from only the hot spot area. EPA believes that the combination of hot spot groundwater extraction and treatment and capping, provided by OU1-5, will be sufficient at 1) preventing groundwater that has contaminant concentrations exceeding MCLs and non-zero MCLGs from migrating beyond the compliance boundary or, in the absence of MCLs or non-zero MCLGs, prevent groundwater that has contaminant concentrations above levels that are protective of human health from migrating beyond the compliance boundary and; 2) preventing the degradation of surface waters below surface water standards. The reason for this is 1) hot spot groundwater extraction and treatment should prevent the continued migration of high levels of contamination currently existing at the hot spot; and 2) the additional capping component should minimize infiltration of precipitation into the landfill thereby effectively minimizing any future migration of contaminated groundwater caused by the existing 121 acre Phase I area. Alternative OU1-5 also provides sufficient long-term effectiveness since it contains groundwater close to what is believed to be the major source of groundwater contamination at the Site.

Those treatment technologies that remove contaminants from the hot spot area provide the greatest reduction in volume and toxicity of contaminants. Alternative OU1-6 does not include treatment of the hot spot area and therefore

provides the least reduction in volume and toxicity of contaminants. Alternatives OU1-8 and 9, which involve treatment of the hot spot chemical sludges, and extraction and treatment of groundwater from both the hot spot area and landfill perimeter, provides the greatest reduction in volume and toxicity of Site contamination. However, as noted above, treatment of the chemical sludges does not address the major problem, DNAPLs in the fractured bedrock underlying the hot spot area.

Alternatives OU1-7, 8 and 9 require groundwater extraction and treatment from both the hot spot area and the southern perimeter of the landfill. Alternatives OU1-7, 8 and 9 may provide a slightly greater reduction in the volume and mobility of Site contaminants than alternative OU1-5, which involves the extraction of groundwater at just the hot spot area; however, as noted above, the southern perimeter collection and treatment system may not provide any significant additional long-term effectiveness.

Alternatives OU1-8 and 9 will result in the greatest short-term risk to on-site workers and area residents due to potential exposures to released contaminants during the treatment of the hot spot chemical sludges. Alternatives OU1-6, 7, 8 and 9, which include extraction and treatment of large volumes of groundwater from the southern, downgradient perimeter of the landfill may result in a significant lowering of the water table which could potentially impact adjacent wetlands. Extraction of large volumes of groundwater from the southern perimeter of the landfill may also cause a migration of contaminants from identified off-site source areas to the Central Landfill Site. Alternative OU1-2 and OU1-5 which involve extraction and treatment of groundwater from only the hot spot area should not impact any wetlands. Therefore, the groundwater containment system used in alternatives OU1-2 and OU1-5 are slightly more short-term effective than the other alternatives.

All of the alternatives evaluated are implementable. Cap construction and groundwater extraction and treatment are commonly used at landfill sites. Alternatives OU1-8 and 9 which involve the in-situ treatment or excavation of the hot spot chemical sludges are technically more difficult to implement than the other alternatives due to the difficulties encountered with in-situ treatment (OU1-8) of sludges with very low pneumatic permeabilities, such as the hot spot chemical sludges, and the difficulties encountered in excavation of the hot spot chemical sludges (OU1-9) given the uncertainties in the areal extent of the chemical sludges and the amount of overburden material which would have to be excavated.

**E. The Selected Remedy Satisfies the Preference for Treatment Which Permanently and Significantly Reduces the Toxicity, Mobility or Volume of the Hazardous Substances as a Principal Element**

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. Because many CERCLA municipal landfill sites share similar characteristics, they lend themselves to remediation by similar technologies. EPA has established a number of expectations as to the types of technologies that should be considered and alternatives that should be developed; they are listed in the National Contingency Plan (40 CFR 300.430(a)(1)) and EPA Guidance Document "Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites" EPA/540/P-91/001. For CERCLA municipal landfill sites, it is expected that:

1. The principal threats posed by a site will be treated wherever practical, such as in the case of remediation of a hot spot.
2. Engineering controls such as containment will be used for waste that poses a relatively low long-term threat or where treatment is impractical.
3. A combination of methods will be used as appropriate to achieve protection of human health and the environment. An example of combined methods for municipal landfill sites would be treatment of hot spot in conjunction with containment (capping) of the landfill contents.
4. Institutional controls such as deed restrictions will be used to supplement engineering controls, as appropriate, to prevent exposure to hazardous wastes.
5. Innovative technologies will be considered when such technologies offer the potential for superior treatment performance or lower costs for performance similar to that of demonstrated technologies.
6. Groundwater will be returned to beneficial uses whenever practical, within a reasonable time, given the particular circumstances of the site.

The source control remedy selected in this operable unit satisfies the expectations set forth in CERCLA and the NCP for treatment of CERCLA municipal landfill sites. Potential exposure to and ingestion of contaminated groundwater is the principal threat posed by the Site and the hot spot area was identified during the Remedial Investigation as the major source of groundwater contamination at the Site. The

selected remedy is a containment remedy. A component of the selected remedy requires treatment of the hot spot area by extracting and treating the highly contaminated groundwater in this area using a UV/Chemical Oxidation System. The UV/Chemical Oxidation System (an innovative technology), uses a chemical reaction to convert the hazardous organic contaminants to non-hazardous or less hazardous compounds. Therefore, the hot spot groundwater extraction and treatment component of the remedy, which addresses the principal threat posed by the Site, satisfies the preference for treatment which permanently and significantly reduces the toxicity, mobility and volume of hazardous substances. OU2 will address off-site groundwater contamination.

The selected remedy also includes capping the 121 acre landfill rather than excavating and treating the waste material and institutional controls. The large volume and heterogeneity of waste at the Site makes treatment impracticable. Excavation and treatment of such a large landfill would also involve unacceptable risk and would not be cost effective.

## **XII. DOCUMENTATION OF SIGNIFICANT CHANGES**

EPA presented a proposed plan (preferred alternative) for remediation of the Site in February 1994. As described in the Proposed Plan (and previously in Section X of this ROD), the source control portion of the preferred alternative includes, among other things, constructing a multi-layer RCRA C cap over the existing 121 acre Phase I area and incorporating the existing 32 acres of RIDEM approved cap on the side slopes.

The Proposed Plan reflects the five (5) year design and construction schedule, beginning at design start, provided in the Feasibility Study Report. This ROD further clarifies the remedial steps to be taken in the event filling activities in the Phase II and III areas which overlap approximately 48.4 acres of the western slope and top of Phase I area result in extending the design and construction schedule beyond the five (5) year estimate. Should the Phase II and III filling activities result in such a delay, a impermeable barrier will be designed and installed to prevent or minimize the infiltration of precipitation and leachate through the uncapped areas of the Phase I area. Once Phases II and III filling activities are completed, a RCRA C cap will cover that portion of the Phase II and III areas that overlie the Phase I area as originally planned.

As previously stated in Section X of this ROD, the design for the impermeable barrier will be included in the design documents for the remedy. These design documents for the impermeable barrier will be included in the Administrative Record for this Site.

In the Proposed Plan it was stated that to monitor groundwater containment performance, hydraulic flow data and groundwater contaminant concentration data will be collected and carefully analyzed to determine whether or not the remedy is containing groundwater above MCLs and non-zero MCLGs at the compliance boundary. This ROD includes two additional containment performance criteria 1) in the absence of MCLs or non-zero MCLGs for contaminants of concern, prevent groundwater that has contaminant concentrations above levels that are protective of human health (refer to Table 16, Appendix B of this ROD) from migrating beyond the compliance boundary and; 2) prevent the degradation of surface waters below surface water standards.

#### **XIII. STATE ROLE**

The Rhode Island Department of Environmental Management has reviewed the various alternatives and has indicated its support for the selected remedy. The State has also reviewed the Remedial Investigation, Risk Assessment and Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate State Environmental laws and regulations. The State of Rhode Island concurs with the selected remedy for the Central Landfill Superfund Site. A copy of the declaration of concurrence is attached as Appendix C.





APPENDIX A

RECORD OF DECISION  
CENTRAL LANDFILL SUPERFUND SITE

LIST OF FIGURES

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FIGURE 1: CENTRAL LANDFILL SITE AREA MAP - JOHNSTON, RHODE ISLAND

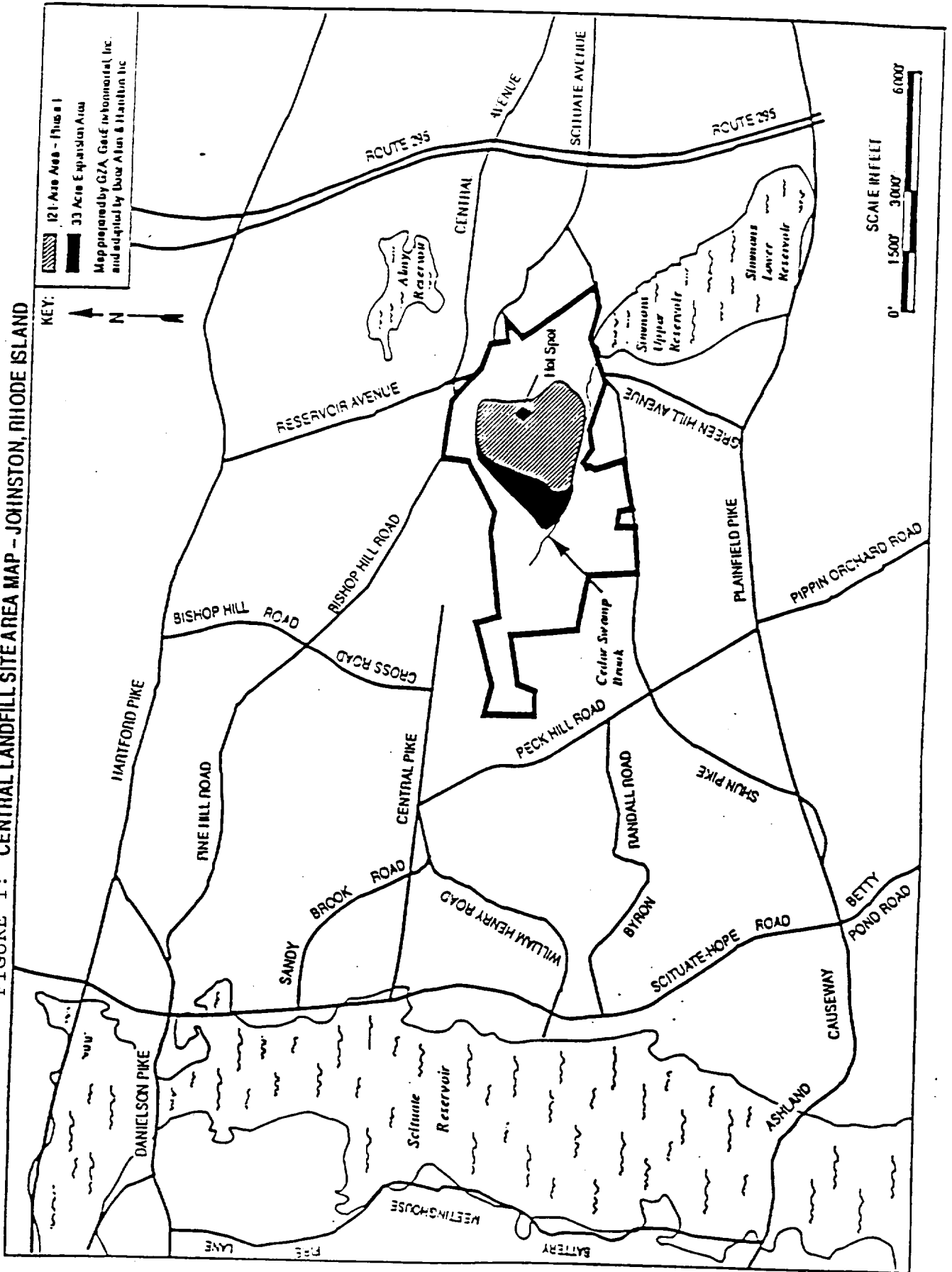


FIGURE 2: SCHEMATIC, ALTERNATIVE OUI-1

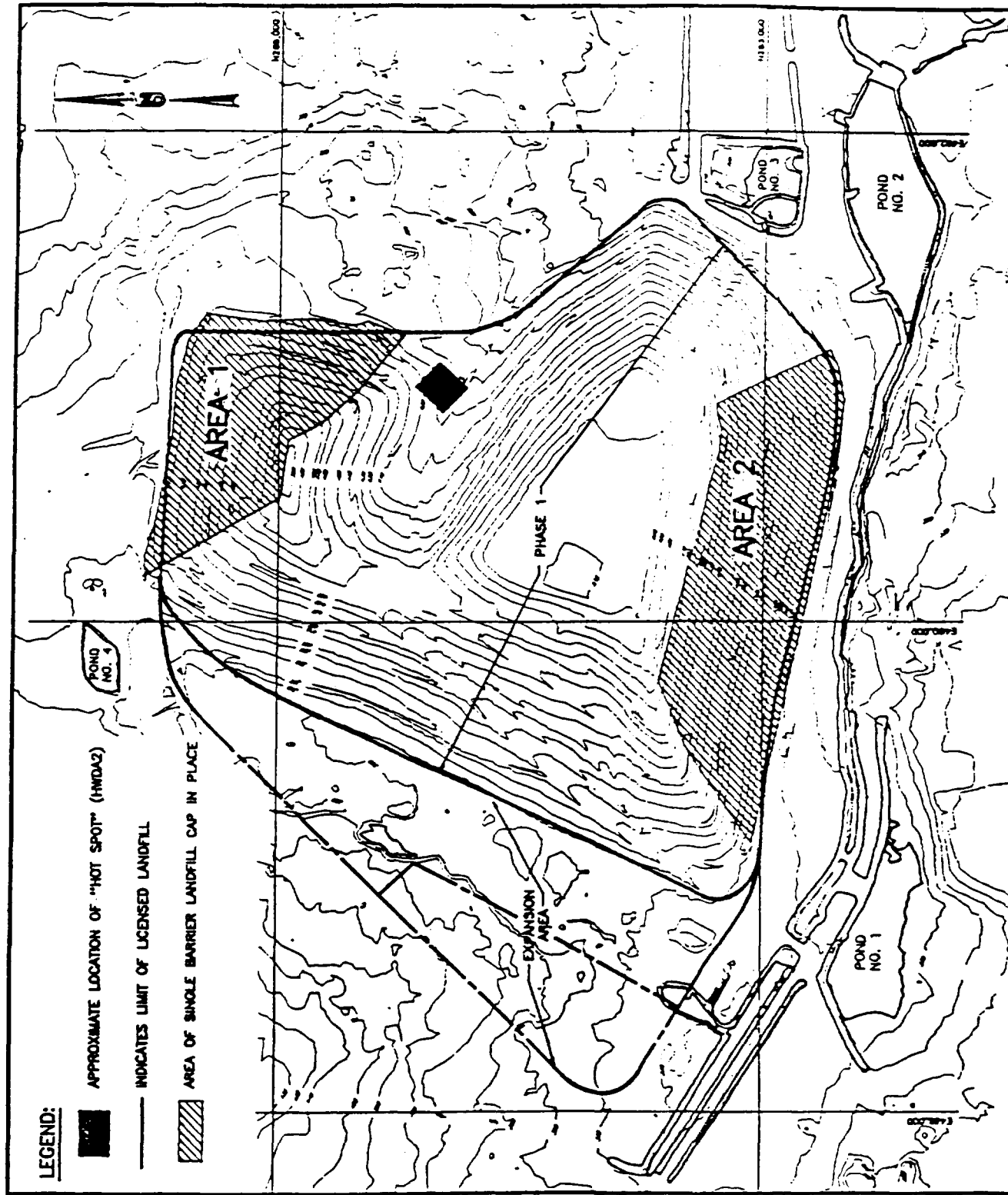
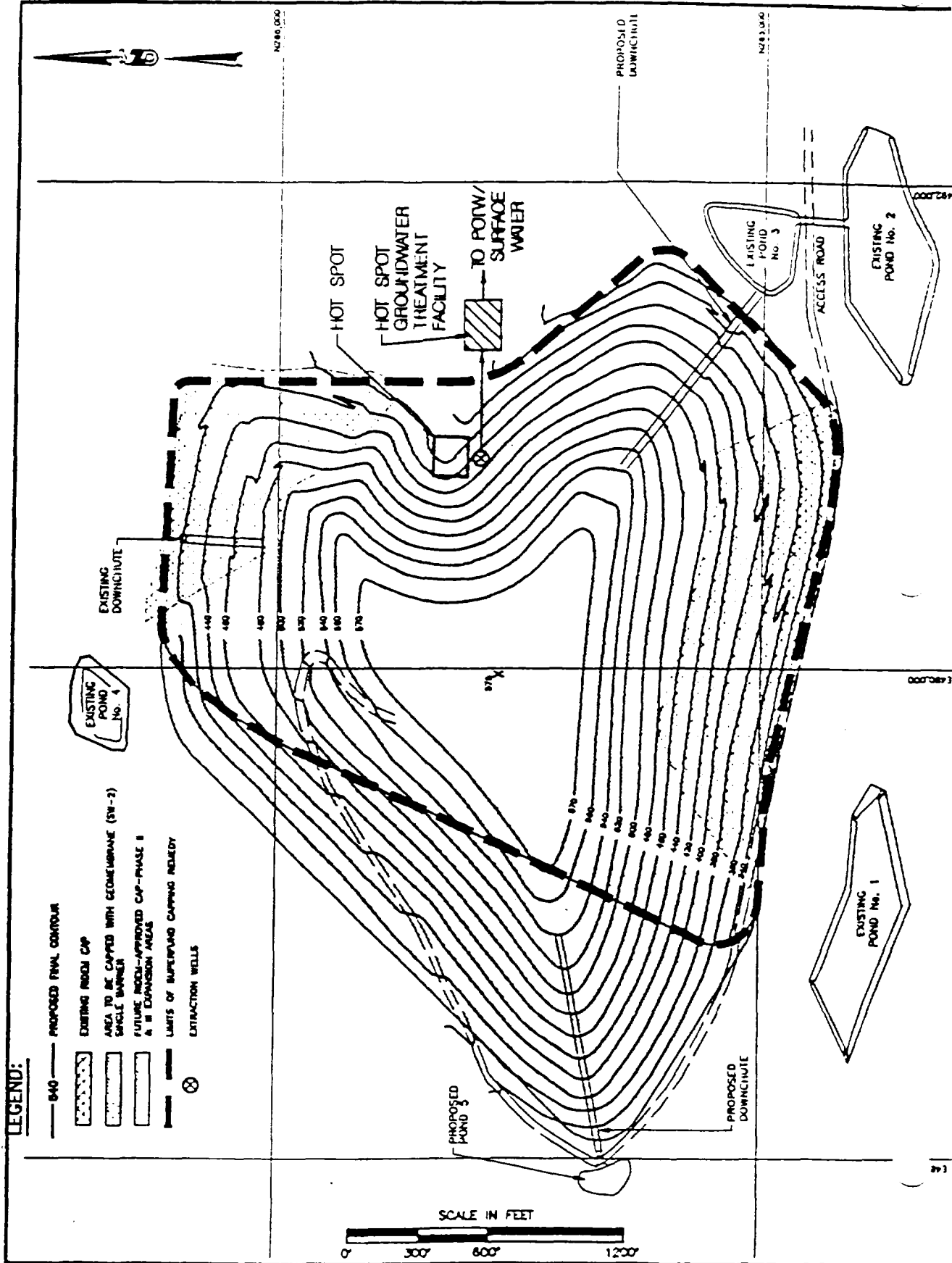
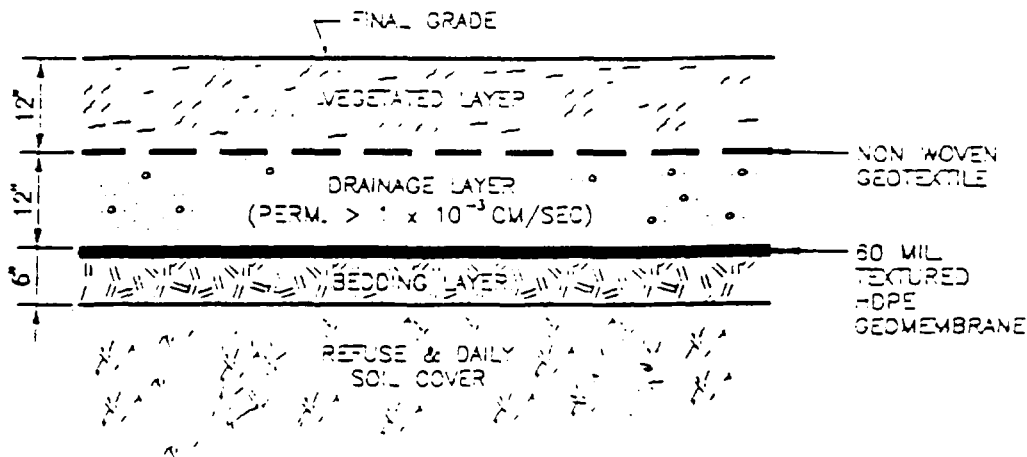


FIGURE 3: SCHEMATIC, ALTERNATIVE OUI-2





SINGLE BARRIER CAP WITH  
GEOMEMBRANE BARRIER-  
CAP ALTERNATIVE SW-2

FIGURE 4: RIDEM SINGLE-BARRIER CAP DESIGN

FIGURE 5: FLOW DIAGRAM, HOT SPOT GROUNDWATER TREATMENT SYSTEM

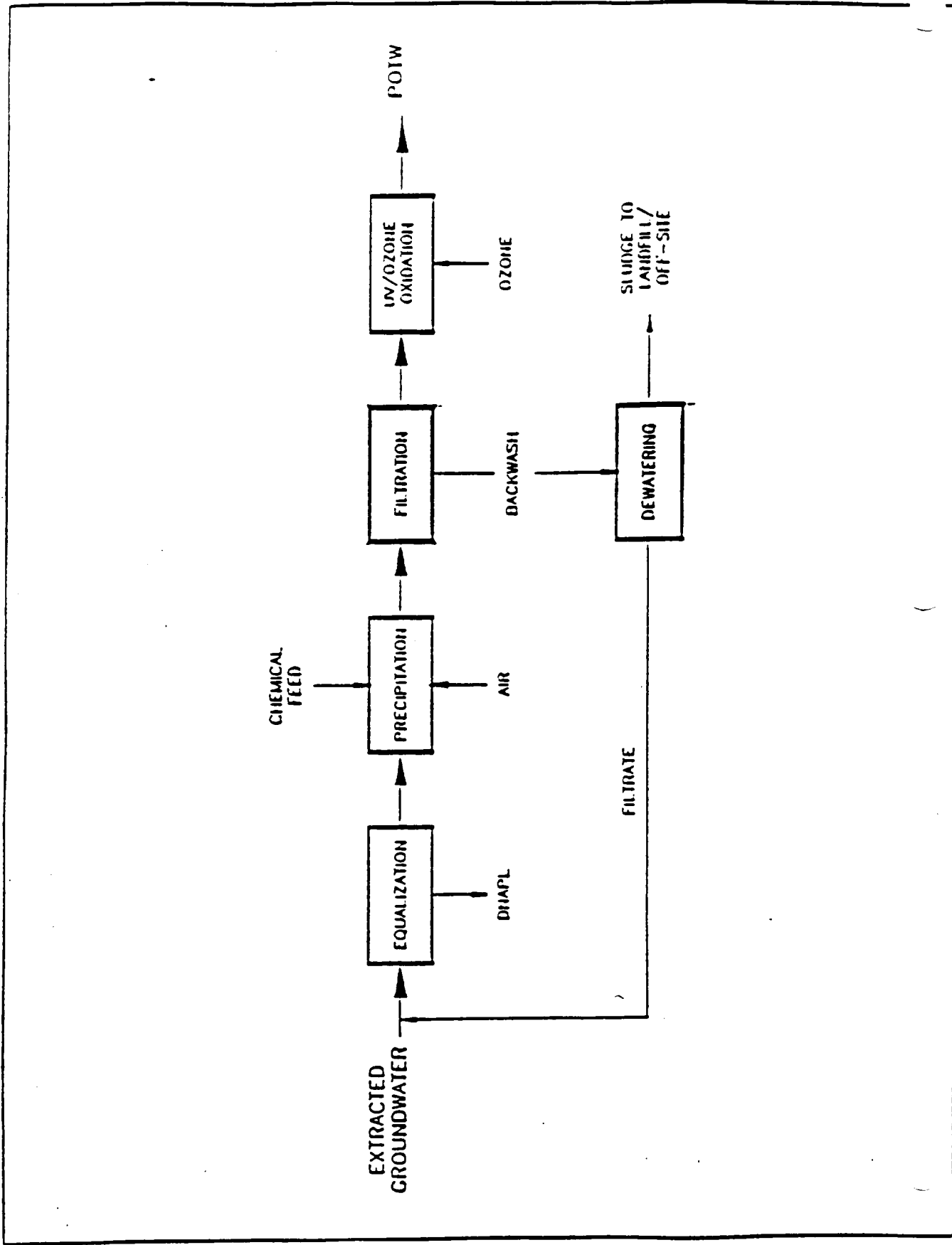


FIGURE 6: SCHEMATIC ALTERNATIVE OUI-3

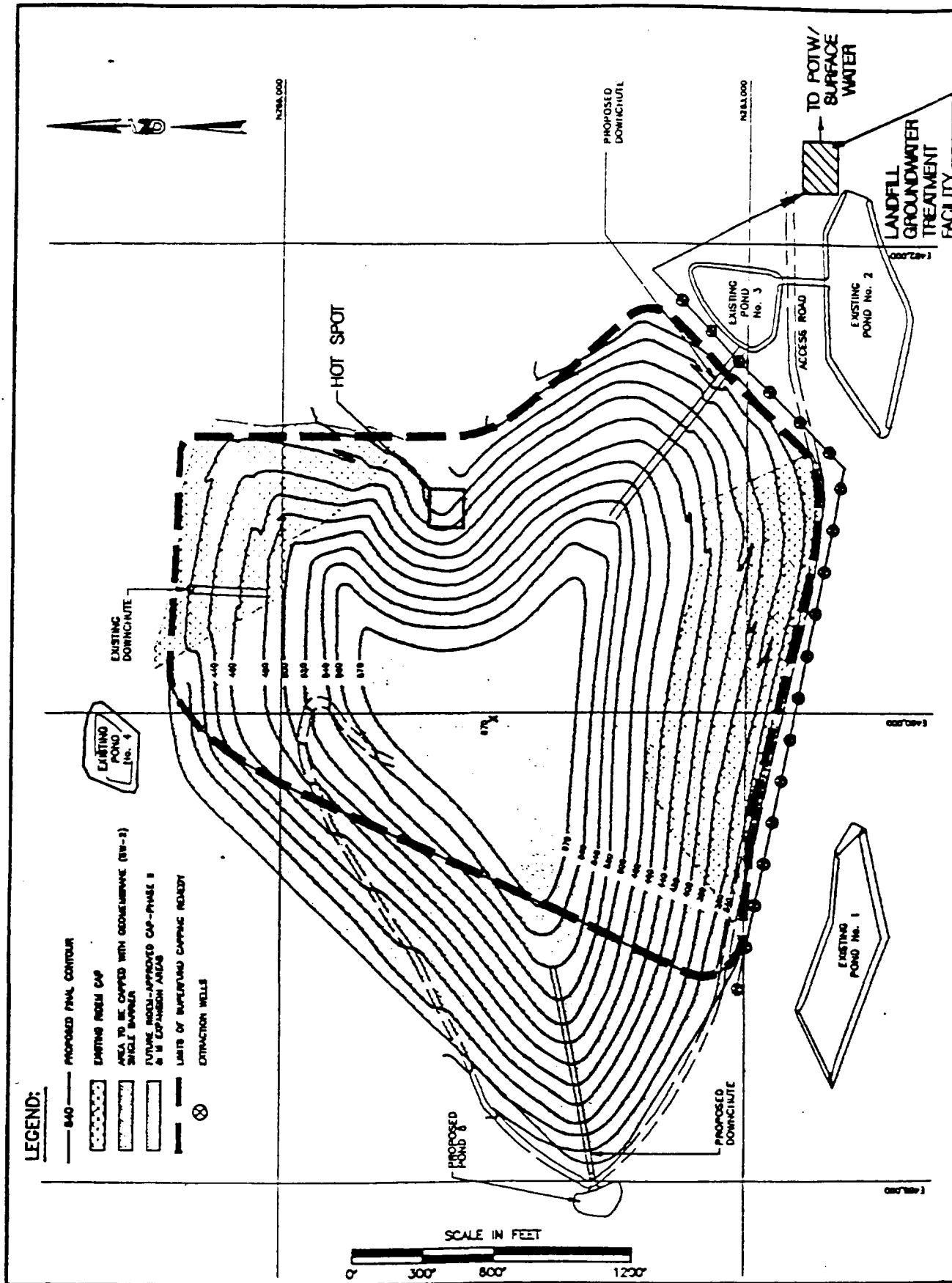




FIGURE 7: SCHEMATIC, ALTERNATIVE OUI-4

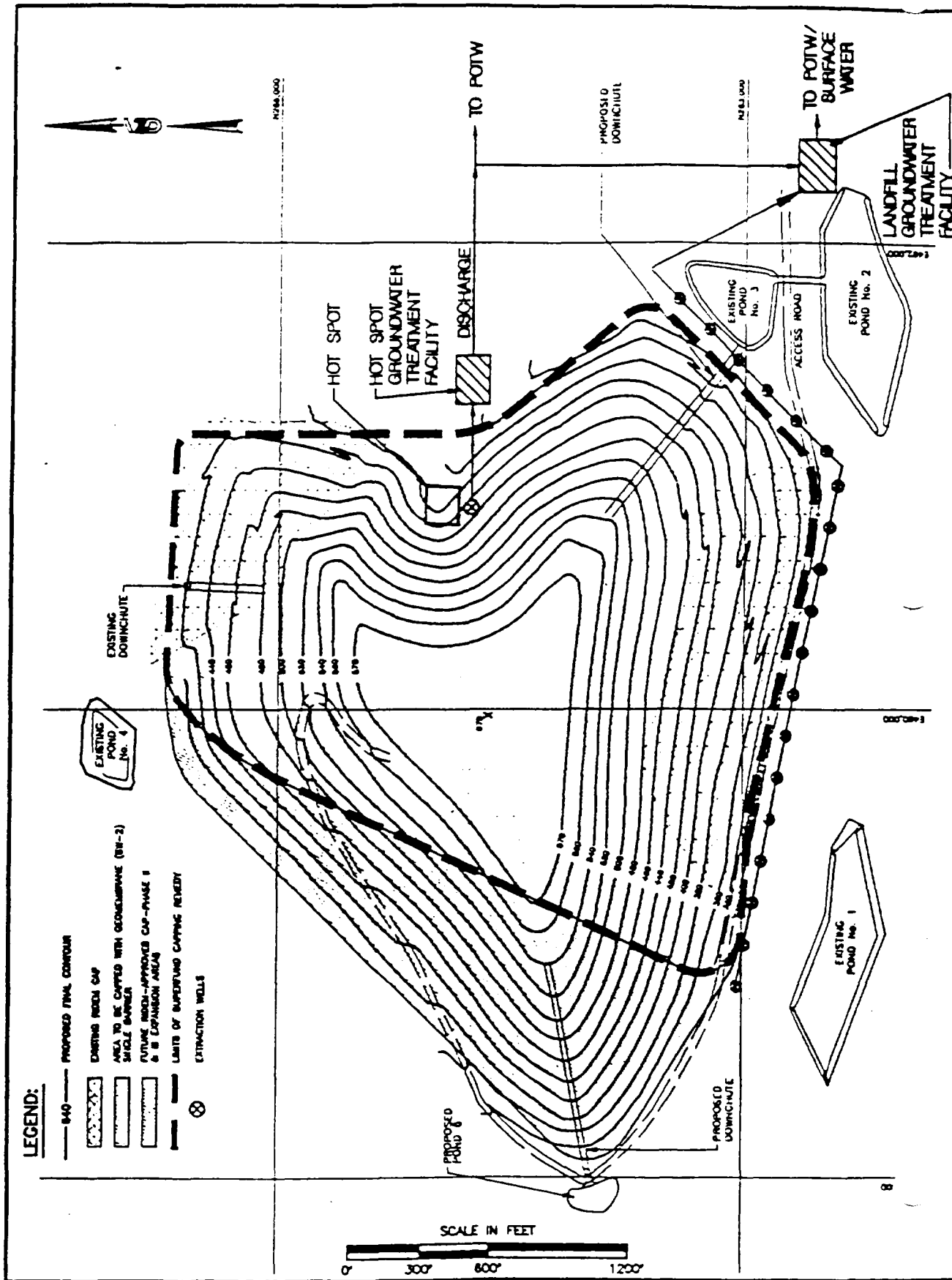


FIGURE 8: SCHEMATIC, ALTERNATIVE OUI-5

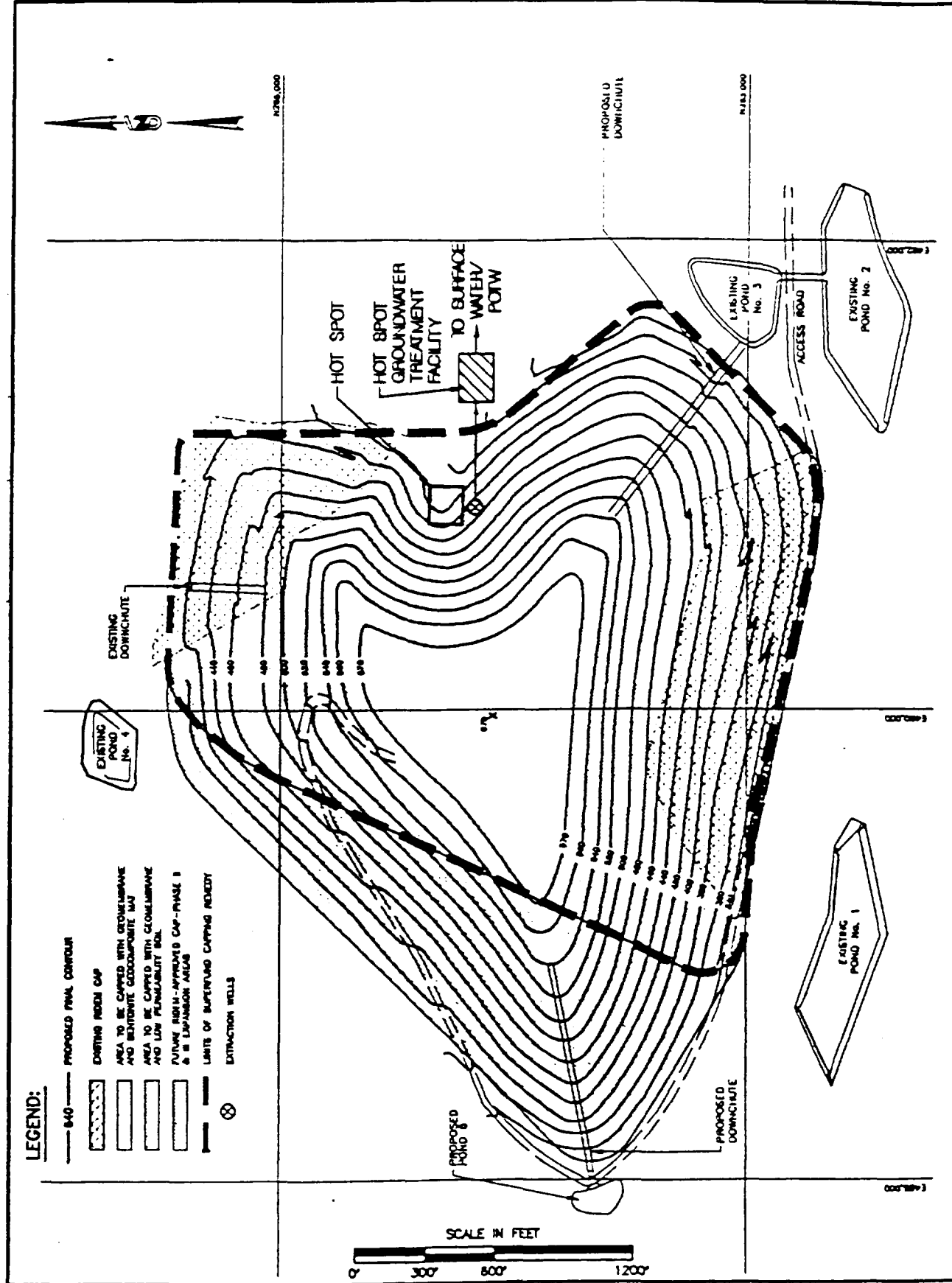
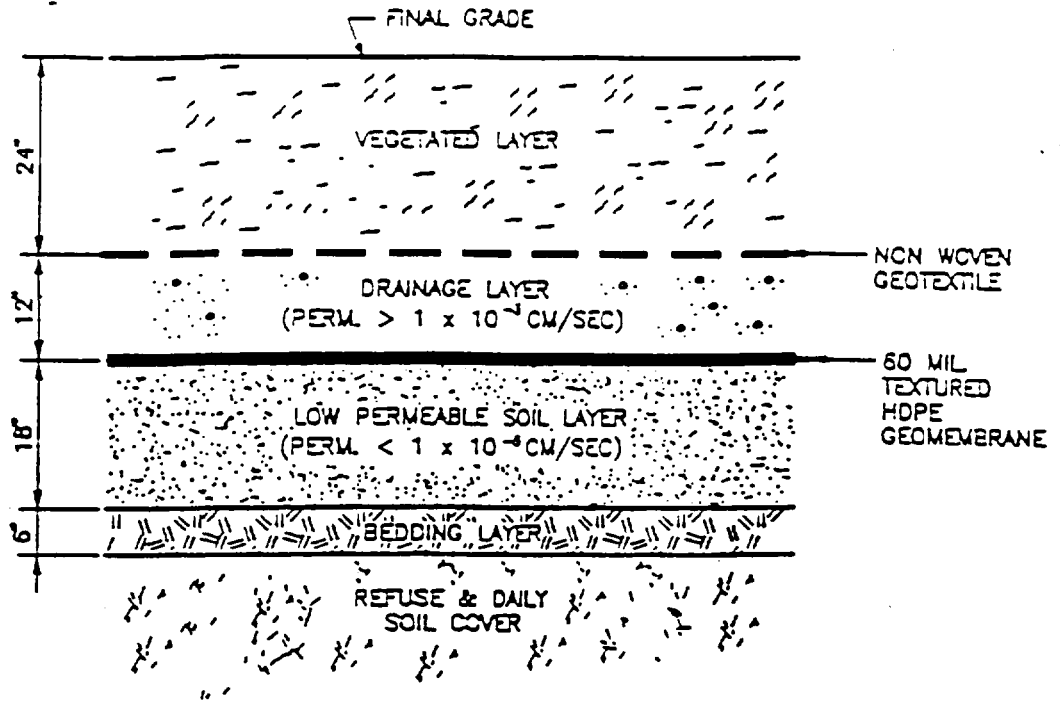
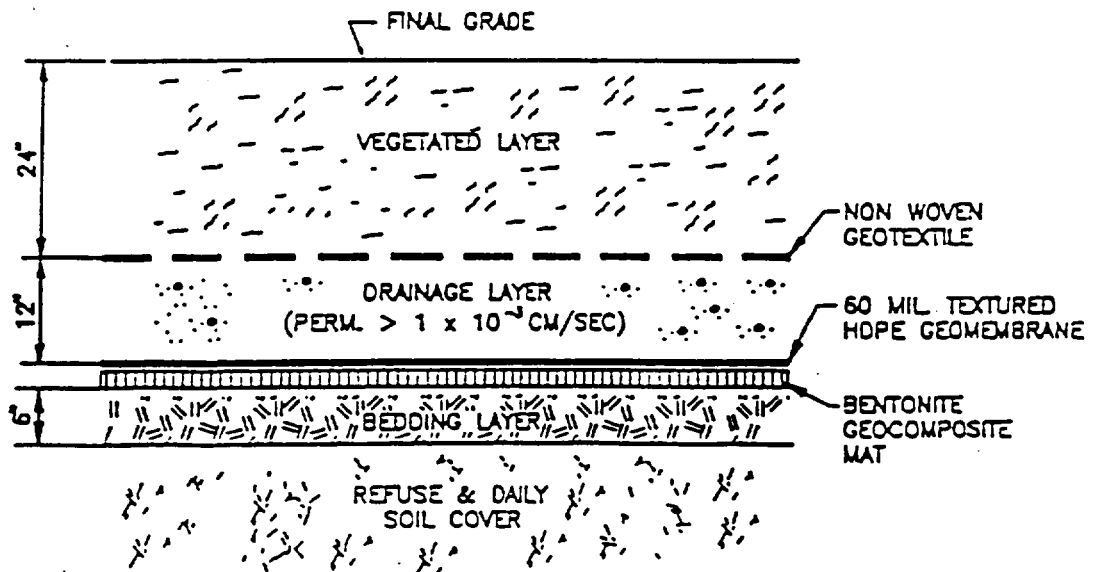


FIGURE 9:

**MULTI-LAYER CAP CROSS-SECTIONS  
FOR USE ON THE TOP, FLAT AREA AND THE AREAS OF THE  
SIDE SLOPES NOT CURRENTLY CAPPED WITH THE RIDEM CAP**



**A: LANDFILL CAP DESIGN-ALTERNATIVES  
SW-3 & SW-4 (SIDESLOPES)**



**B: GEOCOMPOSITE DOUBLE BARRIER CAP-  
ALTERNATIVES SW-3 & SW-4 (TOP)**

FIGURE 10: SCHEMATIC, ALTERNATIVE OUI-6

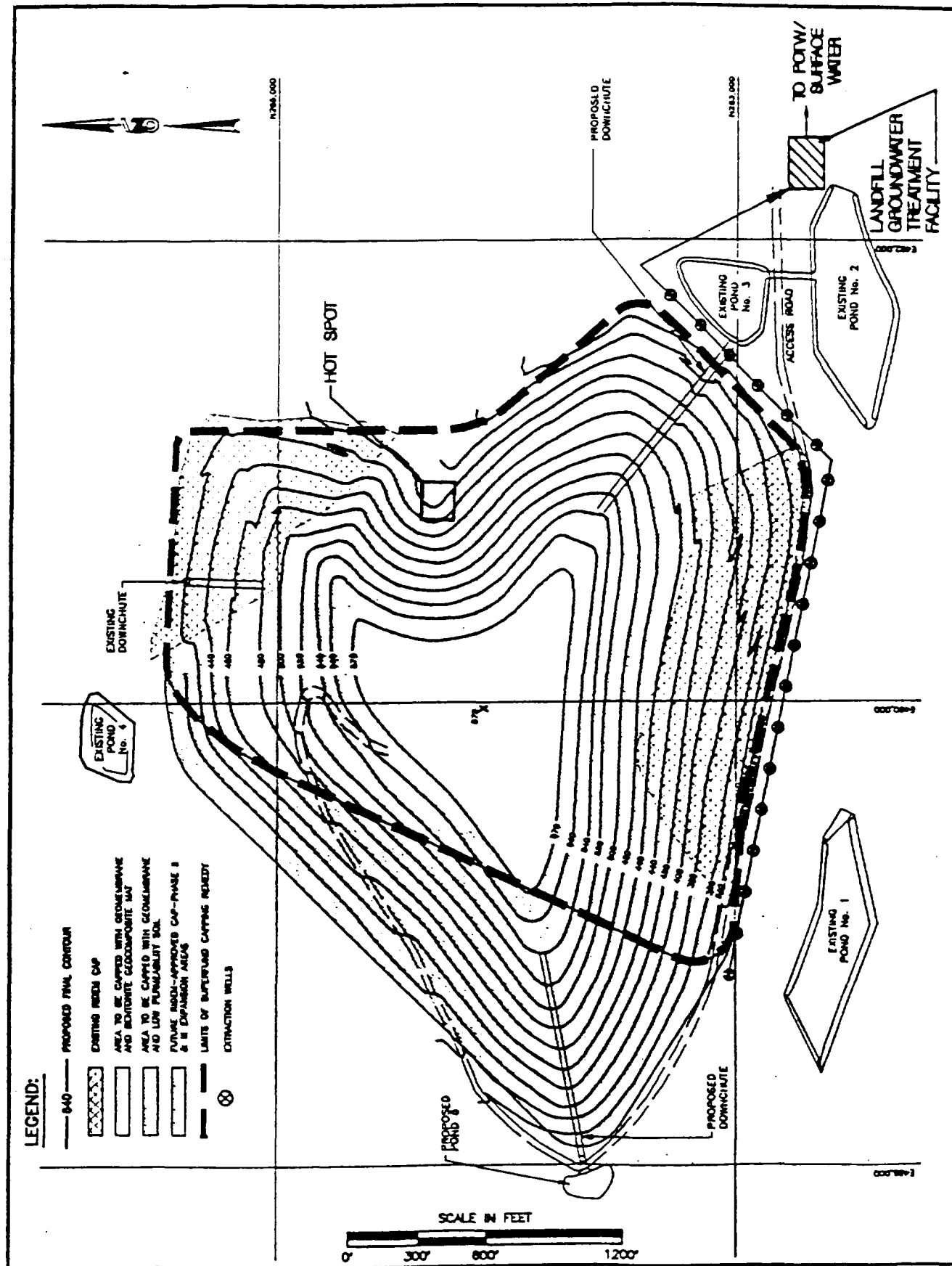
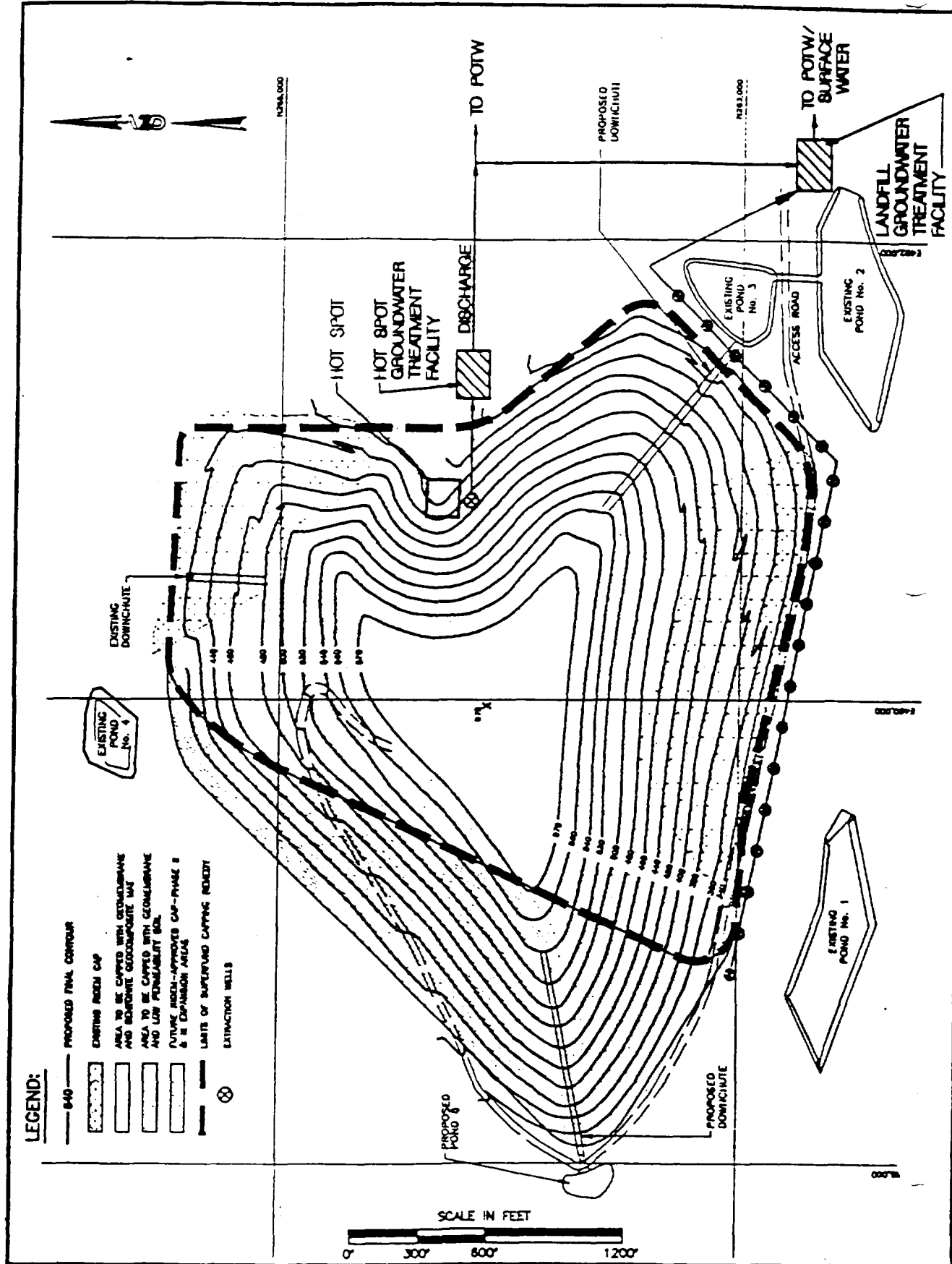


FIGURE 11: SCHEMATIC, ALTERNATIVE OUI-7



**LEGEND:**

- 840 — PROPOSED FINAL CONTOUR
- ▤ EXISTING REEDS CAP
- ▥ AREA TO BE CAPPED WITH GEOMEMBRANE AND BENTONITE GEOMEMBRANE MAT
- ▧ AREA TO BE CAPPED WITH GEOMEMBRANE AND LOW PERMEABILITY SOIL
- ▨ FUTURE NEEDS-APPROX CAP-PHASE 2 & 3 EXPANSION AREAS
- — — — — LIMITS OF SUPERFUND CAPPING REMEDIATION
- ⊗ EXTRACTION WELLS

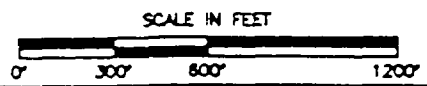


FIGURE 12: SCHEMATIC, ALTERNATIVE OUI-8

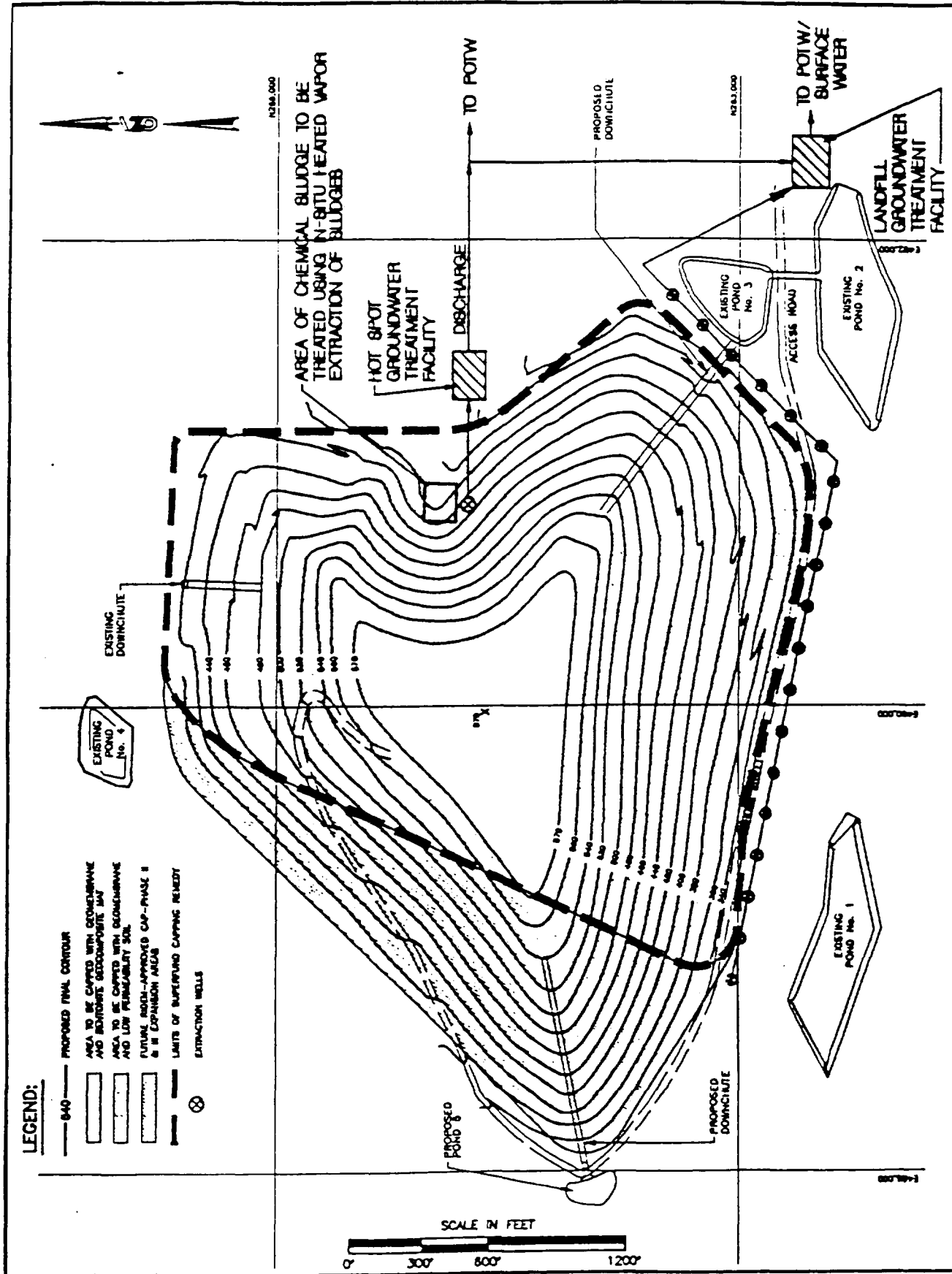
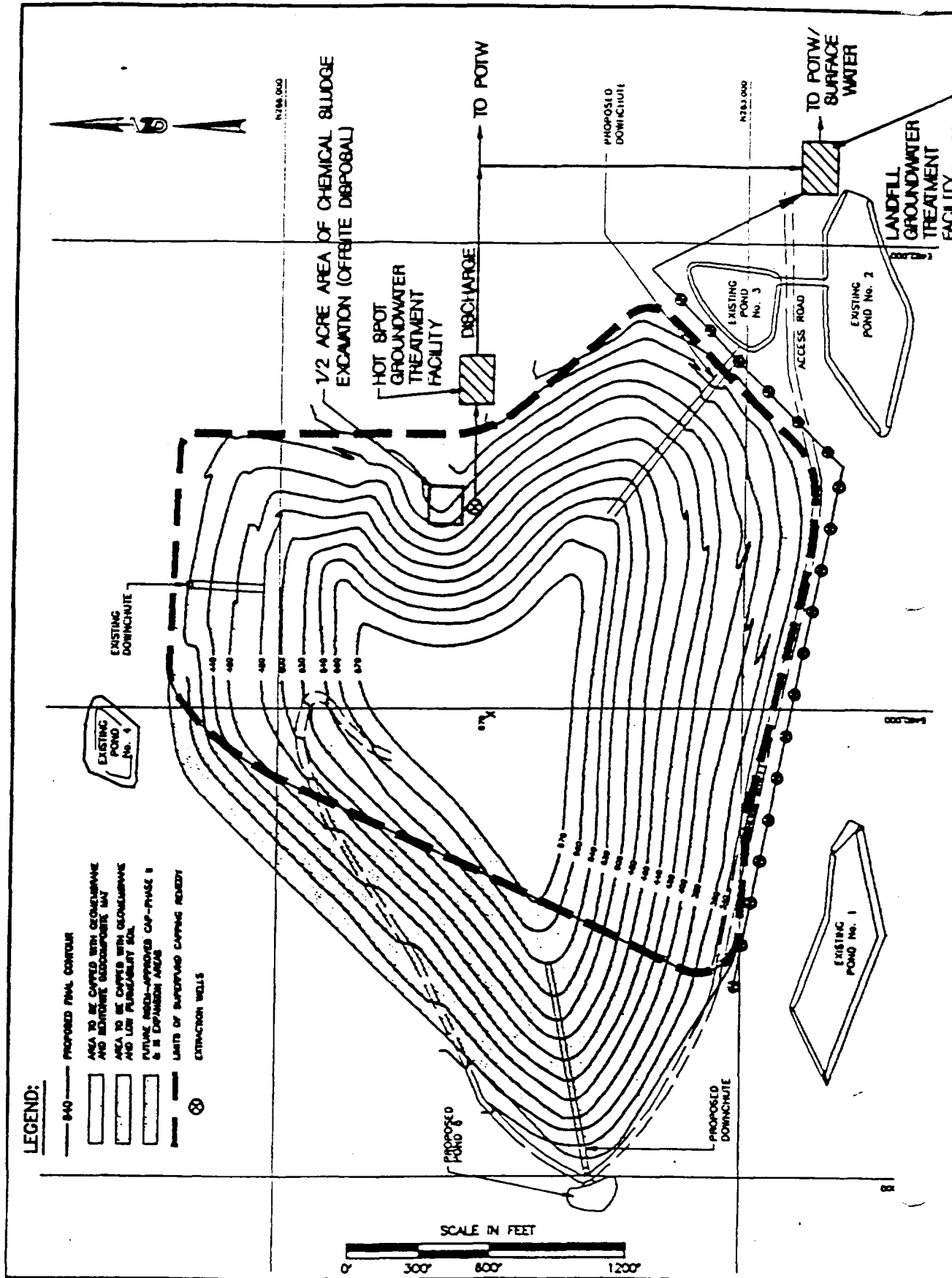


FIGURE 13: SCHEMATIC, ALTERNATIVE OUI-9



APPENDIX B

RECORD OF DECISION  
CENTRAL LANDFILL SUPERFUND SITE

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TABLE 1  
Groundwater Results for VOCs  
Concentration (ug/l)

Compound Name	Freq	Range of Detected Values		Location of Max.	Arithmetic Mean
		Minimum	Maximum		
<u>HSL VOCs - RI/FS I</u>					
1,1,1-Trichloroethane	2/24	12.00	250.00 J	MWJ	25.20
1,1-Dichloroethane	4/24	1.00 J	620.00 J	MWJ	22.43
1,1-Dichloroethene	2/24	1.00 J	3.00 J	WE8718	22.03
1,2-Dichloroethane	1/24	2.00 J	2.00 J	WE8718	22.05
1,2-Dichloroethene	3/24	4.00 J	760.00 J	MWJ	24.50
Methyl ethyl ketone	1/23	29.00 JB	29.00 JB	WE87ML3E	152.28
4-Methyl-2-Pentanone	2/24	10.00	690.00 J	MWJ	52.13
Benzene	5/24	10.00	74.00	WE8728	27.56
Bromoform	1/24	2.00 J	2.00 J	WE87ML2D	22.05
Carbon disulfide	7/24	1.00 J	39.00	WE874	23.86
Chlorobenzene	8/24	2.00 J	67000.00	MWJ	1666.10
Chloroethane	3/24	8.00 J	100.00 J	WE8728	46.51
Chloroform	3/24	1.00 J	2.00 J	WE87ML5B	21.94
Ethylbenzene	6/24	1.00 J	760.00 J	MWJ	81.82
Methylene Chloride	3/24	1.00 JB	37.00	WE8728	46.83
Tetrachloroethene	2/24	1.00 J	110.00 J	MWJ	21.09
Toluene	7/24	0.90 JB	9700.00	MWJ	309.42
Trichloroethene	4/24	1.00 J	2.00 J	WE8718	21.96
Vinyl acetate	1/24	180.00	180.00	WE8728	48.77
Vinyl chloride	3/24	2.00 J	920.00 J	MWJ	30.99
Xylenes	3/24	7.00	1400.00	WE8728	106.65
<u>EPA METHOD 8010/8020 VOCs - RI/FS I</u>					
1,1,1-Trichloroethane	4/53	1.00 J	500.00 J	MWJ	9.48
1,1-Dichloroethane	5/53	1.00 J	510.00 J	MWJ	10.98
1,1-Dichloroethene	1/53	4.00	4.00	WE8718	5.51
1,2-Dichloroethane	2/53	3.00	26.00 J	MWJ	1.19
1,2-Dichloropropane	1/53	1.00 J	1.00 J	WE8718	0.78
4-Methyl-2-Pentanone	1/5	82.00	82.00	WE873A	42.40
Acetone	2/5	20.00	290.00	MWE	87.00
Benzene	11/53	1.00 J	70.00	MWJ	4.14
Chlorobenzene	17/51	6.00 J	27000.00 J	MWJ	530.26
Chloroethane	7/53	1.00 J	39.00	WE873B	2.38
Chloroform	1/52	47.00 J	47.00 J	MWJ	21.35
Chloromethane	1/53	9.00 J	9.00 J	WE8719	0.85
Dibromochloromethane	2/53	1.00	7.00 J	MWJ	0.91
Dichlorobenzenes	8/42	10.00	22000.00 J	MWJ	369.19
Ethylbenzene	8/53	0.50 U	740.00	MWJ	19.22
Tetrachloroethene	1/50	2.30 J	38.00 J	MWJ	3.04
Toluene	5/35	10.00	7200.00	MWJ	138.85
trans-1,2-Dichloroethene	9/53	1.00 J	620.00 J	MWJ	13.47
Trichloroethene	2/40	16.00 J	470.00 J	WE8712	14.65
Trichlorofluoromethane	4/53	0.50 UJ	43.00 J	MWJ	1.57
Vinyl chloride	1/53	310.00 J	380.00 J	MWJ	8.14
Xylenes	9/53	5.00	1800.00	MWJ	39.71

TAELE 1 (cont'd.)

Groundwater Results for VOCs  
Concentration (ug/l)

Compound Name	Freq	Range of Detected Values		Location of Max.	Arithmetic Mean
		Minimum	Maximum		
<u>CLP VOCs - RI/FS II</u>					
1,1,1-Trichloroethane	3/54	7.00	2100.00	MW9026A	107.91
1,1-Dichloroethane	3/54	28.00	520.00	MW9026A	55.47
1,2-Dichloroethene	4/54	34.00	2800.00	MW9026A	135.26
Methyl ethyl ketone	5/40	6000.00 J	46000.00 J	MW9027AW	3018.38
4-Methyl-2-Pentanone	3/54	960.00 J	4300.00	MW90248W	172.69
Acetone	13/54	10.00 B	8800.00 J	MW9026A	550.74
Benzene	11/54	3.00 J	130.00 J	MW9026A	46.56
Chlorobenzene	18/54	8.00	34000.00	MWJ	901.28
Chloroethane	3/54	5.00 J	18.00 J	WE874	91.92
Chloroform	1/54	230.00 J	230.00 J	MW9026A	47.27
Ethylbenzene	8/54	15.00	2700.00	MW9026A	193.70
Methylene Chloride	10/54	3.00 J	940.00 J	MWJ	54.41
Styrene	1/54	160.00 J	160.00 J	MW9026A	46.44
Toluene	14/54	3.00 J	21000.00	MW9025AW	900.22
Trichloroethene	1/54	120.00	120.00	WE8712	47.50
Vinyl chloride	2/54	1000.00 J	1800.00 J	MW9027AW	122.13
Xylenes	10/54	3.00 J	7000.00	MW9026A	445.36

TABLE 2

Groundwater Results for SVOCs  
Concentration (ug/l)

Compound Name	Freq	Range of Detected Values		Location of Max.	Arithmetic Mean
		Minimum	Maximum		
<u>HSL SVOCs - RI/FS I</u>					
1,2,4-Trichlorobenzene	1/27	25.00 J	25.00 J	MWJ	13.43
1,2-Dichlorobenzene	5/27	13.00 J	3500.00 E	MWJ	97.37
1,3-Dichlorobenzene	2/27	19.00 J	120.00	MWJ	15.89
1,4-Dichlorobenzene	5/27	4.00 J	1000.00	MWJ	34.57
2,4,5-Trichlorophenol	1/20	27.00	27.00	WE872A	17.35
2,4-Dichlorophenol	2/20	10.00 J	27.00	WE872A	17.43
2,4-Dimethylphenol	2/20	11.00 J	27.00	WE872A	16.92
2-Chlorophenol	2/20	33.00	220.00 J	MWJ	21.40
2-Methylnaphthalene	2/27	5.00 J	10.00 DJ	MWJ	11.85
2-Methyl phenol	1/20	21.00 J	21.00 J	MWJ	15.77
4-Chloroaniline	1/27	3.00 J	3.00 J	WE871B	53.63
4-Methyl phenol	1/20	170.00	280.00 J	MWJ	15.33
Anthracene	1/27	19.00 J	19.00 J	WE872A	13.85
Benzoic acid	2/27	26.00 J	730.00	MWJ	49.48
Benzyl alcohol	1/27	9600.00	9600.00	MWJ	125.68
Bis(2-chloroisopropyl)ether	1/20	57.00 J	57.00 J	WE872A	9.85
Bis(2-ethylhexyl)phthalate	4/24	2.00 JB	34.00 DJ	WE8719	15.25
Di-n-butyl phthalate	14/27	12.00 B	89.00	WE87ML2D	32.59
Diethyl phthalate	3/27	5.00 J	19.00 J	WE872A	13.89
Fluorene	1/27	3.00 J	3.00 J	MWJ	13.31
Isophorone	1/27	170.00 J	170.00 J	MWJ	9.25
N-Nitrosodiphenylamines	1/27	4.00 DJ	4.00 DJ	WE8719	46.44
Naphthalene	6/27	4.00 J	100.00	MWJ	14.73
Phenanthrene	1/27	3.00 J	3.00 J	MWJ	13.31
Phenol	1/20	120.00	120.00	MWJ	106.67
<u>CLP SVOCs - RI/FS II</u>					
1,2,4-Trichlorobenzene	2/53	49.00 J	58.00 J	MW9026A	11.56
1,2-Dichlorobenzene	10/53	3.00 J	25000.00	MWJ	735.01
1,3-Dichlorobenzene	2/53	5.00 J	57.00 J	MW9026A	11.77
1,4-Dichlorobenzene	11/53	2.00 J	820.00 J	MWJ	31.95
2,4-Dichlorophenol	1/40	43.00 J	43.00 J	MWJ	14.64
2,4-Dimethylphenol	1/40	38.00 J	38.00 J	MW9027AW	13.89
2-Chlorophenol	2/40	40.00 J	58.00	MWJ	15.39
2-Methylnaphthalene	4/53	3.00 J	18.00 J	MW9024B	10.49
2-Methyl phenol	1/40	49.00 J	49.00 J	MW9025AW	12.91
3,3'-Dichlorobenzidene	1/53	120.00 J	120.00 J	MW9026A	22.10
4-Chloro-3-methylphenol	1/39	32.00 J	32.00 J	MW9027AW	13.68
4-Methyl phenol	6/40	6.00 J	660.00	MW9027AW	36.90
Benzoic acid	3/40	130.00 J	780.00	MW9027AW	78.19
Bis(2-ethylhexyl)phthalate	22/53	12.00 B	670.00 B	MW9027AW	51.82
Di-n-butyl phthalate	10/53	3.00 J	42.00 J	MW9027AW	11.99
Di-n-octyl phthalate	12/53	1.00 J	43.00 J	MW9026A	11.70
Isophorone	2/53	57.00 J	130.00	MW9027AW	12.27
Naphthalene	12/53	4.00 J	57.00 J	MW9027AW	9.19
Pentachlorophenol	1/40	60.00 J	60.00 J	MWB1	69.31
Phenol	5/40	35.00 J	120.00	MW9027AW	17.81

TABLE 3

Groundwater Results for Pesticides/PCBs and Herbicides  
Concentration (ug/l)

Compound Name	Freq	Range of Detected Values		Location of Max.	Arithmetic Mean
		Minimum	Maximum		
<u>HSL PESTICIDES/PCBs - RI/FS I</u>					
4,4'-DDT	2/26	0.01	0.11	WE872B	0.08
PCB 1248	1/27	0.98	0.98	WE8719	0.40
PCB 1260	1/27	0.37	0.37	WE8719	0.74
<u>CLP PESTICIDES/PCBs - RI/FS II</u>					
4,4'-DDD	1/53	0.12 X	0.12 X	MWB1	0.63
4,4'-DDT	2/53	0.04 J	0.37 X	WE87ML2C	0.63
alpha-BHC	1/53	0.02 J	0.02 J	WE87ML2B	0.31
Dieldrin	2/53	0.02 J	0.06 J	WE87ML1B	0.63
Endrin	1/53	0.02 J	0.02 J	MW9028A	0.63
gamma-BHC	1/51	1.10 JX	1.10 JX	MW9026A	0.30
Heptachlor	1/52	0.03 J	0.03 J	MWD	0.32
<u>HERBICIDES - RI/FS I</u>					
2,4,5-T	4/27	<0.05	1.50	MWJ	0.06
2,4,5-TP (Silvex)	5/27	0.09	2.40	MWJ	0.17
2,4-D	16/27	<0.05	17.00	MWJ	1.37
<u>HERBICIDES - RI/FS II</u>					
NONE DETECTED					

TABLE 4

Groundwater Results for Total and Dissolved Metals  
Concentration (mg/l)

Compound Name	Freq	Range of Detected Values		Location of Max.	Arithmetic Mean
		Minimum	Maximum		
<u>HSL Total Metals - RI/FS I</u>					
Aluminum (Al)	4/26	0.28	11.00	WE874	1.03
Antimony (Sb)	1/26	4.13	4.13	WE871B	0.25
Arsenic (As)	2/26	0.03	0.10	WE872B	0.01
Barium (Ba)	3/25	0.50	2.51	WE8719	0.37
Beryllium (Be)	11/26	0.007	0.02	WE87ML1D/WE87ML5C	0.01
Cadmium (Cd)	1/6	0.05	0.05	WE872A	0.01
Calcium (Ca)	4/26	4.12	229.00	WE871B	21.20
Chromium (Cr)	8/26	0.05	0.33 J	WE871B	0.05
Cobalt (Co)	1/26	0.05	0.05	WE8719	0.03
Copper (Cu)	3/26	0.05	0.19 J	WE871B	0.02
Iron (Fe)	3/25	16.20	47.20	WE872B	6.06
Lead (Pb)	4/26	0.05 J	0.33	WE8719	0.04
Magnesium (Mg)	25/26	0.15	448.00	WE871B	19.82
Manganese (Mn)	20/26	0.15	170.00	WE872B	22.82
Nickel (Ni)	5/26	0.06	0.35	WE871B	0.06
Potassium (K)	26/26	0.70	354.00	WE8719	21.42
Sodium (Na)	26/26	3.00	1090.00	WE8719	159.87
Total Solids	26/26	16.00	8090.00	WE872B	1172.42
Total Suspended Solids (TSS)	22/26	0.50	4050.00	WE8719	319.63
Thallium (Tl)	1/26	0.32	0.32	WE871B	0.24
Vanadium (V)	4/26	0.29	0.52	WE872B	0.07
Zinc (Zn)	5/7	0.05	10.00	WE871B	1.64
<u>Non-HSL Total Metals - RI/FS I</u>					
Antimony (Sb)	4/27	2.10	4.00	MWB	0.48
Arsenic (As)	6/27	0.01	0.03	WE873B	0.01
Barium (Ba)	2/27	0.50	0.55 J	MWC	0.33
Beryllium (Be)	9/27	0.01	0.01	MW1/MW0/WE856A/ WE85M1/WE8715/WE8719	0.004
Cadmium (Cd)	8/23	0.01	0.06	WE85M1	0.01
Chromium (Cr)	7/25	0.05	0.37	WE8715	0.07
Copper (Cu)	21/27	0.02	0.50	WE8719	0.06
Iron (Fe)	4/27	18.00	60.70	WE8715	19.02
Lead (Pb)	13/27	0.05	1.95 J	WE8719	0.13
Nickel (Ni)	13/27	0.04	0.59	WE8719	0.09
Total Solids	27/27	103.00	8930.00	WE873A	2077.00
Total Suspended Solids(TSS)	27/27	33.30	4890.00	WE8719	806.21
Thallium (Tl)	5/27	0.12	0.27	MWB	0.22
Vanadium (V)	6/27	0.21	0.67	WE873A	0.10
Zinc (Zn)	11/22	0.04	2.51	MWC	1.02
<u>CLP Total Metals - RI/FS II</u>					
Aluminum (Al)	49/53	0.047 J	77.500 J	MW9026A	7.452
Antimony (Sb)	1/53	0.048 B	0.048 B	MW9027AW	0.022
Arsenic (As)	9/53	0.006 J	0.813	MW9024BW	0.029
Barium (Ba)	37/53	0.014 B	2.590	MW9026A	0.224
Beryllium (Be)	26/53	0.003 J	0.067 J	MW9024BW	0.011
Cadmium (Cd)	8/53	0.005 J	0.048 J	MW9026A	0.005
Calcium (Ca)	53/53	0.103	247.00	WE871B	16.293
Chromium (Cr)	42/53	0.008 J	0.237	MW9025AW	0.035
Cobalt (Co)	7/53	0.022 B	0.073	MW9026A	0.010
Copper (Cu)	20/53	0.017 B	1.880	MW9026A	0.136
Cyanide (CN)	12/53	0.011	0.508	WE856B	0.025
Iron (Fe)	53/53	0.122 J	297.000 J	MW9024B	11.937
Lead (Pb)	33/52	0.002 B	1.000 J	MW9025AW	0.057
Magnesium (Mg)	43/53	0.106	88.500	MW81	8.023
Manganese (Mn)	52/53	0.022 J	174.000 J	WE871B	3.465
Mercury (Hg)	28/53	0.00021	0.004	MW9026A	0.0004
Nickel (Ni)	21/53	0.024 B*	0.660 J	MW9026A	0.064
Potassium (K)	48/53	0.102 J	46.000 J	MWC	3.919
Selenium (Se)	2/35	0.007	0.057	MW9024BW	0.012
Silver (Ag)	3/53	0.009 B	0.034 J	WE871B	0.005
Sodium (Na)	53/53	0.156	97.500	MW0	10.837
Vanadium (V)	6/53	0.026 B	0.267	MW9026A	0.018
Zinc (Zn)	52/53	0.015 J	12.400 J	MW9026A	0.725

TABLE 4 (cont'd.)

Groundwater Results for Total and Dissolved Metals  
Concentration (mg/l)

Compound Name	Freq	Range of Detected Values		Location of Max.	Arithmetic Mean
		Minimum	Maximum		
<u>HSL Dissolved Metals - RI/FS I</u>					
Arsenic (As)	2/2	0.20	0.20	WE872A	0.20
Barium (Ba)	2/3	0.27	1.91	WE8719	0.81
Beryllium (Be)	7/9	0.01	0.03	WE8718	0.01
Cadmium (Cd)	1/4	0.02	0.02	WE8718	0.01
Chromium (Cr)	2/4	0.06	0.06	WE872A	0.04
Copper (Cu)	2/3	0.02	0.25	WE8719	0.09
Lead (Pb)	1/4	0.08	0.08	WE8718	0.04
Nickel (Ni)	4/5	0.19	0.25	WE8718	0.18
Vanadium (Vn)	4/4	0.32	0.71	WE8728	0.46
Zinc (Zn)	18/26	0.01	13.10	WE8718	0.55
<u>Non-HSL Dissolved Metals - RI/FS I</u>					
Antimony (Sn)	2/7	0.01	3.50	MWB1	0.56
Arsenic (As)	2/3	0.01	0.01	WE873A	0.01
Barium (Ba)	4/7	0.53	0.71	MWD	0.53
Beryllium (Be)	1/9	0.007	0.007	WE85M1	0.003
Chromium (Cr)	4/10	0.05	0.13	WE873A	0.05
Lead (Pb)	2/13	0.06	0.14	WE8717	0.04
Nickel (Ni)	9/11	0.04	0.29	WE873A	0.10
Vanadium (Vn)	6/7	0.23	0.81	WE8738	0.43
Zinc (Zn)	26/26	0.02	2.24	MWC	0.58
<u>CLP Dissolved Metals - RI/FS II</u>					
Aluminum (Al)	27/53	0.047 B	7.300 J	MW9027AW	0.233
Arsenic (As)	8/13	0.013 J	0.151	MW90248W	0.027
Barium (Ba)	39/53	0.001 B	0.839	MWB	0.089
Beryllium (Be)	21/53	0.002 B	0.038*J	WE87ML1E	0.007
Cadmium (Cd)	12/53	0.005	0.012 J	MWP	0.004
Calcium (Ca)	53/53	0.105	78.400	MW90248W	19.397
Chromium (Cr)	18/53	0.007 J	0.124 J	WE87ML4A	0.011
Cobalt (Co)	4/53	0.014 B	0.036 B	MWB1	0.008
Copper (Cu)	1/53	0.034	0.034	WE8711	0.009
Iron (Fe)	44/53	0.028 J	62.600	WE874	5.102
Lead (Pb)	4/44	0.002 J	0.029 J	WE87ML3E	0.007
Magnesium (Mg)	44/53	0.130	87.500	MW9026A	10.951
Manganese (Mn)	50/53	0.013 B	33.500	WE874	2.869
Mercury (Hg)	1/37	0.0002	0.0002	WE855	0.0001
Nickel (Ni)	11/53	0.025 J	0.289 J	MW9027AW	0.034
Potassium (K)	42/45	0.143 J	88.000 J	MWC	10.700
Silver (Ag)	6/39	0.009 J	0.040	WE8718	0.006
Sodium (Na)	53/53	0.125	98.500	MWD	11.027
Zinc (Zn)	40/53	0.015 B*J	7.780*J	WE8718	0.256

TABLE 5

Groundwater Results for WQPs and Petroleum Hydrocarbons  
Concentration (mg/l)

Compound Name	Freq	Range of Detected Values		Location of Max.	Arithmetic Mean
		Minimum	Maximum		
<u>WQPs - RI/FS I</u>					
Ammonia (N)	51/52	0.01	1200.00	WE873A	70.77
Chemical Oxygen Demand (COD)	33/50	4.00	3580.00	WE873A	291.34
Chloride (Cl)	51/52	2.00	1800.00	WE873A	262.07
Nitrate (N)	37/52	0.01	4.93	WE855	0.32
Nitrite (N)	6/52	0.01	0.09	WE87ML3E	0.01
Sulfate (SO4)	32/52	4.00	275.00	WE871B	14.31
Total Organic Carbon (TOC)	31/52	5.00	575.00	WE873A	68.97
<u>WQPs - RI/FS II</u>					
Ammonia (N)	47/53	0.10	2440.00	MW9027AW	132.66
Biological Oxygen Demand	8/9	4.40	570.00	MW9027AW	183.32
Chemical Oxygen Demand (COD)	27/53	4.00	2220.00	MW9027AW	207.88
Chloride (Cl)	53/53	0.50	1790.00	MW9027AW	197.40
Coliform, total (col/100ml)	25/53	3.00	1600.00	MW9026A	102.38
Nitrate (N)	27/53	0.01 J	1.83	WE855	0.16
Nitrite (N)	17/53	0.01	0.04	WE874	0.01
Total Solids	53/53	48.80	15600.00	MW9032	1662.60
Total Suspended Solids (TSS)	43/53	0.60	16700.00 J	MW9032	1008.07
Sulfate (SO4)	20/53	5.00	750.00 J	WE871B	24.87
Total Organic Carbon (TOC)	50/53	5.00 J	580.00 J	MW9027AW	92.79
<u>Petroleum Hydrocarbons - RI/FS II</u>					
Total Petroleum Hydrocarbons	8/9	1.00	80.50	MW9024BW	14.40

TABLE 6  
SUMMARY OF CANCER RISKS AND HAZARD INDICES  
CENTRAL LANDFILL SITE  
RISKS TO RESIDENTS

MEDIA	EXPOSURE PATHWAY	RECEPTOR	AVERAGE CASE			REASONABLE WORST CASE		
			CARCINOGENIC RISK	NONCARCINOGENIC HAZARD INDEX	EFFECT/TARGET ORGAN WITH INDEX EXCEEDING 1.0	CARCINOGENIC RISK	NONCARCINOGENIC HAZARD INDEX	EFFECT/TARGET ORGAN WITH INDEX EXCEEDING 1.0
<u>Groundwater</u>								
Ingestion		Adults	7.9E-04	93	CNS=91	1.4E-03	731	CNS=726 Skin=2.7 Liver=1.2 None=1.2
		Children	3.7E-04	218	CNS=213 Skin=1.9 Liver=1.6	6.8E-04	1707	CNS=1693 Skin=6.2 Liver=2.8 Body Wt. 1.2
Dermal Contact		Adults	1.2E-06	0.14		2.2E-06	1.1	CNS=1.1
		Children	4.4E-07	0.26		8.2E-07	2	CNS=2.0
Inhalation		Adults	2.4E-07	0.057		5.8E-07	0.093	
		Children	2.2E-07	0.27		5.4E-07	0.43	
Subtotal =		Adults	7.9E-04	93.2		1.4E-03	732	
		Children	3.7E-04	219		6.8E-04	1709	
<u>Surface Water</u>								
<u>Upper Simmons</u>								
Ingestion		Adults	1.2E-07	0.00060		2.4E-08	0.0027	
		Children	3.8E-07	0.0049		7.8E-08	0.022	
Dermal Contact		Adults	3.5E-08	0.00018		7.3E-09	0.00083	
		Children	8.2E-08	0.0011		1.7E-08	0.0049	
Subtotal =		Adults	1.6E-07	0.00078		3.1E-08	0.0035	
		Children	4.6E-07	0.0060		9.5E-08	0.027	
<u>Almy Reservoir</u>								
Ingestion		Adults	6.5E-09	0.000053				
		Children	2.6E-08	0.00044				
Dermal Contact		Adults	2.0E-09	0.000012				
		Children	4.6E-09	0.000072				
Subtotal =		Adults	8.5E-09	0.000065				
		Children	3.1E-08	0.00051				



TABLE 7

ARARs

GROUNDWATER PROTECTION - FEDERAL

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Action Specific 1	Safe Drinking Water Act, Maximum Contaminant Levels (MCLs), 40 CFR, Part 141.	Relevant & Appropriate	MCLs have been promulgated for a number of organic and inorganic contaminants. These levels regulate the concentration of contaminants in drinking water supplies. MCLs are considered relevant and appropriate for groundwater because it is federally classified as a potential drinking water source.	MCLs are not used as groundwater cleanup levels; rather, they are used to measure performance of groundwater containment alternatives. These alternatives are expected to contain groundwater exceeding MCLs within the compliance boundary.
Action Specific 2	Resource Conservation and Recovery Act - Releases from Solid Waste Management Units, 40 CFR, Part 264, Subpart F	Applicable	Establishes requirements for solid waste management units (SWMUs) at RCRA regulated sites. Regulations include; groundwater protection standard requirements for groundwater monitoring, detection monitoring and compliance monitoring and the corrective action program.	Because this is a source control remedy, groundwater cleanup will not be addressed and cleanup goals are not set; however, alternatives which include a groundwater containment component will comply with the portions of the regulations which apply to installing groundwater monitoring wells and compliance monitoring.

TABLE 7 (cont'd.)

ARARS  
GROUNDWATER PROTECTION - FEDERAL

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Action Specific 3	Safe Drinking Water Act; Maximum Contaminant Level Goals, (MCLGs) 40 CFR, Part 141.	Relevant & Appropriate	Non-enforceable health goals for public water systems. The USEPA has promulgated non-zero MCLGs for specific contaminants.	MCLGs are not used as groundwater cleanup levels; rather, they are used to measure performance of groundwater containment alternatives. The alternatives are expected to contain groundwater exceeding non-zero MCLGs within the compliance boundary.
Action Specific 4	RCRA-Criteria for Municipal Solid Waste Landfills, 40 CFR, Part 258, Subpart E.	Relevant & Appropriate	Establishes groundwater monitoring requirements for municipal solid waste landfills.	Because this is a source control remedy, groundwater will not be addressed and groundwater cleanup goals are not set, however, alternatives which include a groundwater containment component will comply with the groundwater monitoring program requirements of this subpart.
Chemical Specific 5	USEPA Human Health Assessment Cancer Slope Factors (CSFs)	TBC	CSFs are developed by EPA for health effects assessments or evaluation by the Human Health Assessment Group (HHAG).	These values present the most up to date cancer risk potency information. CSFs shall be used to compute the individual cancer risk resulting from exposure to contaminants.

TABLE 7 (cont'd)

ARARs  
GROUNDWATER PROTECTION - FEDERAL

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Chemical Specific 6	USEPA Reference Doses (RfDs)	TBC	RfDs are dose levels developed by EPA for use in the characterization of risks due to non-carcinogens in various media.	RfDs are considered the levels unlikely to cause significant health effects associated with a threshold mechanism of action in human exposure. RfDs are typically employed to characterize risks of groundwater contaminant exposure (for ingestion pathways).
Chemical Specific 7	Safe Drinking Water Act, Maximum Contaminant Levels (MCLs), 40 CFR, Part 141	Relevant & Appropriate	Establishes enforceable standards for specific contaminants which have been determined to adversely affect human health. These standards are protective of human health for individual chemicals and are developed using MCLs, available treatment technologies, and cost data.	Groundwater contaminant concentrations were compared to MCLs and were included as a component of the risk assessment.
Chemical Specific 8	Safe Drinking Water Act, Maximum Contaminant Level Goals, (MCLGs) 40 CFR, Part 141.	Relevant & Appropriate	MCLGs are non-enforceable health goals. They establish drinking water quality goals at levels of no known or anticipated health effects with an adequate margin of safety.	Groundwater contaminant concentrations were compared to non-zero MCLGs and were included as one component of the risk assessment.

TABLE 8

ARARs  
GROUNDWATER PROTECTION - STATE

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Action Specific 1	Rhode Island Rules and Regulations for Groundwater Quality, RIDEM 7/93, Sections 12.02 and 12.03.	Applicable	Regulations are designed to protect and restore the quality of the State's groundwater and include a groundwater monitoring program.	Although this is a source control remedy which does not address groundwater, some alternatives have a groundwater containment component. These alternatives will comply with these actions as they apply to a groundwater monitoring program.
Action Specific 2	RI Rules and Regulations for Groundwater Quality, RIDEM 7/93, Section 5.06	Applicable	Regulations establish methods to prevent introducing pollutants into groundwater during monitoring well construction and during monitoring well and piezometer abandonment.	All permanent and non-permanent monitoring wells (and all piezometers), when improper abandonment will result in reasonable likelihood of groundwater pollution, will meet the substantive requirements of these regulations.
Action Specific 3	RI Rules and Regulations for Hazardous Waste Management, RIDEM 4/92, Section 9.03.	Applicable	Regulation outlines operation requirements for treatment, storage and disposal facilities, including a groundwater monitoring program.	Although this is source control remedy which doesn't address groundwater, some alternatives have a groundwater containment component. These alternatives will comply with this section to the extent it requires installing groundwater monitoring wells.

TABLE 8 (cont'd)

ARARs

GROUNDWATER PROTECTION - STATE

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Action Specific 4	RI Rules and Regulations for Solid Waste Management, RIDEM 4/92, Section 7.08 and 15.11.	Applicable	Regulations outlines operation requirements for Solid Waste Management Facilities, including a groundwater monitoring program.	Although this is a source control remedy which doesn't address groundwater. Some alternatives have a groundwater containment component. These alternatives will comply with these sections to the extent they require a groundwater monitoring program.

TABLE 9

ARARs  
SURFACE WATER BODY PROTECTION - FEDERAL

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Action Specific 1	Clean Water Act - National Pollutant Discharge Elimination System (NPDES) Regulation, 40 CFR Parts 122, 123, and 124 November 16, 1990.	Applicable	Regulates the point source discharge of water into public surface waters.	Substantive requirements of the regulation will be met by any discharge to onsite surface waters.
Action Specific 2	Clean Water Act - Federal Ambient Water Quality Criteria (FAWQC), 40 CFR 122.44.	Relevant and Appropriate	Non-enforceable guidance which is used by states in conjunction with a designated use for a stream effluent to establish water quality standards. WQC levels for protection of human health from consuming aquatic organisms (plants and fish) and for protection of aquatic organisms have been developed for several contaminants. The standards for protection of human health from consuming fish and the standards of protection of aquatic organisms are relevant and appropriate if there is no more stringent state rules for particulate contamination.	Standards for protection of human health for consumption of fish and standards for protection of aquatic organisms for which there is no more stringent state standard will be met for any discharge to onsite surface water.

TABLE 9 (cont'd)

ARARs

SURFACE WATER BODY PROTECTION - FEDERAL

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Location Specific 3	Protection of Wetlands - Executive Order No. 11990, 40 CFR, Part 6	Applicable	Requires federal agencies to avoid impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practical alternative exists.	Alternatives that involve alteration of a wetland or that adversely impact a wetland may not be selected unless a determination is made that no practicable alternative exists. If no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the wetland.

TABLE 10

ARARs  
SURFACE WATER BODY PROTECTION - STATE

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Chemical Specific 1	Rhode Island Water Quality Standards, RIDEM, effective 1/9/85, amended 10/28/88	Applicable	Incorporates RI Ambient Water Quality Standards. Classifies water use and defines water quality goals to protect public health and welfare, enhance the quality of state water, and serve the purpose of the CWA.	Effluent discharged to surface waters will meet these standards.
Chemical Specific 2	Rhode Island Water Quality Regulations, RIDEM, effective 1/9/85, amended 10/28/88	Applicable	To restore, preserve and enhance the quality of the waters of the state and to protect the waters from pollutants.	Effluent discharged to surface water will not degrade high quality surface waters or further degrade low quality surface waters.
Chemical Specific 3	Rhode Island Pretreatment Regulations, RIDEM, June 15, 1984.	Applicable	Covers pollutants in wastewaters which can have detrimental effects on POTW processes. Sets specified limitations, pretreatment and monitoring requirements for discharges to POTWs based on federal regulations.	Remedial actions which include discharge to the Cranston POTW, will meet all discharge limitations imposed by POTWs.



TABLE 10 (cont'd)

ARARs  
SURFACE WATER BODY PROTECTION - STATE

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Location Specific 4	Rules and Regulations Governing the Enforcement of the Freshwater Wetlands Act, RIDEM, 8/90	Applicable	Actions required to prevent the undesirable drainage, excavation, filling, alteration, encroachment or any other form of disturbance or destruction to a wetland.	Alternatives involving activities which affect wetlands will comply with the substantive provisions of this regulation.
Action Specific 5	Rhode Island PDES Regulations (RIPDES), RIDEM, adopted 7/20/84, amended 2/9/93	Applicable	Restore, preserve and enhance quality of surface waters and protect waters from dischargers of pollutants.	On-site discharge to surface water will meet substantive requirements that are more stringent than NPDES Program.

TABLE 11

ARARs  
AIR QUALITY PROTECTION - FEDERAL

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Action Specific 1	Resource Conservation and Recovery Act (RCRA) Interim Status; Thermal Treatment, 40 CFR, Part 265, Subpart P	Applicable	Regulations contain requirements for air emissions from thermal units.	All remedial actions which involve thermal treatment will comply with these regulations.
Action Specific 2	RCRA, Air Emission Standards for Process Vents, 40 CFR, Part 264, Subpart AA	Applicable	Standards for air emissions from process vents associated with distillation, fractionation, thin film evaporation, column extraction or air steam stripping operations that treat RCRA substances and have total organic concentrations of 10 ppm or greater.	All remedial alternatives involving one or more of these technologies will comply with the substantive portions of this regulation if the threshold organic concentration is met.
Action Specific 3	RCRA, Air Emission Standards for Equipment Leaks, 40 CFR, Part 264, Subpart BB	Applicable	Standards for air emissions for equipment that contains or contacts RCRA wastes with organic concentrations of at least 10% by weight.	All remedial alternatives which includes such equipment will comply with substantive portions of this regulation if the threshold organic concentration is met.

TABLE 11 (cont'd)

ARARs  
AIR QUALITY PROTECTION - FEDERAL

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Action Specific 4	Clean Air Act (CAA) National Emissions Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61.	Relevant And Appropriate	Establish emission levels for certain hazardous air pollutants.	Remedial actions shall attain NESHAP emission limits for vinyl chloride that result from treatment processes.
Action Specific 5	RCRA, Air Emissions from Treatment, Storage and Disposal Facilities, 40 CFR, Part 264, Subpart CC (Proposed 56 FR 33490-33598 7/22/91)	TBC	Proposed standards for air emissions from treatment, storage and disposal facilities with VOC concentrations equal to or greater than 500 ppm.	Proposed standards will be considered for all remedial alternatives if threshold VOC concentrations are met.
Action Specific 6	CAA - Non Methane Organic Compounds (NMOC's) May 30, 1991 proposed rule CAA Amendments (56 FR 24468-24528.) to 40 CFR Part 60 Subpart WWW)	TBC	Regulations will require NMOC specific gas collection and control systems, monitoring and gas generation estimates. The proposed rule would establish a performance standard for NMOCs emission from municipal solid waste landfill gases.	Proposed regulation will be considered for NMOC emissions from the landfill.

TABLE 11 (cont'd)  
ARARS

AIR QUALITY PROTECTION - FEDERAL

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARS
Action Specific 7	Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites. OSWER Dir. 9355.0-28, 6/15/89	TBC	Provides guidance on the control of air emissions from air strippers used at Superfund sites for groundwater treatment and distinguishes between site located in attainment and non-attainment areas for ozone.	Controls on air stripper will be used as necessary to attain Federal and State ARARS, criteria and guidance.
Action Specific 8	US EPA Region I Memo, July 12, 1989, Louis Gilto to Merrill Hohman	TBC	States that superfund air strippers in ozone non-attainment areas will generally merit controls on all VOC emissions.	Remedial actions including air strippers will include controls to reduce VOC emissions.

TABLE 12

ARARS

AIR QUALITY PROTECTION - STATE

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Action Specific 1	Air Pollution Control Regulations, RI Dept. of Health, Division of Air Pollution Control, Effective 8/2/67 amended 5/20/91 - Regulation No. 1 Visible Emissions	Applicable	No contaminant emissions will be allowed for periods of more than 3 minutes in any one hour which is greater or equal to 20% opacity.	Air emissions from remedial actions will meet emission levels in regulations.
Action Specific 2	RI Air Pollution Control Regulation No. 5 Fugitive Dust	Applicable	Reflects that reasonable precautions be taken to prevent particulate matter from becoming airborne.	On-site remedial actions will use good industrial practices to prevent particulate matter from becoming airborne.
Action Specific 3	RI Air Pollution Control Regulation No. 7 Emissions Detrimental to Persons or Property.	Applicable	Prohibits emissions of contaminants which may be injurious to human, plant or animal life or cause damage to property or which unreasonably interferes with the enjoyment of life and property.	Emissions from technologies under consideration which have the potential of emitting contaminants (including biological, physical and chemical treatments and thermal technologies) will meet these requirements.

TABLE 12 (cont'd).

**ARARS**  
**AIR QUALITY PROTECTION - STATE**

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Action Specific 4	RI Air Pollution Control Regulation No. 9 - Approval to Construct Install, Modify or Operate.	Applicable	Establishes guidelines for the construction, installation, modification or operation of potential air emission units. Establishes permissible emission rates for some contaminants.	Remedial technologies involving construction, installation, modification or operation of air emission units will meet these requirements.
Action Specific 5	RI Air Pollution Control Regulation No. 13 Particulate Emissions	Applicable	Sets emission standards for a class of fossil fuel fired steam or hot water units. Prohibits use of rotary cup burners.	If carbon adsorption is chosen then steam is necessary to regenerate the carbon beds. Hot water may be required in other remedial technologies; all will comply with this regulation.
Action Specific 6	RI Air Pollution Control Regulation No. 15 Control of Organic Solvent Emissions	Applicable	Limits the amount of organic solvents emitted to the atmosphere.	Emissions of organic solvents will be controlled to ensure that the standards are met.
Action Specific 7	RI Air Pollution Control Regulation No. 17 Odors.	Applicable	Prohibits the release of objectionable odors across property lines.	Objectionable odors beyond the facility boundary will be controlled.

TABLE 12 (cont'd)

**ARARs**  
**AIR QUALITY PROTECTION - STATE**

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Action Specific 8	RI Air Pollution Control Regulation No. 20 Burning of Alternative Fuels.	Applicable	Defines standards for alternative fuel and establishes emission allowances.	Substantive requirements of this regulation will be met by components of action which involve burning of alternative fuel.
Action Specific 9	RI Air Pollutant Control Regulation No. 22 Air Toxics	Applicable	This regulation prohibits the emission of specified contaminants at rates which would result in ground level concentrations greater than acceptable ambient levels in the regulation.	The ambient air quality levels will be met for all technologies which emit air contaminants.
Action Specific 10	Rhode Island Guidance for Air Quality/Air Toxics Substances	TBC	Provides guidelines for models and modeling procedures.	Guidance will be considered when modelling emissions from the landfill gas combustion stack.

TABLE 13

**ARARs  
HAZARDOUS WASTE - FEDERAL**

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Action Specific 1	Resource Conservation and Recovery Act (RCRA) - Identification and Listing of Hazardous Waste, 40 CFR, Part 261.	Applicable	Defines those solid wastes which are subject to regulation as hazardous wastes under 40 CFR, Parts 262-265.	Requirements define RCRA regulated wastes. Acceptable management approaches for listed and characteristic hazardous waste will be incorporated into selecting remedial alternatives.
Action Specific 2	RCRA, Interim Status TSDF, Standards; Thermal Treatment, 40 CFR, Part 265, Subpart P	Applicable	General operating, waste analysis, monitoring/inspection and closure requirements for thermal treatment facilities (other than those using enclosed devices with controlled flame combustion).	Remedial alternatives which include on-site thermal treatment will meet these requirements.
Action Specific 3	RCRA Interim Status TSDF Standards; Chemical, Physical and Biological Treatment, 40 CFR, Part 265, Subpart Q	Applicable	General operating, waste analysis and trial test, inspection and closure requirements for facilities which treat hazardous waste by chemical, physical or biological methods in other than tanks, surface impoundment; and land treatment facilities.	Remedial alternatives which include chemical, physical and biological treatment will meet these requirements.



TABLE 13 (cont'd)

**ARARs**  
**HAZARDOUS WASTE - FEDERAL**

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Action Specific 4	Hazardous Waste Management, RCRA, Land Disposal Restrictions (LDR) 40 CFR, Part 268	Applicable	Specific requirements for the land disposal of RCRA hazardous waste. Land disposal restrictions set by waste type and constituent concentration or required treatment technology.	Remedial alternatives which include excavation and off-site disposal of restricted RCRA waste will comply with LDR by meeting treatment standards prior to disposal.
Action Specific 5	Technical Guidance for Final Covers on Hazardous Waste Landfills and Surface Impoundments, EPA/530-SW-047 7/89	TBC	EPA technical guidance for landfill covers. Presents recommended technical specifications for multilayer landfill cover design.	Cap construction should conform to these standards.
Action Specific 6	RCRA, Closure and Post-Closure, 40 CFR, Part 264, Subpart G.	Applicable	Details general requirements for closure and post-closure of hazardous waste facilities, including installation of a groundwater monitoring program.	Remedial alternatives which include a RCRA Cap shall be constructed in accordance with these requirements.

TABLE 13 (cont'd)

ARARS  
HAZARDOUS WASTE - STATE

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Action Specific 1	RI Rules and Regulations for Hazardous Waste Management, Section 9, RIDEM 4/19/92	Applicable	Outlines requirements for general waste analyses, security procedures, inspections and safety. Sets design, construction and operational requirements for containers and tanks, and closure requirements for hazardous waste facilities.	All remedial actions involving treatment facilities and treatment processes will comply with the substantive portions of this Section. Alternatives with double barrier caps will comply with closure standards.
Action Specific 2	RI Rules and Regulations for Hazardous Waste Management, Section 8, RIDEM 4/19/92.	Applicable	Outlines operational requirements for all treatment, storage, and disposal facilities.	All remedial actions will comply with the substantive requirements of this section for treatment technologies.
Action Specific 3	RI Rules and Regulations for Hazardous Waste Management, Section 10, RIDEM 4/19/92.	Relevant and Appropriate	Outlines design, operational and closure requirements for new landfills.	Although this section addresses new landfills, requirements for closure of CLF will be in accordance with these requirements for alternatives with double barrier caps.

TABLE 14

**ARARS  
HAZARDOUS WASTE - STATE**

Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Action Specific 4	RI Rules and Regulation for Hazardous Waste Management, Section 13, RIDEM 4/19/92.	Applicable	Outlines design and operational requirements for miscellaneous units.	Remedial alternatives which include miscellaneous units will meet the substantive requirements of this Section.
Action Specific 5	RI Rules and Regulations for Solid Waste Management, RIDEM, 4/92, Sections 9, 10, & 13	Applicable	Requires minimal standards for solid waste landfill capping. Specifies type and depth of cap barrier layers and engineering standards. Includes measures to protect against odors and dust.	Remedial alternatives which include RIDEM Solid Waste caps will comply with these regulations.

CLF FEASIBILITY STUDY

TABLE 14A

ARARs FOR COMPLIANCE  
SITE WIDE ALTERNATIVES OU1-5, OU1-6, AND OU1-7

Media	Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Groundwater - Federal	Action Specific 1	Safe Drinking Water Act, Maximum Contaminant Levels (MCLs), 40 CFR, Part 141.	Relevant & Appropriate	MCLs have been promulgated for a number of organic and inorganic contaminants. These levels regulate the concentration of contaminants in drinking water supplies. MCLs are considered relevant and appropriate for groundwater because it is federally classified as a potential drinking water source.	The combination of capping and extraction and treatment of groundwater at either the hot spot or the southern perimeter of the landfill or at both is expected to contain groundwater exceeding MCLs within the compliance boundary. A groundwater monitoring program will be designed to determine the effectiveness of the containment system.
Groundwater - Federal	Action Specific 2	Resource Conservation and Recovery Act - Releases from Solid Waste Management Units, 40 CFR, Part 264, Subpart F	Applicable	Establishes requirements for solid waste management units (SWMUs) at RCRA regulated sites. Regulations include: groundwater protection standard requirements for groundwater monitoring, detection monitoring and compliance monitoring and the corrective action program.	Groundwater containment alternatives will install groundwater monitoring wells and a groundwater monitoring program.
Groundwater - Federal	Action Specific 3	Safe Drinking Water Act, Maximum Contaminant Level Goals, (MCLGs) 40 CFR, Part 141.	Relevant & Appropriate	Non-enforceable health goals for public water systems. The USEPA has promulgated non-zero MCLGs for specific contaminants.	The combination of capping and extraction and treatment of groundwater at either the hot spot or the southern perimeter of the landfill or at both is expected to contain groundwater exceeding non-zero MCLGs within the compliance boundary. A groundwater monitoring program will be designed to determine the effectiveness of the containment system.

CLF FEASIBILITY STUDY

TABLE 14A (con't)

ARARs FOR COMPLIANCE  
SITE WIDE ALTERNATIVES OU1-5, OU1-6, AND OU1-7

Media	Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Groundwater - Federal	Action Specific 4	RCRA - Criteria for Municipal Solid Waste Landfills, 40 CFR, Part 258, Subpart E.	Relevant & Appropriate	Establishes groundwater monitoring requirements for municipal solid waste landfills.	Groundwater containment alternatives will include a groundwater monitoring program.
Groundwater - Federal	Chemical Specific 5	USEPA Human Health Assessment Cancer Slope Factors (CSFs)	TBC	CSFs are developed by EPA for health effects assessments or evaluation by the Human Health Assessment Group (HHAG).	Both capping and groundwater containment in conjunction with institutional controls will reduce the individual cancer risk resulting from exposure to contaminants in the groundwater as identified in the Risk Assessment.
Groundwater - Federal	Chemical Specific 6	USEPA Reference Doses (RfDs)	TBC	RfDs are dose levels developed by EPA for use in the characterization of risks due to non-carcinogens in various media.	Both capping and groundwater containment in conjunction with institutional controls will reduce the risk of detrimental health effects resulting from exposure to contaminants in the groundwater as identified in the Risk Assessment.
Groundwater - Federal	Chemical Specific 7	Safe Drinking Water Act, Maximum Contaminant Levels (MCLs), 40 CFR, Part 141	Relevant & Appropriate	Establishes enforceable standards for specific contaminants which have been determined to adversely affect human health. These standards are protective of human health for individual chemicals and are developed using MCLs, available treatment technologies, and cost data.	The combination of capping and extraction and treatment of groundwater at either the hot spot or the southern perimeter of the landfill or at both is expected to contain groundwater exceeding MCLs within the compliance boundary. A groundwater monitoring program will be designed to determine the effectiveness of the containment system.

CLF FEASIBILITY STUDY

TABLE 14A (con't)

ARARs FOR COMPLIANCE  
SITE WIDE ALTERNATIVES OU1-5, OU1-6, AND OU1-7

Media	Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Groundwater -Federal	Chemical Specific 8	Safe Drinking Water Act, Maximum Contaminant Level Goals, (MCLGs) 40 CFR, Part 141.	Relevant & Appropriate	MCLGs are non-enforceable health goals. They establish drinking water quality goals at levels of no known or anticipated health effects with an adequate margin of safety.	The combination of capping and extraction and treatment of groundwater at either the hot spot or the southern perimeter of the landfill or at both is expected to contain groundwater exceeding non-zero MCLGs within the compliance boundary. A groundwater monitoring program will be designed to determine the effectiveness of the containment system.
Groundwater -State	Action Specific 1	Rhode Island Rules and Regulations for Groundwater Quality, RIDEM 793, Sections 12.02 and 12.03.	Applicable	Regulations are designed to protect and restore the quality of the State's groundwater and include a groundwater monitoring program.	These alternatives will include a groundwater monitoring program.
Groundwater -State	Action Specific 2	RI Rules and Regulations for Groundwater Quality, RIDEM 793 Section 5.06.	Applicable	Regulations establish methods to prevent introducing pollutants into groundwater during monitoring well construction and during monitoring well and piezometer abandonment.	All permanent and non-permanent monitoring wells (and all piezometers), will be constructed and abandoned in accordance with these regulations.
Groundwater -State	Action Specific 3	RI Rules and Regulations for Hazardous Waste Management, RIDEM 482, Section 8.03.	Applicable	Regulation outlines operation requirements for treatment, storage and disposal facilities, including a groundwater monitoring program.	These alternatives will include a groundwater monitoring program.
Groundwater -State	Action Specific 4	RI Rules and Regulations for Solid Waste Management, RIDEM 482, Section 7.08 and 15.11.	Applicable	Regulation outlines operation requirements for Solid Waste Management Facilities, including a groundwater monitoring program.	These alternatives will include a groundwater monitoring program.

CLF FEASIBILITY STUDY

TABLE 14A (con't)

ARARs FOR COMPLIANCE  
SITE WIDE ALTERNATIVES OU1-5, OU1-6, AND OU1-7

Media	Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Surface Water - Federal	Action Specific 1	Clean Water Act - National Pollutant Discharge Elimination System (NPDES) Regulation 40 CFR Parts 122, 123, and 124 - November 16, 1980.	Applicable	Regulates the point source discharge of water into public surface waters.	Substantive requirements of the regulation will be met by alternatives discharging effluent to on-site surface waters.
Surface Water - Federal	Action Specific 2	Clean Water Act - Federal Ambient Water Quality Criteria (FAWQC), 40 CFR 122.44.	Relevant and Appropriate	Non-enforceable guidance which is used by states in conjunction with a designated use for a stream effluent to establish water quality standards. WQC levels for protection of human health from consuming aquatic organisms (plants and fish) and for protection of aquatic organisms have been developed for several contaminants. The standards for protection of human health from consuming fish and the standards of protection of aquatic organisms are relevant and appropriate if there is no more stringent state rules for particular contamination.	Standards for protection of human health for consumption of fish and standards for protection of aquatic organisms will be met by alternatives discharging to on-site surface water.
Surface Water - Federal	Location Specific 3	Protection of Wetlands - Executive Order No. 11990, 40 CFR, Part 6	Applicable	Requires federal agencies to avoid impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practical alternative exists.	Alternative OU5 is not expected to alter or adversely impact a wetland. Alternative OU6 and OU7 groundwater contaminant measures may impact wetlands. Any harm will be minimized and the wetlands will be restored at completion of the remedy.

CLF FEASIBILITY STUDY

TABLE 14A (con't)

ARARs FOR COMPLIANCE  
SITE WIDE ALTERNATIVES OU1-5, OU1-6, AND OU1-7

Media	Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Surface Water - State	Chemical Specific 1	Rhode Island Water Quality Standards, RIDEM, effective 1/9/85, amended 10/28/88	Applicable	Incorporates RI Ambient Water Quality Standards. Classifies water use and defines water quality goals to protect public health and welfare, enhance the quality of state water, and serve the purpose of the CWA.	Effluent discharged to surface waters will meet these standards.
Surface Water - State	Chemical Specific 2	Rhode Island Water Quality Regulations, RIDEM, effective 1/9/85, amended 10/28/88	Applicable	To restore, preserve and enhance the quality of the waters of the state and to protect the waters from pollutants.	Effluent discharged to surface water will not degrade high quality surface waters or further degrade low quality surface waters.
Surface Water - State	Chemical Specific 3	Rhode Island Pretreatment Regulations, RDEM, June 15, 1984.	Applicable	Covers pollutants in wastewaters which can have detrimental effects on POTW processes. Sets specified limitations, pretreatment and monitoring requirements for discharges to POTWs based on federal regulations.	Remedial actions which include discharge to the Cranston POTW, will meet all discharge limitations imposed by POTWs.
Surface Water - State	Location Specific 4	Rules and Regulations Governing the Enforcement of the Freshwater Wetlands Act, RDEM, 8/90	Applicable	Actions required to prevent the undesirable drainage, excavation, filling, alteration, encroachment or any other form of disturbance or destruction to a wetland.	Alternative OU5 is not expected to alter or disturb or destroy a wetland. Alternatives OU6 and OU7 groundwater contaminant measures may impact wetlands. Impacts will be minimized in accordance with these regulations.
Surface Water - State	Action Specific 5	Rhode Island PDES Regulations (RPDES), RIDEM, adopted 7/20/84, amended 2/9/93	Applicable	Restore, preserve and enhance quality of surface waters and protect waters from discharges of pollutants.	On-site discharge to surface water will meet substantive requirements that are more stringent than NPDES Program.



CLF FEASIBILITY STUDY

TABLE 14A (con't)

APARs FOR COMPLIANCE  
SITE WIDE ALTERNATIVES OU1-5, OU1-6, AND OU1-7

Media	Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain APARs
Air Quality - Federal	Action Specific 1	Resource Conservation and Recovery Act (RCRA) Interim Status, Thermal Treatment, 40 CFR, Part 265, Subpart P	Applicable	Regulations contain requirements for air emissions monitoring from thermal units.	Emissions from the LFG facility and heated vapor extraction will comply with these regulations.
Air Quality - Federal	Action Specific 2	RCRA, Air Emission Standards for Process Vents, 40 CFR, Part 264, Subpart AA	Applicable	Standards for air emissions from process vents associated with distillation, fractionation, thin film evaporation, column extraction or air steam stripping operations that treat RCRA substances and have total organic concentrations of 10 ppm or greater.	Emissions from air stripping operations for groundwater treatment will comply with the substantive portions of this regulation if the threshold organic concentration is met.
Air Quality - Federal	Action Specific 3	RCRA, Air Emission Standards for Equipment Leaks, 40 CFR, Part 264, Subpart BB	Applicable	Standards for air emissions for equipment that contains or contacts RCRA wastes with organic concentrations of at least 10% by weight.	All remedial alternatives which include such equipment will comply with substantive portions of this regulation if the threshold organic concentration is met.
Air Quality - Federal	Action Specific 4	Clean Air Act (CAA) National Emissions Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61.	Relevant And Appropriate	Establish emission levels for certain hazardous air pollutants.	Remedial actions and the LFG power generating facility shall attain NESHAP emission limits for vinyl chloride that result from treatment processes.
Air Quality - Federal	Action Specific 5	RCRA, Air Emissions from Treatment, Storage and Disposal Facilities, 40 CFR, Part 264, Subpart CC (Proposed 56 FR 33490-33598 7/22/91)	TBC	Proposed standards for air emissions from treatment, storage and disposal facilities with VOC concentrations equal to or greater than 500 ppm.	Emissions from the landfill, from all treatment technologies and from the LFG power generating facility will be monitored and if threshold VOC concentrations are met, the proposed standards will be considered for use as emission limits.

CLF FEASIBILITY STUDY

TABLE 14A (con't)

ARARS FOR COMPLIANCE  
SITE WIDE ALTERNATIVES OU1-5, OU1-6, AND OU1-7

Media	Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Air Quality - Federal	Action Specific 6	CAA - Non Methane Organic Compounds (NMOC's) May 30, 1991 proposed rule CAA Amendments (56 FR 24468 - 24528) to 40 CFR Part 60 Subpart WWW)	TBC	Regulations will require NMOC specific gas collection and control systems, monitoring and gas generation estimates. The proposed rule would establish a performance standard for NMOCs emission from municipal solid waste landfill gases.	The monitoring of the LFG facility and all remedial actions will consider the proposed regulation.
Air Quality - Federal	Action Specific 7	Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites. OSWER Dr. 8355.0, 6/15/89.	TBC	Provides guidance on the control of air emissions from air strippers used at Superfund sites for groundwater treatment and distinguishes between site located in attainment and non-attainment areas for ozone.	Controls of air stripper will be used as necessary to attain Federal and State ARARs, criteria and guidance.
Air Quality - Federal	Action Specific 8	US EPA Region I Memo, July 12, 1989, Louis Gilto to Merrill Hohman	TBC	States that superfund air strippers in ozone non-attainment areas will generally meet controls on all VOC emissions.	Remedial actions including air strippers will include controls to reduce VOC emissions.
Air Quality - State	Action Specific 1	Air Pollution Control Regulations, RI Dept. of Health, Division of Air Pollution Control, Effective 8/2/87 amended 5/20/91 - Regulation No. 1 Visible Emissions	Applicable	No contaminant emissions will be allowed for periods of more than 3 minutes in any one hour which is greater or equal to 20% opacity.	Air emissions from the landfill, the LFG facility and all treatment technologies will meet emission levels in regulations.
Air Quality - State	Action Specific 2	RI Air Pollution Control Regulation No. 5 Fugitive Dust	Applicable	Reflects that reasonable precautions be taken to prevent particulate matter from becoming airborne.	All on-site remedial actions will use good industrial practices to prevent particulate matter from becoming airborne.

CLF FEASIBILITY STUDY

TABLE 14A (con't)

ARARs FOR COMPLIANCE  
SITE WIDE ALTERNATIVES OU1-5, OU1-6, AND OU1-7

Media	Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Air Quality - State	Action Specific 3	RI Air Pollution Control Regulation No. 7 Emissions Derivational to Persons or Property.	Applicable	Prohibits emissions of contaminants which may be injurious to human, plant or animal life or cause damage to property or which unreasonably interfere with the enjoyment of life and property.	Emissions from technologies which have the potential of emitting contaminants (including biological, physical and chemical treatments and thermal technologies) will meet these requirements. An air monitoring program will be instituted during remedial action.
Air Quality - State	Action Specific 4	RI Air Pollution Control Regulation No. 8 - Approval to Construct, Install, Modify or Operate.	Applicable	Establishes guidelines for the construction, installation, modification or operation of potential air emission units. Establishes permissible emission rates for some contaminants.	Remedial technologies involving construction, installation, modification or operation of air emission units will meet these requirements.
Air Quality - State	Action Specific 5	RI Air Pollution Control Regulation No. 13 Particulate Emissions	Applicable	Sets emission standards for a class of fossil fuel fired steam or hot water units. Prohibits use of rotary cup burners.	If carbon adsorption is chosen then steam is necessary to regenerate the carbon beds. Hot water may be required in other remedial technologies; all will comply with this regulation.
Air Quality - State	Action Specific 6	RI Air Pollution Control Regulation No. 15 Control of Organic Solvent Emissions	Applicable	Limits the amount of organic solvents emitted to the atmosphere.	Emissions of organic solvents from all treatment technologies and from the LFO facility will be controlled and monitored to ensure that the standards are met.
Air Quality - State	Action Specific 7	RI Air Pollution Control Regulation No. 17 Odors	Applicable	Prohibits the release of objectionable odors across property lines.	Objectionable odors beyond the facility boundary will be controlled.

CLF FEASIBILITY STUDY

TABLE 14A (con't)

ARARs FOR COMPLIANCE  
SITE WIDE ALTERNATIVES OU1-5, OU1-6, AND OU1-7

Media	Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Air Quality - State	Action Specific 8	RI Air Pollution Control Regulation No. 20 Burning of Alternative Fuels.	Applicable	Defines standards for alternative fuel and establishes emission allowances.	Substantive requirements of this regulation will be met by the LFG facility monitoring program.
Air Quality - State	Action Specific 9	RI Air Pollutant Control Regulation No. 22 Air Toxics	Applicable	This regulation prohibits the emission of specified contaminants at rates which would result in ground level concentrations greater than acceptable ambient levels in the regulation.	The ambient air quality levels will be met for all technologies which emit air contaminants and an air monitoring program will be instituted. Emissions from the LFG facility will also be monitored.
Air Quality - State	Action Specific 10	Rhode Island Guidance for Air Quality/Air Toxics Substances	TBC	Provides guidelines for models and modeling procedures.	Guidance will be considered when modelling emissions from the landfill gas combustion stack.
Hazardous Waste - Federal	Action Specific 1	Resource Conservation and Recovery Act (RCRA) - Identification and Listing of Hazardous Waste, 40 CFR, Part 261.	Applicable	Defines those solid wastes which are subject to regulation as hazardous wastes under 40 CFR, Parts 262-265.	Acceptable management approaches for listed and characteristic hazardous waste will be incorporated into remedial actions.
Hazardous Waste - Federal	Action Specific 2	RCRA, Interim Status TSDF, Standards; Thermal Treatment, 40 CFR, Part 265, Subpart P.	Applicable	General operating, waste analysis, monitoring/inspection and closure requirements for thermal treatment facilities (other than those using enclosed devices with controlled flame combustion).	The LFG facility and heated vapor extraction will meet these requirements.

CLF FEASIBILITY STUDY  
TABLE 14A (con't)

ARARs FOR COMPLIANCE  
SITE WIDE ALTERNATIVES OU1-5, OU1-6, AND OU1-7

Media	Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Hazardous Waste - Federal	Action Specific 3	RCRA Interim Status TSDF Standards; Chemical, Physical and Biological Treatment, 40 CFR, Part 265, Subpart Q	Applicable	General operating, waste analysis and final test, inspection and closure requirements for facilities which treat hazardous waste by chemical, physical or biological methods in other than tanks, surface impoundment, and land treatment facilities.	All chemical, physical and biological treatment will meet those requirements.
Hazardous Waste - Federal	Action Specific 4	Hazardous Waste Management, RCRA, Land Disposal Restrictions (LDR) 40 CFR, Part 268	Applicable	Specific requirements for the land disposal of RCRA hazardous waste. Land disposal restrictions set by waste type and constituent concentration or required treatment technology.	The off-site disposal of potentially hazardous dewatered sludge, will comply with LDR by meeting treatment standards prior to any off-site disposal.
Hazardous Waste - Federal	Action Specific 5	Technical Guidance for Final Covers on Hazardous Waste Landfills and Surface Impoundments, EPA530-SW-047 7/89	TDC	EPA technical guidance for landfill covers. Presents recommended technical specifications for multilayer landfill cover design.	These alternatives will comply with the substantive requirements of this Guidance, except for the existing 32-acres of cap which will remain in place in each alternative.
Hazardous Waste - Federal	Action Specific 6	RCRA, Closure and Post-Closure, 40 CFR, Part 264, Subpart G	Applicable	Details general requirements for closure and post-closure of hazardous waste facilities, including installation of a groundwater monitoring program.	The double barrier cap portion of each of these alternatives will be constructed to meet the performance standards for capping in these regulations. A groundwater monitoring program will be included.

CLF FEASIBILITY STUDY  
TABLE 14A (con't)

ARARs FOR COMPLIANCE  
SITE WIDE ALTERNATIVES OU1-5, OU1-6, AND OU1-7

Media	Type/#	Requirements	Status	Requirement Synopsis	Action to be Taken to Attain ARARs
Hazardous Waste -- State	Action Specific 1	RI Rules and Regulations for Hazardous Waste Management, Section D, RIDEM 4/19/92	Applicable	Outlines requirements for general waste analyses, security procedures, inspections and safety. Sets design, construction and operational requirements for containers and tanks, and closure requirements for hazardous waste facilities.	All remedial actions involving treatment facilities and treatment processes will comply with the substantive portions of this Section. The double barrier cap portion of each of these alternatives will be constructed to meet the performance standards in these regulations.
Hazardous Waste -- State	Action Specific 2	RI Rules and Regulations for Hazardous Waste Management, Section B, RIDEM 4/19/92.	Applicable	Outlines operational requirements for all treatment, storage and disposal facilities.	All remedial actions will comply with the substantive requirements of this section for treatment technologies.
Hazardous Waste -- State	Action Specific 3	RI Rules and Regulations for Hazardous Waste Management, Section 10, RIDEM 4/19/92.	Relevant and Appropriate	Outlines design, operational and closure requirements for new landfills.	Construction of the double barrier cap portion of each alternative will meet the closure requirements for new landfills.
Hazardous Waste -- State	Action Specific 4	RI Rules and Regulation for Hazardous Waste Management, Section 13, RIDEM 4/19/92.	Applicable	Outlines design and operational requirements for miscellaneous units.	Remedial alternatives which include miscellaneous units will meet the substantive requirements of this Section.
Hazardous Waste -- State	Action Specific 5	RI Rules and Regulations for Solid Waste Management, RIDEM, 4/92, Sections 9, 10, & 13	Applicable	Requires minimal standards for solid waste landfill capping. Specifies type and depth of cap barrier layers and engineering standards. Includes measures to protect against odors and dust.	The landfill cap in each alternative will meet or exceed the substantive requirements of these regulations.

TABLE 15

LEGEND

Abbreviations column descriptions are:

- MCLG - Maximum Contaminant Level Goal. A non-enforceable concentration of a drinking water contaminant that is protective of adverse human health effects and allows an adequate margin of safety.
- MCL - Maximum Contaminant Level. Maximum permissible level of a contaminant in water which is delivered to any user of a public water system.
- RfD - Reference Dose. An estimate of a daily exposure to the human population that is likely to be without appreciable risk of deleterious effects over a lifetime.
- DWEL - Drinking Water Equivalent Level. A lifetime exposure concentration protective of adverse, non-cancer health effects, that assumes all of the exposure to a contaminant is from a drinking water source.

(\*) The codes for the Status Reg and Status HA columns are as follows:

- F - final  
D - draft  
L - listed for regulation  
P - proposed  
T - tentative

Other codes found in the table include the following:

- NA - not applicable  
PS - performance standard 0.5 NTU - 1.0 NTU  
TT - treatment technique
- \*\* - No more than 5% of the samples per month may be positive. For systems collecting fewer than 40 samples/month, no more than 1 sample per month may be positive.
- \*\*\* - guidance
- Large discrepancies between Lifetime and Longer-term HA values may occur because of the Agency's conservative policies, especially with regard to carcinogenicity, relative source contribution, and less than lifetime exposures in chronic toxicity testing. These factors can result in a cumulative UF (uncertainty factor) of 10 to 1000 when calculating a Lifetime HA.

# Drinking Water Standards and Health Advisories

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Page

Chemicals	Standards			Status HIA	Health Advisories							Cancer Group		
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		10 kg Child			70 kg Adult						
					One-day (mg/l)	Ten-day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RfD (mg/kg/day)	DWEL (mg/l)	Lifetime (mg/l)		mg/l at 10 <sup>-4</sup> Cancer Risk	
<b>ORGANICS</b>														
Acenaphthene	T	zero				2	0.1	0.4	0.013	0.4			0.1	B2
Acifluorfen	F	zero	TT			<b>0.2</b>	<b>0.01</b>	<b>0.04</b>	<b>0.007</b>	<b>0.04</b>			0.001	B2
Acrylamide	T	zero											0.006	B1*
Acrylonitrile	F	<b>0.4</b>				<b>20</b>	<b>20</b>	<b>60</b>	<b>0.6</b>	<b>20</b>	<b>0.4</b>		<b>3</b>	C
Adipate (diethylhexyl)	F	zero	0.002			0.1	0.1		0.01	0.4			0.04	B2
Alachlor	D	<b>0.007</b>	<b>0.007</b>						0.001	0.035			0.007	D
Aldicarb	D	<b>0.007</b>	<b>0.007</b>						0.001	0.035			0.007	D
Aldicarb sulfone	D	<b>0.007</b>	<b>0.007</b>						0.001	0.035			0.007	D
Aldicarb sulfoxide	D	<b>0.007</b>	<b>0.007</b>						0.0003	0.0003			0.0002	B2
Aldrin						9	9	3	0.009	0.3			0.06	D
Ametryn						20	20	80	0.28	8	2			D
Aminonium sulfamate									0.3					D
Anthracene (PAH)														D
Atrazine	F	0.003	0.003			0.1	0.1	0.05	0.035	0.2*	0.003*			C
Baygon						0.04	0.04	0.1	0.004	0.1	0.003			C
Bentazon	T	0.02				0.3	0.3	0.9	0.0025	0.09	0.02			D
Benz(a)anthracene (PAH)	P	zero	0.0001											B2
Benzene	F	zero	0.005			0.2	0.2						0.1	A
Benzo(a)pyrene (PAH)	F	zero	0.0002											B2*
Benzo(b)fluoranthene (PAH)	P	zero	0.0002											B2
Benzo(g,h,i)perylene (PAH)														D
Benzo(k)fluoranthene (PAH)	P	zero	0.0002											B2
bis-2 Chloroisopropyl ether	L					4	4	13	0.04	1	0.3			D
Bromacil	L					5	5	9	0.13	5	0.09			C
Bromobenzene	L													

\* Under review

NOTE: Anthracene and Benzo(g,h,i)perylene - not proposed in Phase V.

NOTE: Changes from the last version are noted in Italic and Bold Face print





# Drinking Water Standards and Health Advisories

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Chemicals	Standards			Status HA	Health Advisories							Cancer Group		
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		10 kg Child			70 kg Adult						
					One-day (mg/l)	Ten-day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RID (mg/kg/day)	DWEL (mg/l)	Lifetime (mg/l)		mg/l at 10 <sup>-6</sup> Cancer Risk	
Cyanogen chloride	L	-	-	-	-	-	-	-	-	-	-	-	-	-
Cymene p-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-D	F	0.07	0.07	D	1	0.3	0.1	0.4	0.01	0.4	0.07	-	-	D
DCPA (Dacthal)	L	-	-	F	80	80	5	20	0.5	20	4	-	-	D
Dalapon	F	0.2	0.2	F	3	3	0.3	0.9	0.026	0.9	0.2	-	-	D
Di(2-ethylhexyl)adipate	F	0.4	0.4	-	20	20	20	60	0.6	20	0.4	3	-	C
Diazinon	-	-	-	F	0.02	0.02	0.005	0.02	0.00009	0.003	0.0006	-	-	E
Dibenz(a,h)anthracene (PAH)	P	zero	0.0003	-	-	-	-	-	-	-	-	-	-	B2
Dibromoacetonitrile	L	-	-	D	2	2	2	8	0.02	0.8	0.02	-	-	C
Dibromochloropropane (DBCP)	F	zero	0.0002	F	0.2	0.05	-	-	-	-	-	0.003	-	B2
Dibromomethane	L	-	-	-	-	-	-	-	-	-	-	-	-	D
Dibutyl phthalate (PAE)	-	-	-	-	-	-	-	-	-	-	-	-	-	D
Dicamba	L	-	-	F	0.3	0.3	0.3	1	0.03	1	0.2	-	-	D
Dichloroacetaldehyde	L	-	-	D	-	-	-	-	-	-	-	-	-	D
Dichloroacetic acid	T	zero	-	D	1	1	1	4	0.04	0.1	-	-	-	B2
Dichloroacetonitrile	L	-	-	D	1	1	0.8	3	0.008	0.3	0.006	-	-	C
Dichlorobenzene o-	F	0.6	0.6	F	9	9	9	30	0.09	3	0.6	-	-	D
Dichlorobenzene m-	F	0.6	0.6	F	9	9	9	30	0.09	3	0.6	-	-	D
Dichlorobenzene p-	F	0.075	0.075	F	10	10	10	40	0.1	4	0.075	-	-	C
Dichlorodifluoromethane	L	-	-	F	40	40	9	30	0.2	5	1	-	-	D
Dichloroethane (1,1-)	L	-	-	D	-	-	-	-	-	-	-	-	-	D
Dichloroethane (1,2-)	F	zero	0.005	F	0.7	0.7	0.7	2.6	-	-	-	0.04	-	B2
Dichloroethylene (1,1-)	F	0.007	0.007	F	2	1	1	4	0.009	0.4	0.007	-	-	C
Dichloroethylene (cis-1,2-)	F	0.07	0.07	F	4	3	3	11	0.01	0.4	0.07	-	-	D
Dichloroethylene (trans-1,2-)	F	0.1	0.1	F	20	2	2	6	0.02	0.6	0.1	-	-	D
Dichloromethane	F	zero	0.005	F	10	2	-	-	0.06	2	-	0.5	-	B2
Dichlorophenol (2,4)	-	-	-	D	0.03	0.03	0.03	0.1	0.003	0.1	0.02	-	-	D
Dichloropropane (1,1-)	-	-	-	D	-	-	-	-	-	-	-	-	-	D
Dichloropropane (1,2)	F	zero	0.005	F	-	0.09	-	-	-	-	-	0.05	-	B2
Dichloropropane (1,3)	L	-	-	D	-	-	-	-	-	-	-	-	-	B2

\* The values for m-dichlorobenzene are based on data for o-dichlorobenzene.

TABLE 15 (cont'd)

# Drinking Water Standards and Health Advisories

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Chemicals	Standards			Status HA	Health Advisories							Cancer Group				
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		10 kg Child			70 kg Adult								
					One-day (mg/l)	Ten-day (mg/l)	Longer- term (mg/l)	Longer- term (mg/l)	RfD (mg/kg/ day)	DWEL (mg/l)	Lifetime (mg/l)		mg/l at 10 <sup>4</sup> Cancer Risk			
Dichloropropane (2,2,1)	L	-	-	-	D	-	-	-	-	-	-	-	-	-	-	-
Dichloropropene (1,1,1)	L	-	-	-	D	-	-	-	-	-	-	-	-	-	-	-
Dichloropropene (1,3)	T	zero	-	-	F	0.03	0.03	0.03	0.09	0.0003	0.01	-	-	-	0.02	B2
Dieldrin	-	-	-	-	F	0.0005	0.0005	0.0005	0.002	0.00005	0.002	-	-	-	0.0002	B2
Diethyl phthalate (PAE)	-	-	-	-	D	-	-	-	-	-	30	5	-	-	-	D
Diethylene glycol dinitrate	-	-	-	-	**	-	-	-	-	-	-	-	-	-	-	-
Diethylhexyl phthalate (PAE)	F	zero	0.006	-	D	-	-	-	-	-	0.02	0.7	-	-	0.3	B2*
Diisopropyl methylphosphonate	-	-	-	-	F	8	8	8	30	0.08	3	0.6	-	-	-	D
Dimethrin	-	-	-	-	F	10	10	10	40	0.3	10	2	-	-	-	D
Dimethyl methylphosphonate	-	-	-	-	F	2	2	2	6	0.2	7	0.1	-	-	0.7	D
Dimethyl phthalate (PAE)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C
1,3-Dinitrobenzene	-	-	-	-	F	0.04	0.04	0.04	0.14	0.0001	0.005	0.001	-	-	-	D
Dinitrotoluene (2,4)	L	-	-	-	F	0.50	0.50	0.30	1	0.002	0.1	-	-	-	-	D
Dinitrotoluene (2,6)	L	-	-	-	F	0.40	0.40	0.40	1	0.001	0.04	-	-	-	-	-
1,2,4-Trinitrotoluene ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dinoseb	F	0.007	0.007	-	F	0.3	0.3	0.01	0.04	0.001	0.04	0.007	-	-	0.005	B2
Dioxane p-	-	-	-	-	F	4	0.4	-	-	-	-	-	-	-	-	D
Diphenamid	-	-	-	-	F	0.3	0.3	0.3	1	0.03	1	0.2	-	-	0.7	B2
Diphenylamine	-	-	-	-	F	1	1	0.3	1	0.03	1	0.2	-	-	-	D
Diquat	F	0.02	0.02	-	F	-	-	-	-	0.0022	0.08	0.02	-	-	-	D
Disulfoton	-	-	-	-	F	0.01	0.01	0.003	0.009	0.00004	0.001	0.0003	-	-	-	E
Dithiane (1,4-)	-	-	-	-	F	0.4	0.4	0.4	1	0.01	0.4	0.08	-	-	-	D
Diuron	-	-	-	-	F	1	1	0.3	0.9	0.002	0.07	0.01	-	-	-	D
Endosulf	F	0.1	0.1	-	F	0.8	0.8	0.2	0.2	0.02	0.7	0.1	-	-	-	D
Endrin	F	0.002	0.002	-	F	0.02	0.02	0.003	0.01	0.0003	0.01	0.002	-	-	-	D
Epichlorohydrin	F	zero	11	-	F	0.1	0.1	0.07	0.07	0.002	0.07	-	-	-	0.4	B2
Ethylbenzene	F	0.7	0.7	-	F	30	3	1	3	0.1	3	0.7	-	-	-	D
Ethylene dibromide (EDB)	F	zero	0.00005	-	F	0.008	0.008	-	-	-	-	-	-	-	0.00004	B2
Ethylene glycol	-	-	-	-	F	20	6	6	20	2	40	7	-	-	-	D
EU (1,1,1-trichloroethane)	L	-	-	-	F	0.3	3	0.1	0.4	0.00008	0.003	-	-	-	0.03	2
Formaldehyde	-	-	-	-	F	0.009	0.009	0.005	0.02	0.00025	0.009	0.002	-	-	-	2

# Drinking Water Standards and Health Advisories

Chemicals	Standards			Status H/A	Health Advisories							Cancer Group	
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		10 kg Child			70 kg Adult					
					One day (mg/l)	Ten day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RID (mg/kg/day)	DWEL (mg/l)	Lifetime (mg/l)		mg/l at 10 <sup>6</sup> Cancer Risk
Fluometron				F	2	2	2	5	0.013	0.4	0.09		D
Fluorene (PAH)									0.04				D
Fluorotrichloromethane	L			F	7	7	3	10	0.3	10	2		D
Fog Oil				D									
Fonofos				F	0.02	0.02	0.02	0.07	0.002	0.07	0.01		D
Formaldehyde				D	10	5	5	20	0.15	5	1		B1
Gasoline, unleaded (benzene)				D							0.005		
Glyphosate	F	0.7	0.7	F	20	20	1	1	0.1	4	0.7		F
Heptachlor	F	zero	0.0004	F	0.01	0.01	0.005	0.005	0.0005	0.02		0.0008	B2
Heptachlor epoxide	F	zero	0.0002	F	0.01		0.0001	0.0001	7E-5	0.0004		0.0004	B2
Hexachlorobenzene	F	zero	0.001	F	0.05	0.05	0.05	0.2	0.0008	0.03		0.002	B2
Hexachlorobutadiene	T	0.001		F	0.3	0.3	0.1	0.4	0.002	0.07	0.001		C
Hexachlorocyclopentadiene	F	0.05	0.05						0.007	0.2			D
Hexachloroethane	L			F	5	5	0.1	0.5	0.001	0.04	0.001		C
Hexane (n)				F	10	4	4	10					D
Hexazinone				F	3	3	3	9	0.033	1	0.2		D
HMX				F	5	5	5	20	0.05	2	0.4		D
Indeno(1,2,3-c,d)pyrene (PAH)	P	zero	0.0004	D									B2
Isophorone	L			F	15	15	15	15	0.2	7	0.1	4	C
Isopropyl methylphosphonate				D	30	30	30	100	0.1	4.0	0.7		D
Isopropylbenzene				D									
Lindane	F	0.0002	0.0002	F	1	1	0.03	0.1	0.0003	0.01	0.0002		C
Malathion				F	0.2	0.2	0.2	0.8	0.02	0.8	0.2		D
Maleic hydrazide				F	10	10	5	20	0.5	20	4		D
MCPA				F	0.1	0.1	0.1	0.4	0.0015	0.05	0.01		F
Methomyl	L			F	0.3	0.3	0.3	0.3	0.025	0.9	0.2		D
Methoxychlor	F	0.04	0.04	F	0.05	0.05	0.05	0.2	0.005	0.2	0.04		D
2,4-Dichlorophenoxyacetic acid	F			F	0.1	0.1	0.03	0.1	0.00025	0.009	0.002		D

# Drinking Water Standards and Health Advisories

TABLE 15 (continued)

Chemicals	Standards			Status HA	Health Advisories							Cancer Group	
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		10-kg Child			70-kg Adult					
					One-day (mg/l)	Ten-day (mg/l)	Longer- term (mg/l)	Longer- term (mg/l)	RfD (mg/kg/ day)	DWEL (mg/l)	Lifetime (mg/l)		mg/l at 10 <sup>-4</sup> Cancer Risk
Methyl tert butyl ether	L	-	-	D	3	3	0.5	2	0.005	0.2	0.04	-	D
Metolachlor	L	-	-	F	2	2	2	5	0.15	5	0.1	-	C
Metribuzin	L	-	-	F	5	5	0.3	0.9	0.025	0.9	0.2	-	D
Monochloroacetic acid	L	-	-	D	-	-	-	-	-	-	-	-	-
Monochlorobenzene	F	0.1	0.1	F	2	2	2	7	0.02	0.7	0.1	-	D
Naphthalene	-	-	-	F	0.5	0.5	0.4	1	0.004	0.1	0.02	-	D
Nitrocellulose (non-toxic)	-	-	-	F	-	-	-	-	-	-	-	-	-
Nitroguanidine	-	-	-	F	10	10	10	40	0.1	4	0.7	-	D
Nitrophenol p-	-	-	-	F	0.8	0.8	0.8	3	0.008	0.3	0.06	-	D
Oxamyl (Vydate)	F	0.2	0.2	F	0.2	0.2	0.2	0.9	0.025	0.9	0.2	-	E
Paraquat	-	-	-	F	0.1	0.1	0.05	0.2	0.0045	0.2	0.03	-	E
Pentachloroethane	-	-	-	D	-	-	-	-	-	-	-	-	-
Pentachlorophenol	F	zero	0.001	F	1	0.3	0.3	1	0.03	1	-	0.03	B2
Phenanthrene (PAH)	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	-	-	-	D	6	6	6	20	0.6	20	4	-	D
Picloram	F	0.5	0.5	F	20	20	0.7	2	0.07	2	0.5	-	D
Polychlorinated biphenyls (PCBs)	F	zero	0.0005	P	-	-	-	-	-	-	-	0.0005	B2
Prometon	L	-	-	F	0.2	0.2	0.2	0.5	0.015*	0.5*	0.1*	-	D
Pronamide	-	-	-	F	0.8	0.8	0.8	3	0.075	3	0.05	-	C
Propachlor	-	-	-	F	0.5	0.5	0.1	0.5	0.013	0.5	0.09	-	D
Propazine	-	-	-	F	1	1	0.5	2	0.02	0.7	0.01	-	C
Propham	-	-	-	F	5	5	5	20	0.02	0.6	0.1	-	D
Propylbenzene n-	-	-	-	D	-	-	-	-	-	-	-	-	-
Pyrene (PAH)	-	-	-	-	-	-	-	-	0.03	-	-	-	D
RDX	-	-	-	F	0.1	0.1	0.1	0.4	0.003	0.1	0.002	0.03	C
Sinigrin	F	0.004	0.004	F	0.07	0.07	0.07	0.07	0.005	0.2	0.004	-	C
Styrene	F	0.1	0.1	F	20	2	2	7	0.2	7	0.1	-	C
2,4,5-T	L	-	-	F	0.8	0.8	0.8	1	0.01	0.35	0.07	-	D
2,3,7,8-TCDF (Dioxin)	F	zero	11.00	F	11.06	11.07	11.08	41.08	11.09	41.08	-	21.08	B2

\* Under review. NOTE: Picnanthrene - not proposed.

# Drinking Water Standards and Health Advisories

December 1993

Chemicals	Standards			Status HIA	Health Advisories							Cancer Group	
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		10 kg Child			70 kg Adult					
					One-day (mg/l)	Ten-day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RID (mg/kg/day)	DWEL (mg/l)	Lifetime (mg/l)		mg/l at 10 <sup>6</sup> Cancer Risk
Tebuethuron	-	-	-	F	3	3	0.7	2	0.07	2	0.5	-	D
Terbacil	-	-	-	F	0.3	0.3	0.3	0.9	0.013	0.4	0.09	-	E
Terbufos	-	-	-	F	0.005	0.005	0.001	0.005	0.00013	0.005	0.0009	-	D
Tetrachloroethane (1,1,1,2-)	L	-	-	F	2	2	0.9	3	0.03	1	0.07	0.1	C
Tetrachloroethane (1,1,2,2-)	L	-	-	D	-	-	-	-	-	-	-	-	-
Tetrachloroethylene	F	zero	0.005	F	2	2	1	5	0.01	0.5	-	0.07	-
Tetranitromethane	-	-	-	**	-	-	-	-	-	-	-	-	-
Toluene	F	1	1	F	20	2	2	7	0.2	7	1	-	D
Toxaphene	F	zero	0.003	F	0.5	0.04	-	-	0.1	0.0035	-	0.003	B2
2,4,5-TP	F	0.05	0.05	F	0.2	0.2	0.07	0.3	0.0076	0.3	0.05	-	D
1,1,2-Trichloro-1,2,2-trifluoroethane	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroacetic acid	T	0.1	-	D	4	4	4	13	0.1	4.0	0.3	-	C
Trichloroacetonitrile	L	-	-	D	0.05	0.05	-	-	-	-	-	-	-
Trichlorobenzene (1,2,4-)	F	0.07	0.07	F	0.1	0.1	0.1	0.5	0.01	0.4	0.07	-	D
Trichlorobenzene (1,3,5-)	-	-	-	F	0.6	0.6	0.6	2	0.006	0.2	0.04	-	D
Trichloroethane (1,1,1-)	F	0.2	0.2	F	100	40	40	100	0.035	1	0.2	-	D
Trichloroethane (1,1,2-)	F	0.003	0.005	F	0.6	0.4	0.4	1	0.004	0.1	0.003	-	C
Trichloroethanol (2,2,2-)	L	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethylene	F	zero	0.005	F	-	-	-	-	-	0.3	-	0.3	B2
Trichlorophenol (2,4,6-)	L	-	-	D	-	-	-	-	-	-	-	0.3	B2
Trichloropropane (1,1,1-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Trichloropropane (1,2,3-)	L	-	-	F	0.6	0.6	0.6	2	0.006	0.2	0.04	-	B2
Trifluralin	L	-	-	F	0.08	0.08	0.08	0.3	0.0075	0.3	0.005	0.5	C
Trimethylbenzene (1,2,4-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Trimethylbenzene (1,3,5-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Tripropylene glycol	-	-	-	F	0.005	0.005	0.005	0.005	-	-	0.005	-	-
Tripropylene glycol	-	-	-	F	0.02	0.02	0.02	0.02	0.0005	0.02	0.002	0.1	C
Vinyl chloride	F	zero	0.002	F	3	3	0.01	0.05	-	-	-	0.0015	A
Xylenes	F	10	10	F	40	40	40	100	2	60	10	-	D

\*\* A HIA will not be developed due to insufficient data. \* Database Deficiency Report\* has been published.

# Drinking Water Standards and Health Advisories

December 1993

Chemicals	Standards			Status HA	Health Advisories						Cancer Group													
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		10 kg Child			70 kg Adult																
					One-day (mg/l)	Ten-day (mg/l)	Longer- term (mg/l)	Longer- term (mg/l)	RID (mg/kg/ day)	DWEL (mg/l)		Lifetime (mg/l)	mg/l at 10* Cancer Risk											
<b>INORGANICS</b>																								
Aluminum	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ammonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	F	0.006	0.006	-	D	0.01	0.01	0.01	0.015	0.0004	0.01	0.003	30	-	-	-	-	-	-	-	-	-	-	D
Arsenic	-	-	0.05	-	D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	D
Asbestos (fibers/l > 10µm length)	F	7 MFL	7 MFL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A
Barium	F	2	2	-	F	-	-	-	-	0.07	2	2	-	-	-	-	-	-	-	-	-	-	-	D
Beryllium	F	0.004	0.004	-	D	30	4	20	0.005	0.005	0.2	0.2	-	-	-	-	-	-	-	-	-	-	-	B2
Boron	L	-	-	-	D	4	0.9	3	0.09	0.09	3	0.6	-	-	-	-	-	-	-	-	-	-	-	D
Cadmium	F	0.005	0.005	-	F	0.04	0.04	0.005	0.02	0.0005	0.02	0.005	-	-	-	-	-	-	-	-	-	-	-	D
Chloramine	T	4	-	-	D	1	1	1	0.1	0.1	3.3	2.6	-	-	-	-	-	-	-	-	-	-	-	D
Chlorate	L	-	-	-	D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorine	T	4	-	-	D	-	-	-	-	0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	D
Chlorine dioxide	T	0.08	-	-	D	-	-	-	0.003	0.003	0.1	0.08	-	-	-	-	-	-	-	-	-	-	-	D
Chlorite	L	-	-	-	D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	D
Chromium (total)	F	0.1	0.1	-	F	1	0.2	0.8	0.005	0.005	0.2	0.1	-	-	-	-	-	-	-	-	-	-	-	D
Copper	F	1.3	TT**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	D
Cyanide	P	0.2	0.2	-	F	0.2	0.2	0.8	0.022	0.022	0.8	0.2	-	-	-	-	-	-	-	-	-	-	-	D
Fluoride*	F	4	4	-	-	-	-	-	-	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hypochlorite	T	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hypochlorous acid	T	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead (at tap)	F	zero	TT**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	L	-	-	-	D	-	-	-	-	0.14/0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	B2
Mercury (inorganic)	F	0.002	0.002	-	F	-	-	0.002	0.0003	0.0003	0.01	0.002	-	-	-	-	-	-	-	-	-	-	-	D
Molybdenum	L	-	-	-	D	0.08	0.01	0.05	0.005	0.005	0.2	0.04	-	-	-	-	-	-	-	-	-	-	-	D
Nickel	F	0.1	0.1	-	F	1	0.5	1.7	0.02	0.02	0.6	0.1	-	-	-	-	-	-	-	-	-	-	-	D
Nitrate (as N)	F	10	10	-	F	10*	-	-	1.6	1.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-

\* Under review.

TABLE 15 (t'd)

# Drinking Water Standards and Health Advisories

December 1993

Page 9

Chemicals	Standards			Status HA	Health Advisories							Cancer Group				
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		10 kg Child			70 kg Adult								
					One-day (mg/l)	Ten-day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RID (mg/kg/day)	DWEL (mg/l)	Lifetime (mg/l)		mg/l at 10 <sup>-4</sup> Cancer Risk			
Nitrite (as N)	F	1	1	F	1*	-	-	-	-	0.16*	-	-	-	-	.	
Nitrate + Nitrite (both as N)	F	10	10	F	-	-	-	-	-	-	-	-	-	-	.	
Selenium	F	0.05	0.05	F	-	-	-	-	-	0.005	-	-	-	-	.	
Silver	-	-	-	D	0.2	0.2	0.2	0.2	0.2	0.005	0.2	0.1	-	-	D	
Sodium	-	-	-	D	-	-	-	-	-	-	20***	-	-	-	.	
Strontium	L	-	-	D	25	25	25	90	90	0.6	90	17	-	-	D	
Sulfate	P	**	**	-	-	-	-	-	-	-	-	-	-	-	.	
Thallium	F	0.0005	0.002	F	0.007	0.007	0.007	0.02	0.00007	0.00007	0.002	0.0004	-	-	.	
Vanadium	L	-	-	D	-	-	-	-	-	-	-	-	-	-	D	
White phosphorous	-	-	-	F	-	-	-	-	0.00002	0.00002	0.0005	0.0001	-	-	D	
Zinc	L	-	-	F	6	6	3	12	0.3	0.3	11	2	-	-	D	
Zinc chloride (measured as Zinc)	L	-	-	F	6	6	3	12	0.3	0.3	11	2	-	-	D	
<b>RADIONUCLIDES</b>																
Beta particle and photon activity (formerly man-made radionuclides)	P	zero	4 mrem	-	-	-	-	-	-	-	-	-	-	-	-	A
Gross alpha particle activity	P	zero	15 pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	A
Radium 226	P	zero	20 pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	A
Radium 228	P	zero	20 pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	A
Radon	P	zero	300 pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	A
Uranium	P	zero	20 µg/L	-	-	-	-	-	0.003	-	-	-	-	-	-	A

\* Under review.

\*\* Deferred.

\*\*\* Guidance.



TABLE 16

## RISK BASED PERFORMANCE STANDARDS FOR GROUNDWATER CONTAINMENT

Contaminant of Concern	Containment Level (ug/l)
1,1 - Dichloroethane	810
Methyl Ethyl Ketone	22,000
2,4 - Dichlorophenol	110
Naphthalene	1,500
lead	15
Vanadium	260

APPENDIX C

RECORD OF DECISION  
CENTRAL LANDFILL SITE

STATE OF RHODE ISLAND CONCURRENCE LETTER



State of Rhode Island and Providence Plantations  
Department of Environmental Management  
Office of the Director  
9 Hayes Street  
Providence, RI 02908

15 June 1994

John DeVillars, Regional Administrator  
United States Environmental Protection Agency, Region I  
John F. Kennedy Federal Building  
Boston, MA 02203-2211

Dear Mr. DeVillars:

This is to advise you that the State of Rhode Island concurs with the selected source control remedy detailed in the June 1994 Record of Decision for the Remedial Action of the Central Landfill Superfund site. This concurrence is based upon all aspects of the abovementioned Record of Decision being adequately addressed and implemented during design, construction and operation of the remedy.

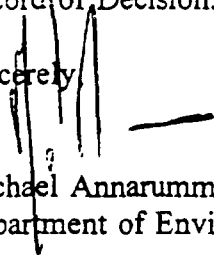
The Department wishes to specifically emphasize that the remedy, as proposed and implemented, must ensure compliance with all applicable or relevant and appropriate State and Federal statutes, regulations and policies.

Furthermore, both agencies must continue to progress on the second operable unit for this site, involving the investigation and analysis of off-site contaminant migration both from the Central Landfill itself and any neighboring sites which have been identified.

Finally, I urge EPA to make every effort to assure that the remedy will be implemented in a timely and efficient manner and that it be implemented, over time, in a coordinated manner with the licensed disposal activities ongoing at this property.

Thank you for providing us with an opportunity to review and concur with this important Record of Decision.

Sincerely,

  
Michael Annarummo, Director  
Department of Environmental Management

cc: James Fester, Associate Director, DEM  
Frank Ciavattieri, Acting Director, EPA Region I Waste Management Division  
Dennis Huebner, Chief, EPA Region I, NH & RI Waste Management Branch  
Terrence Gray, Chief, DEM Division of Site Remediation

APPENDIX D

RECORD OF DECISION  
CENTRAL LANDFILL SITE

RESPONSIVENESS SUMMARY



RESPONSIVENESS SUMMARY  
REMEDIAL INVESTIGATION/FEASIBILITY STUDY  
OPERABLE UNIT 1

CENTRAL LANDFILL SUPERFUND SITE  
JOHNSTON, RHODE ISLAND

June 1994

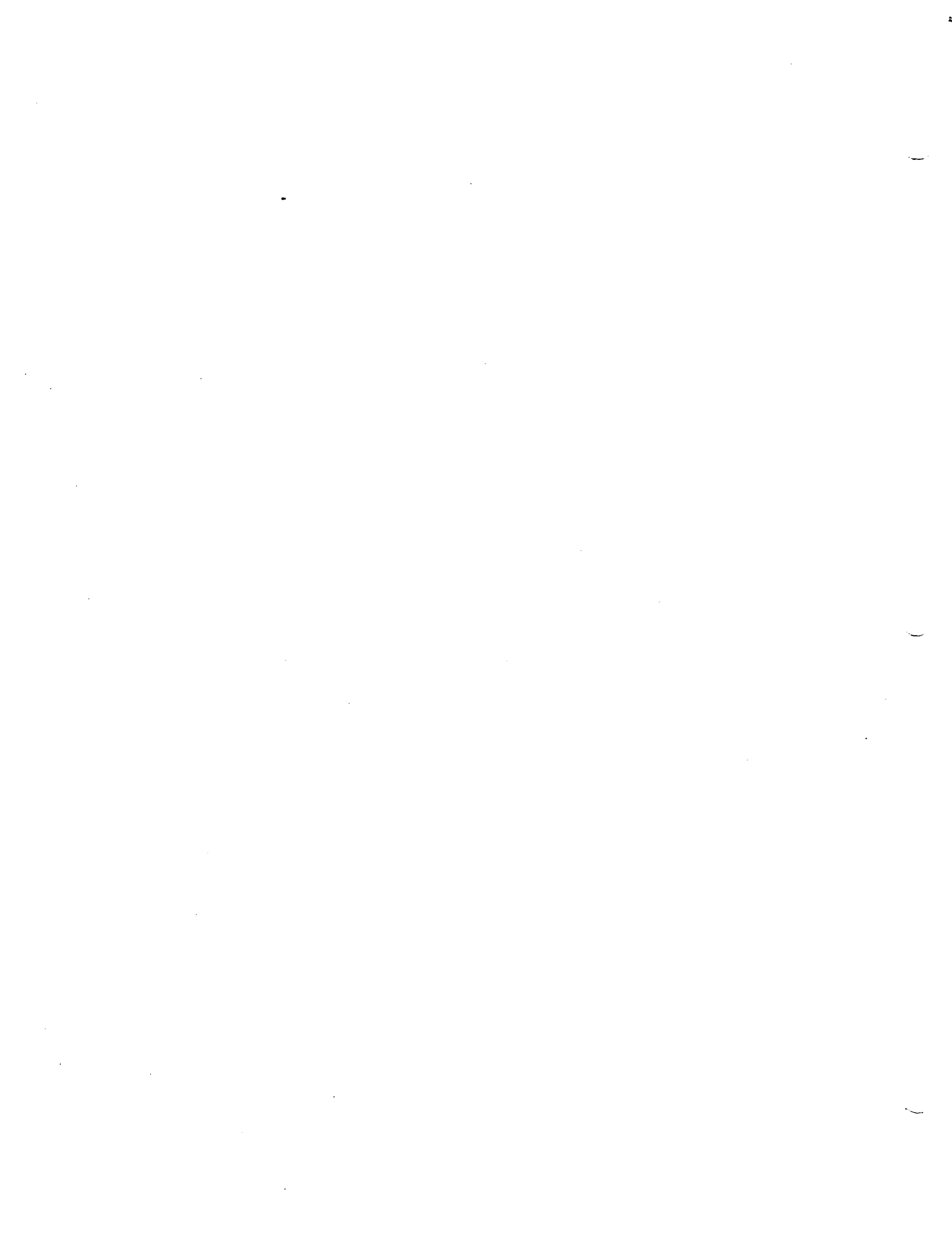


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A. FS Alternatives . . . . .	3
B. General Reaction to the Preferred Alternative . . . . .	6
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III. COMMENTS RECEIVED DURING THE PUBLIC COMMENT . . . . . PERIOD AND EPA RESPONSES	7

ATTACHMENTS

- A. COMMUNITY RELATIONS ACTIVITIES CONDUCTED AT THE CENTRAL  
LANDFILL SUPERFUND SITE IN JOHNSTON, RHODE ISLAND
- B. TRANSCRIPT OF THE FEBRUARY 1994 INFORMAL PUBLIC HEARING
- C. COPIES OF WRITTEN COMMENTS MADE DURING THE PUBLIC COMMENT  
PERIOD





## PREFACE

The U. S. Environmental Protection Agency (EPA) held a 30-day public comment period, from February 13, 1994 to March 14, 1994, to provide an opportunity for interested parties to comment on EPA's Preferred Alternative for a source control remedy at the Central Landfill Superfund Site in Johnston, Rhode Island. The Preferred Alternative was selected after completion of a Feasibility Study that evaluated various options for addressing the source of contamination at the Landfill. EPA identified its preliminary recommendation of a Preferred Alternative for source control in a Proposed Plan, issued in February 1994, at the start of the public comment period. On the evening of February 22, 1994, EPA conducted a public meeting to discuss the Preferred Alternative and Proposed Plan. On February 28, 1994, EPA held an informal public hearing at which eight commenters spoke. Eleven commenters responded during the public comment period, three of whom responded both in writing and at the public hearing.

The purpose of this Responsiveness Summary is to document EPA responses to the comments and questions raised during the public comment period. EPA considered all of the comments summarized in this document before selecting a remedial action to address the source of contamination at the Central Landfill Site.

The Responsiveness Summary is divided into the following sections:

Section I. Overview. This section discusses the Site history, outlines the objectives of the Feasibility Study, identifies the treatment alternatives evaluated in the FS, and identifies and summarizes general reaction to EPA's Preferred Alternative.

Section II. Background on Community Involvement and Concerns. This section contains a summary of the history of community interest and concerns regarding the Central Landfill Site.

Section III. Summary of Major Comments Received During the Public Comment Period and EPA's Response to those Comments. Each written and oral comment from the public and interested parties on the FS and the Proposed Plan are summarized and responded to directly.

ATTACHMENT A - This attachment provides a list of the community relations activities that EPA has conducted for the Central Landfill Superfund Site.

ATTACHMENT B - This attachment is the transcript of the February 28, 1994, informal public hearing held in Johnston, Rhode Island.

ATTACHMENT C - This attachment includes the written comments received during the public comment period.

## I. OVERVIEW

The Central Landfill Site is an active landfill site located on Shun Pike in Johnston, Rhode Island. Since the early 1950s the Site has been used as a combination sand and gravel/quarry stone operation, a refuse burning dump, and a solid waste disposal area. In 1986, the Central Landfill Site was added to the National Priorities List. Field work for the Remedial Investigation commenced in 1987, after the owner signed an agreement with the EPA to study the nature and extent of contamination at the site.

The landfill, has been owned and operated by the RISWMC since 1980, and currently receives approximately 85 percent of Rhode Island's municipal solid waste. A total of 154 acres of the site have been licensed for landfilling by the State of Rhode Island. The 121 acre Phase I landfill area and a 33 acre (Phase II and III) expansion area make up the 154 acres. Within the Phase I area is an approximately 0.5 acre area where large volumes of liquid industrial waste were disposed of in bedrock trenches in the mid to late 1970s by the previous owner.

The 121 acre Phase I area reached its capacity in April 1993 and no longer accepts solid waste. Thirty-two acres (13 acres at the north end of the site and 19 acres at the southern end of the site) of the Phase I landfill area are currently capped with a Rhode Island Department of Environment Management (RIDEM) approved single barrier cap design. The remaining 89 acres of the Phase I area are covered with a temporary soil cap. RISWMC is currently utilizing 12 acres of the 33 acre Phase II and Phase III expansion areas for nonhazardous municipal solid waste disposal.

The remedial response objectives identified in the FS are to:

1. Minimize the effects of landfill contaminants on groundwater quality; specifically, reduce to a minimum the amount of precipitation allowed to leak through the waste column and infiltrate to the groundwater;
2. Eliminate potential future risks to human health through direct contact with landfill contaminants by maintaining a physical barrier;
3. Minimize migration of contaminants in groundwater so that groundwater is not injurious to the aquatic ecological system of receiving water bodies (Upper Simmons Reservoir, Cedar Swamp Brook and Almy Reservoir);
4. Minimize risks to human health associated with potential future consumption of and direct contact with groundwater;

5. Comply with state and federal Applicable or Relevant and Appropriate Requirements (ARARs); and
6. Minimize potential impacts of implementing the selected source control alternative on adjacent surface waters and wetlands.

Based on these objectives, EPA developed and evaluated alternatives to address the source of contamination. The alternatives that were evaluated in the FS report are described briefly below.

#### **A. Feasibility Study Alternatives**

Based on the results of the FS, EPA's Preferred Alternative includes the following components as the most effective for addressing the source of the contamination in and on the Central Landfill Superfund Site:

- Constructing a multi-layer RCRA C cap over the 89 acres of the 121 acre Phase I landfill that are not currently capped. The remaining 32 acres of the 121 acre Phase I area are currently capped with a Rhode Island Department of Environmental Management (RIDEM) approved cap. The 32 acre RIDEM cap will be retained and incorporated into the new 89 acre RCRA C cap.
- Extracting contaminated groundwater from the hot spot area and pre-treating it before it is discharged to either on-site surface water or the Cranston, Rhode Island wastewater treatment plant;
- Implementing deed restrictions on groundwater use and land development within property owned by the Rhode Island Solid Waste Management Corporation (RISWMC);
- Long-term sampling and analysis of groundwater, surface water and air;
- Evaluating in detail the existing landfill gas collection and combustion system.
- Installing a chain-link fence to prevent access.

EPA evaluated nine alternatives in detail in the FS. Several activities were common to all the alternatives considered except the no action alternative. These common activities include: 1) institutional controls; 2) environmental monitoring; 3) evaluation of the existing landfill gas collection and combustion system; and 4) fencing.

Alternative OU1-1: No Action

Alternative OU1-2: Capping of Waste with a Single Barrier Cap in Accordance with RIDEM Solid Waste Regulations and Hydraulic Containment and Treatment of Hot Spot Groundwater

Alternative OU1-3: Capping of Waste with a Single Barrier Cap in Accordance with RIDEM Solid Waste Regulations and Hydraulic Containment and treatment of Groundwater Along the Southern Perimeter of the Landfill

Alternative OU1-4: Capping of Waste with a Single Barrier Cap in Accordance with RIDEM Solid Waste Regulations and Hydraulic Containment and Treatment Hot Spot Groundwater and Groundwater Along the Southern Perimeter of the Landfill.

Alternative OU1-5: Capping of Waste with a Multi-Layer RCRA C Cap and Hydraulic Containment and Treatment of Hot Spot Groundwater

Alternative OU1-6: Capping of Waste with a Multi-Layer RCRA C Cap and Hydraulic Containment of Groundwater along the Southern Perimeter of the Landfill

Alternative OU1-7: Capping of Waste with a Multi-Layer RCRA C Cap, Hydraulic Containment of Groundwater Along the Southern Side of the Landfill and in the Hot Spot Area

Alternative OU1-8: Capping of Waste with a Multi-Layer RCRA C Cap, Hydraulic Containment of Groundwater Along the Southern Side of the Landfill and in the Hot Spot Area and Heated Vapor Extraction of Volatile Organics from the Chemical Sludges Buried in the Hot Spot Area

Alternative OU1-9: Capping of Waste with a Multi-Layer RCRA C Cap, Hydraulic Containment of Groundwater Along the Southern Side of the Landfill and in the Hot Spot Area Excavation of the Chemical Sludges Buried in the Hot Spot Area

EPA has selected Alternative OU1-5. The primary goal is to minimize the continued effects of the landfill contamination on groundwater quality, thereby reducing the risks to human health associated with the potential future consumption of and direct contact with groundwater. Off-site groundwater and an ecological risk assessment are the subject of studies currently being conducted under EPA oversight by the Rhode Island Solid Waste Management Corporation pursuant to an EPA enforcement order. A second Remedial Investigation/Feasibility Study concerning the nature and extent of off-site groundwater contamination, the results of an ecological risk assessment, and a range of alternatives to address any contamination will be issued after the studies are completed.

Except for the no action alternative, all of the alternatives evaluated in the FS would provide overall protection of human health and the environment. However, alternatives OU1-2, 3, and 4 were not acceptable because they would not be in complete compliance with the RCRA C closure requirements for hazardous waste landfills, specifically, the single barrier RIDEM cap design used in these three alternatives does not minimize the infiltration of precipitation into the top, flat portions of the landfill.

Of the remaining alternatives, those which include southern perimeter groundwater extraction and treatment in addition to hot spot groundwater extraction and treatment (OU1-7, 8 and 9) may provide a slightly greater reduction in the volume and mobility of site contaminants than those alternatives that involve only hot spot groundwater extraction and treatment (OU1-5), however, the additional southern perimeter collection system may not provide any significant additional long-term effectiveness or benefit to protecting human health over that provided by hot spot groundwater collection and treatment alone.

EPA believes that the combination of hot spot groundwater extraction and treatment and capping will 1) prevent groundwater that has contaminant concentrations exceeding MCLs and non-zero MCLGs from migrating beyond the compliance boundary or, in the absence of MCLs or non-zero MCLGs, prevent groundwater that has contaminant concentrations above levels that are protective of human health from migrating beyond the compliance boundary and; 2) prevent the degradation of surface waters below surface water standards. Hot spot groundwater extraction and treatment should prevent the continued migration of high levels of contamination currently existing at the hot spot. The additional capping component will minimize infiltration of precipitation into the landfill; thereby, effectively minimizing any future migration of contaminated groundwater caused by the existing 121 acre Phase I area. Based on these reasons, EPA does not believe the additional cost of installing a southern perimeter collection system is warranted.

In summary, Alternative OU1-5 will achieve the best balance among the criteria used by EPA to evaluate the alternatives. The selected alternative will provide short- and long-term protectiveness of human health and the environment, will attain all federal and state applicable, relevant and appropriate requirements (ARARs) identified, will reduce the mobility and toxicity of site contamination and utilize permanent solutions to the maximum extent practicable. In addition, the Alternative OU1-5 is the most cost effective of the alternatives evaluated.

## **B. General Reaction to the Preferred Alternative**

The comments received from the community on the RI/FS and the Proposed Plan during the public comment period and EPA's responses to these comments are summarized in this Responsiveness Summary.

Only one comment, from the DEP, voiced full support for the preferred alternative. Many of the comments received from the community raised serious objections to EPA allowing RISWMC to continue landfilling operations in the Phase II and III areas. There was concern that a delay in closing the Phase I area caused by the Phase II and III operations would allow for infiltration of precipitation through any uncapped areas of Phase I resulting in continued leachate generation. Many commenters felt that closing Central Landfill should have been a component of EPA's preferred alternative. There was also some objections to not excavating the chemical sludges in the hot spot area and not including southern perimeter groundwater collection and treatment in the preferred alternative.

## **II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS**

Throughout the Site's history, community concern and involvement has been high. EPA has kept the community and other interested parties apprised of the Site activities through informational meetings, fact sheets, press releases and public meetings.

In February, 1994, EPA made the administrative record available for public review at EPA's offices in Boston and at the Marion J. Mohr Library in Johnston, Rhode Island. EPA published a notice and brief analysis of the Proposed Plan in Providence Journal on February 8, 1994 and made the plan available to the public at the Marion J. Mohr Library.

In September 1993 EPA issued a fact sheet which summarized the results of the Remedial Investigation. On February 22, 1994, EPA held an informational meeting to discuss the results of the Remedial Investigation and the cleanup alternatives presented in the Feasibility Study Report and to present the Agency's Proposed Plan. Also during this meeting, the Agency answered questions from the public. From February 13 to March 14, 1994, the Agency held a 30 day comment period to accept public comment on the alternatives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public. On February 28, 1994, the Agency held a informal public hearing to again discuss the Proposed Plan and to accept any oral comments. A transcript of this hearing with the comments received and the Agency's response to comments are included in this responsiveness summary.

III. COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND  
EPA'S RESPONSE TO THOSE COMMENTS

Eight people testified at the public hearing. A copy of the transcript of the hearing is attached as Appendix B. Copies of written comments are attached in Appendix C.

Comments from Ms. Sandra Dennehy  
Resident, Johnston RI

**Comment 1:** Is there no possible way you can cap the existing portion of the landfill prior to Phase II and Phase III being filled to capacity by the Rhode Island Solid Waste Agency?

**EPA Response:** EPA's selected remedy does not allow for delaying the capping of the existing 121 acre Phase I landfill until the Phase II and III expansion areas reach their capacity. Currently, 32 acres of the 121 acre Phase I area are capped with a RIDEM approved single-barrier cap. The RIDEM cap is effectively minimizing the infiltration of rain through these areas of the Phase I area. The 33 acre Phase II and III expansion areas will not impact the entire 121 acre Phase I area. The Phase II and III areas, when filled to capacity, will overlap about 48.4 acres of the western portion of the Phase I area. As the Phase II area is filled, a impermeable barrier, termed the Leachate Diversion System (LDS), is being placed between the Phase I and II area as a means of diverting leachate away from the Phase I landfill. The LDS is to be installed over each lift of solid waste placed in Phase II prior to the successive lift being placed. The Rhode Island Department of Environmental Management (RIDEM) has reviewed the LDS and approved its use at the Central Landfill.

EPAs selected remedy requires placing a multi-layer cap directly over those portions of the 121 acre Phase I area that have not already been covered with the RIDEM cap and those portions which will not be impacted by the Phase II and III landfilling activities. This area amounts to about 40.6 acres. Capping of this area can start as soon as the design is completed. The selected remedy also requires covering, with a multi-layer cap, that portion of the Phase II and III expansion area that overlies the western 48.4 acres of the Phase I area. The design and construction of the entire remedy, including all capping, has been estimated in the Feasibility Study Report to be completed within five years from the time design begins. If activities in the Phase II and III areas result in extending the design and construction schedule beyond the five year estimate, then EPA will require that RISWMC construct a liner directly over any part of the 48.4 Phase I acres not impacted at that time by the Phase II and III area. The liner will prevent rain from infiltrating through these parts



of the Phase I landfill. After the liner is completed, filling over the Phase I area can resume. After the Phase II and III area reaches capacity, the multi-layer cap will be constructed over the portion of the Phase II and III area that overlies the Phase I area. The design of the liner will be included as part of the remedial design for the remedy and all the design documents will be made available for public review in the Site File at the Marion J. Mohr Library in Johnston, Rhode Island. None of the other components of the selected remedy will be impacted by the Phase II and III activities.

**Comment 2:** Does your agency have any solutions to deal with the increasing problem of seagulls in and around the landfill?

**EPA Response:** EPA has not investigated the seagulls in and around the landfill. The seagulls are attracted to the landfill by the disposal of municipal solid waste. Regulation of solid waste activities at the landfill are not within the scope of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). However, EPA has forwarded this comment to the Rhode Island Department of Environmental Management. The Rhode Island Department of Environmental Management is currently investigating this issue to determine the magnitude of the problem and to determine what if any actions need to be taken to deal with the situation.

**Comments from Ms. Mary Cerra  
Vice President, Johnston Town Council**

**Comment 1:** Does the clean-up plan that is being proposed fit into the State Master Plan approved by State wide planning?

**EPA Response:** The State Master Plan is not a Applicable Relevant and/or Appropriate Requirement (ARAR). The source control remedy selected by EPA ("clean-up plan") is independent of the State Master Plan. This comment was forwarded to the Rhode Island Department of Environmental Management for their review.

**Comment 2:** How safe is the plan?

**EPA Response:** EPA believes that all of the source control alternatives evaluated, except the no action alternative, are protective of human health and the environment. EPA believes that of all the alternatives evaluated, the selected remedy achieves the best balance when considering long- and short-term effectiveness, reduction of toxicity, mobility and volume of contamination, implementability and cost.

**Comment 3a:** How long will it take to complete?

**EPA Response:** The Feasibility Study Report has estimated that the construction of the remedy will be completed 5 years from the start of design. See also EPA's response to Ms. Sandra Dennehy's comment regarding capping of the existing landfill prior to Phase II and Phase III being filled to capacity.

**Comment 3b:** How effective will it be?

**EPA Response:** The primary goal for all of the alternatives evaluated is to prevent groundwater that is contaminated above drinking water standards from migrating beyond the perimeter of the 154 acre licensed landfill area. EPA believes that the selected remedy will effectively achieve this goal.

**Comment 4:** During this process, what will happen to the trenches and/or pools of liquid, etc.?

**EPA Response:** The Remedial Investigation identified a relatively small area near the northeastern perimeter of the landfill where large volumes of liquid industrial hazardous waste were disposed of prior to 1980 by the previous owner in several trenches that were excavated into the bedrock. This area was referred to as the "hot spot" in the Proposed Plan. Pools of liquid no longer exist in these trenches. The liquids have long since penetrated into the underlying fractured bedrock leaving behind an approximately one foot thick layer of a rubber like chemical sludge. Presently, the trenches and chemical sludge are covered with about thirteen (13) feet of septage sludge and additional fifteen (15) feet of landfill debris and daily soil cover.

The capping component of the selected remedy covers the hot spot area. The cap will prevent or minimize the infiltration of precipitation through the hot spot area. The hot spot groundwater extraction and treatment component of the selected remedy will prevent the highly contaminated groundwater in this area from migrating beyond the landfill area.

**Comment 5:** Are lined landfills leak-proof?

**EPA Response:** The existing 121 acre Phase I landfill area is not lined. The 33 acre Phase II and III expansion will include a bottom liner and a leachate diversion system between the Phase II and Phase I areas. See also EPA's response to Ms. Sandra Dennehy's comment regarding capping of the existing landfill prior to Phase II and Phase III being filled to capacity for more information on the leachate diversion system. The liner for the Phase II and III areas will be designed and constructed to meet the

State and Federal performance criteria for municipal solid waste liners.

**Comment 6:** Since the Town does not own the landfill, who will have the foot the clean-up bills?

**EPA Response:** EPA and the current owner, RISWMC, are currently discussing RISWMC's performance of the remedy. If the RISWMC does not perform the work, EPA could use federal Superfund money to do the work and/or search for other parties potentially responsible for the environmental contamination.

**Comments from Ms. Jennifer A. Champagne Martelli  
State Representative - District 56**

**Comment 1:** The preferred alternative OU1-5 does not include removing the RIDEM cap on the existing 32 acres and replacing it with the RCRA C cap. What short and long-term affects would occur if the RCRA C cap is not used on the 32 acres?

**EPA Response:** Short-term effects refers to the likelihood of adverse impacts on human health or the environment that may be posed during the construction and implementation of an alternative until the specified goals are achieved. Long-term effectiveness refers to the ability of an alternative to maintain reliable protection of human health and the environment over time once the remedial activities have been completed. EPA does not believe that there would be any short-term benefits to removing the RIDEM cap nor any significant long-term benefits.

Removing the existing 32 acres of RIDEM approved capping on the side slopes and replacing it with the RCRA C cap proposed by EPA for the side slopes will require bringing on-site a greater amount of cap construction material, resulting in greater short-term impacts on local traffic as well as greater increase in dust, fugitive emissions, risk to workers, etc. for minimal benefit. Based on information EPA has to date, we believe the existing 32 acres of RIDEM approved capping on the side slopes of the existing landfill meets the performance criteria for hazardous waste caps (RCRA C). That is, the existing 32 acre cap requires minimum amount of maintenance; promotes drainage and minimizes erosion; accommodates settling and subsidence of the landfill; and has a permeability less than the permeability of the natural subsoils present. Also, the EPA has no data to suggest that the existing 32 acre cap will not provide long-term minimization of the infiltration of liquids through the closed landfill.

**Comment 2:** What short and long-term effects if OU1-8 and OU1-9 are not completed?

**EPA Response:** The differences between EPAs selected remedy and alternatives OU1-8 and 9 are that alternative OU1-8 and 9 would require removing the 32 acres of RIDEM capping and replacing it with EPA's selected cap design for the side slopes and treating the chemical sludges in the hot spot area of the Site. EPA's selected remedy, alternative OU1-5, will retain the 32 acres of RIDEM capping and will not treat the chemical sludges in the hot spot area. As discussed above, EPA does not believe that there would be any short-term or significant long-term benefits to removing the RIDEM cap. Although alternatives OU1-8 and 9 treat the chemical sludges, EPA does not believe that this treatment will provide any significant additional long-term effectiveness since this treatment does nothing to address the major source of contamination at the Site, which is in the groundwater in fractured bedrock below the chemical sludges. EPA believes that the capping provided by the selected remedy, which covers the hot spot area will prevent or minimize the infiltration of precipitation through this area. The hot spot groundwater extraction and treatment component of the selected remedy will prevent the highly contaminated groundwater in this area from migrating beyond the landfill area.

**Comment 3:** If the RIDEM cap were replaced and/or the off-site disposal of the hot spot chemical sludges were removed, your report suggests that a tremendous amount of off-site trucking would occur. What compensation do you suggest to the (Town of Johnston) host community or the area residents for their exposure to the increase trucking?

**EPA Response:** EPAs selected remedy results in less traffic impacts than alternatives OU1-8 and 9 since it involves retaining the 32 acre cap and does not involve excavation of the chemical sludges. The statute governing cleaning up Superfund sites, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 40 CFR 6901, et. seq. does not require EPA to provide for any compensation to the Town of Johnston or area residents for increased traffic impacts during performance of the remedy.

**Comment 4:** What would the impact be on wetlands if you went forward with the treatment of the groundwater in the southern area?

**EPA Response:** Extraction of large volumes of groundwater along the southern perimeter of the landfill may significantly lower the groundwater table in nearby wetlands. A significant lowering of the water table in nearby wetland areas will adversely effect the wetland vegetation and associated fauna which has become established in these areas.

**Comment 5:** What effect short/long term if this area is not treated?

**EPA Response:** Extracting and treating groundwater from the southern perimeter of the landfill in addition to extracting and treating groundwater from the hot spot area may not provide any significant additional long-term effectiveness. EPA believes that the combination of hot spot groundwater extraction and treatment and capping, provided by the selected remedy, will achieve the goal of preventing groundwater with contaminant concentrations exceeding drinking water standards from migrating beyond the boundary of the licensed landfill. The reason for this is 1) hot spot groundwater extraction and treatment should prevent the continued migration of high levels of contamination currently existing at the hot spot; and 2) the additional capping component will minimize infiltration of precipitation into the landfill thereby effectively minimizing any future migration of contaminated groundwater caused by the existing 121 acre landfill. The selected remedy also provides long-term effectiveness since it contains groundwater close to what is believed to be the major source of groundwater contamination at the site.

Institutional controls on the use of groundwater in this area and the availability of public water to surrounding residents will prevent any likelihood of adverse impacts on human health until the specified containment goals are achieved.

**Comment 6:** What proof can EPA provide that the new so-called state of the art landfill, Phase II and III, will not produce the same or similar chemical sludge that we are not cleaning up?

**EPA Response:** The disposal of liquid industrial wastes in trenches excavated into bedrock in the hot spot area of the site prior to 1980 was the activity responsible for producing the existing chemical sludges in that area. Existing Rhode Island solid waste regulations prohibit this type of activity from taking place in any of the phases at Central Landfill.

**Comment 7:** All nine Source Control Alternatives were examined and are proposed by the EPA, I would like to know why is not one of the alternatives to cease all landfill operations considering it's close proximity to the Reservoir?

**EPA Response:** As stated on page 8 of the February 1994 Proposed Plan, the results of studies undertaken during the remedial investigation found no evidence to suggest that contaminated groundwater underneath the site is migrating to the Scituate Reservoir located about 2.5 miles west of the 121 acre landfill. The studies did conclude that the Upper Simmons Reservoir, located about 1,200 feet southeast of the landfill, is the major receptor

of groundwater which passes beneath the Central Landfill. The studies also indicate that a small portion of the flow beneath the landfill migrates to the Almy Reservoir, located about 2,400 feet northeast of the landfill. The basic goal of the source control remedy selected in this first operable unit is to prevent any further effects from the 121 acre landfill to off-site areas, including Upper Simmons and Almy Reservoirs.

**Comment 8:** I request a legal opinion as to what authority the EPA possesses to recommend the closure of the State Landfill operations in the Town of Johnston. Further, in EPA's legal opinion, what body is vested with the power; what body possesses the responsibility, to recommend complete cessation of landfill operations in the Town of Johnston.

**EPA Response:** Sections 7002 and 7003 of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6972 and 6973, provide for civil action in the event that a hazardous or solid waste facility poses an imminent and substantial threat to the environment. Section 7003 provides for EPA to take action against the violator; Section 7002 provides for a citizens' suit. Based on the results of the RI/FS performed for the first operable unit at this Site, EPA believes that the Phase I area is the source of groundwater contamination and has issued a Proposed Plan for remediating the source including closing the Phase I area. At this time, EPA has no evidence on which we could base a determination that Phases II and III meet the criteria for issuing a Section 7003 order to close these areas. Any citizen may of course pursue a Section 7002 action.

In addition, all municipal solid waste landfills are subject to 40 CFR Part 258 regulations which govern construction, operation and closure of municipal landfills. Phases II and III are subject to Part 258 regulations. Section 4005 of RCRA requires each state to create a state permitting program to implement the Part 258 regulations. The State of Rhode Island has created a permitting program and has applied for EPA approval of its program. Unless and until EPA deems the State program inadequate, EPA has no mechanism to enforce these regulations. If a state permitting program is deemed inadequate by EPA, EPA has enforcement authority to enforce the federal criteria. Further, EPA always retains its authority under Section 7003 should an imminent and substantial endangerment situation arise. Citizens may also seek enforcement of the federal criteria, independent of any state enforcement program through Section 7002 authority. The State is also able to enforce its own permitting program in state court for violation of the state criteria.

The Phase I area of Central Landfill has been identified as a Superfund hazardous waste landfill and was listed on the National Priorities List in 1986. As such, activities in the Phase I area

are governed by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9601 et. seq. Under CERCLA, Section 104(e)(3), EPA has the authority to enter any site to determine the need for response action or the appropriate response or to effectuate a response action. This Record of Decision reflects EPA's site investigation and the remedial action necessary at Central Landfill to protect human health, welfare and the environment. As part of the remedial action, RCRA regulations including closure of a hazardous waste landfill and groundwater monitoring requirements are identified. These regulations must be complied with when the remedy for the Phase I area is implemented.

Under CERCLA and the National Contingency Plan (NCP) 40 CFR Part 300 et. seq., its implementing regulations, EPA also has authority to prohibit activities which interfere with its performance of a response action, including the performance of studies, design, construction and operation of a remedy. As of this date, EPA has no reason to believe that the landfilling activities in Phases II and III will interfere with the remedial action set out in this Record of Decision.

**Comments from Mr. Louis A. Perrotta, Town Council President  
Town of Johnston, RI**

**Comment 1:** If hazardous waste has and is flowing and polluting wells, what is going to stop it from continuing and if the Cedar Swamp Brook, which flows to the Bay, is contaminated, what effects does this have on the Bay?

**EPA Response:** The selected remedy is the first operable unit of a two operable unit approach to remediation of the environmental contamination caused by the Central Landfill Site. The selected remedy is a source control remedy. The purpose of the selected source control remedy is to prevent or minimize the continued effects of contamination within the 121 acre Phase I area on groundwater quality. The second operable unit will address any impacts to off-site areas, including Cedar Swamp Brook, caused by contaminants that have already migrated from the Phase I area and beyond the edge of the waste management area. During the second operable unit, additional studies will be undertaken to better characterize the extent of off-site contamination and to develop and evaluate alternatives for remediation should it be required.

At this time, EPA has determined that Cedar Swamp Brook and Upper Simmons Reservoir have received contamination from the Site. What effect, if any, on the Bay is not known at this time. The studies of Cedar Swamp Brook and Upper Simmons Reservoir that will be conducted during the second operable unit will provide additional data to help EPA determine if there is an adverse impact to other

bodies of water.

**Comment 2:** Would your program guarantee that wells further away from the Cedar Swamp Brook and the Upper Simmons Reservoir be protected?

**EPA Response:** The source control remedy selected in operable unit one is intended to prevent or minimize the continued release of contamination from the 121 acre Phase 1 area. Operable unit two will investigate to what extent contaminated groundwater has migrated from the Site. As discussed in the RI and FS there are many other potential sources of groundwater contamination in the vicinity of the Central Landfill Site. These other source areas are being investigated by the RIDEM.

**Comment 3:** Does EPA have the power to close the landfill?

**EPA Response:** See EPA's response number 8 to Representative Jennifer A. Champagne Martelli's comments.

**Comments from Mr. Paul Santilli  
Resident, Johnston, RI**

**Comment 1:** Why doesn't EPA do all the testing/sampling at the landfill and have all the samples analyzed out of the State of Rhode Island instead of splitting ten percent of the samples collected by the RISWMC?

**EPA Response:** EPA has no reason to believe that the environmental monitoring data reported by the RISWMC during the Remedial Investigation was inaccurate or tampered with. As the commenter indicated, EPA has split approximately 10% of the samples collected by the RISWMC and had the samples sent to laboratories selected by the EPA. EPA compared the laboratory results of the split samples with the results that the RISWMC obtained from their laboratory. The comparison showed good correlation between the samples analyzed by EPA and the samples analyzed by the laboratories selected by the RISWMC.

**Comment 2:** Why doesn't EPA get involved with the Town in shutting down the landfill?

**EPA Response:** See EPA's response number 8 to Representative Jennifer A. Champagne Martelli's comments.



Comments from Mr. Kevin J. McNichols  
Resident, Johnston, RI

**Comment 1:** What is the criteria for EPA assuming jurisdiction of the landfill and if EPA doesn't have direct operational control, what do we do to give you the direct operational control?

**EPA Response:** See EPA's response number 8 to Representative Jennifer A. Champagne Martelli's comments.

Comments from Mr. J Darrot Lynott, P.E.  
Weston & Sampson Engineers

At the request and the authorization of the Mayor of Johnston, RI, Mr. Ralph R. Russo, a review of the Proposed Plan was completed by Weston and Sampson Engineers. The following comments were received in a letter to EPA dated March 9, 1994.

**Comment 1:** It is our understanding that the EPA has proposed, in the Source Control Plan for the Central Landfill Superfund Site, to cap 89-Acres of the landfill and extend the cap over that portion of the 33 acre expansion that "piggy backs" the existing unlined landfill. If it is the intention of the EPA to delay closure of 89 acres of the landfill until the 33 acres expansion is capped the flow of leachate through the so called "hot spots" will continue unabated until such time as the expansion area is closed. It is anticipated that phase II and III will continue operation until 2023. We recommend that the EPA complete a construction schedule for the 89 acre closure and prepare an analysis of groundwater contamination due to delayed closure.

**EPA Response:** Filling in the Phase II area started in March 1993. The remaining capacity of the combined Phase II and III areas is a function of the filling rate. Based upon the April 1993 to April 1994 records, 597,000 tons were received, or an average filling rate of 2,100 tons per day, 5 1/2 days per week. The estimated capacity, based on the April 1993 to April 1994 data is 7.45 years or a completion date of October 2000. This completion date was estimated as follows:

Estimated Solid Waste Received	597,000 tons/year
Assumed Density	1,100 lbs/yd <sup>3</sup>
Volume of Solid Waste	1,085,454 yd <sup>3</sup> /year
Volume of Cover Material	272,500 yd <sup>3</sup> /year

Total Volumetric Filling Rate	1,357,954 yd <sup>3</sup> /year
Phase II Volume Remaining	7,620,000 yd <sup>3</sup>
Phase III Volume	2,500,000 yd <sup>3</sup>
Total Volume of Phase II & III	10,120,000 yd <sup>3</sup>
Filling Start Date of Phase II	April 1993
Total Life of Phases II and III	7.45 years
Estimated Completion Date	October 2000

If the filling rate were to increase to an average of 3,000 tons per day, the life expectancy would decrease to 5.2 years (i.e. June 1998). If the filling rate decreased to an average of 1,200 tons per day, the life expectancy would increase to 13 years (i.e. April 2006).

Currently, 32 acres of the 121 acre Phase I area are capped with a RIDEM approved single-barrier cap. The RIDEM cap is effectively minimizing the infiltration of rain through these areas of the Phase I area. The 33 acre Phase II and III expansion areas will not impact the entire 121 acre Phase I area. The Phase II and III areas, when filled to capacity, will overlap about 48.4 acres of the western portion of the Phase I area. As the Phase II area is filled, a impermeable barrier, termed the Leachate Diversion System (LDS), is being placed between the Phase I and II area as a means of diverting leachate away from the Phase I landfill. The LDS is to be installed over each lift of solid waste placed in Phase II prior to the successive lift being placed. The Rhode Island Department of Environmental Management (RIDEM) has reviewed the LDS and approved its use at the Central Landfill.

EPAs selected remedy requires placing a multi-layer cap directly over those portions of the 121 acre Phase I area that have not already been covered with the RIDEM cap and those portions which will not be impacted by the Phase II and III landfilling activity. This area amounts to about 40.6 acres. Capping of this area, which includes the hot spot area, can start as soon as the design is completed. The selected remedy also requires covering, with a multi-layer cap, that portion of the Phase II and III expansion area that overlies the western 48.4 acres of the Phase I area. The design and construction schedule for the entire remedy, including all capping, has been estimated in the Feasibility Study Report to be 5 years. If the Phase II and III area does not reach its design capacity in time to allow completing construction of the cap over that portion of the Phase II and III area overlying the western 48.4 acres of the Phase I area by the time estimated in the FS Report, then EPA will require that RISWMC construct a liner

directly over any part of the 48.4 Phase I acres not impacted at that time by the Phase II and III area. The liner will prevent rain from infiltrating through these parts of the Phase I landfill. After the liner is completed, filling over the Phase I area can resume. After the Phase II and III area reaches capacity, the multi-layer cap will be constructed over the portion of the Phase II and III area that overlies the Phase I area. The design of the liner will be included as part of the remedial design for the remedy and all the design documents will be made available for public review in the Site File at the Marion J. Mohr Library in Johnston, Rhode Island. None of the other components of the selected remedy will be impacted by the Phase II and III activities.

**Comment 2:** By moving forward with an expansion which "piggy-backs" on the existing unlined landfill the potential exists for a) differential settlement on top of the existing landfill and b) gross deformation of the liner on the side slope of the existing landfill.

Differential Settlement is due to void spaces within the existing landfill. Areas settle and consolidate at different rates causing pipes laid at minimum slope for leachate collection to settle and possibly break. The net effect is a buildup of leachate within the landfill which will eventually flow through the existing unlined landfill and potentially through "hot spots" identified by the EPA. Deformation is due to settlement of the existing unlined landfill and the weight of the new trash placed on the side slopes. Gross deformation of the liner or clay can lead to rupture of the liner. If this occurs, leachate may flow through the existing unlined landfill and potentially through "hot spots" identified by the EPA. It is our request that the EPA provide documentation in support of their proposed closure design and in particular on the effects of differential settlement and gross deformation of the lined expansion.

**EPA Response:** EPA agrees that a potential exists for differential settlement on top of the existing landfill and will need to be considered during the detailed design of the cap. However, the concern over possibly breaking leachate collection pipes in the cap is not valid since, as illustrated in Figure 4 of the Proposed Plan, the proposed cap will employ a 12 inch thick drainage layer consisting of a sand or sand/gravel mix instead of drainage pipes.

The commenter also raised a concern over gross deformation of a liner on the side slopes of the existing landfill and that the gross deformation could lead to rupture of the liner, resulting in the flow of leachate through the unlined landfill and potentially through the "hot spot". A liner has not been constructed on the side slopes as originally planned. The Rhode Island Department of Environmental Management (RIDEM) approved the use of a Leachate

Diversion System (LDS), instead of a liner, in January 1992. The construction drawings for the LDS are dated January 1993. As discussed previously, the LDS will be placed between the Phase I and II area as a means of diverting leachate away from the Phase I landfill. The LDS is to be installed over each lift of solid waste placed in Phase II prior to the successive lift being placed. EPA recommends that the commenter review the drawings for the LDS. These drawings are available at EPA's office at 90 Canal Street in Boston, MA. A copy should also be available at the RIDEM office at 291 Promenade Street, in Providence, RI.

**Comments from Mr. Blake A. Martin  
Groundwater Associates, Inc.**

At the request and the authorization of the Mayor of Johnston, RI, Mr. Ralph R. Russo, a review of the Proposed Plan was completed by Ground Water Associates, Inc. The following comments were received in a letter to EPA dated March 11, 1994.

**Comment 1:** We understand that closure and capping of the Phase I landfill will be delayed until the Phase II area is completed. Any delays in the capping/closure program will undoubtedly leave open faces at the existing landfill. Such open areas will allow rainfall infiltration and greatly enhance opportunities for leachate generation. Our report of March, 1993 indicated that both leachate generation and contaminant migration from the "hot spot" had already caused significant impacts to ground water quality both on-site and off-site. Also, additional leachate generation would hinder efforts to monitor the effectiveness of any collection at the hot spot. Changes in groundwater quality due to leachate generation versus changes caused by the collection system would be difficult to discern.

**EPA Response:** The statement that closure and capping of the Phase I landfill will be delayed until the Phase II area is completed is not correct. EPA's selected remedy requires placing a multi-layer cap directly over those portions of the 121 acre Phase I area that have not already been covered with the RIDEM cap and those portions which will not be impacted by the Phase II and III landfilling activity. This area amounts to about 40.6 acres. Capping of this area, which includes the hot spot area, can start as soon as the design is completed. The selected remedy also requires covering, with a multi-layer cap, that portion of the Phase II and III expansion area that overlies the western 48.4 acres of the Phase I area. The design and construction schedule for the entire remedy, including all capping, has been estimated in the Feasibility Study Report to be 5 years from the start of design. If the Phase II and III area does not reach its design capacity in time to allow completing construction of the cap over that portion of the Phase

II and III area overlying the western 48.4 acres of the Phase I area by the time estimated in the FS Report, then EPA will require that RISWMC construct a liner directly over any part of the 48.4 Phase I acres not impacted at that time by the Phase II and III area. The liner will prevent rain from infiltrating through these parts of the Phase I landfill. After the liner is completed, filling over the Phase I area can resume. After the Phase II and III area reaches capacity, the multi-layer cap will be constructed over the portion of the Phase II and III area that overlies the Phase I area. The design of the liner will be included as part of the remedial design for the remedy and all the design documents will be made available for public review in the Site File at the Marion J. Mohr Library in Johnston, Rhode Island. None of the other components of the selected remedy will be impacted by the Phase II and III activities.

EPA agrees that any delays in the capping/closure program will leave "open" (un-capped) faces at the existing (Phase I) landfill and that these open faces will allow rainfall infiltration and leachate generation to continue. EPA also agrees that additional leachate generation would hinder efforts to monitor the effectiveness of collection or containment at the hot spot. The changes or impacts to groundwater quality due to leachate generation versus changes caused by the containment system would be difficult to discern. These are the major reasons EPA will require that the RISWMC construct the liner as discussed above if the Phase II and III landfilling activities are not completed in time to allow completing the cap construction by the time estimated in the FS Report.

**Comment 2:** The second concern is related to capture and containment of both the hot spot contamination, and contaminant movement along the southern boundary of the landfill. Although the EPA summary indicates that no risk reduction benefits can be gained by capturing contaminated ground water beyond the hot spot area, concentrations of VOC's and metals significantly exceeding state and federal standards are found beyond the extent of the Phase I landfill. In Ground Water Associates report of March, 1993, data is presented showing the presence of dissolved thallium (54-457 ppb) and chlorobenzene (300-474 ppb) at elevated levels to the south and southeast of the landfill (see GWA, 1993, pages 40-43).

Without capture and containment of these contaminants of concern, an elevated continued risk to human health and the environment can be expected. Only options OU1-6, OU1-7, OU1-8, and OU1-9 address this issue--not OU1-5.

Options 7 through 9 are discounted due to their impacts on wetlands. However, discharge of treated water on-site is a possible alternative. Thus, the Source Control Plan should consider the ability to maintain wetlands by on-site recharge.

**EPA Response:** EPA is aware of the VOCs and metals contamination (including chlorobenzene and thallium) in the groundwater beyond the extent of the Phase I area. Most of the data referred to in Groundwater Associates March 1993 Report was collected as part of the Operable Unit One Remedial Investigation performed by the RISWMC under EPA direction and oversight. An analysis of this data was part of EPA's remedy selection process. Many of the VOCs and metals identified in the groundwater beyond the extent of the Phase I area were identified as contaminants of concern in EPA's Risk Assessment Report.

The commenter stated that, "Without capture and containment of these contaminants of concern, an elevated continued risk to human health and the environment can be expected. Only options OU1-6, OU1-7, OU1-8 and OU1-9 address this issue--not OU1-5." EPA agrees that capture and containment of these contaminants of concern is necessary to protect human health and the environment. However, EPA does not agree that only options or alternatives OU1-6, 7, 8, and 9 will be protective of human health and the environment. EPA believes that of the nine alternatives evaluated in detail in the Feasibility Study Report, all of them, except the no action alternative (OU1-1), are protective of human health and the environment. Source control alternative OU1-5 was selected as the remedy because EPA believes it provides the best balance in terms of the nine evaluation criteria used by EPA. These criteria and a summary of the evaluations were presented on pages 27 through 34 of the Proposed Plan. In summary, EPA selected alternative OU1-5 because of its long-term effectiveness, ability to reduce toxicity, mobility and volume of contaminants and was the most efficient in light of implementability and cost concerns. EPA believes that the combination of hot spot groundwater extraction and treatment and capping provided by OU1-5 will be sufficient at containing groundwater exceeding MCLs and non-zero MCLGs from migrating beyond the compliance boundary, which in the case of Central Landfill is the perimeter of the licensed landfill area. The reason for this is 1) hot spot groundwater extraction and treatment should prevent the continued migration of high levels of contamination currently existing at the hot spot; and 2) the additional capping component should minimize infiltration of precipitation into the landfill thereby effectively minimizing any future migration of contaminated groundwater caused by the existing 121 acre Phase I area.

The commenter also stated that options 7 through 9 were discounted due to their impacts on wetlands. Although it is true that these alternatives may impact nearby wetlands, and this was one of the reasons for not selecting them, it was not the main reason for not selecting them. Alternatives OU1-7, 8 and 9, which include southern perimeter groundwater extraction and treatment in addition to hot spot groundwater extraction and treatment, may not provide any significant additional long-term effectiveness over the selected remedy, OU1-5, which requires extraction and treatment of groundwater from only the hot spot area. As stated previously, EPA

believes that the combination of hot spot groundwater extraction and treatment and capping provided by the selected remedy will be sufficient at containing groundwater exceeding MCLs and non-zero MCLGs from migrating beyond the compliance boundary. Alternatives OU1-8 and 9 treat the chemical sludges in the hot spot area in addition to capping and groundwater containment; however, treatment of the chemical sludges will not provide any significant additional long-term effectiveness since this treatment does not address the DNAPLs in the fractured bedrock underlying the hot spot area. DNAPLs have been identified as the major source of contamination at the hot spot area.

**Comments from Mr. Ralph Perotta, Special Counsel  
to the Town of Johnston**

**Comment 1:** The Source Control Study is deficient because it fails to consider or even address or acknowledge that there will be Phase II and III landfills piggybacked on top of the Phase I site, which you're allegedly closing.

**EPA Response:** Mr. Perotta felt that the Proposed Plan was deficient because it did not considered or even addressed or acknowledged that the Phase II and III expansion will piggyback on top of the Phase I area. EPA is very much aware that the Phase II and III expansion piggybacks on the Phase I area. On page 13, first full paragraph, of the Proposed Plan it states, "There are 33 acres of lined expansion areas designated as Phase II and III which, when completed, will overlay the west slope of the Phase I area. The proposed multi-layer cap will extend over that portion of the expansion area that directly overlies the 121-acre Phase I area." EPA agrees that this is an important issue and the Proposed Plan may not have provided enough of a discussion on this issue. EPA's proposed plans are only intended to provide a brief description of the preferred alternative and the other alternatives evaluated in the Feasibility Study Report. The issue is discussed in more detail in the Record of Decision and in EPA's responses to the remainder of the issues raised by Mr. Perotta.

**Comment 2:** Mr. Perotta presented a summary of the technical review of the Proposed Plan performed by Weston & Sampson Engineers, Inc. and Ground Water Associates, Inc. Mr. Perotta is concerned that: 1) Phase I would not be capped until Phase II is completed; 2) differential settlement between the phase I and II areas and gross deformation of the liner placed between the Phase I and II areas; 3) continued leachate generation in the Phase I area if capping is not performed until the Phase II area is completed; and 4) the proposed plan (OU1-5) will not prevent contamination from migrating beyond the southern landfill boundary.

**EPA Response:** The concerns raised by Mr. Perotta are addressed in EPA's responses to the comments received from Weston & Sampson Engineers, Inc. and Ground Water Associates, Inc.

**Comments from Ms. Eugenia Marks, Director for Issues  
Audubon Society of Rhode Island**

**Comment 1:** I would like to emphasize Audubon's position that the chemical sludge be removed from the hot spot in order to prevent future groundwater contamination after the remedial treatment has been completed. Because groundwater will be formed as precipitation infiltrates land outside the capped landfill footprint, groundwater will continue to come into contact with the sludges dumped during the Silvestri Brothers operation of the area. According to U.S.G.S. surficial geology maps there are glacial deposits in the area which transmit groundwater easily. These are the deposits which the Silvestri Brothers sold in their sand and gravel operation. We also understand that the sludges were dumped into open pits cut into the bedrock and fissures in the bedrock may also serve in the transport of groundwater. General patterns of groundwater movement would indicate that the groundwater moving over and around the hot spot would eventually recharge the surface water in Cedar Swamp Brook which flows into Simmonsville Reservoir. We believe that the long-term health of the groundwater quality and the surface water it recharges will be best served by removing the hot spot sludges.

**EPA Response:** The commenter believes that the chemical sludges should be removed from the hot spot area in order to prevent future groundwater contamination. During the mid to late 1970s large volumes of liquid industrial wastes were disposed of in several trenches which were excavated into bedrock in a small area (about 0.5 acres) of the Site, near the eastern perimeter of the existing landfill. This area has been identified as the hot spot area. The liquids disposed of have long since penetrated into the underlying fractured bedrock leaving behind a chemical sludge. Results of studies conducted during the Remedial Investigation in the hot spot area indicates that the chemical sludges are of very low permeability, rubber like in consistency, located close to but above the water table and are currently covered with about thirteen (13) feet of septage sludge and an additional fifteen (15) feet of landfill debris and daily soil cover. EPA believes that the major source of contamination to the groundwater from the hot spot area is not the residual chemical sludge but the liquids that have penetrated into and remain in the underlying fractured bedrock, below the water table. During the Remedial Investigation, Dense Non-Aqueous Phase Liquids (DNAPLs) were found in the fractured bedrock beneath the chemical sludges.



Alternative OU1-8 evaluated the in-situ treatment of the chemical sludges in the hot spot area and alternative OU1-9 evaluated the excavation and off-site disposal of the chemical sludges from the hot spot area. Although alternatives OU1-8 and 9 would treat the chemical sludges, EPA does not believe that this would provide any significant gains in long-term effectiveness since this treatment would do nothing to address the real source problem, which is below the chemical sludges. EPA believes that the capping provided by the selected remedy, which covers the hot spot area, will prevent precipitation from contacting the chemical sludges and as stated previously, the chemical sludges are above the groundwater table. EPA believes that the hot spot groundwater extraction and treatment component of the remedy will prevent the highly contaminated groundwater in this area from migrating beyond the landfill and that this containment provides the best available approach to protecting groundwater quality and the surface water it recharges to.

**Comment 2:** We ask that the proposed plan consider the long-term possibilities for contamination of the Upper Simonsville Reservoir. We are concerned that erosion is occurring on the existing grassed southeastern face of the landfill, contributing not only to sedimentation of Cedar Swamp Brook and ultimately the Upper Simonsville Reservoir, but also contributing some contaminants. Of particular concern would be the heavy metals cadmium, chromium, and mercury which may leach as organic acids form in the refuse or acidified precipitation continues at current pH levels if erosion compromises the RI DEM single cap barrier. Our concern is for the health of fish and any persons who may consume them. Although the risk is low on a population scale, we believe that this toxicological pathway should be addressed. We understand that there are off-site studies continuing which will provide data on which to base decisions. Nonetheless, the treatment of the cap and the extraction of groundwater in the proposed plan on which we comment have an impact on water quality and fish health in the Upper Simonsville and Almy Reservoirs.

**EPA Response:** The commenter raised a concern that erosion of the RIDEM single barrier cap may occur and contribute to the sedimentation of Cedar Swamp Brook and ultimately the Upper Simons Reservoir. The commenter was also concerned that if erosion compromised the RIDEM cap, infiltration of precipitation through the cap may leach heavy metals in the form of organic acids from the refuse. EPA is aware that erosion of uncapped areas of the landfill is occurring and that erosion of other areas of the 610 acre parcel owned by the RISWMC may also be eroding and contributing to the sedimentation problem in the Upper Simons Reservoir. However, erosion of the areas capped with the RIDEM single barrier cap have been effectively controlled. A component of EPA's remedy will cap the remainder of the Phase I area which will control the erosion of these areas as well. EPA believes that

the capping component of its remedy, which incorporates the existing 32 acres of RIDEM single barrier capping, will provide for long-term minimization of the infiltration of precipitation through the landfill. The cap will be monitored and maintenance activities will be performed as needed to ensure that the cap continues to perform satisfactory over the years. One of the performance criteria is to prevent erosion.

**Comment 3:** We ask that the possibility of extracting groundwater from the southern landfill boundary be held as a contingency should off-site studies indicate levels of concern.

**EPA Response:** The commenter requested that extracting groundwater from the southern landfill boundary be held as a contingency should off-site studies indicate levels of concern. The selected remedy, OUI-5, is the first operable unit of at least a two operable unit approach to remediation of the environmental contamination caused by the Central Landfill Site. The selected remedy is a source control remedy. The basic purpose of the selected source control remedy is to prevent or minimize the continued effects of the 121 acre Phase I area, including the hot spot, on groundwater and surface water quality. A monitoring program is included as part of the remedy to assure that the source control remedy performs as required. The remedy may need adjustments or modifications if data collected as part of the monitoring program warrants such adjustments or modifications. Also, EPA will review the Site at least once every five years after the initiation of the remedy to assure that the remedy continues to protect human health and the environment.

The second operable unit will address any impacts to off-site areas caused by contaminants that have already migrated from the Phase I area and beyond the RISWMC property boundary. During the second operable unit, additional studies will be undertaken to better characterize the extent of off-site contamination and to develop and evaluate alternatives for remediation should it be required.

**Comment 4:** We ask that consumption of fish be considered under recreational fishing. Although I understand that standards for metals and organics in fish tissue are not set federally, some states are creating their own standards.

**EPA Response:** The commenter requested that consumption of fish be considered under recreational fishing. EPA currently plans on evaluating this route of exposure during the operable unit two studies.

**Comment 5:** As an alternative, we suggest that additional geomembrane be installed over the existing DEM cap on the northeastern face of the landfill as well as assuring sufficient coverage in the cove around the hot spot. Although water will not collect and percolate through the slope in the volume that it does on the cap because of erosion and the concentration of contaminants in the hot spot area, we ask that the protection of an additional layer be considered.

**EPA Response:** The multi-layer capping component of EPA's selected source control alternative will meet the performance criteria for capping hazardous waste landfills (RCRA C). Based on information EPA has to date, we believe the existing 32 acres of RIDEM approved capping, which will be integrated into the multi-layer cap, is meeting the performance criteria for capping hazardous waste landfills. That is, the existing 32 acre cap requires minimum amount of maintenance; promotes drainage and minimizes erosion; accommodates settling and subsidence of the landfill; and has a permeability less than the permeability of the natural subsoils present. Also, the EPA has no data to suggest that the existing 32 acre cap will not provide long-term minimization of the infiltration of liquids through the closed landfill. The existing 32 acre cap, as well as the new capping to be constructed, will be monitored over time to ensure that it continues to meet the RCRA C performance standards for the closure of a hazardous waste landfill.

**Comment 6:** To what degree will the contaminants be removed during treatment.

**EPA Response:** The degree of treatment required for the groundwater extracted from the hot spot area depends on the discharge option selected. Two discharge options will be evaluated in detail during the remedy design phase; 1.) on-site surface waters, and 2.) the Cranston Waste Water Treatment Plant.

If discharge to on-site surface waters is the option selected, the effluent of the on-site treatment system will meet the NPDES provisions of the Clean Water Act, and those of the RIPDES program if they are more stringent than the federal requirements. Additionally, the Rhode Island Water Quality Standards and Water Quality Regulations define the water quality antidegradation policy of the state. The Rhode Island Water Quality Standards are based on Federal Ambient Water Quality Criteria which set standards for surface water quality for the protection of human health aquatic life. Any state standards which are more stringent than federal standards must be complied with if the surface water discharge option is selected. If discharge to the Cranston Waste Water Treatment Plant is the option selected, the effluent of the on-site treatment system will meet the Rhode Island Pretreatment regulations for the Cranston POTW. This regulation adopts a state

and local pretreatment system for wastewater based on federal regulations.

**Comments from Mr. Al Russo, State Representative  
Town of Johnston**

**Comment 1:** What if anything is going to be done to clean up the upper and lower Simmons Reservoir? Is EPA going to dredge the solids on the bottom of the pond and return the reservoirs to their pristine state?

**EPA Response:** The selected remedy is the first operable unit of a two operable unit approach to remediation of the environmental contamination caused by the Central Landfill Superfund Site. The first operable unit will control the sources of contamination at the Site. Source control remedies prevent or minimize the continued release of hazardous substances to the environment. Source control alternatives rely on the prevention of exposure for the protection of human health and the environment. The second operable unit, currently underway, will address impacts to off-site areas, including Upper and Lower Simmons Reservoir, caused by contaminants that have already migrated from the Site. During the second operable unit, additional studies will be undertaken to characterize the extent of off-site contamination and to develop and evaluate alternatives for remediation should it be required. As of this date, it is not known if EPA will require any remedial action in Upper or Lower Simmons Reservoir. However, the RISWMC has been ordered by the RIDEM to take corrective actions to restore wetlands altered by the landfill operations. Dredging of the Upper Simmons Reservoir is one of the planned activities under this State Order.

**Comment 2:** Will the groundwater flowing from the landfill in a southeasterly direction be monitored since it possesses a potential risk to the health of the residents?

**EPA Response:** A component of the selected remedy requires long-term monitoring of groundwater which will include monitoring of the groundwater flowing from the landfill in a southeasterly direction.

**Comment 3:** What are the estimated contaminant concentrations that groundwater would have flowing into the Upper Simmons Reservoir?

**EPA Response:** Estimates of the contaminant concentrations in groundwater discharging to the Upper Simmons Reservoir were presented in Volume I, Section 9.60 and Volume II Table 9-5 of the OU1 RI Report. The estimates were based on current Site

conditions, i.e, the concentrations calculated did not account for the effects of EPA's source control remedy. The data collected in Upper Simmons Reservoir during the OU2 studies will allow EPA to better evaluate the contaminant concentrations in the Upper Simmons Reservoir.

**Comment 4:** What are the deed restrictions on the groundwater use and land development on the property owned by the RISWMC?

**EPA Response:** Institutional controls shall ensure the long-term integrity of all the components of this source control remedy. Deed restrictions and/or other controls shall prohibit any activity at the Site which would interfere with or compromise the landfill cap, its related systems, the hot spot containment and treatment system, or any other component of this source control remedy. Such controls will also provide for EPA and RIDEM approval prior to the commencement of any future activities at the Site which may impact the landfill cap, its related systems, or any other component of this source control remedy. The institutional controls will also prohibit the use of on-site groundwater as a drinking water source.

**Comment 5:** As to the long-term program of sampling and analysis of groundwater, surface water and air, how often are you going to test, how long will this testing continue and will the tests be on-site or off-site?

**EPA Response:** Initially EPA will require that the sampling be performed quarterly. The exact sampling locations have not been determined yet. It is likely that sampling will be performed in off-site areas as well as on-site areas. Sampling will continue until it can be demonstrated that the source control remedy has adequately performed for three consecutive years.

**Comment 6:** What will become of the residue from the groundwater treatment system?

**EPA Response:** Any residues generated from the treatment of groundwater extracted from the hot spot area will be tested to determine if it is hazardous or non-hazardous. If any residue is hazardous, it will be disposed of at an approved off-site hazardous waste facility. If it is non-hazardous, on-site disposal may be an option.

**Comment 7:** Why was the preferred plan (OU1-5) selected over alternative OU1-9?

**EPA Response:** Alternative OU1-9 evaluated the excavation and off-site disposal of the chemical sludges from the hot spot area.

Although alternatives OU1-9 would remove the chemical sludges, EPA does not believe that this would provide any significant gains in protection of human health and long-term effectiveness since the excavation of the chemical sludges would do nothing to address the real source problem, which is below the chemical sludges. EPA believes that the capping provided by the selected remedy, which covers the hot spot area, will prevent precipitation from contacting the chemical sludges. EPA believes that the hot spot groundwater extraction and treatment component of the remedy will prevent the highly contaminated groundwater in this area from migrating beyond the landfill and that this containment provides the best available approach to protecting groundwater quality and the surface water it recharges to. See also EPA's response number 1 to comments submitted by Ms. Eugina Marks, Director of issues, Audubon Society of Rhode Island.

**Comments from Mr. Rocco Mariorenzi, President  
Rotary Drive Association, Town of Johnston**

**Comment 1:** Mr. Mariorenzi is concerned about the bacterial level in surface water in the vicinity of Rotary Drive which has been found to be as high as 230,000 over 230,000. Mr. Mariorenzi believes that the bacterial contamination may be coming from the Central Landfill. Mr. Mariorenzi requests an explanation of the significance of the bacteria count. What kind of bacteria is it, where is it coming from and what can EPA do about it?

**EPA Response:** EPA has forwarded this comment to the Rhode Island Department of Environmental Management for their review and response.

**Comments from Ms. Karen Torti  
Resident, Johnston, RI**

**Comment 1:** What type of fill will be used in the preferred plan, where will the fill be purchased, will the fill be utilized from RISWMC property, if so, what portion of the property will this fill be utilized from?

**EPA Response:** If any fill is needed the design will specify the requirements for the fill. Material from RISWMC property may be used if it meets the design requirements.

**Comment 2:** Ms. Torti expressed concern over the impacts of the Phase II and III areas and the potential that another problem like the hot spot is being created. Ms. Torti also stated that the liner system for the Phase II and II areas according to Hazardous Newsletter, only lasts approximately 13 days and the leachate collection system will only last up to 2 years.

**EPA Response:** See EPA's response to comment number 6 submitted by State Representative Jennifer A. Champagne Martelli.

**Comment 3:** If a problem ever existed at the Scituate Reservoir, what would EPA's reaction be and what type of process would you use to remediate that problem? Who will accept the liability if a liability does occur?

**EPA Response:** The primary goal of the selected source control remedy is to prevent or minimize the continued effects of contamination from the Site on groundwater quality. As the commenter indicated, results of the studies undertaken during the Remedial Investigation found no evidence to suggest that contaminated groundwater from the Site is migrating to the Scituate Reservoir. A component of the selected remedy requires long-term monitoring of groundwater. If data collected during the monitoring program, or other evidence obtained by EPA in the future, were to indicate that contaminated groundwater from the Central Landfill Superfund Site was migrating to the Scituate Reservoir, the goal of the source control remedy is not being met and EPA would require that the RISWMC take measures to stop the migration from the Site.

**Comment 4:** Has the preferred process (UV/Oxidation) been used in any Superfund Site? How long has the life of the process been? Will the process have an odor? Will the process have any air emissions, if so, will the air quality of the residents in the area be affected?

**EPA Response:** EPA, New England Division, is currently planning on using the UV/Oxidation system at eight Superfund Sites and is currently using the system at three Superfund Sites. At one of these Sites the system has been successfully operating for about 1.5 years. EPA does not anticipate any odor or emissions problems associated with the UV/Oxidation system. A UV/Oxidation pilot study will be performed at the Site before full scale operations begin to ensure that air emissions and odor are not a problem.

ATTACHMENT A

COMMUNITY RELATIONS ACTIVITIES CONDUCTED AT THE  
CENTRAL LANDFILL SUPERFUND SITE IN JOHNSTON, RHODE ISLAND





**COMMUNITY RELATIONS ACTIVITIES CONDUCTED AT THE  
CENTRAL LANDFILL SUPERFUND SITE IN JOHNSTON, RHODE ISLAND**

Community relations activities conducted at the Central Landfill Superfund Site:

- EPA issued a fact sheet describing the RI/FS process in November 1987.
- EPA issued a press release announcing the completion of the RI Field work on July 26, 1993.
- EPA issued a fact sheet announcing the Remedial Investigation results in September 1993.
- EPA published a notice on February 8, 1994 in the Providence Journal announcing the establishment of the Administrative Record for the Operable Unit 1, the dates for the public meeting and public hearing, and the public comment period dates.
- EPA issued a press release indicating that because of severe winter weather, the public meeting would be postponed to February 22, 1994.
- EPA released a proposed plan, dated February 1994, discussing the Feasibility Study and its preferred alternative.
- EPA conducted a public meeting on February 22, 1994 to discuss the Preferred Alternative. EPA also conducted a public hearing on February 28, 1994 to solicit public comment on the Preferred Alternative. Seventy-four people signed the sign-in sheet for the public meeting; eight people testified during the public hearing. A copy of the hearing transcript is included in the Administrative Record at the Information Repositories at the Marion J. Mohr Memorial Public Library and at the EPA Records Center.
- EPA conducted a public comment period from February 13, 1994 through March 14, 1994. Six people submitted written comments.



**ATTACHMENT B**

**TRANSCRIPT OF THE FEBRUARY 28, 1994 INFORMAL PUBLIC HEARING**

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
TOWN OF JOHNSTON

IN RE: CENTRAL LANDFILL PUBLIC HEARING

Hearing held on Monday, February 28, 1994, at the  
Johnston High School, 345 Cherry Hill Road, Johnston, Rhode  
Island, commencing at 7:00 p.m. before Mary M. Guglietti,  
Shorthand Reporter and Notary Public within and for the State  
of Rhode Island and Providence Plantations.

HEARING PANEL

DICK BOYNTON, U.S. EPA, BOSTON, MASSACHUSETTS  
JIM BROWN, EPA  
AMY ROGERS, EPA

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MONDAY, FEBRUARY 28, 1994

(COMMENCING AT 7:00 P.M.)

MR. BOYNTON: Good evening. My name is Dick Boynton, I'm from EPA's Region 1 Boston office from the Waste Management Division, and I have supervisory responsibilities for NPL sites, National Priority List sites, Superfund sites in Rhode Island. I'll be the Hearing Officer for tonight's hearing.

What we're going to talk about tonight or what we're going to receive comment on tonight is EPA's proposed plan for containing contamination at the Central Landfill Superfund site, which is defined as a 154 acre licensed portion of the landfill.

And with me tonight is Jim Brown, who is EPA's Project Manager for the Superfund site, Amy Rogers, who is outside of the door, she's our Community Relations Coordinator. And, as I said, the purpose of this hearing is to formally accept oral comments on our proposed plan for containing contamination at the site.

I want to emphasize that EPA does not have regulatory authority for solid waste operations at landfills in the State of Rhode Island. That is strictly a state regulatory authority.

Since this is a hearing, we will not be responding

1 to comments and questions tonight. We were here last  
2 week on I believe it was Tuesday night in this room and  
3 we talked to you about our proposed plan and some of the  
4 questions, and we had a question-and-answer session. We  
5 will be responding to all comments that we receive  
6 tonight and during our comment period, which began  
7 February 13th and will end on March 14th, and we will  
8 respond in writing to all of those comments in a document  
9 called the Responsiveness Summary that becomes part of  
10 our decision document, which is called the Record of  
11 Decision.

12 Now, let me describe the format of the hearing.  
13 First, Jim Brown, Project Manager, will give a brief  
14 overview of our proposed plan for the Superfund site.  
15 Following Jim's presentation, we will accept oral  
16 comments for the record. Those of you wishing to comment  
17 should have indicated that you wanted to comment by  
18 filling out an index card with your name on it at the  
19 front table, and I will call the names on the cards as I  
20 received them for people to come up, and if you would  
21 come up to the microphone and state your name and speak  
22 very clearly when you're called because our reporter is  
23 recording everything you say for the record.

24 So are there any questions about how we plan to

1           conduct the hearing? With that, I think I'll ask Jim to  
2           - give a brief overview of our proposed plan.

3                           MR. BROWN: For the benefit of  
4           those who weren't here last Tuesday night, in addition to  
5           presenting the proposed plan, I'll also briefly go over  
6           the major conclusions of the investigations that were  
7           done at the Central Landfill site.

8                           The Central Landfill site is located within a 610  
9           acre parcel of land off Shun Pike in Johnston, Rhode  
10          Island. The 154 acre licensed landfill is typically  
11          described as in two components, a 121 acre area -- the  
12          colors don't show up very good in this light, but the 121  
13          acre is this green area and a 33 acre area just to the  
14          west, which is also sometimes called the Phase II and the  
15          Phase III areas, and this 121 acre area is sometimes  
16          referred to as the Phase I area.

17                          Most of the waste that's been deposited at the site  
18          has been deposited in the Phase I area, and most of the  
19          waste in this area is just municipal solid waste.  
20          However, prior to 1980, in addition to municipal solid  
21          waste disposal in this area, some hazardous substance may  
22          have also been disposed of. We do know that in the mid  
23          to late 1970's, there's an area of the site located right  
24          here, this is an area where large volumes of liquid





1 industrial waste were disposed of in trenches that were  
2 excavated into the bedrock. This area's been termed the  
3 "hot spot" area of the site because of the concentrations  
4 that we find in this area are so much greater than the  
5 concentrations of contamination found anywhere else on  
6 the site. And we do believe that it's this area of the  
7 site, the hot spot area's the major source of  
8 contamination of the Central Landfill site.

9 All of the municipal -- all of the landfilling  
10 activities have ceased in this area here, the 121 acre  
11 area, as of April, 1993. Currently, all the waste that's  
12 brought to the Central Landfill site is disposed of in  
13 this 33 acre expansion area. There's a 12 acre area  
14 that's been prepared in the northern portion of that area  
15 and that's the area of the site right now where non-  
16 hazardous municipal solid waste is being disposed of.

17 Using groundwater level data from 41 -- from  
18 monitoring wells located in 41 different spots around the  
19 Central Landfill and by using data provided by the U.S.  
20 Geologic Survey, we're able to determine that most of the  
21 groundwater that flows underneath the Central Landfill  
22 site is flowing toward the upper Simmons Reservoir.  
23 These yellow arrows here show the direction of  
24 groundwater moving at the site. There is a small

1 component of groundwater that flows underneath the 121  
2 acre area that does flow toward the Almy Reservoir. This  
3 yellow line here indicates a groundwater divide, water on  
4 this side -- groundwater on this side of the line flows  
5 in that direction, the groundwater on the other side of  
6 the line flows in this direction. So you can see that  
7 most of the groundwater underneath the site, you know,  
8 flows in this general direction.

9 None of the data that we collected at the site  
10 indicated that the groundwater flowed toward the west  
11 toward the Scituate Reservoir. The Risk Assessment that  
12 we performed and all of the data that was collected  
13 during the investigations concluded that groundwater was  
14 a pathway of concern at the site. In a sense, we've  
15 concluded that a potential risk to human health would  
16 occur if groundwater at the site was presently used as a  
17 drinking water source. If the contaminated groundwater  
18 from the site were allowed to continue to migrate off-  
19 site and that off-site groundwater were to be developed  
20 as a drinking water source in the future, that a  
21 potential risk could also occur from drinking that water.  
22 Currently, though, there is no human health risk because  
23 no one is drinking the groundwater on-site and any  
24 potentially affected resident in the vicinity of the

1 Central Landfill is on public water.

2 I prepared a plan for controlling the contamination  
3 at the site. It was selected from a list of nine plans  
4 that were analyzed in detail in the Feasibility Study  
5 Report.

6 Let me just briefly go over some of the existing  
7 site conditions before I talk about the proposed plan.  
8 This is the 154 acre licensed landfill area. This is the  
9 Phase I area, the 121 acre area, and the 33 acre Phase II  
10 and Phase III areas. Currently, there are two areas of  
11 the 121 acre site -- 121 acre area that are capped with a  
12 State approved cap. It's the Area 1 and the Area 2. The  
13 remainder of the 121 acre area is capped with a temporary  
14 soil cover, it's about one-foot thick temporary soil  
15 cover.

16 Also, methane that is being generated from the  
17 decomposition of solid waste in the Phase I area is being  
18 collected and burned at a facility located right here,  
19 and the energy from burning the methane is being used to  
20 generate electricity. That facility is not owned by  
21 Rhode Island Solid Waste Management Corporation. It was  
22 installed by a private power company and is operated and  
23 maintained by that private company.

24 The purpose of the preferred plan is -- as Dick said

1 earlier, is to control the sources of contamination  
2 located within this 121 acre area, including the hot spot  
3 area. The plan for operating and closing this area is  
4 the State responsibility, and the plan for operating and  
5 closing that area was approved in April of 1991.

6 All right. So what is our proposed plan? This  
7 schematic is provided in the 40-page proposed plan that  
8 was released to the public. The proposed plan consists  
9 of six components.

10 The first component will require capping the 89  
11 acres of the 121 acre area that are not currently capped  
12 with the State approved cap.

13 The second component of the plan would require  
14 pumping approximately 30,000 gallons per day of  
15 contaminated groundwater out of the hot spot area,  
16 treating that groundwater on-site and then discharging  
17 the clean water to either on-site surface waters,  
18 potentially Pond No. 3 or Pond No. 2, or to the Cranston  
19 Wastewater Treatment Plant.

20 The third component will require long-term  
21 environmental monitoring program. We'll be monitoring  
22 groundwater around the site, surface water and air in the  
23 long-term. This will allow us to continue to monitor the  
24 site over the future years and to monitor the

1 effectiveness of our proposed plan.

2 The fourth component will require conducting a  
3 detailed evaluation of the existing landfill gas  
4 collection and combustion system. Just a few moments  
5 ago, I talked about the methane that's being collected  
6 and burned on-site. The existing system has been  
7 permitted by the State of Rhode Island and it appears to  
8 be operating well. However, there are a few more tests  
9 that we want to have done on that system just to make  
10 sure that it is operating as well as any system we would  
11 have put in ourselves. Also, since the system is not  
12 owned by Rhode Island Solid Waste Management Corporation,  
13 we want to make sure that it's understood that the system  
14 is a component of the remedy and it's an important  
15 component of the remedy and if, in the future, the  
16 company that is operating that system decides it no  
17 longer wants to do that, the Rhode Island Solid Waste  
18 will have to assume the responsibility for operating that  
19 system.

20 The fifth component will require some deed  
21 restrictions on land use and groundwater use at the site.

22 And the sixth and final component would require  
23 installing a fence to prevent access.

24 That's it. That's a summary of the investigations

1 and the proposed plan, and I guess that's it.

2 MR. BOYNTON: Thanks, Jim. I  
3 have eight people who have indicated that they want to  
4 comment tonight. I would ask that you try to keep your  
5 comments to around ten minutes or so. If you have  
6 something more lengthy that you want to submit to us, you  
7 can do that tonight or you can mail your comments into  
8 the address that's on page 5 of the proposed plan, which  
9 is Jim's address. Make that ten people.

10 So, with that, as I said, if you'll just try to get  
11 your major points for the record. Everything you say  
12 tonight is being recorded, so try to speak up so that our  
13 reporter can get the essence of your comments.

14 Let me begin with Judy Graham from Rhode Island DEM  
15 with the Division of Site Remediation.

16 MS. GRAHAM: Hi, Dick. The  
17 Department of Environmental Management, Division of Site  
18 Remediation, has conducted a thorough review of the  
19 Operable Unit 1 Remedial Investigation and Feasibility  
20 Study, as well as other technical documents resulting  
21 from the Superfund investigations at the Central  
22 Landfill, including the proposed plan.

23 As a result of this review, the Division has  
24 generated numerous comments which have been

1           satisfactorily addressed. These comments have been  
2           - documented and are contained in the administrative  
3           record, which is available for public review.

4           The Division believes that the final remedy  
5           selection as outlined in the proposed plan accurately  
6           defines, recognizes and complies with all promulgated  
7           State environmental regulations and all existing  
8           agreements and requirements entered into with and set  
9           forth by the Department of Environmental Management.

4  
10           It is broadly accepted that caps are effective in  
11           controlling the migration of contamination from  
12           landfills. The State's regulations for landfill closure  
13           require a single impermeable barrier cap. Although this  
14           type of closure would probably provide sufficient  
15           protection to human health and the environment, the  
16           multilayer design provides the added assurance of  
17           long-term performance. The Division supports the concept  
18           for source control at Central Landfill. The Division  
19           believes that this design will provide long-term  
20           minimization of the flow of liquids through the closed  
21           landfill. It will function with minimum maintenance and  
22           it will promote drainage and minimize erosion or abrasion  
23           of the cover, and it will accommodate settling and  
24           subsidence so that the cover integrity is maintained.



1           Additionally, the placement of bedrock groundwater  
2           recovery wells at the hot spot to prevent the migration  
3           of highly contaminated groundwater through bedrock  
4           fractures provides further assurance of successful  
5           containment. This groundwater extraction and treatment  
6           system when properly designed and executed will  
7           adequately address the State's concerns over this  
8           potential route of exposure.

9           This proposed plan and associated Remedial  
10          Investigation and Feasibility Study is relative to  
11          on-site conditions only. Off-site receptors such as the  
12          upper Simmons and the Almy Reservoirs will be addressed  
13          in the Operable Unit 2 portion of the studies.  
14          Additionally, the lower Simmons Reservoir may be impacted  
15          by conditions at the landfill and will be considered  
16          during the OU-2 study.

17          In conclusion, based upon the Division of Site  
18          Remediation review of all of the information available to  
19          the Department of Environmental Management, the DEM  
20          agrees with the selection of the remedy as proposed by  
21          the Environmental Protection Agency. Thank you.

22   MR. BOYNTON: Thanks, Judy.

23          Next is Alfred A. Russo, Jr. That's R-U-S-S-O?

24   MR. RUSSO: Correct.

1 MR. BOYNTON: Jr., right?

2 MR. RUSSO: Correct. For the  
3 record, as you stated, my name is Al Russo, I am a State  
4 Representative here in the Town of Johnston. I've read  
5 through the materials and I have a few questions.

6 First of all, on the preferred plan, what, if  
7 anything, is going to be done to clean up the upper and  
8 lower Simmons Reservoirs? Is EPA going to dredge the  
9 solids on the bottom of the pond and return the  
10 reservoirs to their pristine state?

11 No. 2, will the groundwater flowing from the  
12 landfill in a southeasterly direction be monitored since  
13 it possesses a potential risk to the health of the  
14 residents?

15 No. 3, what are the estimated contaminated  
16 concentrations that groundwater would have flowing into  
17 the upper Simmons Reservoir?

18 No. 4, I read on page 12 of the materials that you  
19 had some deed restrictions, what are these deed  
20 restrictions on the groundwater use and land development  
21 on the property owned by Solid Waste Management  
22 Corporation?

23 No. 5, as to the long-term program of sampling and  
24 analysis of the groundwater, surface water and air

1 quality sampling, how often are you going to test, how  
2 long will this testing continue and will the tests be  
3 on-site or off-site?

4 No. 6, is the groundwater -- in the groundwater  
5 treatment system what will become of the residue? I  
6 understand on the bottom, when you take out the irons and  
7 so forth, that material can be very hazardous, and I'd  
8 like to know what's going to be done with that material.  
9 Is that material going to be redeposited in the landfill  
10 or will that be taken off-site to a hazardous waste  
11 facility?

12 I had one question as to the other plans, not with  
13 the preferred plan, and it deals with Plan No. 9. In  
14 that plan, the way I understand it, excavation will be  
15 done to the area of the hot spot where the one thousand  
16 or so yards of material's been identified. I was  
17 wondering why that plan or Plan No. 9 was not selected  
18 and you selected preferred Plan No. 5.

5  
19 I would like EPA to revisit that plan one more time,  
20 look at it and seriously give consideration to the taking  
21 of the excavated materials out of the landfill and take  
22 it off the site and take it to a hazardous treatment  
23 plant. And that's all I have. Thank you.

24 MR. BOYNTON: Thank you,

1 Mr. Russo. Next is Paul Santilli.

2 MR. SANTILLI: I'm going to pass  
3 at this time.

4 MR. BOYNTON: Okay. Next is  
5 Rocco Mariorenzi, M-A-R-I-O-R-E-N-Z-I.

6 MR. MARIOREZZI: The correct  
7 pronunciation is Rocco Mariorenzi.

8 MR. BOYNTON: Mariorenzi?

9 MR. MARIOREZZI: Mariorenzi,  
10 just say Mario and then say Renzi and you've got it.

11 MR. BOYNTON: Thank you.

12 MR. MARIOREZZI: I'm the  
13 President of the Rotary Drive Association and my question  
14 is the bacteria level that flows through a pipe and then  
15 comes into the plat on April Street and empties out  
16 onto -- into the Dry Brook River, the question is the  
17 bacterial level is 230,000 over 230,000 and DEM is  
18 reluctant to tell anybody what this bacterial level is,  
19 including the City Council. Joe Falvo has been trying to  
20 find out, Councilman Falvo, and President Louis  
21 Perrotta's been trying to find out, and no one seems to  
22 have the answer.

23 It has been coming within the plat because it's  
24 piped in from outside the plat. Personally, I believe

1           there's such a thing as an underground river and it could  
2           be coming from the landfill, that's what I think. It's  
3           been brought to the attention of Senator Reed, it's been  
4           brought to the attention of the Governor of the State of  
5           Rhode Island, and everybody avoids the subject. It's  
6           obvious to me if it is coming from the landfill, they'd  
7           have to close this landfill immediately, but no one wants  
8           to address it. And, like I said, it definitely isn't  
9           coming from the people's sewage where I live. They want  
10          everybody to think so, but that isn't the case at all.

11                 About a year ago, they came in, they put a new plat  
12          on April -- a new pipe on April Street, because I  
13          complained about this same subject to Mr. Tomanski (sic).  
14          Obviously, they thought that the pipe was leaking, but we  
15          still have the same problem there. They're concerned,  
16          they're trying to do something, but they haven't come up  
17          with the answer. When I met at the Governor's Office --  
18          correction, when I met at the State House, I mentioned  
19          the fact that the Dry Brook River and the water coming  
20          from this pipe should be rerouted. But that would cost a  
21          lot of money and no one wants to hear it. The Dry Brook  
22          River, which runs behind my plat, could run underground  
23          on Atwood Avenue and empty out on Long Avenue. Of  
24          course, that would cost millions of dollars and, like I

1           said, no one wants to hear it.

2           So my question, and I repeat myself, is what is this  
3           230,000 over 230,000? What is it? What are they going  
4           to do about it? Where is it coming from? And that's the  
5           main question. Thank you.

6                           MR. BOYNTON: Thank you,  
7           Mr. Mariorenzi. Next is Representative Jennifer  
8           Champagne Martelli.

9                           MS. MARTELLI: Good evening.  
10          Just for the record, as you stated, Jennifer Champagne  
11          Martelli, and I'm a State Representative in Johnston. My  
12          first question focuses on the preferred alternative and  
13          it has to do with OU-1-5. The question is why does  
14          OU-1-5 not include removing the Rhode Island DEM cap on  
15          the existing 32 acres and replacing it with the RCRAC  
16          cap? One, what short and long-term effects would occur  
17          if the RCRAC cap is not used in that 32 acre area and,  
18          two, what short and long-term effects if OU-1-8 and  
19          OU-1-9 is not completed? Would you like me to read that  
20          into the record what exactly that is stating?

21                           MR. BOYNTON: You can if you'd  
22          like or you can give it to us and we'll put it into the  
23          record.

24                           MS. MARTELLI: Okay. Now, if .

6

1 the Rhode Island DEM cap is replaced and/or the off-site  
2 disposal of the hot spot chemical sludges are removed,  
3 your report suggests that a tremendous amount of off-site  
4 trucking would occur in that area. My question is do you  
5 suggest any compensation to the Town of Johnston, which  
6 is the host community, or to the area residents for their  
7 exposure to the increased trucking?

8 Next, I'd like to turn our attention to the  
9 treatment of the groundwater in the southern landfill  
10 boundary, and that's on page 31 of the short report that  
11 I'm referring to. The quote on that page says that the  
12 treatment of the groundwater in the southern landfill  
13 boundary, quote, may result in a significant lowering in  
14 the water table which could impact the wetlands. My  
15 first question relative to that is what would the impact  
16 be on the wetlands if you were to go forward with the  
17 treatment of the groundwater in the southern area and,  
18 two, what effect, long and short-term, if this area is  
19 not treated?

20 My next question focuses on the EPA's proof that  
21 they may be able to provide that the new so-called state-  
22 of-the-art landfill, meaning Phase II and Phase III, will  
23 not somewhere down the line produce some of the same  
24 chemical sludge that we are now cleaning up. I realize

1 that the technical part of the Phase II and Phase III, at  
2 face value, we can say will not produce the same chemical  
3 sludge, but if we can focus on what perhaps in the future  
4 chemicals may be produced from this Phase II and Phase  
5 III area that we may in the future need to clean up.

6 And my final question is focused on why one of the  
7 alternatives is not to cease all landfill operations in  
8 that area, and if your answer is that perhaps you don't  
9 have the authority to do that, I would need a little  
10 clarification on how we can appeal to the EPA to focus on  
11 that as an alternative and, further, what -- who you  
12 believe is vested with that power and why EPA cannot be  
13 involved in moving forward with ceasing operations in  
14 that entire area. Thank you.

15 MR. BOYNTON: Thank you, Miss  
16 Martelli. Next is Ralph Perrotta.

17 MR. PERROTTA: My name is Ralph  
18 Perrotta, I'm special counsel to the Town of Johnston on  
19 landfill issues. The Mayor couldn't be here tonight and  
20 he specifically asked me to come and to reiterate the  
21 remarks he made last week, which were to the effect that  
22 the EPA's interest and involvement in this issue is long  
23 overdue and by fifteen years, at least, overdue. And,  
24 secondly, that the failure of the Source Control Study to



1 even consider or even address or acknowledge that there-  
2 will be Phase II and III landfills piggybacked on top of  
3 the Phase I site, which you're allegedly closing, is a  
4 serious deficiency in the study.

5 I asked two experts, one a landfill engineer, Dara  
6 Lynott of Weston & Sampson, and the other a groundwater  
7 specialist fibrogeologist, Blake Martin, of Groundwater  
8 Associates in Dracut, Massachusetts, to look at the plan  
9 and they have both written to me their concerns about it,  
10 and both of them focus particularly on the point that was  
11 made by Mr. Brown I believe last week, which is not  
12 revealed at all in the report, and that is that the top  
13 of Phase I will not be capped until Phase II is completed  
14 so that the cap will eventually cover Phase I and Phase  
15 II. And that means that there will not be a closure of  
16 the Phase I landfill until Phase II is completely filled,  
17 which I think in Mr. Brown's estimate was the turn of the  
18 next -- of this century. My engineer tells me that there  
19 is a capacity potentially in Phase II until 2023. In any  
20 case, we have an open-ended -- the possibility of an  
21 open-ended closure date and not any kind of real clear-  
22 cut closure, as your plan would imply if one were to take  
23 it at face value.

24 Now, there are real problems created by this opening

1 and, also, by the heaping of trash and garbage on the  
2 slope of the existing landfill. I understand that from  
3 our own landfill engineer that his calculations show that  
4 two-thirds of the trash and garbage dumped in Phase II  
5 will be in the air over the ground over the footprint, I  
6 guess you would call it, of Phase I. So we really  
7 have -- when we're talking about Phase II, we really have  
8 an expansion of Phase I. We do not have a new landfill.  
9 And the notion that we can call it a new landfill just  
10 because we put a couple of layers of plastic between is  
11 simply, simply nonsense.

12 Let me tell you some of the problems that Mr. Lynott  
13 has raised. Differential settlement and gross  
14 deformation of the liner, both differential settlement on  
15 top of the existing landfill and gross deformation of the  
16 liner on the side slope of the existing landfill.  
17 Differential settlement is due to void spaces within the  
18 existing landfill areas settle and consolidate at  
19 different rates, which may cause pipes laid at a minimum  
20 slope for leachate collection to settle and possibly  
21 break. The net effect is a buildup of leachate within  
22 the landfill, which will eventually flow through the  
23 existing Phase I underlying landfill and potentially  
24 through the hot spots identified by the EPA.

1 Deformation, which is the counterpart of differential —  
2 settlement, is due to settlement of the existing  
3 underlying landfill and the weight of new trash placed on  
4 the side slopes. Gross deformation of the liner or clay  
5 can lead to rupture of the liner. If this occurs,  
6 leachate may flow through the existing underlying  
7 landfill and potentially through hot spots identified by  
8 the EPA.

9 Now from Blake Martin, who also begins by saying  
10 first we understand that closure and capping of the Phase  
11 I landfill will be delayed until the Phase II area is  
12 completed. Any delays in the capping/closure program  
13 will undoubtedly leave open phases at the existing  
14 landfill. That means that leachate will continue to be  
15 generated. If the top of Phase I is left open for five,  
16 ten, fifteen years, rain will continue to fall and will  
17 continue to drain and leach through the Phase I, which is  
18 allegedly closed, and into the hot spot and into other  
19 areas wherever it may -- wherever it may find its way  
20 out. As a matter of fact, pumping, which the plan  
21 contemplates, pumping water contaminant out of the hot  
22 spot area may well serve to suck more leachate through.

23 If you've got an open top and rain is coming down  
24 and you're pumping at the bottom, there's a -- it's

1           predictable that you will actually accentuate and  
2           . accelerate the flow of new leachate through a landfill  
3           which purportedly is closed. Obviously, it is not  
4           closed. It's like trying to drain a tub when you've got  
5           the faucet running at the same time. If the faucet is  
6           running, it doesn't matter, you're going to continue to  
7           have water in the tub. You're going to continue to  
8           generate leachate.

9           Now, there's another problem that's caused by  
10          leaving the top open. According to Blake Martin, there  
11          would be no way to monitor the effectiveness of any  
12          collection at the hot spot. Changes in groundwater  
13          quality due to leachate generation versus changes caused  
14          by the collection system would be difficult to discern.  
15          In other words, how can you tell what your -- what kind  
16          of effect your hot spot pumping system is having if  
17          you've got a variable in there, namely the opening at the  
18          top, which is allowing more rain to fall and to flow  
19          through the system constantly. You're not going to be  
20          able to tell whether the leachate you got from the hot  
21          spot is -- whether you're getting a significant  
22          proportion of the leachate that's being generated or not  
23          because the rainfall will be a variable factor.

24          Now, there's another concern that Mr. Martin also

8

1           expressed, which is -- relates to a different subject,  
2           - and that is that contaminant movement along the southern  
3           boundary of the landfill. Option 6, 7, 8 and 9 address  
4           that issue. Option 5, which is the one selected, does  
5           not address it. A report prepared by Blake Martin and  
6           Groundwater Associates in March of 1993 at our request,  
7           which we will forward to you, shows that there are  
8           concentrations of volatile organic compounds and metals  
9           significantly exceeding State and Federal standards in  
10          this -- along the southern boundary, particularly the two  
11          compounds mentioned are dissolved thallium and  
12          chlorobenzene at elevated levels he says to the south and  
13          southeast of the landfill. We will be filing a written  
14          report expressing these concerns in more detail,  
15          including the Groundwater Associates report of March,  
16          1993.

17                 But I want to reiterate the comments that I made  
18                 last week and that is that we are very disturbed at the  
19                 failure of the report to even portray the Phase I  
20                 landfill in its relationship to Phases II and III in a  
21                 way that reveals what's really happening here, and I  
22                 can't help but feel that this is not an accident.  
23                 Mr. Brown was very forthcoming when the question was  
24                 asked of him last week but the question need not be

1           asked, and I think the initial posture of the  
2           Environmental Protection Agency last week was we have no  
3           concern with Phases II and III, they are completely  
4           beyond our kin and beyond the scope of this inquiry.

5           I think you all acknowledged last week that you  
6           really do need expert advice on the issues that are  
7           raised by Blake Martin and Dara Lynott and that is on the  
8           impact of the continued open top of Phase I and the  
9           expectation that enormous quantities of trash will be  
10          deposited on the slope of Phase I for the next five, ten,  
11          fifteen, perhaps twenty years. This study cannot be  
12          complete without that kind of an appraisal. Thank you.

13                           MR. BOYNTON: Thank you. Now  
14          I'd like to call Karen Torti.

15                           MS. TORTI: Hi. I have a few  
16          questions I'd like to state for the record. My name is  
17          Karen Torti, 721 Central Avenue in Johnston, and my  
18          concerns are what type of fill will be used in the  
19          preferred plan? Two, where will the fill be purchased?  
20          Will the fill be utilized from Solid Waste Management  
21          property? If so, what portion of the property will this  
22          fill be utilized from?

23                           I'm also glad to hear last week, like I had  
24          mentioned, my concerns about the liners and, also,

1 leachate collection system, which I know from reading  
2 Hazardous Newsletters that they are totally inadequate,  
3 and I am very pleased to see that it was backed up by  
4 what Mr. Blake and Mr. Martin had stated.

5 My concern is, though, from reading this whole  
6 scenario that you have come up with was I didn't feel  
7 comfortable with it and I couldn't really understand why  
8 I didn't feel comfortable with it, and then finally last  
9 night when I was going over it again, I realized why. My  
10 concern is -- like Mr. Perrotta has stated, basically is  
11 we have an unlined operational site, which is Phase I,  
12 okay, which you have mentioned, now there is one spot  
13 called the hot spot that there's a problem in.

14 Our problem is what about the contaminants or the  
15 bacteria? Because I know there's no more hazardous waste  
16 being dumped there any longer, but what about the  
17 material and the sludge and, also, the bacteria that may  
18 be created in that operational site right now and, also,  
19 in Phase II and Phase III? Because the liner systems,  
20 according to the Hazardous Newsletter, only last  
21 approximately thirteen days and the leachate collection  
22 system will only last up to two years. So what exactly  
23 are you going to do to maybe not cause another problem  
24 like the hot spot, to prevent? What type of prevention

1 will you do to dredge up the material that is used? I  
2 mean, everyone thinks that because there are liners there  
3 that we are safe, when we are not safe, and because  
4 there's a leachate collection system.

5 So my question is basically what are you going to do  
6 to prevent further contaminants going into the hot spot  
7 or other areas? And, also, in relation to that, if there  
8 is a problem with the Scituate Reservoir, I know right  
9 now there isn't a problem, supposedly, from all of the  
10 tests that have been created and have been utilized, if  
11 there is a problem to ever exist with the Scituate  
12 Reservoir, what would your reaction be and what type of  
13 process would you do to remediate that problem?

14 Also, if a problem does occur while utilizing this  
15 process, who will be accepting the liability, if a  
16 liability does occur? Has the preferred process been  
17 used in any Superfund site? If so, how long has the life  
18 of the process been? I had asked that question last week  
19 and I just wanted to go over it again. And, also, will  
20 the process have an odor? My next question is will the  
21 process have any emissions into the air? If so, will the  
22 air quality of the residents in the area be affected by  
23 this? And I thank you for your time.

24 MR. BOYNTON: Thank you. Regina



1 Marks. Did I get the right name? Is it Eugenia or --

2 MS. MARKS: Yes, my name is  
3 Eugenia Marks, I'm Director of Issues at the Audubon  
4 Society of Rhode Island. I hold a Master's degree in  
5 Environmental Studies from Brown University. Audubon's  
6 interests in this case are to protect public and  
7 environmental health while at the same time providing the  
8 services of an already developed and an already altered  
9 site for landfilling solid waste.

10 We ask that the proposed plan consider the long-term  
11 contamination of the upper Simmonsville Reservoir. We  
12 are concerned that erosion is occurring on the existi  
13 grassed southeastern face of the landfill contributing  
14 not only to the sedimentation of the Cedar Swamp Brook  
15 and, ultimately, the upper Simmonsville Reservoir but  
16 that there also may be some contribution of contaminants,  
17 of particular concern would be cadmium, chromium and  
18 mercury, in the solid waste that's being deposited there  
19 and which may leach as organic acids from the refuse or  
20 acidified precipitation continues at current pH levels if  
21 the erosion on that southeast face continues over Rhode  
22 Island DEM single barrier cap.

23 Our concern is for the health of fish and of any  
24 persons who may consume them. Although risk is low on a

1 population scale, we believe that this toxicological  
2 pathway should be addressed. We understand that there  
3 are off-site studies continuing which will provide data  
4 on which to base decisions. Nonetheless, the treatment  
5 of the cap and the extraction of groundwater in the  
6 proposed plan under which we comment tonight having  
7 impact on water quality and fish health in the upper  
8 Simmonsville and Almy Reservoirs.

9 We ask that the possibility of extracting  
10 groundwater from the southern landfill boundary be held  
11 as a contingency should off-site studies indicate levels  
12 of concern. The wetlands in the area have already  
13 suffered degradation, and I do not believe that the  
14 withdrawal of water is -- could hurt them more,  
15 especially as they would serve as any wildlife habitat.

16 We also ask that consumption of fish be considered  
17 under recreational fishing, and I was not clear on that  
18 in the current report. Although I understand that  
19 standards for metals and organics in fish tissue are not  
20 federally set yet, some states are creating their own  
21 standards.

22 We are concerned that the groundwater extraction and  
23 treatment by EPA will not continue in perpetuity and,  
24 thus, we would prefer that the chemical sludges

1 themselves be removed as proposed in alternative No. 9 to  
2 prevent long-term movement of groundwater which arises  
3 from other sources than the landfill, which will be  
4 capped. This groundwater moves through the area in the  
5 remains of glacial deposits that were not taken during  
6 the former saline and gravel operations and through the  
7 bedrock factors as well. Since the hazardous materials  
8 are nonaqueous, their presence may last for much longer  
9 than the proposed treatment and may continue to cause the  
10 problem we see currently after the treatment is  
11 completed.

12 As an alternative, we suggest that additional GO  
13 membrane be installed over the existing DEM cap on the  
14 northeastern face of the landfill as well as assuring  
15 sufficient coverage in the cove around the hot spot.  
16 Although water will not collect and percolate through the  
17 slope in the volume that it does on the cap because of  
18 erosion and the concentration of contaminants in the hot  
19 spot area, we ask that the protection of an additional  
20 layer be considered. I also ask to what degree will --  
21 the contaminants removed during treatment, what is the  
22 degree of removal on those contaminants? Surely, it's  
23 not a hundred percent. Thank you for this opportunity to  
24 comment.

10

1 MR. BOYNTON: Thank you. Louis  
2 A. Perrotta, Town Council President, Town of Johnston.

3 MR. PERROTTA: Thank you. My  
4 name is Louis A. Perrotta, President of the Johnston Town  
5 Council. I wasn't here at the last meeting, I was out of  
6 town, so if -- I just don't know what was said and maybe  
7 I'll just be saying some of the same thing, but I just  
8 wanted -- for the record, I want to relate to the EPA's  
9 Docket No. 84-1045 dated June 29th, 1984, signed by  
10 Michael Deelon (sic), Regional Administrator, and I quote  
11 that report in the EPA findings on hazardous waste  
12 manifest on file with the RI DEM, it is estimated that  
13 during 1978 and 1979, 1.5 million gallons of hazardous  
14 waste from Rhode Island was deposited at the site. And  
15 from the Massachusetts DEM, an additional one million  
16 gallons were deposited by Massachusetts, also. At some  
17 areas of the dump, the levels of contamination are as  
18 high as 34,000 PPB of chlorobenzene. The substances  
19 listed in this report have been shown in scientific  
20 studies to have adverse effects on human health. The  
21 presence of these chemicals in the groundwater under and  
22 adjacent to the site indicates that the landfill was and  
23 may continue to be a source of releases of hazardous  
24 waste into the environment. Based upon the findings, it

1 is hereby determined that hazardous waste has been  
2 disposed of at the site, that the release of such waste  
3 may have occurred, may continue to occur, may have  
4 presented and may present a substantial hazard to human  
5 health and on the environment.

6 In your EPA Environmental News dated February 1,  
7 1994, on page 3, it says that in 1986 Rhode Island Solid  
8 Waste Management Corporation in conjunction with RI DEM  
9 and the Town of Johnston initiated a project to provide  
10 public drinking water to area residents as a  
11 precautionary measure. Just let me say this, this  
12 project was not undertaken as a precautionary measure.  
13 There are many wells in the area and on the watershed of  
14 the Scituate Reservoir that were -- are polluted, and  
15 that's also referenced on page 5 of Docket No. 84-1045.

16 My question is that if this hazardous waste has and  
17 is flowing and polluting wells, what is going to stop it  
18 from continuing? And if the Cedar Swamp Brook, which  
19 flows to the bay, is contaminated, what effects does this  
20 have on the bay? Would your program guarantee that wells  
21 further away the Cedar Swamp Brook and the upper Simmons  
22 Reservoir be protected? I know Representative Russo has  
23 already implied that and asked that question and  
24 Representative Martelli has asked, if these things are so

1 severe, do you have the power to close this dump, if you  
2 in your own report say that the hazards are so great?

3 Thank you.

4 MR. BOYNTON: Thank you. Next  
5 is Robert -- I'm just going to spell this, I think it's  
6 C-H-S-Z-B-E-R-T-I-S.

7 MS. ROGERS: He changed his  
8 mind, he wasn't sure he wanted to speak.

9 MR. BOYNTON: Okay. Fine.

10 Kevin J. McNichols.

11 MR. McNICHOLS: Good evening.  
12 Unfortunately, I wasn't here last week so I'm not aware  
13 of everything that's going on about the project. My  
14 basic question is as the Councilman had said, the EPA has  
15 already identified a severe hot spot on this dump and  
16 labeled it as a super --

17 THE STENOGRAPHER: Excuse me,  
18 could you please speak up. I can't hear you.

19 MR. McNICHOLS: The gentleman  
20 said you had no jurisdiction on the operation of the  
21 dump. The State of Rhode Island has seen another EPA  
22 site, Picillo Pig Farm, which is one of the top ten  
23 Superfund sites in the country. EPA seems to have a  
24 record in Rhode Island or Rhode Island has a record with

1 EPA. You gentlemen don't show up until it has become a  
2 severe emergency. And you're sitting here saying that  
3 the operation here is going to be under the jurisdiction  
4 of Rhode Island DEM, which apparently has a very bad  
5 track record in controlling its own problems. I'd like  
6 to know what the criteria for EPA's assuming jurisdiction  
7 on this operation will be. And if you folks don't have  
8 direct operational control, what do we do to give you the  
9 direct operational control? Thank you.

10 MR. BOYNTON: Thank you. That  
11 concludes the comments --

12 MR. SANTILLI: May I approach  
13 now?

14 MR. BOYNTON: Mr. Santilli, you  
15 want to speak now? All right.

16 MR. SANTILLI: Thank you. Paul  
17 Santilli, 9 Albert Drive, Johnston. I'd like to know --  
18 there's two questions that I want to key on. I want to  
19 know who will be doing the testing, the water testing and  
20 the air quality testing at the landfill, and if it -- if  
21 the answer's going to be Solid Waste Management and/or  
22 DEM, even though I know that there's an oversight of ten  
23 percent, I'd like to know why EPA doesn't do indepen-  
24 testing up there with sample -- with these samples going

1 out to a lab out of State so it has nothing to do here in  
2 the State of Rhode Island. And I would like to know --  
3 for obvious reasons, I'd like that question answered,  
4 and, secondly, while I know that you're here because  
5 you're supposed to be eliminating the hazardous waste up  
6 at the landfill and containing it, the question that I  
7 have is with the landfill surrounded by three reservoirs  
8 and acres and acres of wetland, why EPA does not get  
9 involved with the Town in shutting the entire landfill  
10 down. I think that that would be the best alternative  
11 with all the problems that are going on up at the  
12 landfill.

13 This is the first time we're having EPA come in and,  
14 obviously, I know, again, for the hazardous waste, but I  
15 think you have a greater duty to the Town and to the  
16 people and to the environment of seeing that that entire  
17 landfill is closed down. Thank you.

18 MR. BOYNTON: Thank you. That  
19 concludes the comments that I had on the cards. Are  
20 there any other comments anybody would like to make?  
21 Could you give us your name and address, please.

22 MS. CERRA: Councilwoman Mary  
23 Cerra, 975 Atwood Avenue.

24 MR. BOYNTON: Can you spell the



1 last name for --

2 MS. CERRA: C-E-R-R-A, simple.

3 MR. BOYNTON: Thank you very

4 much.

5 MS. CERRA: My first question is  
6 does the cleanup plan that is being proposed fit into the  
7 State master plan approved by Statewide Planning?  
8 Question No. 1. How long will it take to complete this  
9 project and how effective will it be? I know I'm  
10 repeating many of the things that were said but these are  
11 questions I'd like answered. Are there Federal  
12 regulatory guidelines and how close would they be work,  
13 with all of the other agencies? How safe is the plan?  
14 What will happen to the trenches or pools of liquid that  
15 have already been pinpointed there by satellite when EPA  
16 was doing their investigation?

17 As we know, there are many, many of material was  
18 dumped into that landfill, and I have a newspaper article  
19 here that does indicate much of that. I can make a copy  
20 of it and I can leave it to you. It's dated November 21,  
21 1989. When I mail my questions to you, I can also send  
22 you a copy of this newspaper because it surprises me to  
23 see that in the old photographs there are obviously  
24 trenches of pools of liquid Robinson said is not your

12

1 typical solid waste. For about three years, the  
2 Sylvestres took in liquid waste pouring them into the  
3 three trenches and letting the liquid seep into the  
4 ground. So, you see, there's a lot of trenches here, as  
5 was pinpointed by EPA satellite. And my concern is what  
6 will be happening when you're working with this proposed  
7 plan.

8 We know that this all happened in the 1970's, we're  
9 familiar with that. I believe that was much discussed at  
10 the last meeting. In the Seventies there was a lot --  
11 like the Mayor said, we're all saying, where was EPA  
12 fifteen years ago, and who and how many agencies were  
13 responsible before the -- whatever comprehensive plan,  
14 before any regulatory guidelines were in effect and who  
15 else was responsible for dumping in this area? I just  
16 feel that, ironically, you'd be surprised when you read a  
17 newspaper article and find out. Okay. So you will have  
18 the newspaper article mailed to you at the time of my  
19 questions. Thank you very much for having me say a few  
20 words.

21 MR. BOYNTON: Is there anybody  
22 else that would like to make any comments? The comment  
23 period will remain open till March 14th and if you think  
24 of something or you want to mail us comments, you can do

1           that. The address is on page 5 of the proposed plan. —  
2           - And if you do have any questions in the meantime about  
3           commenting, you can call either Amy or Jim and I believe  
4           their numbers are in the proposed plan. I want to thank  
5           everybody for coming and giving comments. This hearing  
6           is closed. Thank you.

7                           (HEARING ADJOURNED AT 8:10 P.M.)

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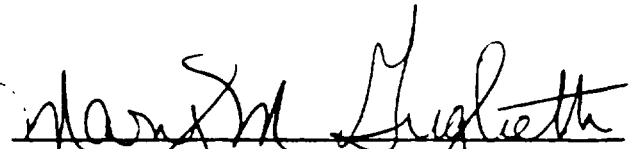
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STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
PROVIDENCE, SC.

I, MARY M. GUGLIETTI, do hereby certify that the  
foregoing transcript is true and accurate according to my  
stenographic notes.

IN WITNESS WHEREOF I hereunder set my hand and affix  
my notarial seal this 2d day of March, 1994.

  
MARY M. GUGLIETTI  
SHORTHAND REPORTER/NOTARY PUBLIC

(My Commission expires June 23, 1995)

**ATTACHMENT C**

**WRITTEN COMMENTS RECEIVED DURING THE  
PUBLIC COMMENT PERIOD**

UNITED STATES ENVIRONMENTAL  
PROTECTION AGENCY - REGION 1  
JAMES BROWN, PROJECT MANAGER  
AMY ROGERS, COMMUNITY RELATIONS

FEBRUARY 28, 1994

RE: E.P.A. PUBLIC MEETING TO DISCUSS THE PROPOSED  
CLEAN-UP PLAN FOR THE CENTRAL LANDFILL SUPERFUND  
SITE (JOHNSTON, RI)

I attended the public informational meeting on February 22, and February 28, at 7:00PM. The meetings were held in the auditorium of Johnston High School, Johnston, RI.

I would like the following comments/questions to be considered as part of the hearing process and be made part of record.

1. DOES THE CLEAN-UP PLAN THAT IS BEING PROPOSED FIT INTO THE STATE MASTER PLAN APPROVED BY STATE WIDE PLANNING?
2. HOW SAFE IS THIS PLAN?
3. HOW LONG WILL IT TAKE TO COMPLETE? AND HOW EFFECTIVE WILL IT BE?
4. DURING THIS PROCESS, WHAT WILL HAPPEN TO THE TRENCHES AND/OR POOLS OF LIQUID, ETC.?
5. ARE LINED LANDFILLS LEAK-PROOF?
6. SINCE THE TOWN DOES NOT OWN THE LANDFILL, WHO WILL HAVE TO FOOT THE CLEAN-UP BILLS?

Enclosed are newspaper articles that were presented for any information that may in some way help to assist you with your proposed plan.

Sincerely,



Mary Cerra  
Vice President  
Johnston Town Council

1  
1  
Wednesday, September 14, 1991

WASHINGTON

# First federal landfill standards will require regular r

The Washington Post

WASHINGTON -- In an effort to protect the nation's underground drinking water, the Environmental Protection Agency yesterday unveiled the first federal standards for landfills.

The nation's 6,000 landfills will have to install special devices to monitor the movement of underground contaminants, clean up ground water polluted by trash and cover the dump daily with soil to prevent pest infestation. New land-

fills will have to be rimmed with a special clay and plastic liner to prevent leaks.

But environmentalists said the regulation was so compromised by loopholes and weak provisions that it fails to protect ground water that supplies drinking water to half of the U.S. population.

The standards were issued nearly four years after the deadline set in 1984 by Congress. Although the EPA proposed regulations in 1988, they have been held up since then

by the Office of Management and Budget. A court suit brought by environmental groups in May forced the agency to publish the plan.

Local governments and the waste management industry have put off construction of new dumps in anticipation of federal standards to regulate their design. Experts predict a landfill shortage in the next decade as result of the delays.

Public landfills receive three-fourths of the 180 million tons of trash dumped by Americans every

year. None of the garbage meets the EPA definition of "hazardous." But significant dangers are posed by household pesticides, mercury in certain paints, lead in batteries and newsprint and cadmium in plastic products.

Nearly a quarter of the nation's worst toxic-waste sites are former landfills, and the EPA found contaminated ground water at 146 dumps in a 1988 study.

EPA Administrator William K. Reilly said the new standards will

"assure the integrity" of landfills.

The requirement to monitor ground water of active landfills twice a year — and once a year in closed dumps — will result in detection and cleanup of contaminants before they reach community water supplies, Reilly said.

More than a quarter of landfills now have a check for underground leachate. Among the provisions critical by environmentalists is an expansion from the liner requirement to small communities that have

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# RHODE ISLAND

## Pollution check OK'd at state landfill

### \$275,000 study to gauge threat to Scituate Reservoir

By BOB WYSS  
Journal-Bulletin Staff Writer

PROVIDENCE — A \$275,000 study was approved yesterday that is designed to discover if hazardous

waste dumped at the Rhode Island Central Landfill in Johnston is threatening ground water including the water supply for more than half of Rhode Island.

The Rhode Island Solid Waste Management Corporation, which owns the landfill, approved the study, which will take 25 months to complete. It stems from an administrative order issued in June, 1984,

by the U.S. Environmental Protection Agency, which was concerned about potential contamination from hazardous waste dumped at the landfill.

"We know hazardous waste was dumped there in the 1970s, and we want to know where it is going," explained Kenneth Wenger, project manager for the EPA in Boston.

The study will try to see if pollution has infiltrated ground water around the massive dump and whether it is threatening the wells of nearby homes or the Scituate watershed, the primary water source for Providence and surrounding communities.

### Pollution evidence lacking

Wenger said that there is no strong evidence indicating that pollution from the landfill has entered the Scituate watershed or has caused problems in wells still in use. But, he added, no firm conclusions are possible until the study is finished.

The study will determine only if a problem exists and how serious it is. After that, Wenger said, the options range from doing nothing to closing the landfill and launching a massive cleanup. While the landfill is on the federal Superfund cleanup list, Wenger said, the corporation would probably have to pay for any cleanup because Superfund money is used only as a last resort.

Records indicate that more than 1.5 million gallons of hazardous waste were dumped in 1978 and 1979 when the landfill was owned by Albert and Anthony Silvestri. The corporation paid \$10.1 million for the landfill in December, 1980, and Albert Silvestri remained a \$500-a-month consultant at the facility until he was dismissed last month.

Albert B. West, lawyer for the solid waste agency, said the Silvestris will be asked to pay for the study because the problems emanate from when they managed the facility.

"Why should I pay for that?" Albert Silvestri responded when informed of West's comments. Silvestri said that liquid waste, but nothing hazardous, was dumped at the landfill while he owned it and that the corporation's purchase agreement indicated that any claims for environmental problems had to be

*Shunday  
October 10, 1986*





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ment increases that any new environmental problems had to be filed by June, 1982.

West responded that the Silvestris have repeatedly been put on notice they would be liable for studies such as this one and that the June, 1982, date does not apply. He also conceded the claim will probably

The project, called a hydrogeologic study, involves a series of tests of the ground water including the siting of 21 new wells in and around the landfill to search for contaminants. The work will be conducted by engineers for Goldberg, Zomo & Associates (GZA) of Newton, Mass., and Wehran Engineering of Middletown, N.Y.

Michael Powers of GZA said that the results will then be analyzed and the potential health risks on surrounding residents assessed. The degree of risk will determine what actions should be taken, he said.

A group of Johnston residents organized as WATER (We Are the Endangered Residents) filed suit to close down the landfill because of concerns that pollution was poisoning their wells and the Scituate Reservoir.

WATER recently settled that suit on the condition that it receives \$35,000 a year from the solid waste agency so that it can hire consultants to oversee work at the landfill and on this study.

The corporation in April, 1984, first announced its plans for a broad hydrogeologic study, three months before the EPA filed its administrative order. After the EPA acted, the corporation agreed to broaden the study, but the final terms of a consent agreement were held up because the EPA has been short-staffed.

Yesterday, the corporation's commission authorized its executive director, Thomas E. Wright, to sign the final order. Wenger said it should be signed by all parties within two weeks, and work on the study must begin seven days after that.

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# Bostich 'inadvertently' dumps sodium cyanide

## Poison was mixed accidentally with trash, company says

By Dave Canfield  
Journal-Bulletin Staff Writer

JOHNSTON — The Stanley-Bostich Co. of East Greenwich "inadvertently" dumped 400 pounds of sodium cyanide at the state's central landfill last month, but state officials say it poses no immediate threat to public health or safety.

Alan Gates, environmental specialist for the company, yesterday told state officials that the chemical was accidentally mixed with about 8,000 pounds of regular trash dumped — and buried — at the landfill Jan. 29.

Gates said his company learned of the problem Wednesday, when employees discovered the sodium cyanide missing from a secure area used to store hazardous wastes at the plant. Someone had thrown it into a dumpster with the rest of the company's trash, and it was all taken to the landfill, he said.

"We realize it's a hazardous waste that came here," Gates said yesterday afternoon after meeting with state officials at the landfill. "We admit to that. We want to cooperate" with the investigation and cleanup.

Gates declined to elaborate on what happened, saying his company was still investigating. The company manufactures staples, nails and other fasteners and fastening equipment. They use sodium cyanide in their manufacturing process.

### Several agencies probing

Several state agencies are also investigating because it is illegal to dump hazardous waste in Rhode Island. Officials said Stanley-Bostich will be responsible for testing and



THOMAS WRIGHT, director of the state Solid Waste Management Corp., says immediate danger from the dumping of sodium cyanide at the state's central landfill.

cleanup costs, and the company could be fined.

Thomas Wright, director of the state Solid Waste Management Corporation, said landfill crews have identified, through daily records, a 400- by 100-foot area 30 feet deep where they think the sodium cyanide was buried.

"Right now we don't see any immediate danger" caused by the hazardous material buried there, Wright said. The area, however, is still being tested.

The site has been roped off and covered with plastic. Stanley-Bostich has hired MacDonald and Watson Waste Co. to test air samples and drill to determine exactly where the chemicals are and whether they could — or should — be removed.

Wright said that the rocklike chunks of sodium cyanide were buried in yellow bags and open pails but that they may be difficult to find because they have no markings indicating that the contents are hazardous.

MacDonald and Watson will also test similar chunks of sodium cyanide from the Stanley-Bostich plant to determine potential dangers to the atmosphere or ground water, Wright said.

Robert Bendick, director of the state Department of Environmental Management, said that one of the biggest concerns is that the cyanide will mix with acids or acidic leachate at the dump, creating deadly hydrogen cyanide gas.

No cyanide was found in air sam-

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ing the body...  
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are usually...  
● It can be gaseous for taste and...  
Inhaling as little...  
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cause death...  
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ounce equivalent...  
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in certain...  
silver and...  
graphic solvents...  
products...  
● Symptoms include nausea...  
anxiety, confusion...  
feeling of...  
throat...

# Boy's use/shoppes

STARTS TODAY

# IS BIRTHDAY



2

on cleanup costs, and the company could be fined.

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Robert Bendick, director of the state Department of Environmental Management, said that one of the biggest concerns is that the cyanide will mix with acids or acidic leachate at the dump, creating deadly hydrogen cyanide gas.

No cyanide was found in air samples taken yesterday, Bendick said. "So it doesn't appear that there's any hazard to health at this time."

However, a permanent air monitor will be installed, and state officials will monitor the area to ensure that the chemical doesn't spread or dissolve into ground water, Bendick said.

**A notification first**

Bendick and Wright said that this is the first time that they've been notified of hazardous waste being dumped at the landfill.

"The company reported it to us, and that's a first," Bendick said. "I can't recall a company reporting, 'Oops. We put a bunch of stuff in the trash and it got taken to the landfill.' ... I don't recall a situation like that."

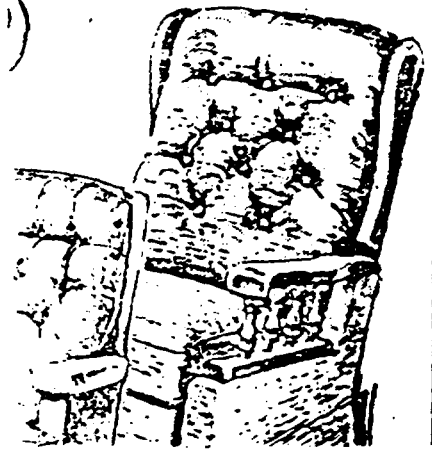
The Solid Waste Management Corporation contracts with Mac-

**Cyanide facts**

- It is one of the most rapidly fatal poisons known to man, blocking the body's ability to use oxygen. The heart, brain and kidneys are usually affected first.
- It can be in powder, liquid or gas form and typically has the taste and odor of bitter almond. Inhaling as little as 100 milligrams or the gas or swallowing as little as 300 milligrams of cyanide salts can cause death in a period ranging from seconds to minutes. (An ounce equals 28,350 milligrams.)
- Cyanide is commonly found in certain rat and pest poisons, silver and metal polishes, photographic solutions and fumigating products.
- Symptoms of poisoning include nausea without vomiting, anxiety, confusion, staggering, a feeling of suffocation, lower jaw stiffness, convulsions, paralysis and coma. Recovery from poisoning depends on how quickly antidotes are administered.

**STARTS TODAY**

**HOLIDAY ALE**



Donald and Watson to check every load of trash that enters the landfill to ensure that no hazardous materials are dumped there. But, Wright said, the three-man crew cannot inspect all 4,000 tons of trash dumped at the landfill every day. And they might not have recognized the sodium cyanide, anyway, he added.

"There's never any guarantee that hazardous waste isn't going to get into the landfill," Wright said.

But Johnston Mayor Ralph Russo said he's going to insist on stricter monitoring of every load of trash. "I think they should have a guarantee that this will never happen again."



—Journal-Bulletin Photo

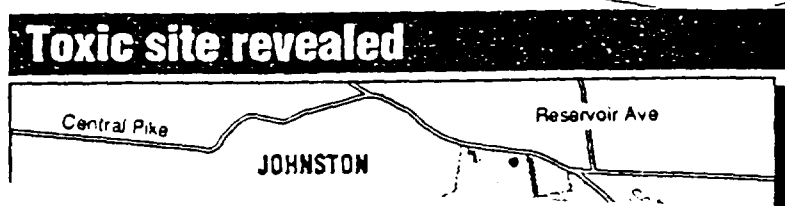
**NEIGHBORS:** This 1979 photo shows the proximity of the Rhode Island Central Landfill, the former investri dump, to the Simmons Upper Reservoir in Johnston.

# Satellites pinpoint source of toxic waste in Johnston

*Friday November 21, 1987*

by **JOHN HILL**  
Journal-Bulletin Staff Writer

**JOHNSTON** — Usually the government's spy satellites spend their monitoring fleets and armies and the globe. But last year one ed detect a different enemy — under the ground in Johnston.



## needs mo neighbor t

By **BOB JAGOLINZER**  
Journal-Bulletin Staff Writer

**SMITHFIELD** — The dispute between the town and the state Department of Transportation over an indoor salt storage facility, which appeared to have been settled last week, is apparently about to heat up again.

This time it's a property owner, Richard Conti, who wants the town to act. Conti's land abuts the site chosen for the barn at the intersection of Washington Highway (Route 116) and Douglas Pike (Route 7). Conti, through his attorney James P. Marusak, has sent a letter to the Town Council asking it to force the DOT to comply with town zoning and environmental laws before the facility is built. The letter is scheduled to be considered at tonight's council meeting.

Specifically, Marusak is urging the town to force the DOT to get approval of both the Zoning Board Review and the town's soil erosion office before proceeding further with construction.

Marusak said the state's site, which comprises about two acres, is zoned for industrial use. "A salt storage facility is not permitted in an industrial zone without a variance from the Zoning Board," he said.

Conti owns about 13 acres of land that abuts the state property on both sides. Earlier this year, the court rezoned it from industrial to village commercial, Marusak said.

Conti wants to put in a shopping center, with half a dozen stores. He fears the property will be used by the salt facility. "There are other concerns such as traffic that the facility will generate, would be addressed at a Zoning Board hearing," Marusak added.

The DOT wants to build an enclosure that will allow salt and sand to be stored indoors in winter. It would use trucks for use on snow-covered or icy roads. Frederic

## Town owes in legal fe

By **HELENE COOPER**  
Journal-Bulletin Staff Writer

**NORTH PROVIDENCE** — Providence attorney Kevin McAl who represented the Town Council in its court fight against the DOT has not yet

NEIGHBORS: This 1979 photo shows the proximity of the Rhode Island Central Landfill, the former Silvestri dump, to the Simmons Upper Reservoir in Johnston.

# Satellites pinpoint source of toxic waste in Johnston

By JOHN HILL  
Journal-Bulletin Staff Writer

November 21, 1989

JOHNSTON — Usually the government's spy satellites spend their time monitoring fleets and armies around the globe. But last year one helped detect a different enemy — one under the ground in Johnston.

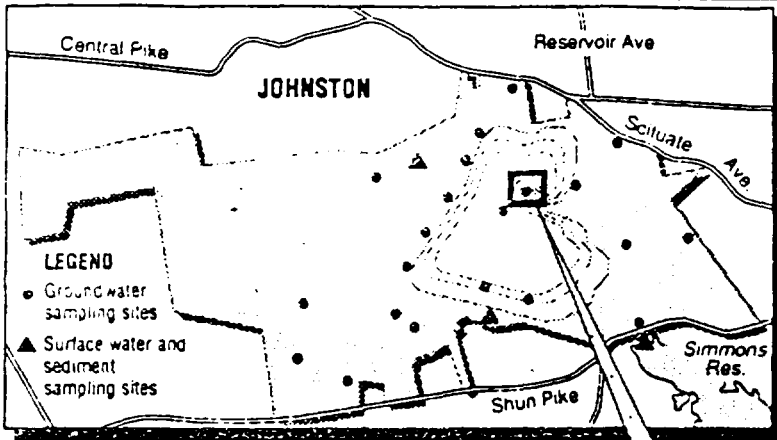
At the time, federal and state engineers were stymied in their efforts to locate the spots where liquid chemicals were dumped during the 1970s at the former Silvestri dump, now the Rhode Island Central Landfill.

Though the precise dumping spots couldn't be found, they were generating enough contamination to put the landfill on the superfund list of the federal Environmental Protection Agency.

Engineers had interviewed former landfill owners and workers from the 1970s and drilled wells where they thought the old trenches were. But they came up empty.

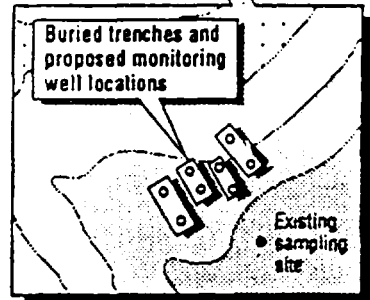
David Dorocz, an environmental engineer with the Solid Waste Management Corporation — the state agency that runs the landfill — said the break came when a EPA supervisor was at a seminar with a Department of Defense official last

## Toxic site revealed



### R.I. CENTRAL LANDFILL

Size:	154 acres
Contamination found:	1983
Superfund designated:	1984



—Journal-Bulletin Graphic

Turn to SATELLITES, Page 2

Conti war center, with he fears the ed by the other concer the facility v addr at ing, Marusak DOT wan barn that wi be stored in loaded into t covered or i

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By HE Journal-

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# Thanksgiving games still grid se

Local griders are keeping one eye on the football and the other on the turkey this final week of the regular Interscholastic season. Two of the four contests in the Metro West area will have a bearing on the final division standings, but neither will play a part in Citizens Bank Super Bowl XVIII one week from Saturday.

Football on Thanksgiving is as traditional as grandma's dinner and mom's apple pie. As traditional as eating too much turkey and falling asleep in front of the television set watching whatever ball game that happens to be on.

The longest running Turkey Day series in this region is between Smithfield and North Providence with this year's game marking the 20th meeting between the two



## SPORTS WEEK

By AL ALEIXO

Bowl appearance against Central. While the Cougars have the usual bumps and bruises, the Sentinels may have to go without senior quarterback P.J. Williams who is recovering from a separated shoulder he suffered late in the season. Coach Jim Dunn says there are probably seven or eight players who may miss the game because of injury or illness, but North Providence's Bernie Pina knows

'60s.

"That was against a tough (Fra 'Monk' Maznicki team," he recalled had a quarterback by the name of ( Cornell who was real good and the was scoreless when I got hurt and me to the hospital.

"They put seven stitches in my sent me back to the field. I was sur game was still going on, but to hell broke loose just after I le... he continued. "They told me there had brawl and the Brothers took the tea field and made them all sit in the bu or 15 minutes to cool them off. I sti know what started it, but they told players, fans, everyone got into it. the game, 6-0."

# Satellites pinpoint source of toxic waste

Continued from Page One

fall.

The defense official talked about the highly magnified photographs his agency had on file, some of the United States that dated back into the 1970s. But for security reasons, the Defense Department could not release them.

Dorocz said the corporation and EPA sent in maps of the landfill area and asked the Defense Department specialists to review their files and see if they could spot any trenches.

"They marked the maps, said those are the trenches," Dorocz said.

Armed with that high-altitude reconnaissance, the corporation will be sinking about 17 new test wells, and Dorocz said he is optimistic they will pinpoint the source of the contamination.

That's the good news. The bad news is, even if they find the pollution source, it may take two years to figure out what to do about it.

"It's a couple of years," said Wayne Robinson, remedial program manager for the Boston office of the federal Environmental Protection Agency and the federal supervisor of the Johnston cleanup. "That's realistic."

## Time and money

The reality of superfund cleanups is that they can take years of work and millions of dollars. The Metro West area's two sites, the Central Landfill in Johnston and the Davis liquid dump site on Tarkiln Road in Smithfield, are relics of 10 to 15 years ago, when it was a standard — and legal — practice to dump liquid waste into the ground and forget about it.

The superfund program is trying to take those sites and impose the disposal standards of the 1980s on the legacies of the 1970s.

EPA officials at the Davis site — about eight miles north of the Central Landfill — are further along in their investigations than those in Johnston. At Davis's dump, the EPA has decided what it thinks will clean the site, but Robinson's counterpart on that project said accomplishing it could take 10 to 40 years.

"It takes a long time; I really can't say," said Neal Handler, the remedial project manager at the Davis site. "There are so many kinds of possibilities, some of those materials may have sunk very deep."

Some of the chemicals have leached into the bedrock under the site, Handler said, and flushing the bedrock clean to where the water

would be pure enough to drink could take decades. It could even be impossible.

Dorocz said the \$1 million investigation in Johnston has centered on three trenches that were located in the center of the landfill in the 1970s when it was operated by the Silvestri brothers.

"In old photographs, there are obviously trenches or pools of liquid," Robinson said. "It is not your typical solid waste."

For about three years, the Silvestris took in liquid wastes, pouring them into the three trenches and letting the liquid seep into the ground.

"A lot of those liquid wastes were industrial wastes that even by today's standards were not hazardous wastes," Dorocz said. Ironically, one of the Silvestris' best customers was the state Department of Environmental Management, which used the site to dispose of oil and grease.

At the Davis site in Smithfield, the problem is easier, at least in terms of officials knowing what they have to do. But estimates are it could take 40 years and \$25 million to clean up the site, where liquid chemical wastes were poured from tanker trucks into open lagoons throughout the 1970s, until a Superior Court ordered the operation

closed in 1978.

The EPA estimates it can destroy more than 99 percent of the contaminating organic compounds by burning the soil in a high-temperature incinerator. The exhaust will go through air filter equipment before being released into the atmosphere.

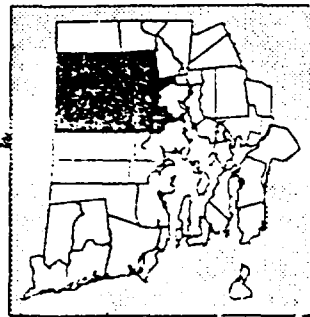
The treated soil will be tested for heavy metals, which aren't destroyed by incineration. Clean soil will be used as fill, and soil that remains contaminated will be dumped at a special landfill prepared according to federal guidelines.

For the ground water, EPA wants to employ what it calls the "pump and treat" alternative. Extraction wells would pump the water from the aquifers and send it into a carbon filtration system to remove oils, metals, suspended particles and organic compounds. The sludge would go into the special landfill.

Construction of special landfills and special engineering tests to determine contamination levels and handle the wastes are made more expensive because the EPA may require a superfund site owner to improve the site's treatment if the technology to do it improves.

"The rules and regulations can change so fast," he said. "Then we've got to go out and do it all over again."

## METRO WEST II



The Metro West II section of the Journal-Bulletin contains news and features about local schools, churches, clubs, people, sports and events in the communities of Cranston, Glocester, Smithfield, North Providence, Johnston, Scituate and Foster.

News items for this section should be submitted at least four working days before publication.

News of these communities should be mailed or delivered to:  
The Journal-Bulletin's Metro West Bureau  
One Commerce Way  
Johnston, RI 02919

If there are questions, call Bettye Poon at 273-2300.

For information about newspaper delivery, call the Journal-Bulletin Customer Service Department at 277-7600.  
Residents of Glocester, Smithfield, North Providence, Johnston, Scituate, or Foster may call 1-800-669-7626 (toll free).

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For classified advertising, call 277-7700.

2

INGTON

# Will require regular monitoring

ear. None of the garbage meets the EPA definition of "hazardous." But significant dangers are posed by household pesticides, mercury in certain paints, lead in batteries and newsprint and cadmium in plastic products.

Nearly a quarter of the nation's worst toxic-waste sites are former landfills, and the EPA found contaminated ground water at 146 dumps in a 1988 study.

EPA Administrator William K. Reilly said the new standards will

"assure the integrity" of landfills.

The requirement to monitor the ground water of active landfills twice a year — and once a year for closed dumps — will result in the detection and cleanup of contaminants before they pose a community water supply, Reilly said. Fewer than a quarter of landfills now regularly check for underground leaks.

Among the provisions criticized by environmentalists is an exemption from the liner requirement for small communities that have no

practical alternative to landfills. Allen Hershkowitz, of the Natural Resources Defense Council, criticized the regulations for failing to require the cleanup of surface water polluted by landfill leaks and the treatment of certain wastes before they enter landfills.

Dan Weiss, of the Sierra Club, said the regulation gives too much authority to states to create their own exemptions to the federal standards.

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tion of risk-taking — finds its roots in the biblical story of Adam and Eve's partaking of the forbidden fruit.

"They took a gamble — I might say a very large gamble — and we are all paying the price of

being to deal with... is on the increase. And while the numbers... questions remain.

"This is a relatively new field," Labonte said. "We're basically at where alcohol treatment was

only grow, L  
"All the  
"But it's esti  
who gamble"

Monday  
with hearing 2/1/89

# Public EPA meeting on Central Landfill

■ Hearings will be held later on the impact of contamination off the landfill site, an EPA spokeswoman said.

By JOSEPH R. LaPLANTE  
Journal-Bulletin Staff Writer

JOHNSTON — The U.S. Environmental Protection Agency will introduce its plan for cleaning the Superfund site at the state Central Landfill at a public meeting tomorrow evening, when it will report on the extent of contamination and health risks there.

The session, originally set for Feb. 12 but postponed because of snow, will start at 7 p.m. in the Johnston High School auditorium.

The federal agency proposes to cap the final 89 acres of a landfill section designated Phase I and to integrate it with the cap on 32 more acres now monitored by the Department of Environmental Management.

The agency also proposes to pump out and treat contaminated ground water from "hot spots" at the landfill. It also plans to place deed restrictions on ground-water use and land development in the southern end of the buffer zone surrounding the landfill, which is

owned by the state Solid Waste Management Corporation.

The agency's plan will also be the subject of a public hearing next Monday at 7 p.m. in the high school auditorium.

A separate pair of meetings will be held to discuss the impact of contamination off the landfill site, said agency spokeswoman Amy Rogers.

The Central Landfill remains the major dumping site for trash in Rhode Island, receiving about 85 percent of the state's solid waste.

Governor Sundlun last summer released a set of goals for the Central Landfill that identify a sequence of four new landfills that would replace the closed 121 acres that are the target of the cleanup, by using the remaining 33 acres on the 154-acre property for garbage disposal.

Together, the new landfills — called Phases II and III — could handle the state's trash until 2023, which angers Johnston residents and Mayor Ralph R. Russo, who signed an agreement with the state in 1989 with then-Governor Edward D. DiPrete to close all landfill operations by July 1.

The agency will hold the Feb. 28 meeting so that the public can make comments about the cleanup plan and submit statements.

# Gasoline spill shuts down section of Route 6 in Swansea for 5 hours

SWANSEA, Mass. — A section of Route 6 was closed to traffic for about 5½ hours, until 10 last night, after about 30 gallons of gasoline spilled onto the roadway from a pump at the Cumberland Farms Store at Route 6 and Maple Avenue.

Minutes after the highway was closed, at 4:30 p.m., nearby Bushee Road also was closed.

Fire officials said a hazardous condition persisted when the gasoline mixed with melting snow and drifted along the highway.

Firefighters and employees of the state Departments of Public Works

and Environmental Protection were still cleaning up the scene at 11 p.m., said a spokesman for the Fire Department.

The area of the spill is not far from the Coles River. As a precaution, the Coast Guard and the Special Hazards Unit of the Seekonk Fire Department were also called to the scene, the spokesman said.

The cause of the spill was unclear. A police officer speculated that the gas pump may have been hit by a car.

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# Audubon Society of Rhode Island



10 Sanderson Road  
Smithfield, RI 02917-2600  
401-231-6444

Lee D. Schaefer, Jr.  
Executive Director

James M. Brown, Remedial Project Manager  
U. S. Environmental Protection Agency  
Waste Management Division (HSV-CANS)  
JFK Federal Building  
Boston, MA 02203-1911

re: Central Landfill: EPA's proposed Plan under CERCLA  
2/28/94

Dear Mr. Brown:

I presented oral testimony on February 28, 1994, at the public hearing on the above-referenced case in Johnston, Rhode Island. However, I would like to emphasize Audubon's position that the chemical sludge be removed from the hotspot in order to prevent future groundwater contamination after the remedial treatment has been completed.

Because groundwater will be formed as precipitation infiltrates land outside the capped landfill footprint, groundwater will continue to come into contact with the sludges dumped during the Silvestri Brothers operation of the area. According to U.S.G.S. surficial geology maps there are glacial deposits in the area which transmit groundwater easily. These are the deposits which the Silvestri Brothers sold in their sand and gravel operation. We also understand that the sludges were dumped into open pits cut into the bedrock and fissures in the bedrock may also serve in the transport of groundwater. General patterns of groundwater movement would indicate that the groundwater moving over and around the hotspot would eventually recharge the surface water in Cedar Swamp Brook which flows into Simmonsville Reservoir. We believe that the long-term health of the groundwater quality and the surface water it recharges will be best served by removing the hotspot sludges.

Audubon's interests in this case are to protect public and environmental health while at the same time providing the services of an already developed and already altered site for landfilling solid waste.

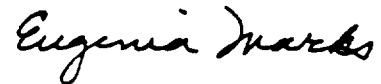
We ask that the proposed plan consider the long term possibilities for contamination of the Upper Simmonsville Reservoir. We are concerned that erosion is occurring on the existing grassed southeastern face of the landfill, contributing not only to sedimentation of Cedar Swamp Brook and ultimately the Upper Simmonsville Reservoir, but also contributing some contaminants. Of particular concern would be the heavy metals cadmium, chromium, and mercury which may leach as organic acids form in the refuse or acidified precipitation continues at current pH levels if erosion compromises the RI DEM single cap barrier. Our concern is for the health of fish and of any persons who may consume them. Although the risk is low on a population scale, we believe that this toxicological pathway should be addressed. We understand that there are off-site studies continuing which will provide data on which to base decisions. Nonetheless, the treatment of the cap and the extraction of groundwater in the proposed plan on which we comment tonight have an impact on water quality and fish health in the Upper Simmonsville and Almy Reservoirs.

We ask that the possibility of extracting groundwater from the southern landfill boundary be held as a contingency should off-site studies indicate levels of concern.

We also ask that consumption fish be considered under recreational fishing. Although I understand that standards for metals and organics in fish tissue are not set federally, some states are creating their own standards.

Thank you for this opportunity to comment.

Cordially,

A handwritten signature in cursive script that reads "Eugenia Marks".

Eugenia Marks  
Director for Issues

State of Rhode Island and Providence Plantations

REPRESENTATIVE  
JENNIFER A. CHAMPAGNE MARTELLI  
19 Warren Avenue  
Johnston, Rhode Island 02919

Room 21, State House  
Providence, Rhode Island 02903

Res.: 401-231-8510



Committee on Health, Education  
and Welfare

Joint Committee on Accounts  
and Claims

House of Representatives

March 8, 1994

Mr. James M. Brown  
Remedial Project Manager  
U.S. Environmental Protection Agency  
Waste Management Division (HSV-CAN5)  
JFK Federal Building  
Boston, MA 02203

Dear Mr. Brown:

Please find enclosed a written review of the questions and comments publicly presented at the February 28, 1994 public hearing at the EPA Hearing on the EPA Source Control Plan for the Central Landfill Superfund Site.

Respectfully submitted,

*Jennifer A. Martelli*

Jennifer A. Champagne Martelli  
Representative - District 56

JACM/jak

Enclosure

# State of Rhode Island and Providence Plantations

REPRESENTATIVE  
JENNIFER A. CHAMPAGNE MARTELLI  
19 Warren Avenue  
Johnston, Rhode Island 02919

Room 21, State House  
Providence, Rhode Island 02903

Res.: 401-231-8510



Committee on Health, Education  
and Welfare

Joint Committee on Accounts  
and Claims

## House of Representatives

The Preferred alternative OUI-5 does not include removing the RIDEM cap on the existing 32 acres and replacing it with the RCRA C cap.

What short and long term affects would occur if the RCRA C cap is not used on that 32 acres?

What short and long term affects if OUI-8 and OUI-9 are not completed?

If the RIDEM Cap replaced and/or the off-site disposal of the hot spot chemical sludges removed your report suggests that a tremendous amount of off-site trucking would occur.

What compensation do you suggest to the (Town of Johnston) host community or the area residents for their exposure to the increase trucking.

I will now focus on the treatment of groundwater in the Southern Landfill boundary the report states that the treatment of groundwater in Southern Landfill boundary, "may result in a significant lowering in the water table, which could impact wetlands."

1. What would the impact be on wetlands if you went forward with the treatment of the groundwater in the southern area?
2. What effect short/long term if this area is not treated?

What proof can EPA provide that the new so-called State Of The Art Landfill, Phase II, III, will not produce the same or similar chemical sludge that we are not cleaning up?

All nine Source Control Alternatives were examined and are proposed by the EPA, I would like to know why is not one of the alternatives to cease all Landfill operations considering it's close proximity to the Reservoir?

I request a legal opinion as to what authority the EPA posses to recommend the closure of the State Landfill operations in the Town of Johnston. Further, in EPA's legal opinion, what body is vested with the power; what body possesses the responsibility, to recommend complete cestation of Landfill operations in the Town of Johnston.

# Weston & Sampson

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March 9, 1994

USEPA, Waste Management Division  
HSV - CANS  
JFK Federal Building  
Boston, Massachusetts 02203-1911

Re: 9319.1 Central Landfill Site  
Johnston, Rhode Island  
Proposed Plan, Comments

Attention: James M. Brown, Esq.  
Remedial Project Manager

Dear Mr. Brown:

In accordance with the request and the authorization of the Mayor of Johnston, RI. Mr. Ralph R. Russo a review of the proposed plan for remediation of the Central Landfill, Johnston, RI was completed by this office.

It is our understanding that the Environmental Protection Agency (EPA) has proposed, in the Source Control Plan for the Central Landfill Superfund Site, to cap 89-Acres of the landfill and extend the cap over that portion of the 33 acre expansion that "piggy backs" the existing unlined landfill. If it is the intention of the EPA to delay closure of 89 acres of the landfill until the 33 acres expansion is capped then the flow of leachate through the so called "hot spots" will continue unabated until such time as the expansion area is closed. It is anticipated that phase II and III will continue operation until 2023. We recommend that the EPA complete a construction schedule for the 89 acre closure and prepare an analysis of groundwater contamination due to delayed closure.

By moving forward with an expansion which "piggy-backs" on the existing unlined landfill the potential exists for a) differential settlement on top of the existing landfill and b) gross deformation of the liner on the side slope of the existing landfill.

Differential Settlement is due to void spaces within the existing landfill. Areas settle and consolidate at different rates causing pipes laid at minimum slope for leachate collection to settle and possibly break. The net effect is a buildup of leachate within the landfill which will eventually flow through the existing unlined landfill and potentially through "hot spots" identified

# Weston & Sampson

E N G I N E E R S , I N C .

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James M. Brown, Esq.

March 9, 1994

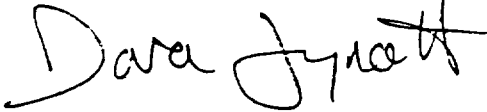
Page 2

by the EPA. Deformation is due to settlement of the existing unlined landfill and the weight of new trash placed on the side slopes. Gross deformation of the liner or clay can lead to rupture of the liner. If this occurs, leachate may flow through the existing unlined landfill and potentially through "hot spots" identified by the EPA. It is our request that the EPA provide documentation in support of their proposed closure design and in particular on the effects of differential settlement and gross deformation of the lined expansion.

If you have any further questions or require any additional information please do not hesitate to call.

Very truly yours,

WESTON & SAMPSON ENGINEERS



J. Dara Lynott, P.E.  
Project Engineer

JDL:lag

cc: Mr. Ralph R. aRusso, Mayor of Johnston  
Mr. Ralph J. Perrotta, Esq.

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# **GROUND WATER ASSOCIATES, INC.**

16 Commercial Drive, P.O. Box 280, Dracut, Massachusetts 01826 (508) 970-5388

March 11, 1994

Mr. James M. Brown, Remedial Project Manager  
U.S. Environmental Protection Agency  
Waste Management Division (HSV-CAN5)  
JFK Federal Building  
Boston, Massachusetts 02203-1911

**Re: Proposed Source Control Plan  
for Central Landfill Site**

Dear Mr. Brown:

Having reviewed EPA's proposed Source Control Plan summarized in the February, 1994 document, several areas of concern are noted.

First, we understand that closure and capping of the Phase I landfill will be delayed until the Phase II area is completed. Any delays in the capping/closure program will undoubtedly leave open faces at the existing landfill. Such open areas will allow rainfall infiltration and greatly enhance opportunities for leachate generation. Our report of March, 1993 indicated that both leachate generation and contaminant migration from the "hot spot" had already caused significant impacts to ground water quality both on-site and off-site. Also, additional leachate generation would hinder efforts to monitor the effectiveness of any collection at the hot spot. Changes in ground water quality due to leachate generation versus changes caused by the collection system would be difficult to discern.

The second concern is related to capture and containment of both the hot spot contamination, and contaminant movement along the southern boundary of the landfill. Although the EPA summary indicates that no risk reduction benefits can be gained by capturing contaminated ground water beyond the hot spot area, concentrations of VOC's and metals significantly exceeding state and federal standards are found beyond the extent of the Phase I landfill. In Ground Water Associates' report of March, 1993, data is presented showing the presence of dissolved thallium (54-457 ppb) and chlorobenzene (300-474 ppb) at elevated levels to the south and southeast of the landfill (see GWA, 1993, pages 40-43).

Without capture and containment of these contaminants of concern, an elevated continued risk to human health and the environment can be expected. Only options OU1-6, OU1-7, OU1-8, and OU1-9 address this issue--not OU1-5.

Mr. James M. Brown, Remedial Project Manager  
March 11, 1994  
Page Two

Options 7 through 9 are discounted due to their impacts on wetlands. However, discharge of treated water on-site is a possible alternative. Thus, the Source Control Plan should consider the ability to maintain wetlands by on-site recharge.

In summary, any Source Control Plan which allows continued generation of leachate while not fully capturing and containing ground water contamination should be re-evaluated, as it does not ensure an adequate level of protection for human health and the environment.

Very truly yours,

GROUND WATER ASSOCIATES, INC.



Blake A. Martin  
District Manager

DN:94-68-25



March 1, 1994

Mr. James M. Brown, Remedial Project Manager  
U.S. Environmental Protection Agency  
Waste Management Division (HSV-CAN5)  
JFK Federal Building  
Boston, Ma 02203-1911

RE: Central Landfill Site  
Johnston, RI

Dear Mr. Brown,

I am writing to you with a great feeling of frustration.

Is there no possible way you can CAP the existing portion of the landfill prior to Phase II and Phase III being filled to capacity by the Rhode Island Solid Waste Agency? It seems to my uneducated mind that continued rain infiltration into Phase I will only increase the amount of leachate and therefore the amount of liquid to be pumped from the "Hot Spot" presenting a disposal problem of its own.

After sitting thru countless meetings with Rhode Island DEM and Solid Waste Management years ago, and being gullible enough to believe the hearing officer, Kathleen Lanphear, when she rendered her decision that the landfill would close, I find my faith in Government - all divisions - to be sorely tested. I believed, as I am sure many of my fellow residents of the west end of Johnston believed, that EPA in its infinite wisdom would protect our environment for our future generations. Wrong again.

Another concern I would like addressed is does your agency have any solutions to deal with the increasing problem of seagulls in and around the landfill? Compared to Hazardous Waste contaminating our lives this would seem a minute concern but it is definitely a growing problem as more and more fly over and land in the Reservoir and surrounding bodies of water. It seems to me that something should be done to control this problem.

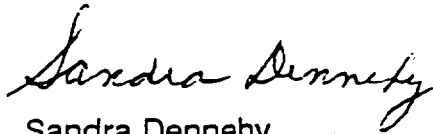
Hopefully your proposed plan is the best available and will be implemented in a timely manner. Help to restore my belief that right will prevail over wrong and that

continued

Government truly does care for the "little people". We do need all the help you can provide and we need it now.

Thank you for answering my concerns.

Sincerely,

A handwritten signature in cursive script that reads "Sandra Dennehy".

Sandra Dennehy

(Mrs. Donald Dennehy)  
49 Pine Hill Road  
Johnston, RI 02919

APPENDIX E

RECORD OF DECISION  
CENTRAL LANDFILL

ADMINISTRATIVE RECORD INDEX

## Introduction

This document is the Index to the Initial Administrative Record for the Central Landfill National Priorities List (NPL) site. Section I of the Index cites site-specific documents and Section II cites guidance documents used by EPA staff in selecting a response action at the site.

The Administrative Record is available for public review at the EPA Region I's Records Center, 90 Canal St., Boston, Massachusetts (617-573-5729), and at Marion J. Mohr Memorial Library, 1 Memorial Avenue, Johnston, Rhode Island 02929. Questions concerning the Administrative Record should be addressed to the EPA Region I site manager. Additional/Supplemental volumes may be added to this Administrative Record.

This index contains Confidential documents that are available only for judicial review.

The Administrative Record is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

Central Landfill  
NPL Site Administrative Record  
Index

Compiled: February 4, 1994

ROD Signed June 17, 1994

Prepared for

Region I

Waste Management Division

U.S. Environmental Protection Agency

Central Landfill NPL Site

Administrative Record

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  - 1.2 Preliminary Assessment
- 3.0 Remedial Investigation (RI)
  - 3.1 Correspondence
  - 3.2 Sampling and Analysis Data

Volume II

- 3.4 Interim Deliverables
- 3.6 Remedial Investigation (RI) Reports

Volume III

- 3.6 Remedial Investigation (RI) Reports (cont'd.)

Volume IV

- 3.6 Remedial Investigation (RI) Reports (cont'd.)

Volume V

- 3.7 Work Plans and Progress Reports

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- 3.7 Work Plans and Progress Reports (cont'd.)

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- 3.9 Health Assessments
- 3.10 Endangerment Assessments
- 4.0 Feasibility Study (FS)
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Central Landfill NPL Site

Administrative Record

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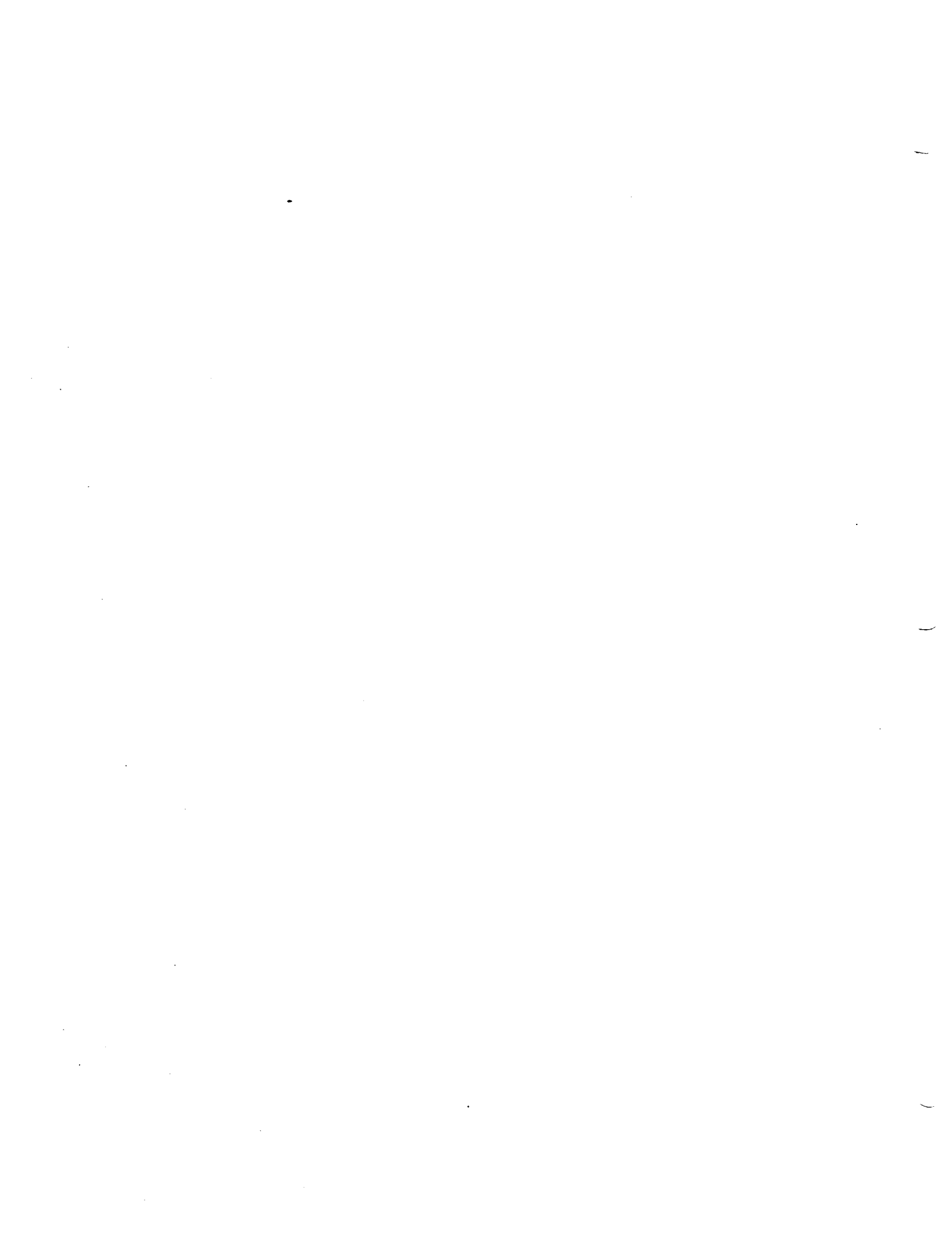
- 13.0 Community Relations
  - 13.1 Correspondence
  - 13.5 Fact Sheets
- 16.0 Natural Resource Trustee
  - 16.1 Correspondence
- 17.0 Site Management Records
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Administrative Record Index

Section I

Site-Specific Documents





## ADMINISTRATIVE RECORD INDEX

for the

### Central Landfill NPL Site

#### 1.0 Pre-Remedial

##### 1.2 Preliminary Assessment

1. "Potential Hazardous Waste Site Identification and Preliminary Assessment," EPA Region I (April 15, 1982).

#### 3.0 Remedial Investigation (RI)

##### 3.1 Correspondence

1. Letter from John P. Hartley, Goldberg-Zoino & Associates, Inc. to Kenneth Wenger, EPA Region I (April 6, 1987). Concerning comments and questions relating to review of residential well data.

*Attachments cited in entry number 2 may be viewed, by appointment only, at the EPA Region I Records Center, Boston, Massachusetts.*

2. Letter from Jeffrey Girard, Rhode Island Solid Waste Management Corporation to John Quinn, State of Rhode Island Division of Land Resources (May 20, 1987). Concerning the attached:
  - A. Project Location Plan
  - B. Well Location Plan
  - C. Well Detail (Drawing No. 833419.3)
  - D. Slotted PVC Pipe Detail (Drawing No. 833419.4).
3. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Ronald Lee, State of Rhode Island Department of Health (August 11, 1987). Concerning a request for information associated with residential well sampling data.
4. Memorandum from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Ronald Gagnon, State of Rhode Island Department of Environmental Management, Richard C. Boynton, EPA Region I, Town of Johnston (February 15, 1991). Concerning notification of sampling rounds.
5. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Ronald Gagnon, State of Rhode Island Department of Environmental Management (March 18, 1991). Concerning explanation of the attached "Table of Locations, Elevations, and Current Status of Wells and Borings."
6. Letter from Richard C. Boynton, EPA Region I to Thomas E. Wright, Rhode Island Solid Waste Management Corporation (April 24, 1991). Concerning notification that James M. Brown will be the EPA Remedial Project Manager for the site.

## 3.1 Correspondence (cont'd.)

7. Letter from Dennis P. aRusso, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (May 3, 1991). Concerning decommissioning of well WE87-1. With attached:
  - A. Procedures for decommissioning monitoring wells
  - B. Site Plan.
8. Letter from Judith S. McCabe, State of Rhode Island Department of Environmental Management to James M. Brown, EPA Region I (May 7, 1991). Concerning results of the April 30, 1991 meeting on the Phase II Expansion Area.
9. Letter from John P. Hartley, GZA GeoEnvironmental, Inc. to James M. Brown, EPA Region I (May 14, 1991). Concerning explanation of the attached preliminary sampling schedule.
10. Letter from James H. Doorley III, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (May 22, 1991). Concerning plans to landfill Interim Area 3.
11. Letter from Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (May 30, 1991). Concerning notification that deep-well drilling will commence on June 10, 1991.
12. Letter from Judith S. McCabe, State of Rhode Island Department of Environmental Management to James M. Brown, EPA Region I (June 3, 1991). Concerning explanation of the attached Memorandum Dated October 3, 1988 from Susan B. Kiernan and Sofia Bobiak, State of Rhode Island Department of Environmental Management to Robert L. Bendick, State of Rhode Island Department of Environmental Management.
13. Letter from James M. Brown, EPA Region I to Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation (June 6, 1991). Concerning proposed casing and well grout for deep wells in HWDA-2.
14. Letter from Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (June 14, 1991). Concerning decommissioning of Monitoring Well WE87-1 a & b.
15. Trip Report on a Visit to the Central Landfill Site, James M. Brown, EPA Region I, Dennis P. aRusso and Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation (June 18, 1991). Concerning drilling of well ML6.
16. Letter from Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (June 18, 1991). Concerning the revised schedule for deep-well drilling.
17. Letter from James M. Brown, EPA Region I to Jeff Newman, State of Rhode Island Office of the Speaker (July 1, 1991). Concerning transmittal of the attached "RI/FS Status Report -- June 1991."
18. Letter from James M. Brown, EPA Region I to Joseph Ignazio, U.S. Army Corps of Engineers (July 8, 1991). Concerning a response to the attached June 13, 1991 letter regarding site activities.
19. Letter from Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (July 18, 1991). Concerning the attached list of documents pertaining to the RI/FS.
20. Letter from Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (July 23, 1991). Concerning confirmation of the July 29, 1991 RI/FS meeting.

## 3.1 Correspondence (cont'd.)

21. Letter from James M. Brown, EPA Region I to Jeffrey Girard, Rhode Island Solid Waste Management Corporation (July 30, 1991). Concerning rock excavation in Phase II and III of the site and the attached Letter Dated November 24, 1987 from Kenneth Wenger, EPA Region I to Jeffrey Girard, Rhode Island Solid Waste Management Corporation
22. Letter from James M. Brown, EPA Region I to Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation (August 2, 1991). Concerning summary of the July 29, 1991 meeting.
23. Letter from Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation to Ronald Gagnon, State of Rhode Island Department of Environmental Management (August 6, 1991). Concerning requests for new sampling wells. With attached:
  - A. Proposed Location Plan
  - B. Location Plan and Boring Logs for B-1 and WE 87-13.
24. Letter from James M. Brown, EPA Region I to Dennis P. aRusso, Rhode Island Solid Waste Management Corporation (August 16, 1991). Concerning a revised schedule for completion of the RI/FS.
25. Letter from Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (September 5, 1991). Concerning agreement with the revised schedule for completion of RI/FS documents.
26. Letter from Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (September 23, 1991). Concerning transmittal of the attached field summary for the decommissioning of MW-D and the GZ88 series wells.
27. Letter from Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (September 25, 1991). Concerning confirmation of the October 15, 1991 meeting.
28. Letter from Richard C. Boynton, EPA Region I to Dennis P. aRusso, Rhode Island Solid Waste Management Corporation (October 10, 1991). Concerning the revised schedule for the primary RI/FS deliverables.
29. Letter from Dennis P. aRusso, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (October 18, 1991). Concerning a request for EPA to release water quality results from the attached list of residential wells that Rhode Island Solid Waste Management Corporation now has title to.
30. Letter from Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (December 3, 1991). Concerning meeting scheduled for December 17, 1991.
31. Letter Report from Thomas E. Billups, David R. Carchedi, and Michael A. Powers, GZA GeoEnvironmental, Inc. to Michael E. Lavalley, Rhode Island Solid Waste Management Corporation (December 30, 1991). Concerning final report of blast monitoring activities.
32. Letter from Michael E. Lavalley, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (January 3, 1992). Concerning transmittal of the Blast Monitoring Final Report, GZA GeoEnvironmental, Inc. for comment.

## 3.1 Correspondence (cont'd.)

33. Letter from Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (February 4, 1992). Concerning construction of a Westside Leachate Collection System and the request that EPA provide opinion on whether Resources Conservation and Recovery Act (RCRA) will apply.
34. Letter from Russell J. Morgan and Michael A. Powers, GZA GeoEnvironmental, Inc. to James M. Brown, EPA Region I (February 11, 1992). Concerning deliverable schedules and RI/FS timeline.
35. Letter from Richard C. Boynton, EPA Region I to Terrence Gray, State of Rhode Island Department of Environmental Management (March 18, 1992). Concerning proposed dredging of Cedar Swamp Brook and Upper Simmons Reservoir.
36. Letter from Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (April 14, 1992). Concerning blast monitoring at the site.
37. Letter Report from Steven J. Simpson, Thomas E. Billups, and Michael A. Powers, GZA GeoEnvironmental, Inc. to Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation (June 29, 1992). Concerning final report of blast monitoring activities.
38. Letter from Edward A. Summerly and Michael A. Powers, GZA GeoEnvironmental, Inc. to James M. Brown, EPA Region I (January 29, 1993). Concerning a request for an extension of submittal of the final Remedial Investigation Report.
39. Letter from Dennis P. Russo, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (February 16, 1993). Concerning a request for an extension of submittal of the final Remedial Investigation Report and the Feasibility Study Report.
40. Letter from Dennis P. Russo, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (May 4, 1993). Concerning the release of information in the March 1993 Remedial Investigation Report.

## 3.2 Sampling and Analysis Data

*The Work Plan referenced in entry number 1 has been amended by subsequent Progress Reports cited in 3.7 Work Plans and Progress Reports.*

1. Cross-Reference: "Revised Proposal for Sampling, Analysis, Monitoring and Reporting of Conditions at the Central Landfill," Rhode Island Solid Waste Management Corporation (February 1985) [Filed and cited as attachment A to entry number 1 in 10.7 EPA Administrative Orders].
2. "Project Operations Plan for Residential Well Sampling," Camp Dresser & McKee Inc. (May 1985).
3. Letter from John Drake, Camp Dresser & McKee to Kenneth Wenger, EPA Region I (June 3, 1987). Concerning the attached:
  - A. Residential Well Findings from July 23-25, 1985 sampling.
  - B. Location Map.
  - C. Hazardous Substance List and Detection Limits for Water.
  - D. Residential Well Sampling Cross Reference List  
*Residential Well Sampling Cross Reference List is withheld as CONFIDENTIAL).*

### 3.2 Sampling and Analysis Data (cont'd.)

4. Letter from James E. Bedell, Geo Tech Environmental Services Inc. to Kenneth Wenger, EPA Region I (July 22, 1987). Concerning comments on monitoring well installations.

*Maps associated with entry number 5 are reproduced in the March 1993 Remedial Investigation Reports filed as entries 1 through 7 in 3.6 Remedial Investigation (RI) Reports.*

5. "Fracture Trace/Geophysical Investigation of Central Landfill Site, Johnston, Rhode Island," University of Rhode Island and Geotech Enterprises Inc. for Goldberg-Zoino & Associates, Inc. (August 1987).
6. Letter from James E. Bedell, Geo Tech Environmental Services Inc. to David Del Sesto, We Are The Endangered Residents (August 28, 1987). Concerning review of data sets from June 9, 1987 sampling.

*The sampling plans cited in number 7 may be reviewed, by appointment only, at the EPA Region I Records Center, Boston, Massachusetts.*

7. Memorandum from Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation to Ronald Gagnon, State of Rhode Island Department of Environmental Management (November 19, 1991). Concerning transmittal of the May 1990 Sampling Round Report and the second Sampling Round Report.
8. "Community Health Services Office of Health Engineering Summary of Private Wells - Beryllium - Town of Johnston," Rhode Island Department of Health.
9. "Community Health Services Office of Health Engineering Geology - Ground Water - Town of Johnston," Rhode Island Department of Health.

### 3.4 Interim Deliverables

1. "Central Landfill Health and Safety Plan," Goldberg-Zoino & Associates, Inc. (June 1987).
2. Letter Report from Thomas E. Billups, et al, GZA GeoEnvironmental, Inc. to Michael Lavallee, Rhode Island Solid Waste Management Corporation (December 30, 1991). Concerning results of GZA's blast monitoring program for rock excavation in the Phase II and III expansion areas.

### 3.6 Remedial Investigation (RI) Reports

#### Reports

1. "Remedial Investigation Report - Operable Unit I - Volume I of VII," GZA GeoEnvironmental, Inc. (March 1993).

*The oversize drawings associated with number 2 may be reviewed, by appointment only, at the EPA Region I Records Center, Boston, Massachusetts.*

2. "Remedial Investigation Report - Operable Unit I - Volume II of VII," GZA GeoEnvironmental, Inc. (March 1993).
3. "Remedial Investigation Report - Operable Unit I - Volume III of VII," GZA GeoEnvironmental, Inc. (March 1993).

## 3.6 Remedial Investigation (RI) Reports (cont'd.)

4. "Remedial Investigation Report - Operable Unit I - Volume IV of VII," GZA GeoEnvironmental, Inc. (March 1993).
5. "Remedial Investigation Report - Operable Unit I - Volume V of VII," GZA GeoEnvironmental, Inc. (March 1993).
6. "Remedial Investigation Report - Operable Unit I - Volume VI of VII," GZA GeoEnvironmental, Inc. (March 1993).
7. "Remedial Investigation Report - Operable Unit I - Volume VII of VII," GZA GeoEnvironmental, Inc. (March 1993).

## Comments

8. Letter from Judith S. Graham, State of Rhode Island Department of Environmental Management to James M. Brown, EPA Region I (May 27, 1993). Concerning approval of the March 1993 "Remedial Investigation Report - Operable Unit I," GZA GeoEnvironmental, Inc.
9. Letter from Richard C. Boynton, EPA Region I to Thomas E. Wright, Rhode Island Solid Waste Management Corporation (June 8, 1993). Concerning approval of the March 1993 "Remedial Investigation Report - Operable Unit I," GZA GeoEnvironmental, Inc.

## 3.7 Work Plans and Progress Reports

## Progress Reports

1. Letter Report from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Kenneth Wenger, EPA Region I (May 9, 1987). Concerning the May 10, 1987 progress report.
2. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Kenneth Wenger, EPA Region I (June 10, 1987) with attached Progress Report 1, Goldberg-Zoino & Associates, Inc.
3. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Kenneth Wenger, EPA Region I (July 14, 1987) with attached Progress Report 2, Goldberg-Zoino & Associates, Inc.
4. Letter from John P. Hartley, Goldberg-Zoino & Associates, Inc. to David D. Dorocz, Rhode Island Solid Waste Management Corporation (August 13, 1987). Concerning Progress Report 3.
5. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Kenneth Wenger, EPA Region I (September 16, 1987) with attached Progress Report 4, Goldberg-Zoino & Associates, Inc.
6. Letter from John P. Hartley, Goldberg-Zoino & Associates, Inc. to David D. Dorocz, Rhode Island Solid Waste Management Corporation (October 15, 1987). Concerning Progress Report 5.
7. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Kenneth Wenger, EPA Region I (November 17, 1987) with attached Progress Report 6, Goldberg-Zoino & Associates, Inc.
8. Letter from John P. Hartley, Goldberg-Zoino & Associates, Inc. to David D. Dorocz, Rhode Island Solid Waste Management Corporation (December 21, 1987). Concerning Progress Report 7.

## 3.7 Work Plans and Progress Reports (cont'd.)

*The oversized drawing associated with number 9 may be reviewed, by appointment only, at the EPA Region I Records Center, Boston, Massachusetts.*

9. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Kenneth Wenger, EPA Region I (January 22, 1988) with attached Progress Report 8, Goldberg-Zoino & Associates, Inc.
10. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Kenneth Wenger, EPA Region I (February 12, 1988) with attached Progress Report 9, Goldberg-Zoino & Associates, Inc.
11. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Kenneth Wenger, EPA Region I (March 15, 1988) with attached Progress Report 10, Goldberg-Zoino & Associates, Inc.
12. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Kenneth Wenger, EPA Region I (April 19, 1988) with attached "Environmental Sampling Program," Goldberg-Zoino & Associates, Inc. (March 1988). Concerning Progress Report 11.
13. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (May 19, 1988) with attached Progress Report 12, Goldberg-Zoino & Associates, Inc.
14. Letter from John P. Hartley and Edward A. Summerly, Goldberg-Zoino & Associates, Inc. to David D. Dorocz, Rhode Island Solid Waste Management Corporation (June 7, 1988). Concerning Progress Report 13.
15. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (July 14, 1988) with attached Progress Report 14, Goldberg-Zoino & Associates, Inc.
16. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (August 10, 1988) with attached Progress Report 15, Goldberg-Zoino & Associates, Inc.
17. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (September 19, 1988) with attached Progress Report 16, Goldberg-Zoino & Associates, Inc.
18. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (October 14, 1988) with attached Progress Report 17, Goldberg-Zoino & Associates, Inc.
19. Letter from David D. Dorocz, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (December 1, 1988) with attached Progress Report 18, Goldberg-Zoino & Associates, Inc.
20. Letter from Ronald T. DeFino, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (December 22, 1988) with attached Progress Report 19, Goldberg-Zoino & Associates, Inc.
21. Letter from John P. Hartley and Edward A. Summerly, Goldberg-Zoino & Associates, Inc. to David D. Dorocz, Rhode Island Solid Waste Management Corporation (January 13, 1989). Concerning Progress Report 20.
22. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (February 10, 1989) with attached Progress Report 21, Goldberg-Zoino & Associates, Inc.
23. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (March 15, 1989) with attached Progress Report 22, Goldberg-Zoino & Associates, Inc.



## 3.7 Work Plans and Progress Reports (cont'd.)

24. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (April 17, 1989) with attached Progress Report 23, Goldberg-Zoino & Associates, Inc.
25. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (May 12, 1989) with attached Progress Report 24, Goldberg-Zoino & Associates, Inc.
26. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (June 20, 1989) with attached Progress Report 25, Goldberg-Zoino & Associates, Inc.
27. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (July 13, 1989) with attached Progress Report 26, Goldberg-Zoino & Associates, Inc.
28. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (August 28, 1989) with attached Progress Report 27, Goldberg-Zoino & Associates, Inc.
29. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (September 20, 1989) with attached Progress Report 28, Goldberg-Zoino & Associates, Inc.
30. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (October 17, 1989) with attached Progress Report 29, Goldberg-Zoino & Associates, Inc.
31. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (November 17, 1989) with attached Progress Report 30, Goldberg-Zoino & Associates, Inc.
32. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (December 29, 1989) with attached Progress Report 31, Goldberg-Zoino & Associates, Inc.
33. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (January 26, 1990) with attached Progress Report 32, Goldberg-Zoino & Associates, Inc.
34. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Wayne Robinson, EPA Region I (March 30, 1990) with attached Progress Report 33, Goldberg-Zoino & Associates, Inc.
35. "Central Landfill RI/FS Progress Report No. 34," Goldberg-Zoino & Associates, Inc. for Rhode Island Solid Waste Management Corporation (August 1990).
36. "Progress Report No. 35, Central Landfill RI/FS," Goldberg-Zoino & Associates, Inc. for Rhode Island Solid Waste Management Corporation (October 1990).
37. Response Dated February 5, 1991 from Edward A. Summerly, John P. Hartley, and Frank W. Clark for Michael A. Powers to the January 7, 1991 Comments from EPA Region I.
38. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to Richard C. Boynton, EPA Region I (February 18, 1991). Concerning transmittal of responses to comments on Progress Report No. 35.
39. Letter from John P. Hartley, GZA GeoEnvironmental, Inc. to Julie A. Serowik, Rhode Island Solid Waste Management Corporation (March 14, 1991). Concerning Progress Report 36.
40. Letter from Julie A. Serowik, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (May 1, 1991) with attached Progress Report 37, GZA GeoEnvironmental, Inc.

## 3.7 Work Plans and Progress Reports (cont'd.)

41. "Central Landfill RI/FS Progress Report No. 38," GZA GeoEnvironmental, Inc. for Rhode Island Solid Waste Management Corporation (July 1991).
42. "Central Landfill RI/FS Progress Report No. 39," GZA GeoEnvironmental, Inc. for Rhode Island Solid Waste Management Corporation (August 1991).
43. "Central Landfill RI/FS Progress Report No. 40," GZA GeoEnvironmental, Inc. for Rhode Island Solid Waste Management Corporation (November 1991).

## Work Plans

44. "Technical Specifications for Drilling at the Central Landfill," Goldberg-Zoino & Associates, Inc. for Rhode Island Solid Waste Management Corporation (June 1987).
45. "Tank Removal Project Work Plan," Goldberg-Zoino & Associates, Inc. for Rhode Island Solid Waste Management Corporation (August 1988).
46. "Project Work Plan Abandoned Drum Characterization," Goldberg-Zoino & Associates, Inc. for Rhode Island Solid Waste Management Corporation (September 1988).
47. "Project Work Plan Multi-Level Well Sampling," Goldberg-Zoino & Associates, Inc. for Rhode Island Solid Waste Management Corporation (September 1988)."
48. Letter Report from Thomas E. Billups, David R. Carchedi, and Cheryl Marfuo for Edward A. Summerly, GZA GeoEnvironmental, Inc. to Michael E. Lavalley, Rhode Island Solid Waste Management Corporation (September 11, 1991). Concerning the Blast Monitoring Work Plan.
49. Letter from Michael E. Lavalley, Rhode Island Solid Waste Management Corporation to James M. Brown, EPA Region I (October 3, 1991). Concerning transmittal of the Blast Monitoring Work Plan - Revision 1, GZA GeoEnvironmental, Inc. for comment.
50. Letter Report from Thomas E. Billups, David R. Carchedi, and Edward A. Summerly, GZA GeoEnvironmental, Inc. to Michael E. Lavalley, Rhode Island Solid Waste Management Corporation (February 4, 1992). Concerning the Blast Monitoring Work Plan.

## Comments on Work Plans

51. Comments Dated September 27, 1991 from James M. Brown, EPA Region I on the September 11, 1991 Letter Report from Thomas E. Billups, David R. Carchedi, and Cheryl Marfuo for Edward A. Summerly, GZA GeoEnvironmental, Inc. to Michael E. Lavalley, Rhode Island Solid Waste Management Corporation.
52. Comments Dated October 9, 1991 from James M. Brown, EPA Region I on the Blast Monitoring Work Plan Revision 1.

### 3.9 Health Assessments

1. Letter from Louise A. House, Department of Health and Human Services Agency for Toxic Substances and Disease Registry to James M. Brown, EPA Region I (September 3, 1992). Concerning transmittal of the following attachments:
  - A. "ATSDR's Evaluation of Childhood Brain Cancer Cases in Providence" (August 1992).
  - B. Memorandum from Don Gibeaut and Laura Barr, Department of Health and Human Services Agency for Toxic Substances and Disease Registry to Louise A. House, Department of Health and Human Services Agency for Toxic Substances and Disease Registry (August 7, 1992).
  - C. Memorandum from Ahmed Gomaa, Department of Health and Human Services Agency for Toxic Substances and Disease Registry to Louise A. House, Department of Health and Human Services Agency for Toxic Substances and Disease Registry (July 23, 1992).
  - D. Memorandum from Louise A. House, Department of Health and Human Services Agency for Toxic Substances and Disease Registry to James M. Brown, EPA Region I (July 19, 1991).
2. "Lead Initiative Summary Report," Department of Health and Human Services Agency for Toxic Substances and Disease Registry (September 24, 1992). Attached to letter dated September 29, 1992 from Louise A. House, Agency for Toxic Substances and Disease Registry to James M. Brown, EPA Region I.

### 3.10 Endangerment Assessments

1. "Baseline Risk Assessment," CDM Federal Programs Corporation (FPC) (November 23, 1993).

## 4.0 Feasibility Study (FS)

### 4.1 Correspondence

1. Cross Reference: Letter from Richard C. Boynton, EPA Region I to Thomas E. Wright, Rhode Island Solid Waste Management Corporation (January 25, 1994). Concerning preliminary approval of the December 1993 "Final Feasibility Study - Operable Unit OU1 - Volume I-3," GZA GeoEnvironmental, Inc. for Rhode Island Solid Waste Management Corporation [Filed as part of entry number 1 in 4.6 Feasibility Study (FS) Reports].

### 4.2 Sampling and Analysis Data

1. Letter from Russell J. Morgan, GZA GeoEnvironmental, Inc. to James M. Brown, EPA Region I (June 2, 1992). Concerning the attached groundwater quality criteria for use during the Feasibility Study.

#### 4.4 Interim Deliverables

##### Reports

1. "Feasibility Study - Technical Memorandum - Identification of Remedial Technologies," GZA GeoEnvironmental, Inc. (December 1991).
2. "Feasibility Study Technical Memorandum - Remedial Response Objectives and Response Actions," GZA GeoEnvironmental, Inc. for Rhode Island Solid Waste Management Corporation (February 1992).
3. "Draft Report - Initial Screenings of Remedial Alternatives," GZA GeoEnvironmental, Inc. for Rhode Island Solid Waste Management Corporation (March 1992).

##### Comments

4. Comments Dated November 5, 1991 from James M. Brown, EPA Region I on the October 1991 "Preliminary Remedial Response Objectives and Response Actions - Technical Memorandum," GZA GeoEnvironmental, Inc.
5. Comments Dated December 13, 1991 from Judith S. McCabe, State of Rhode Island Department of Environmental Management on the December 1991 "Feasibility Study - Technical Memorandum - Identification of Remedial Technologies," GZA GeoEnvironmental, Inc.
6. Comments Dated January 15, 1992 from James M. Brown, EPA Region I on the December 1991 "Feasibility Study - Technical Memorandum - Identification of Remedial Technologies," GZA GeoEnvironmental, Inc.

##### Responses to Comments

7. Response Dated February 24, 1992 from Russell J. Morgan and Michael A. Powers, GZA GeoEnvironmental, Inc. to the Comments Dated January 15, 1992 from James M. Brown, EPA Region I.

#### 4.6 Feasibility Study (FS) Reports

1. "Final Feasibility Study - Operable Unit OU1 - Volume I," GZA GeoEnvironmental, Inc. for Rhode Island Solid Waste Management Corporation (December 1993).
2. "Final Feasibility Study - Operable Unit OU1 - Volume II," GZA GeoEnvironmental, Inc. for Rhode Island Solid Waste Management Corporation (December 1993).
3. "Final Feasibility Study - Operable Unit OU1 - Volume III," GZA GeoEnvironmental, Inc. for Rhode Island Solid Waste Management Corporation (December 1993).

#### 4.9 Proposed Plan for Selected Remedial Action

1. "EPA Proposes Source Control Plan for the Central Landfill Superfund Site," EPA Region I (February 1994).

5.0 Record of Decision (ROD)

5.2 Applicable or Relevant and Appropriate Requirements (ARARS)

1. Cross-Reference: "A Summary of Groundwater Classification -- Draft, "State of Rhode Island Department of Environmental Management (January 1990) and "Chapter 13.1 Groundwater Protection, "State of Rhode Island Department of Environmental Management [Filed and cited as Attachments A and B of entry number 4 in 9.1 Correspondence].
2. Letter from Judith S. McCabe, State of Rhode Island Department of Environmental Management to James M. Brown, EPA Region I (February 10, 1992). Concerning the attached preliminary list of Applicable or Relevant and Appropriate Requirements (ARARS).

5.4 Record of Decision

1. Record of Decision, EPA Region I (June 17, 1994)

9.0 State Coordination

9.1 Correspondence

1. Memorandum from Richard C. Boynton, EPA Region I to File (July 3, 1991). Concerning telephone call with Terrence Gray, State of Rhode Island Department of Environmental Management regarding an amended Consent Order for wetlands remediation.
2. "Solid Waste Management Facility License Conditions for the Rhode Island Solid Waste Management Corporation Central Landfill, "State of Rhode Island Department of Environmental Management (July 24, 1991).
3. Letter from Judith S. McCabe, State of Rhode Island Department of Environmental Management to James M. Brown, EPA Region I (September 24, 1991). Concerning the following attachments:
  - A. "A Summary of Groundwater Classification -- Draft, "State of Rhode Island Department of Environmental Management (January 1990).
  - B. "Chapter 13.1 Groundwater Protection, "Rules and Regulations for Groundwater Quality, State of Rhode Island Department of Environmental Management.

9.1 Correspondence (cont'd.)

4. - Letter from Judith Graham, State of Rhode Island Department of Environmental Management to James M. Brown, EPA Region I (April 14, 1993). Concerning transmittal of the attached February 11, 1993 "State of Rhode Island Senate Resolution Respectfully Requesting the Solid Waste Management Corporation, the Department of Environmental Management and the U.S. Environmental Protection Agency to Complete the Cleanup of the Johnston Landfill."

10.0 Enforcement

10.3 State and Local Enforcement Records

1. Letter from Ronald T. DelFino, Rhode Island Solid Waste Management Corporation to Thomas E. Wright, Rhode Island Solid Waste Management Corporation (September 14, 1981). Concerning attached Consent Order revising the schedule for closure of the hazardous waste disposal area.

10.7 EPA Administrative Orders

The Work Plan included in entry number 1 has been amended by subsequent Progress Reports cited in 3.7 Work Plans and Progress Reports.

1. Administrative Order by Consent, In the Matter of Central Landfill, U.S. EPA Docket No. I-87-1016 (April 3, 1987), with attachments:
  - A. "Revised Proposal for Sampling, Analysis, Monitoring and Reporting of Conditions at the Central Landfill," Rhode Island Solid Waste Management Corporation (February 1985)
  - B. Changes and/or additional testing elements pe@g to the Remedial Investigation
  - C. Schedule of activities and deliverables-

13.0 Community Relations

13.1 Correspondence

1. Letter from David Del Sesto, We Are The Endangered Residents to Kenneth Wenger, EPA Region I (January 15, 1987). Concerning the new SARA grant legislation.

## 13.1 Correspondence (cont'd.)

2. Letter from James E. Bedell, Geo Tech Environmental Services to We Are The Endangered Residents (February 10, 1987). Concerning brief description of the geologic and hydrologic reasons for concern.
3. Letter from Thomas E. Wright, Rhode Island Solid Waste Management Corporation to Robert Finke, WPRI - TV 12 (August 2, 1991). Concerning the television series titled, "Don't Drink the Water."
4. Letter from Julie A. Jaglowski, Rhode Island Solid Waste Management Corporation to Sharon Abbott, Booz, Allen & Hamilton (August 23, 1991). Concerning transmittal of documents to be used in the Community Relations Plan.
5. Letter from Judith S. McCabe, State of Rhode Island Department of Environmental Management to James M. Brown, EPA Region I (September 13, 1991). Concerning desire for the state to play an active role in the development of the Community Relation Plan.
6. Letter from James M. Brown, EPA Region I to Stephen O'Connell (October 7, 1991). Concerning clarification of EPA's position on the site closure plan.
7. Letter from Ralph J. Perrotta to Paul G. Keough, EPA Region I (April 22, 1993). Concerning questions regarding EPA's position on the cleanup at the site and with the following attachments:
  - A. Letter from Linda M. Murphy for Merrill S. Hohman, EPA Region I to Thomas E. Wright, Rhode Island Solid Waste Management Corporation (September 25, 1990).
  - B. "FY93 Budget Narrative."
  - C. "Figure 10 - Off-site Sources of Contamination in Central Landfill Vicinity".
  - D. "Figure 4 - Map Showing Existing Landfill, Previously Mapped Surficial Deposits, and Borrow Pit Area".
  - E. Letter from Richard C. Boynton, EPA Region I to Thomas E. Wright, Rhode Island Solid Waste Management Corporation (July 1, 1992).
  - F. Letter from James M. Brown, EPA Region I to Dennis P. arusso, Rhode Island Solid Waste Management Corporation (August 16, 1991).
8. Letter from Paul G. Keough, EPA Region I to Ralph J. Perrotta (June 2, 1993). Concerning responses to questions raised in the April 22, 1993 letter.

13.1 Correspondence (cont'd.)

- 9.- Technical Report - "Critical Evaluation Of Central Landfill With Regard To Future Expansion And/Or Siting Of a Free-Standing Landfill". Prepared for the Town of Johnston by Groundwater Associates, Inc., March 29, 1993.

13.5 Fact Sheets

1. "Central Landfill Fact Sheet

16.0 Natural Resource Trustee

16.1 Correspondence

1. Letter from Merrill S. Hohman, EPA Region I to Sharon Christopherson, National Oceanic and Atmospheric Administration. Concerning notification of potential natural resource damages with attached trustee notification package.
2. Letter from Merrill S. Hohman, EPA Region I to William Patterson, U.S. Fish and Wildlife Service. Concerning notification of potential natural resource damages with attached trustee notification package.

17.0 Site Management Records

17.7 Reference Documents

1. Letter from J. Joseph Garrahy, Governor of the State of Rhode Island to Herbert Johnston, U.S. Geological Survey (September 29, 1983). Concerning inquiry into effects of the Central State Landfill on the Scituate River.
2. Letter from Herbert Johnston, U.S. Geological Survey to J. Joseph Garrahy, Governor of the State of Rhode Island (October 12, 1983). Concerning response to inquiry into effects of the Central State Landfill on the Scituate River.
3. "Wastewater Investigation," U.S. Army Corps of Engineers (May 1992).
4. Cross Reference: Memorandum from Don Gibeaut and Laura Barr, Department of Health and Human Services Agency for Toxic Substances and Disease Registry to Louise A. House, Department of Health and Human Services Agency for Toxic Substances and Disease Registry (August 7, 1992) [Filed and cited as attachment B of entry number 1 in 3.9 Health Assessments].



17.7 Reference Documents (cont'd.)

- 5.- "Evaluation of the Central Landfill and its Potential Impacts on the Scituate Reservoir, "CH2M Hill for the Providence Water Supply Board (October 1988).

17.8 State and Local Technical Records

1. Letter from Herbert E. Johnston, U.S. Geological Survey to Tom Quigley, Goldberg-Zoino & Associates, Inc. (August 28, 1984). Concerning direction of ground water flow in the vicinity of the Central State Landfill with attached letters of explanation.
2. "Study Plan - Cyanide Waste Disposal Assessment," Goldberg-Zoino & Associates, Inc. for Rhode Island Solid Waste Management Corporation (February 1987).
3. "Cyanide Waste Disposal Assessment (Final Report)," Goldberg-Zoino & Associates, Inc. for Rhode Island Solid Waste Management Corporation (May 1987).

### Guidance Documents

EPA guidance documents may be reviewed at the Region I Records Center in Boston, MA.

#### General EPA Guidance Documents

1. "Final and Proposed Amendments to the National Oil and Hazardous Substances Pollution Contingency Plan," Code of Federal Regulations (Title 40, Part 300), September 8, 1983.
2. "National Oil and Hazardous Substances Pollution Contingency Plan," Code of Federal Regulations (Title 40, Part 300), 1985.
3. "National Oil and Hazardous Substances Pollution Contingency Plan - Final Rule," Federal Register (Vol. 55, No. 46), March 8, 1990.
4. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Community Relations in Superfund: A Handbook (Interim Version) (EPA/HW-6), September 1983.
5. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Guidance on Remedial Investigation under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) (EPA/540/G-85/002), June 1985.
6. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Guidance on Feasibility Studies under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) (EPA/540/G-85/003), June 1985.
7. U.S. Environmental Protection Agency. Environmental Monitoring Systems Laboratory. Sediment Sampling Quality Assurance User's Guide (EPA/600/4-85/048), July 1985.
8. U.S. Environmental Protection Agency. Hazardous Waste Engineering Research Laboratory and Office of Emergency and Remedial Response. Covers for Uncontrolled Hazardous Waste Sites (EPA 540/2-85/002), September 1985.
9. U.S. Department of Health and Human Services. National Institute for Occupational Safety and Health, and Occupational Safety and Health Administration. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985.

10. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites (OSWER Directive 9283.1-2), December 1988.
11. U.S. Environmental Protection Agency. Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended October 17, 1986.
12. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Superfund Public Health Evaluation Manual (EPA/540/1-86/060, OSWER Directive 9285.4-1), October 1986.
13. U.S. Environmental Protection Agency. Office of Ground-Water Protection. Guidelines for Ground-Water Classification under the EPA Ground-Water Protection Strategy, December 1986.
14. U.S. Environmental Protection Agency. Quality Assurance Management Staff. Guidelines and Specifications for Preparing Quality Assurance Program Documentation, June 1987.
15. U.S. Environmental Protection Agency. Center for Environmental Research Information. A Compendium of Technologies Used in the Treatment of Hazardous Waste (EPA/625/8-87/014), September 1987.
16. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. A Compendium of Superfund Field Operations Methods (OSWER Directive 9355.0-14), December 1987.
17. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Draft Guidance on Conducting Remedial Investigation and Feasibility Studies under CERCLA (Comprehensive Environmental Response, Compensation and Liability Act), March 1988.
18. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Draft Guidance on Remedial Actions for Contaminated GroundWater at Superfund Sites(OSWER Directive 9283.1-2), April 1988.
19. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Superfund Exposure Assessment Manual (EPA/540/1-88/001, OSWER Directive 9285.5-1), April 1988.
20. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Community Relations in Superfund: A Handbook (Interim Version) (EPA/540/G-88/002, OSWER Directive 9230.0-3A), June 1988.

21. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. CERCLA (Comprehensive Environmental Response, Compensation and Liability Act) Compliance with Other Laws Manual (EPA/540/G-89/006, OSWER Directive 9234.1-01), August 1988.
22. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Guidance for Conducting, Remedial Investigations and Feasibility Studies Under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act)(Interim Final) (EPA/540/G-89/004, OSWER Directive 9355.3-01), October 1988.
23. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Community Relations in Superfund: A Handbook (Interim Version), Chapter 6 (OSWER Directive 9230.0-3B), November 3, 1988.
24. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Design, Construction, and Evaluation of Clay Liners for Waste Management Facilities (EPA/530/SW-86/007F), November 1988.
25. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites (EPA/540/G-88/003, OSWER Directive 9283.1-2), December 1988.
26. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. User's Guide to the Contract Laboratory Program (OSWER Directive 9240.0-1), December 1988.
27. U.S. Environmental Protection Agency. Risk Reduction Engineering Laboratory. Technology Evaluation Report: SITE Program Demonstration Test Terra Vac In Situ Vacuum Extraction System Groveland, Massachusetts, Volume I (EPA/540/5-89/003a), April 1989.
28. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. A Guide on Remedial Actions for Contaminated Ground Water (OSWER Directive 9283.1-2FS), April 1989.
29. U.S. Environmental Protection Agency. Office of Research and Development. Requirements for Hazardous Waste Landfill Design, Construction and Closure (EPA/625/4-89/022), April 1989.
30. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. ARARS O's & A's (OERR 9234.2-01FS), May 1989.

31. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Land Disposal Restrictions: Summary of Requirements, June 1989.
32. U.S. Environmental Protection Agency. Risk Assessment Work Group, Region I. Supplemental Risk Assessment Guidance for the Superfund Program (Draft Final) (EPA/901/5-89/001), June 1989.
33. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #1. Overview of RCRA Land Disposal Restrictions (LDRs) (OSWER Directive 9347.3-01FS), July 1989.
34. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #2, Complying With the California List Restrictions Under Land Disposal Restrictions (LDRs) (OSWER Directive 9347.3-02FS), July 1989.
35. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #3, Treatment Standards and Minimum Technology Requirements Under Land Disposal Restrictions (LDRs) (OSWER Directive 9347.3-03FS), July 1989.
36. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #4, Complying With the Hammer Restrictions Under Land Disposal Restrictions (LDRs) (OSWER Directive: 9347.3-04FS), July 1989.
37. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #5, Determining When Land Disposal Restrictions (LDRS) Are Applicable to CERCLA Response Actions. (OSWER Directive: 9347.3-05FS), July 1989.
38. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #6A, Obtaining a Soil and Debris Treatability Variance for Remedial Actions. (OSWER Directive: 9347.3-06FS), July 1989.
39. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Risk Assessment Guidance for Superfund, Human Health Evaluation Manual Part A, July 1989.
40. U.S. Environmental Protection Agency. Office of Research and Development. Technical Guidance Document: Final Covers on hazardous Waste Landfills and Surface Impoundments (EPA/530-SW-89-047), July 1989.

41. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. CERCLA (Comprehensive Environmental Response and Liability Act) Compliance with Other Laws Manual -Part II: Clean Air Act and Other Environmental Statutes and State Requirements (EPA/540/G-89/009, OSWER Directive 9234.1-02), August 1989.
42. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. CERCLA Compliance with Other Laws Manual- RCRA ARARS: Focus and Closure Requirements (OSWER Directive 9234.2-04), October 1989.
43. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. The Feasibility Study: Development and Screening of Remedial Action Alternatives (OSWER Directive 9355.3-01FS3), November 1989.
44. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. The Remedial Investigation: Site Characterization and Treatability Studies (OSWER Directive 9355.3-01FS2), November 1989.
45. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. State and Local Involvement in the Superfund Program (9375.5-01/FS), Fall 1989.
46. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Risk Assessment Guidance for Superfund - Volume I: Human Health Evaluation Manual (Part A -Interim Final) (EPA/540/1-89/002), December 1989.
47. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #7, Determining When Land Disposal Restrictions (LDRs) are Relevant and Appropriate to CERCLA Response Actions. (OSWER Directive 9347.3-08FS), December 1989.
48. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. CERCLA Compliance with Other Laws Manual - CERCLA Compliance with State Requirements (OSWER Directive 9234.2-05/FS), December 1989.
49. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. CERCLA Compliance with Other Laws Manual - Overview of ARARs Focus on ARAR Waivers (Publication 9234.2-03/FS), December 1989.
50. U.S. Environmental Protection Agency. Risk Reduction Engineering Laboratory. Handbook on In Situ Treatment of Hazardous Waste-Contaminated Soils EPA/540/2-90/002), January 1990.

51. U.S. Environmental Protection Agency. Risk Engineering Laboratory. Project Summary State of Technology Review: Soil Vapor Extraction Systems (EPA/600/S2-89/024), January 1990.
52. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. CERCLA Compliance with Other Laws Manual - CERCLA Compliance with the CWA and SDWA (OSWER Directive 9234.2-06/FS), February 1990.
53. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. The Feasibility Study: Detailed Analysis of Remedial Action Alternatives (OSWER Directive 9355.3-01FS4), March 1990.
54. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. CERCLA Compliance with Other Laws Manual - Summary of Part II- CAA, TSCA, and Other Statutes (OSWER Directive 9234.2-07/FS), April 1990.
55. "Control Technology: A Field Demonstration of the UV/Oxidation Technology to Treat Groundwater Contaminated with VOCs, "Journal of the Air & Waste Management Association (Vol. 40, No. 4), April 1990, pp. 540-47.