United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R02-91/147
October 1991

EPA

# Superfund Record of Decision:

## Global Landfill, NJ

50272-101

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SUPERFUND RECORD OF DECISION
Global Landfill, NJ
First Remedial Action

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09/11/91

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U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

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800/000

**14.**

**15. Supplementary Notes**

**16. Abstract (Limit: 200 words)**

The 57.5-acre Global Landfill is an inactive solid waste disposal facility in Old Bridge Township, Middlesex County, New Jersey. The facility is bordered by wetlands to the northeast, southeast, and southwest, and a former sand borrow pit and wooded area to the northwest. Land use in the area is primarily residential. Onsite features include a 51-acre landfill, a 6.5-acre northwest landfill extension, and an inactive 1.7-acre leachate collection pond. Municipal water supply wells are located approximately 1 mile north of the landfill. From 1968 until its closure in 1984, the Global Landfill site was used for non-hazardous solid waste disposal. As a result of a slope failure in 1984, landfill wastes were exposed, the dyke was breached, and the wastes spilled into an adjacent wetlands area. Subsequently, the State ordered all onsite disposal operations to cease. From 1988 to 1991, EPA and State site investigations identified 63 buried 55-gallon drums containing hazardous wastes including VOCs, organics, and metals within both the waste mound and northwest extension. This Record of Decision (ROD) addresses Operable Unit 1 (OU1), the landfill wastes. A second ROD will address possible offsite ground water and surface water contamination, and wetland areas, as OU2. The primary contaminants of concern

(See Attached Page)

**17. Document Analysis a. Descriptors**
Record of Decision - Global Landfill, NJ
First Remedial Action
Contaminated Media: soil, sediment
Key Contaminants: VOCs (benzene, PCE, TCE, toluene, xylenes), other organics, metals (arsenic, chromium, lead)

**b. Identifiers/Open-Ended Terms**

**c. COSATI Field/Group**

| 18. Availability Statement | 19. Security Class (This Report) None | 21. No. of Pages 168 |
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(See ANSI-Z39.18) *See Instructions on Reverse*

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

EPA/ROD/R02-91/147
Global Landfill, NJ
First Remedial Action

Abstract (Continued)

affecting the soil and sediment are VOCs including benzene, PCE, TCE, toluene, and xylenes; other organics; and metals including arsenic, chromium, and lead.

The selected remedial action for this site includes capping the landfill with a synthetic and clay cap; constructing a soil stabilization berm; constructing and operating a gas management system, and stormwater and leachate collection systems; pumping leachate and condensate from the gas collection system to a holding tank, and subsequently transporting the waste offsite for treatment and disposal (this constitutes an interim remedy for the leachate); disposing of sludge offsite at a RCRA facility; implementing a monitoring program to ensure the effectiveness of the remedy; mitigating any affected wetlands; and implementing site access restrictions such as fencing. Onsite leachate treatment that would replace the offsite leachate treatment and disposal provided for in this ROD, may be initiated as part of the ground water remedy in the next ROD, which addresses OU2, as part of the preferred leachate management alternative. This may include treatment using powdered activated carbon, nitrification and denitrification, and UV disinfection, followed by discharging the treated effluent onsite to the Cheesequake Creek. The estimated present worth cost of this remedial action is $30,353,200, which includes an annual O&M cost of $865,100 based on onsite treatment of leachate.

PERFORMANCE STANDARDS OR GOALS: A waiver of the New Jersey Hazardous Waste Landfill Closure Regulations will be required on the basis of technical impracticality due to the large volume of waste to be removed. The remedy will meet the appropriate Federal and State guidelines and requirements for subsurface gas and leachate management systems and surface water systems. No chemical-specific standards were provided.

# ROD FACT SHEET

**SITE**

| | |
|---|---|
| Name: | Global Landfill |
| Location/State: | Old Bridge Twp., Middlesex Co., New Jersey |
| EPA Region: | II |
| HRS Score (date): | 45.92 (March '89) |
| NPL Rank (date): | 297 (February 91) |

**ROD**

Date Signed: September 11, 1991

Selected Remedy

| | |
|---|---|
| Soils: | Restore Landfill Source Control and Stability through the Construction of a Modified NJDEP Hazardous Waste Cap. |
| Groundwater: | Leachate Collection from OU-1 will Likely be Integrated with Off-site Groundwater Collection and Treatment under OU-2. |

| | |
|---|---|
| Capital Cost: | $ 21,464,200 |
| O & M: | $ 865,100 |
| Present Worth: | $ 30,353,200 |

**LEAD**

| | |
|---|---|
| Remedial, EPA | Remedial, State Lead |
| Primary Contact (phone): | Peter Latimer (609-633-1328) |
| Secondary Contact (phone): | Edward J. Finnerty (212-264-3555) |

**WASTE**

| | |
|---|---|
| Type: | Soil - VOC's, naphthalene, phthalates, heavy metals and buried drums.<br>Groundwater - Elevated levels of BOD, COD, and TDS found in the upper aquifer. |
| Medium: | Soil, groundwater and wetlands. |
| Origin: | Pollution originated as a result of both deliberate and indirect disposal of hazardous wastes at the landfill. Drums and liquid wastes were also deposited there. |

SEP 6 1991

Record of Decision for the
Global Landfill Site

Kathleen C. Callahan, Director
Emergency and Remedial Response Division (2ERRD)

Constantine Sidamon-Eristoff
Regional Administrator (2RA)

Attached for your approval is the Record of Decision (ROD) for the Global Landfill site, Middlesex County, New Jersey.

The selected remedial action represents the first of two planned operable units for the site, and is a response action to institute on-site controls for the landfill. NJDEP has initiated an RI/FS at Global Landfill for the second operable unit, to determine the nature and extent of migration of contaminants from the site into the groundwater, surface water, and wetland areas, and to evaluate remedial alternatives.

Both EPA and the New Jersey Department of Environmental Protection (NJDEP) have determined that a modified NJDEP hazardous waste cap is the most appropriate remedy for addressing source control at the Global Landfill site. The remedy involves capping of the landfill in accordance with State and Federal requirements, slope stability enhancement through construction of a soil stabilization berm, construction and operation of a gas management system, construction and operation of stormwater and leachate management systems, installation of a perimeter security fence to restrict access to the site, and implementation of a monitoring program to ensure the effectiveness of the remedy. The preferred leachate treatment option is on-site treatment with discharge to surface water, however disposal of the leachate at an industrial waste treatment plant will be employed until the RI/FS for the second operable unit is completed.

The estimated present worth for all tasks associated with the selected remedy (with Leachate Option 3) is $30,353,200.

The results of the FS and the Proposed Plan for the site were released to the public on February 19, 1991. The public comment period extended from this date until May 6, 1991. NJDEP conducted a public meeting on March 12, 1991, and a public information session on March 13, 1991. A few written comments on the FS and Proposed Plan were received from the community; they were generally supportive of the proposed remedial actions. In

addition, the potentially responsible parties submitted extensive comments questioning the proposed remedial actions.

The attached ROD was developed by EPA, and has been reviewed by NJDEP and the appropriate prcgram offices within Region II. Their input and comments are reflected in this document.

If you have any questions concerning this ROD, I will be happy to discuss them at your convenience.

Attachment

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
SCOTT A. WEINER, COMMISSIONER
CN 402
TRENTON, N.J. 08625-0402
(609) 292-2885
Fax: (609) 984-3962

June 27, 1991

Mr. Constantine Sidamon-Eristoff
Regional Administrator
USEPA - Region II
Jacob K. Javits Federal Building
New York, NY 10278

RE: Global Landfill Project, Operable Unit 1
Record of Decision Concurrence Letter

The Department of Environmental Protection has evaluated and concurs with the selected remedy for Operable Unit #1 for the Global Landfill Superfund Site outlined below:

The selected remedy represents the first of two planned operable units for the site. It involves cappping the landfill in accordance with State and Federal requirements. A subsequent decision document will address the remediation of groundwater, surface waters and wetland areas surrounding the site.

The major components of the selected remedy include the following:

- Capping the landfill with a modified hazardous waste cap;
- Slope stability enhancement through construction of a soil stabilization berm;
- Construction and operation of a gas management system;
- Construction and operation of stormwater and leachate management systems;
- Installation of a perimeter security fence to restrict access to the site; and
- Implementation of a monitoring program to ensure the effectiveness of the remedy.

The Department reserves its final comments on the complete Record of Decision pending an opportunity to review the completed documents, including the document's Responsiveness Summary.

Sincerely,

Scott A. Weiner
Commissioner

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# DECLARATION STATEMENT

# RECORD OF DECISION

# GLOBAL LANDFILL

## SITE NAME AND LOCATION

Global Landfill
Township of Old Bridge, Middlesex County, New Jersey

## STATEMENT OF BASIS AND PURPOSE

This Record of Decision presents the selected remedial action for the Global Landfill Superfund site, chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent applicable, the National Oil and Hazardous Substances Pollution Contingency Plan of 1990. This decision document serves to explain the factual and legal basis for selecting the remedy for the site.

The State of New Jersey concurs with the selected remedy. Information which supports the remedy can be found within the administrative record for the site.

## ASSESSMENT OF THE SITE

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

## DESCRIPTION OF THE REMEDY

The remedial action described in this document represents the first of two planned operable units for the site. It involves capping of the landfill in accordance with State and Federal requirements. A subsequent decision document will address the remediation of groundwater, surface waters and wetland areas surrounding the site.

The major components of the selected remedy include the following:

- Capping of the landfill with a modified hazardous waste cap;
- Slope stability enhancement through construction of a soil stabilization berm;
- Construction and operation of a gas management system;
- Construction and operation of stormwater and leachate management systems;
- Installation of a perimeter security fence to restrict access to the site; and
- Implementation of a monitoring program to ensure the effectiveness of the remedy.

**STATUTORY DETERMINATIONS**

The selected remedy is protective of human health and the environment, and is cost-effective. With the exception of cap construction, the selected remedy complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action. The remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. However, because treatment of the entire contents of the wastefill was not found to be practicable, the statutory preference for treatment as a principal element of the remedy will not be completely satisfied. This action does not constitute the final remedy for the site. Subsequent actions are planned to fully address the remaining principle threats posed by the site.

Because the remedy will result in low levels of hazardous substances remaining on the site above health-based levels, a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Constantine Sidamon-Eristoff
Regional Administrator
EPA Region II

9/11/91
Date

# RECORD OF DECISION

## DECISION SUMMARY

## GLOBAL LANDFILL SUPERFUND SITE

## OLD BRIDGE TOWNSHIP, MIDDLESEX COUNTY

## NEW JERSEY

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# DECISION SUMMARY

## RECORD OF DECISION

## GLOBAL LANDFILL

### SITE NAME, LOCATION, AND DESCRIPTION

The Global Landfill site is a landfill located on Lots 10, 25.12 and 26, Block 4185, in Old Bridge Township, Middlesex County, New Jersey (Figure 1). The northeastern property line is also the municipal boundary between Old Bridge Township and the Borough of Sayreville. The site is bordered by wetlands to the northeast, southeast, and southwest, in the drainage basin of Cheesequake Creek. The creek is located approximately 900 feet southeast of the landfill, drains to the northeast, and enters the Raritan Bay approximately 9,000 feet northeast of the site. On the opposite side of the creek is Cheesequake State Park. The Garden State Parkway is located 2,700 feet east-northeast of the landfill. Immediately to the northwest, the site is bordered by a former sand borrow pit. An active 42-inch gas pipeline is located approximately four feet beneath the original ground level, at the base of the landfill's northwestern toe of slope. This pipeline is owned by the Transcontinental Gas Pipe Line Company (Transco).

Residential areas of Old Bridge Township and the Borough of Sayreville are north and west-northwest of the site, respectively, and include several apartment complexes, as well as single-family homes, located off of Westminster Boulevard and Ernston Road. The apartments are approximately 900 to 2400 feet from the site, with the intervening area consisting of either the previously mentioned borrow pit or a wooded area. The nearest single-family homes are located in Sayreville, approximately 500 feet north of the site. The nearest municipal water supply wells are located approximately one mile north of the landfill. They are located upgradient from groundwater flow, and are not believed to be impacted by the site.

The Global Landfill site is approximately 57.5 acres in size, and consists of two areas, a 51-acre main section and a 6.5-acre northwest extension (Figure 2). The main section of the landfill consists of a mound ranging from 5 to 15 feet above mean sea level (MSL) at its base, to approximately 90 to 108 feet at the top. The top of the mound area (above elevation 90) is approximately 11-12 acres, with the remaining area of the mound consisting of sideslope. The top of the mound slopes generally to the southeast, however, localized variations in grade occur, resulting in flat areas or depressions that periodically contain standing water. The mound has a volume of approximately 2,400,000 cubic yards. The northwest extension of the landfill begins at the northwestern toe of slope of the mound area, and extends across the Transco pipeline right-of-way to the northwest

property line of lot 25.12. Elevations in the northwest extension range from 8 to 32 feet above MSL. The volume of waste material in the northwest extension is estimated to be 160,000 cubic yards.

Elevations in the adjacent wetlands area are between 3 to 6 feet above MSL. Mean high tide in the wetlands and Cheesequake Creek is approximately elevation 4 feet above MSL. The 100-year and the 500-year tidal floods in Cheesequake Creek are approximately elevation 12 feet and 15.5 feet above MSL, respectively.

## SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Global Landfill site was used for solid waste disposal from approximately 1968 to 1984. The landfill was operated by Global Landfill Reclaiming Corporation (GLRC), and was permitted to accept waste classified by the State of New Jersey as ID-10 (municipal waste), ID-13 (bulky waste), ID-23 (vegetative waste), and ID-27 (non-hazardous industrial waste).

In April 1984, a slope failure occurred on the southeast side of the landfill, opening a fissure approximately 60 feet wide, 600 feet long and 40 feet deep. Rapid filling of the eastern portion of the landfill followed by a period of heavy rainfall, and excessive high tides in the surrounding wetlands, were reported to be the principal factors contributing to the failure. The failure exposed landfill wastes, breached the perimeter dike, and filled a large portion of the adjacent wetlands with waste. Subsequently, the failure area was filled, regraded and topped with a thin soil cover. NJDEP ordered the GLRC to cease disposal operations at the landfill on April 27, 1984, in an order to show cause filed in the Superior Court of New Jersey, Middlesex County. Since that time, the landfill has been inactive.

GLRC was ordered to establish an escrow account for closure of the landfill, and on April 23, 1986, the Superior Court of New Jersey, Middlesex County, appointed an Administrator to oversee the closure fund. Later in 1986, the Administrator of the closure fund authorized the consulting firm of E.T. Killam Associates of Millburn, New Jersey, to conduct an investigation at the site. A slope stability study was performed which showed that the sideslopes adjacent to the wetlands generally do not meet acceptable safety levels.

Witnesses have alleged that large numbers of drums containing hazardous waste were also disposed of at the landfill, both in the 51-acre mound area and the 6.5-acre northwest extension. These allegations led to an exploratory excavation of the 6.5-acre northeast tract by Killam Associates in March 1988. Drums of hazardous waste were encountered during the excavation.

The site was placed on the Environmental Protection Agency's National Priorities List (NPL) in March 1989 and became eligible for action under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Killam Associates was authorized by NJDEP and the Administrator of the closure fund to prepare a Feasibility Study (FS) to evaluate alternatives for on-site controls at the site, prior to completion of a remedial investigation and feasibility study (RI/FS).

A search for Potential Responsible Parties (PRPs) has also been conducted. New Jersey Spill Act Directives were issued by NJDEP on August 18, 1989 and March 21, 1991, to a total of 52 respondents. The Directives ordered the respondents to pay for the ongoing RI/FS, and all future remedial actions required at the site. In addition, the Environmental Protection Agency (EPA) has issued General Notice letters to 24 respondents, notifying them of their potential liability with respect to the site.

In June 1991, NJDEP negotiations with a group of respondents known as the Global Landfill PRP Group, resulted in the funding of the RI/FS for operable unit two (OU-2), in accordance with the Spill Act Directives. In addition, several suits were filed by residents in the vicinity of the Global Landfill, and have been consolidated under Bernard Lamb, et al. vs. Global Landfill Reclaiming, Inc., et al.) in the Superior Court of New Jersey, Middlesex County (Docket No. w-15349-88).

## HIGHLIGHTS OF COMMUNITY PARTICIPATION

The FS report and a Proposed Plan for the Global Landfill site were released for public comment on February 19, 1991 by NJDEP. These two documents were made available to the public in the administrative record information repositories maintained at NJDEP in Trenton, EPA Region II Docket Room in New York City, and at the Old Bridge Public Library. A notice of availability for these two documents was published in the Central New Jersey Home News, on February 19, 1991. A public comment period on the Proposed Plan was held from February 20, 1991 to May 6, 1991.

A public meeting was held on March 12, 1991. At this meeting, representatives from EPA and NJDEP answered questions about problems at the site and the remedial alternatives under consideration. Following the public meeting, a public information session was held on March 23, 1991. A response to the comments received during the public comment period is included in the Responsiveness Summary, which is part of this Record of Decision (ROD). This decision document presents the selected remedial action for the Global Landfill Superfund site under CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan

(NCP). The decision for this site is based on information contained within the administrative record.

## SCOPE AND ROLE OF THE FIRST OPERABLE UNIT

The NJDEP in consultation with EPA, has organized the remedial work into two planned actions, which are referred to as operable units. This ROD addresses the first operable unit (OU-1) for the site, which is a response action to institute on-site controls for the landfill. The principal threats associated with the site relate to the buried drums of hazardous waste in the landfill. In addition, there is an unacceptable factor of safety related to the stability of the southeast sideslope of the landfill which threatens the adjacent wetlands. The overall objective of this action is to contain contaminants at the site, and limit exposure to levels protective of human health and the environment.

The NJDEP has also initiated a comprehensive RI/FS at Global Landfill (OU-2). This RI/FS will determine the nature and extent of the migration of contaminants from the site into nearby surface water and groundwater, and will evaluate alternatives to address this contamination. Selection of a remedial alternative for the OU-2 action will take place at a later date.

## SUMMARY OF SITE CHARACTERISTICS

When the landfill ceased operations in 1984, it was closed with only a thin soil cover. Vegetative cover over most of the site is sparse to non-existent. As a result, the soil cover is eroding, forming gullies in the sideslopes, and exposing waste materials across the surface of the site. The height of the landfill, the steepness of the sideslopes, the characteristics of the underlying soils, and the nature of the fill, indicate that the landfill is marginally stable. Slope movement (creep) of the southeast sideslope will continue until engineering controls are implemented.

### Solid Wastes and Buried Drums

A total of 63 drums were discovered during the drum excavation in March 1988, 18 of which were removed for sampling and analysis. The drums, all of 55-gallon capacity, contained wastes of varied color and consistency. The drums were generally in poor condition, having been previously crushed or corroded. Their contents included solids and sludges; one drum contained liquids. Table 1-A presents the results of Priority Pollutant analyses performed on the contents of the drums. The table lists only the compounds which were detected in the samples.

Volatile organic compounds present in the samples ranged in concentration from 49.2 milligrams per kilogram (mg/kg) (1,3 dichlorobenzene) to 4,890 mg/kg (carbon tetrachloride). The predominant volatile organic compounds present included xylene, toluene, and ethylbenzene. Base-neutral extractable organic compounds in the samples ranged in concentration from 126 mg/kg to 70,900 mg/kg. Bis (2-ethylhexyl) phthalate, naphthalene and di-n-butylphthalate were the principal base-neutral extractable organic compounds present. The predominant metals present included arsenic, chromium, copper, lead, nickel and zinc. Of the 18 drums sampled, 11 contained hazardous waste based on EPA limits. An additional three drums contained hazardous waste based on NJDEP limits. Table 1-B contains a summary of the drum wastes which fail Resource Conservation and Recovery Act (RCRA) characteristics and, therefore, are considered hazardous waste.

The feasibility of additional drum removal in the northwest extension of the landfill will be determined as part of the remedial design activities.

**Groundwater**

Groundwater in the vicinity of Global Landfill is classified as Class GW-2 under New Jersey Administrative Code (NJAC 7.9-6.5). There are 15 active groundwater monitoring wells at the site. The boring logs indicate that at the southeast limit of the landfill, the site is generally underlain by two to ten feet of meadow mat (an organic-rich horizon comprised of clays, silts, sands, and decomposed vegetation that is generally representative of a water saturated environment, such as a swamp or marsh), and 25 to 35 feet of dark gray silty clay, identified as the Amboy Stoneware Clay member of the Raritan Formation. Beneath the clay is the Old Bridge Sand member of the Raritan Formation, a municipal water supply source for Old Bridge Township and several other communities.

The meadow mat layer decreases in thickness in a northwesterly direction, and is absent upland of the landfill. The Amboy Stoneware Clay also thins in a northwesterly direction. In the vicinity of the Transco gas pipeline, it is either replaced by, or grades into, one to two feet of light tan to gray clay layer. The Amboy Stoneware Clay serves as a confining layer between the landfill and the Old Bridge Sand, however, in the northwestern section of the landfill, it may be locally absent. The absence of this confining layer between the Old Bridge Sand and water table aquifer may provide a pollutant pathway to the potable water aquifer. A hydraulic conductivity of 125 feet per day in the Old Bridge Sand aquifer has been reported by the United States Geological Survey.

Eight of the fifteen groundwater monitoring wells at the site are screened in the water table aquifer in sands above the clay

layer. Seven of the wells are screened in the Old Bridge Sand beneath the clay. The direction of groundwater flow at the site is generally to the southeast, both in the water table aquifer and in the Old Bridge Sand. The shallow groundwater flow direction may be influenced by mounding of groundwater within the landfill. Infiltration of precipitation may contribute to mounding of groundwater below the landfill surface, and thereby contribute to leaching and off-site migration of hazardous substances. Mounding effects will continue to occur until a proper cap and stormwater runoff controls are implemented to prevent precipitation from entering the site in the future. Water level measurements indicate that the Old Bridge Sand is under confined or artesian conditions. An upward vertical gradient is greatest in the southeastern section of the landfill, where the clay layer is thickest, and less in the northwestern part of the site, where the clay layer thins or disappears.

Groundwater data presented in the FS was obtained from monitoring wells which have been sampled quarterly since October 1987, as required under a New Jersey Pollution Discharge Elimination System (NJPDES) permit issued to Global Landfill.

Data shown in Tables 2-A, 2-B, 2-C indicates that the landfill has adversely impacted groundwater in the area. Many contaminants identified in the landfill leachate and in the drums excavated from the landfill, have been detected above maximum contaminant levels (MCLs) in the downgradient groundwater. MCLs are generally "at the tap" or "point of use" standards.

Typical leachate indicator parameters such as Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), iron, chlorides, total dissolved solids (TDS), and ammonia nitrogen are at elevated levels in the shallow groundwater aquifer. Several of the shallow monitoring wells have shown a general trend of increasing concentration for these leachate parameters from October 1987 to April 1990.

Table 2-A presents a comparison of downgradient and upgradient groundwater quality in the shallow aquifer. Groundwater quality criteria are based on State and Federal MCLs, and New Jersey GW-2 groundwater quality standards. These data demonstrate the landfill's impact on groundwater quality in this aquifer. Contaminants not detected in upgradient wells were found at levels above their MCLs in the downgradient wells. For example, in the downgradient wells, benzene and chlorobenzene were detected above MCLs in 39 of 45, and 42 of 45 samples, respectively, and were not detected in upgradient wells. Similarly, acenaphthene, 1,2 dichlorobenzene, heptachlor, cadmium, hexavalent and total chromium were detected above MCLs in the downgradient wells.

Table 2-B, a comparison of groundwater quality in the deep wells (Old Bridge Sand aquifer), indicates that the landfill also has impacted groundwater in the Old Bridge Sand aquifer. For example, cadmium, total chromium, lead, benzene, chlorobenzene, trichloroethene, and vinyl chloride exceed MCLs in the downgradient wells, and were not detected in the upgradient wells.

During the March 1988 drum investigation, two samples of groundwater, pumped from the trenches during dewatering operations, were sampled and analyzed for Priority Pollutant organics and metals. The data, summarized in Table 2-C, reveal a similar spectrum of compounds to those encountered in the shallow groundwater.

**Leachate**

Leachate seeps and ponded leachate have been frequently observed at the landfill. These surface exposures of leachate are most often observed at the toe of slope, but have also been noted at higher elevations on the landfill sideslopes. At the present time, there are no measures in place for leachate collection and disposal. A 1.75-acre leachate collection pond was previously constructed at the southern corner of the landfill, and a leachate collection well was installed through the top of the landfill in July 1985. However, neither of these facilities is currently in operation.

As part of a NJPDES quarterly monitoring program, leachate samples from exposed seeps have been collected for analysis from October 1987 to April 1990. The average flow rates for individual seeps ranged from 0.08 gallons per minute (gpm) to 3.5 gpm, while the total average leachate seepage flow from the site is 5.5 gpm (8000 gallons per day). This flow represents only surface leachate seeps that are exposed at the toe of the slope or on sideslope areas.

Since 1987, concentrations of leachate indicator parameters (BOD, COD, ammonia, chlorides, TDS, hardness and iron) were found to be elevated. Certain heavy metal compounds (including lead and cadmium) have been detected in the leachate above MCLs. Volatile organics detected in the leachate consisted primarily of benzene-related compounds, with chlorobenzene concentrations up to 4,600 micrograms per liter (ug/l). Benzene, chlorobenzene, and xylene exceeded MCLs, respectively, in 24, 28, and 14 of the 50 samples analyzed. Table 3 compares leachate data with groundwater quality standards and illustrates the potential impact the leachate is having on the groundwater and wetlands.

**Surface Water and Wetlands**

Cheesequake Creek has been classified as a saline SE-1 surface water under the NJAC Surface Water Quality Standards. Surface waters within Cheesequake State Park are classified as Category One waters, which are considered non-degradable. In addition, Global Landfill is bordered on three sides by wetlands. Surface drainage on the northeast, southeast, and southwest sides of the mound area of the landfill is into the adjoining wetlands. On the northwest side, surface drainage from the landfill mound is into the northwest extension, and then southwest into the wetlands. Currently, the wetlands are subject to several discharges from the landfill, including stormwater runoff, surface leachate seeps, and contaminated shallow groundwater.

In October 1986, NJDEP sampled surface water at two locations adjacent to the landfill (one sample in Melvin's Creek, and one at an unspecified location on the southwest side of the landfill), and analyzed them for Priority Pollutants. These data are presented in Table 4-A. In October 1987, additional surface water sampling was performed at ten locations in the vicinity of the landfill (Table 4-B).

Table 4-C summarizes the data from the two sampling events, and compares them to NJDEP Surface Water Quality standards for estuarine waters (NJAC 7:9-4.14(c)), and with NJPDES Criteria for Protection of Salt Water Aquatic Life (NJAC 7:14A-appendix F). Concentrations of cadmium, copper, nickel, silver, and zinc exceeded the NJPDES Criteria for Protection of Salt Water Aquatic Life. With regard to surface water quality, standards for the pesticides, lindane and DDT, were exceeded.

These data are insufficient to establish background water quality in the wetland areas, and to determine what impact the landfill is having on those areas. However, the compounds detected above NJPDES standards are present in both the leachate and groundwater that discharges into the wetlands. These discharges provide a potential threat to the wetlands. The nature and extent of contaminants in the wetland areas will be characterized during the RI/FS for OU-2.

**Air**

Limited air monitoring data are available, and therefore cannot be compared with State or Federal air quality standards. Monitoring of ambient air for organic vapors suggests that the organic gasses emitted from the landfill consist primarily of methane. No gas analyses for specific organic compounds have been performed.

Subsurface methane migration has occurred beyond the northwest property line. However, methane was not detected at a distance

of 500 feet from the toe of slope, and did not extend to the adjacent residential areas at the time of the field investigation. Odor generation has been a significant nuisance problem in the vicinity of the landfill, with odors being detected in the residential areas and as far away as the Garden State Parkway, 2700 feet to the east-northeast.

Although no specific toxic compounds have been identified in the air emissions from the landfill, there exists the potential of a public health risk via the air pathway. Air and gas quality monitoring will be performed during the RI/FS for OU-2, and will be incorporated into the design of the gas management system (OU-1).

**Transcontinental Gas Pipeline**

Transco owns a 42-inch natural gas pipeline that lies between the northwest extension and the main portion of the landfill. The pipeline is located approximately four feet beneath the original ground level, within a 75-foot easement that runs through the landfill proper. Approximately five to fifteen feet of refuse have been deposited on the Transco easement. Discussions are currently underway between representatives of Transco and NJDEP regarding the feasibility of relocating the pipeline to an area beyond the extent of the proposed cap. This would have the desired effect of isolating the pipeline from the possible corrosive effects of contaminated groundwater and leachate beneath the landfill. This action would also prevent post-construction damage to the cap, should repairs to the pipeline become necessary.

## SUMMARY OF SITE RISKS

**Human Health Assessment**

When Global Landfill ceased operations in 1984, it was improperly closed with only a six-inch soil cover. The lack of a proper cover at the landfill creates a number of potential pathways for exposure. The failure of the southeast east sideslope also created on- and off-site potential pathways for exposure through direct contact with, or ingestion of, contaminants present in the exposed refuse. Potential hazards also exist through the inhalation of contaminated airborne particulates migrating from the exposed refuse. Also, the migration of landfill gas emissions can act as carrier gasses for volatile and semi-volatile organic compounds present in the refuse.

The discovery of drums in the northwest area of the landfill, containing hazardous waste, support allegations that drums were also disposed of in the main landfill area. A possibility exists that these drums have and may continue to release hazardous waste

into the environment. Leachate generated from the infiltration of rainwater significantly increases the mobility of contaminants present in the landfill. Additionally, the potential for direct contact with the leachate seeps present on the surface of the landfill also exists.

Sixteen potential exposure pathways were evaluated in the FS, ten of which were determined to be complete pathways, as defined by the following exposure pathway elements:

- A source and mechanism of chemical release in the environment,
- A transport medium,
- A point of potential environmental or human exposure,
- An exposure route at the point of contact.

The ten complete pathways for the Global Landfill site are:

1. Inhalation of contaminated ambient outdoor air, off-site;
2. Inhalation of contaminated ambient outdoor air, on-site;
3. Inhalation of contaminated ambient indoor air;
4. Ingestion of garden produce contaminated by ambient outdoor air;
5. Ingestion of contaminated windblown particles deposited onto back yard soils;
6. Ingestion of contaminated windblown particles deposited onto indoor surfaces;
7. Ingestion of contaminated particles and liquids on-site;
8. Dermal contact with contaminated windblown particles deposited onto back yard soils;
9. Dermal contact with contaminated windblown particles deposited onto indoor surfaces; and
10. Dermal contact with contaminated particles and liquids on-site.

Exposures to site-related contaminants through the above pathways were not quantified. However, in accordance with CERCLA guidance on municipal landfills (Conducting Remedial Investigations/ Feasibility Studies for CERCLA Municipal Landfill Sites, February 1991, OSWER Directive 9355.3-11), where established standards for one or more contaminants in a given medium are clearly exceeded, the basis for taking remedial action is warranted. Many contaminants in the Old Bridge aquifer, a source of public water supply, were detected at levels in excess of MCLs. Metals (cadmium, chromium, and lead), and volatile organic compounds (chlorobenzene, benzene, and vinyl chloride), were all detected in excess of MCLs. The presence of these hazardous substances at levels above MCLs poses a potential future threat to public

health, and may prevent groundwater near the site from being used as a potable water supply.

In an effort to qualitatively assess public health issues, the mean landfill-associated concentration of each substance in shallow groundwater was compared with State and Federal groundwater protection standards. In addition, the estimated overall concentrations of each substance, including groundwater, leachate, and drummed waste, were also compared with State and Federal groundwater standards.

Substances of concern identified through this analysis are presented in Table 5. The data shown in this table has been revised to update and correct the MCL standards presented in the FS. Nine substances are of concern based upon comparison of mean groundwater concentrations with State and Federal standards. They are ammonia nitrogen (641 x MCL), iron (56.7 x MCL), chlorobenzene (41.0 x MCL), sodium (36.8 x MCL), benzene (21.0 x MCL), chloride (37.7 x MCL), heptachlor (4.08 x MCL), aldrin (2.22 x MCL) and total chromium (1.45 x MCL). However, it is likely that the concentrations of chloride and sodium are influenced by background tidal conditions. Based on the comparison of leachate and drummed waste with State and Federal MCLs, 30 pollutants are of concern, including eleven metals, five substituted alkane and alkene hydrocarbons, and five miscellaneous substances.

The environmental data collected at and near Global Landfill lead to a number of conclusions which support the need for remedial action at the site. As previously stated, groundwater data collected to date reveals that groundwater quality beneath this site exceeds MCLs for numerous hazardous substances, pollutants and contaminants. Many of these hazardous substances were detected in drums buried at the landfill, and in leachate flowing out of the fill material. The migration of these substances from the landfill into the underlying aquifers, and possibly into the nearby surface waterways will continue unless remedial actions are implemented.

Actual or threatened releases of hazardous substances from this site, if not addressed by the preferred alternative or one of the other active remedial measures considered, may present a current or potential threat to the public health, welfare, and the environment through the continued leaching of contaminants from the landfill.

**Environmental Assessment**

As previously mentioned, the wetlands are subject to several discharges from the landfill, including stormwater runoff, surface leachate seeps, and contaminated shallow groundwater. In September 1990, Killam Associates conducted a wetland delineation

study which evaluated potential wetland losses and mitigation requirements associated with the capping alternatives. The result of the study, presented in Appendix L of the FS report, concludes that the proposed remedial activities will disturb the wetland fringe along the base of the landfill. The study also concludes that mitigation of impacted wetlands will be required. A wetland mitigation report will be prepared in conjunction with the design of the selected remedial alternative.

In addition to the delineation, a Wetland Evaluation Technique (WET) 2.0 analysis was conducted, and provides preliminary information regarding the functions and values of the wetland habitat in, and adjacent to, the Global Landfill site. The WET was prepared as a supplement to the OU-1 FS report. The WET identifies areas in which further data collection is required, and provides a basis for evaluating potential wetland losses and mitigation requirements associated with remedial activities at the site. The WET recommends sampling parameters utilizing quantitative data collection techniques, in order to gain a useful and workable inventory of existing wildlife resources. Also, a quantitative wildlife survey should be performed prior to the design of on-site controls, or specification of mitigation requirements for the site.

## DESCRIPTION OF ALTERNATIVES

The goals of the remedial action are to prevent, reduce, or control the migration of contaminants from the landfill. Treatment or removal alternatives that reduce toxicity, mobility, or volume are preferred. However, it has been estimated that removal of waste in the main portion of the landfill would require bulk excavation of approximately 2,500,000 cubic yards of landfill material. Removal of waste in the northwest extension area would require excavation of approximately 160,000 cubic yards. Because of the variability and volume of wastes encountered at the landfill, excavation and/or treatment is economically and technically infeasible, and was not considered further. Containment of potentially contaminated soil and waste at the landfill involves the placement of an impermeable cover over the existing fill material. Containment technologies are proven to be an effective and reliable means of protecting human health and the environment against direct contact and migration of contaminants from landfills.

In preparing the FS, a wide range of remedial technologies were identified and initially screened for effectiveness, implementability, and cost. Those alternatives which passed this screening process were further evaluated for incorporation into the on-site containment alternatives discussed below. Each capping alternative, with the exception of the "No Action" alternative, would include the following technologies:

- construction of a clay-based or composite cap;
- slope stability enhancement by construction of a stabilization berm;
- construction of a gas collection/treatment system;
- construction of a stormwater management system;
- construction of site access controls; and
- implementation of a program to monitor movement of the landfill sideslopes.

Each alternative assumes operation and maintenance (O&M) over a thirty-year period of time. The estimated annual O&M costs, and the estimated capital construction costs, are presented along with the calculated estimated present worth cost.

The conceptual gas collection and treatment system consists of an interior and perimeter active gas collection system, and treatment of the gasses by flare or thermal oxidation. Future sampling will be conducted at the site to analyze the gas emissions. This information will be used during the design of OU-1 to determine the proper choice of gas treatment.

While each of the five capping alternatives propose a specific berm configuration, the final design of the berm will be determined during the design of OU-1, and will take into account all specific design parameters necessary to achieve an adequate short and long-term factor of safety. The extent of the berm will also be determined during the design.

In addition to the above components, there are three options for leachate collection and treatment. These options will be discussed under the section entitled "Leachate Treatment Options". The costs for the leachate system options are listed separately, and are not included in the cost estimates for the individual capping alternatives.

**Alternative 1: No Action**

| | |
|---|---|
| Estimated Capital Cost: | $0 |
| Estimated Annual O&M Cost: | $210,000 |
| Estimated Present Worth: | $3,228,000 |

CERCLA requires that the evaluation of a "No Action" alternative be considered at each site, to serve as a point of comparison with other remedial action alternatives. Under this alternative, the landfill would remain in its current condition. No remediation measures would be implemented. However, NJPDES groundwater monitoring program would be continued for 30 years. The expense for this monitoring is shown as the annual O&M cost. This program would consist of quarterly sampling of the 15 wells which surround the site, in order to monitor contaminant migration. The samples would be analyzed for EPA priority pollutants plus selected indicator parameters. Also, the

condition of the wells would be inspected on a weekly basis. No other action is proposed under this alternative. Because this alternative does not entail contaminant removal, CERCLA requires that a review of site conditions be conducted every five years.

**Alternative 2: NJDEP Solid Waste Cap**

| | |
|---|---|
| Estimated Capital Cost: | $16,915,000 |
| Estimated Annual O&M Cost: | $489,000 |
| Estimated Present Worth: | $23,722,000 |
| Estimated Construction Period: | 1½ years |

This alternative would incorporate requirements for capping a solid waste landfill, in accordance with the NJAC 7:26-2.9. Using these guidelines, the following cap was developed:

12" vegetative topsoil
12" sand drainage
12" clay (with permeability of 1 x $10^{-7}$ cm/sec)

This cap would have an overall thickness of three feet, and a unit weight of 450 pounds per square foot (psf). The construction of this cap would require a stabilization berm in Zone 1 (Figure 2) in order to achieve an acceptable factor of safety for sideslope stability. The Zone 1 stabilization berm would consist of a soil embankment that would be constructed along the toe of slope of the landfill for a length of approximately 1000 feet. The berm would be placed along the entire southeast sideslope in the former sideslope failure area, and would have 3:1 to 3.5:1 sideslopes. The top width would be approximately 50 feet, with a top elevation of about 20 feet above MSL, or 15 feet above the adjacent wetlands.

**Alternative 3: NJDEP Hazardous Waste Cap**

| | |
|---|---|
| Estimated Capital Cost: | $30,190,000 |
| Estimated Annual O&M Cost: | $581,900 |
| Estimated Present Worth: | $38,420,000 |
| Estimated Construction Period: | 2½ years |

This alternative would incorporate capping requirements in compliance with New Jersey State Hazardous Waste Regulation (NJAC 7:26-10.8(i)). Using these guidelines, the following cap was developed:

12" vegetative topsoil
12" clean fill
12" sand drainage
30 mil textured synthetic material layer
36" clay (with permeability of 1 x $10^{-7}$ cm/sec)

This alternative would have a unit weight of 800 pounds psf, an overall thickness of six feet, and would employ a textured synthetic material layer. NJDEP guidelines restrict the use of smooth synthetic material layers on landfills with sideslopes greater than 7 percent. The sideslopes at Global Landfill range from 5:1 (20 percent) to 3:1 (33 percent) slopes. Smooth synthetic material layers have insufficient friction angles between overlying soil layers to maintain long-term slope stability. Recently, synthetic material manufacturers have developed textured synthetic material layers that provide increased friction angles with soil material together with other engineering controls, such as geogrids and geonets, that provide support, and render sufficient slope stability on sideslopes greater than 7 percent.

This cap would require a stabilization berm in Zones 1 and 2 in order to achieve an acceptable factor of safety for sideslope stability. The Zone 1 and 2 stabilization berm would consist of soil embankments constructed along the toe of slope of the landfill for lengths of approximately 1000 and 600 feet respectively. They would range in height from approximately ten to twenty feet above the adjacent wetlands, with 3:1 to 3.5:1 sideslopes. The top width of the southeast berm (Zone 1) would be approximately 50 feet, with a top elevation of about 25 feet above MSL. The top of the southwest berm (Zone 2) would be about 20 feet wide, with a top elevation of 15 to 18 feet.

**Alternative 4: RCRA Cap**

| | |
|---|---|
| Estimated Capital Cost: | $26,739,000 |
| Estimated Annual O&M Cost: | $554,000 |
| Estimated Present Worth: | $34,548,000 |
| Estimated Construction Period: | 2½ years |

This alternative would employ the capping requirements set forth in RCRA (40 C.F.R. 264.310) guidelines. Using these guidelines, the following was developed:

12" vegetated topsoil
12" clean fill
12" sand drainage
30 mil textured synthetic material layer
24" clay (with a permeability of $1 \times 10^{-7}$ cm/sec)

This alternative would have an overall thickness of five feet and a unit weight of 650 pounds psf. As is the case with Alternative 3, this cap would require the construction of a stabilization berm in Zones 1 and 2 in order to achieve an acceptable factor of safety for sideslope stability.

**Alternative 5: Bentonite Clay Cap**

| | |
|---|---|
| Estimated Capital Cost: | $18,909,000 |
| Estimated Annual O&M Cost: | $504,000 |
| Estimated Present Worth: | $25,945,000 |
| Estimated Construction Period: | 1½ years |

Bentonite is a clay material which is typically mixed with soil, or used alone, to form an impervious layer. This capping alternative uses a bentonite barrier layer in order to minimize the load placed on the landfill from capping. The bentonite cap would include:

12" vegetated topsoil
8" sand fill
±0.5" synthetic drainage
4" bentonite clay (with permeability of $1 \times 10^{-9}$ cm/sec, after hydration)

The barrier layer in this alternative would be a pre-fabricated material consisting of a dry bentonite clay layer (approximately 0.5-inch), sandwiched between two geotextile layers. Upon contact with moisture, the bentonite layer swells to a thickness of approximately two inches. A fifty percent overlap of the barrier would be provided, resulting in an effective bentonite thickness of four inches. This cap has a unit weight of 300 pounds psf. Also, as is the case with Alternative 2, this cap would require a stabilization berm in Zone 1 in order to achieve an acceptable factor of safety against sideslope failure.

**Alternative 6: Modified NJDEP Hazardous Waste Cap**

| | |
|---|---|
| Estimated Capital Cost: | $19,938,000 |
| Estimated Annual O&M Cost: | $512,000 |
| Estimated Present Worth: | $27,101,000 |
| Estimated Construction Period: | 2 years |

This alternative was developed to provide a light weight capping system for the Global Landfill site. It would incorporate the composite cap features of NJDEP Hazardous Waste and RCRA capping alternatives in that it would also contain a textured synthetic material layer that would increase friction along the landfill sideslopes, and provide sufficient stability along the sideslopes. However, this alternative would have a reduced unit weight and thickness, in consideration of the slope stability problems of the landfill. The Modified Hazardous Waste Cap alternative would include:

12" vegetated topsoil
12" sand drainage
30 mil textured synthetic material layer
12" clay (with permeability of $1 \times 10^{-7}$ cm/sec)

This cap would have a total thickness of three feet, and a unit weight of 450 pounds psf. Also, as is the case with Alternatives 2 and 5, this alternative would require a stabilization berm in Zone 1 in order to assure an acceptable factor of safety against sideslope failure.

**Leachate System Options**

The landfill is partially saturated with leachate due to the lack of an adequate cap. The leachate finds its way to the surface of the landfill in the form of leachate seeps, and needs to be collected. Collection of exposed leachate surface seeps would prevent their migration from the landfill and discharge to the adjacent wetlands. In addition, collection of the leachate would assist in maintaining cap integrity by preventing a buildup of leachate at the toe of slope of the landfill. Once collected, the leachate would be treated, using one of the treatment options described below. Condensate generated by the landfill gas management system would also be collected and treated along with the leachate. Reinfiltration of groundwater was not considered because recharge at the site would be limited by the shallow depth to groundwater characteristic of the surrounding wetlands.

The leachate treatment system would treat a flow rate that diminishes annually from approximately 20,000 gallons per day (gpd) to approximately 400 gpd after 15 years. Below are three options for leachate collection and treatment:

Option 1: Off-Site Disposal at an Industrial Waste Treatment Facility

Under this option, a leachate surface seep collection system would be constructed along the toe of slope around the perimeter of the landfill. Leachate, along with condensate from the gas collection system, would then be pumped to a holding tank, and transferred by truck to a RCRA permitted hazardous waste treatment, storage and disposal (TSD) facility. No pretreatment would be required under this option.

Option 2: On-Site Pretreatment With Discharge to a Publicly Owned Treatment Works (POTW)

This option requires the construction of a wastewater pretreatment plant on site. Collection of the leachate seeps for this option is similar to that described for Option 1. The collected leachate and gas condensate would be pumped to the treatment facility. The pretreatment process proposed under this option would consist of flow equalization followed by a one-stage, batch-operated biological treatment with the addition of powdered activated carbon. Metals removal may be necessary to meet Federal and State regulations. Following pretreatment, the collected wastewater would be retained on-site in storage tanks,

then transported by truck to a municipal waste water treatment facility (otherwise known as a publicly owned treatment works, or POTW). Sludge generated during pre-treatment would be transported by truck to a RCRA permitted TSD facility for treatment and disposal.

Option 3: On-Site Treatment With Discharge to Surface Water

This option requires the construction of a complete waste water treatment plant on-site. The leachate seep collection system for this option is also similar to that described in Option 1. The collected leachate and gas condensate would be pumped to the on-site treatment plant. The treatment process proposed under this option would consist of flow equalization followed by a two-stage, batch-operated biological treatment system, with the addition of powdered activated carbon for residual organics removal. The system provides for nitrification and denitrification as part of the process. Ultraviolet disinfection of the treated effluent would be the final step, prior to discharge to the Cheesequake Creek. Metals removal may be necessary to meet Federal and State regulations. As in Option 2, sludge generated from the treatment process would be transported, by truck, to a RCRA permitted TSD facility. The treatment unit would be designed to produce an effluent that would meet NJPDES requirements for discharge to surface water.

Estimated Costs and Required Construction Time (Years)

| | Option 1 | Option 2 | Option 3 |
|---|---|---|---|
| Capital Cost | $483,600 | $1,051,700 | $1,526,200 |
| Annual O&M Cost | $1,394,700 | $275,500 | $253,100 |
| Present Worth | $4,485,800 | $2,797,700 | $3,252,200 |
| Construction period* | 1 to 1½ | 2 to 2½ | 2 to 2½ |

* Construction would take place concurrently with cap construction

## SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In accordance with the NCP, a detailed analysis of each remedial alternative was conducted with respect to each of the nine criteria. This section discusses and compares the performance of the remedial alternatives under consideration against these criteria. The nine criteria are described below. All selected alternatives must at least attain the Threshold Criteria. The selected alternative should provide the best trade-offs among the Primary Balancing Criteria. The Modifying Criteria were evaluated following the public comment period.

**THRESHOLD CRITERIA**

- **Overall Protection of Human Health and 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.

- **Compliance with ARARs** addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements (ARARs) of other Federal and State environmental statutes and/or provide grounds for invoking a waiver.

**PRIMARY BALANCING CRITERIA**

- **Long-term Effectiveness and Permanence** refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once remedial objectives have been met.

- **Reduction of Toxicity, Mobility, or Volume Through Treatment** is the anticipated performance of the disposal or treatment technologies that may be employed in a remedy.

- **Short-term Effectiveness** refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

- **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

- **Cost** refers to estimates used to compare costs among various alternatives.

**MODIFYING CRITERIA**

- **State Acceptance** indicates whether, based on its review of the FS and Proposed Plan, NJDEP concurs with, opposes, or has no comment on the preferred alternative.

- **Community Acceptance** summarizes the public's general response to the alternatives described in the Proposed Plan and the FS report. Responses to public comments are addressed in the Responsiveness Summary of this ROD.

**ANALYSIS**

The following is a summary of the comparison of each alternative's strengths and weaknesses with respect to the nine evaluation criteria:

**Overall Protection of Human Health and the Environment**

All of the containment alternatives, with the exception of the No Action alternative, address the on-site remedial action objectives identified for the Global Landfill site. Wastes would be contained on-site and residuals would be controlled through the implementation of gas and leachate surface seep controls. The alternatives would offer protection from windblown contaminants, and from direct contact with contaminated soil or leachate seeps. All of the alternatives are protective of a 100-year flood, however, they would not offer protection from a 500-year flood without additional reinforcement of sideslopes and/or increasing the size of the berm.

Alternative 3 (NJDEP Hazardous Waste Cap), Alternative 4 (EPA RCRA Cap), Alternative 5 (Bentonite Clay Cap), and Alternative 6 (Modified NJDEP Hazardous Waste Cap) would reduce the infiltration of rainwater through the landfill's surface by over 99 percent, thereby reducing the current rate of leachate generation. Alternative 2 (NJDEP Solid Waste Cap) reduces infiltration of rainwater by an estimated 94 percent.

Alternatives 2, 5, and 6 would impact the least wetlands acreage because they are lighter in weight (450, 300, and 450 pounds psf, respectively), and therefore would only require Zone 1 stabilization berms. These alternatives would impact approximately 2.6 acres of wetlands. Alternatives 3 and 4, however, would require stabilization berms in Zones 1 and 2 to support their unit weights (800 and 650 pounds psf, respectively). These alternatives would impact approximately a total of 4.0 and 4.2 acres of wetlands, respectively.

Alternatives 3, 4, and 6 would provide greater control of gas migration (in conjunction with the gas collection system) than Alternatives 2 and 5, due to the incorporation of an synthetic material layer into the cap.

The No Action alternative offers little protection of human health and the environment. The risks would be increased over time due to continual deterioration of the minimal on-site cover. This alternative will not be considered further in this document.

Alternative 6 offers the greatest overall protection of human health and the environment. This Modified NJDEP Hazardous Waste Cap alternative effectively reduces the infiltration of rainwater, thereby reducing the rate of leachate generation and

provide protection from exposure to contaminants. It is lighter in weight and would provide a greater factor of safety for the sideslopes of the landfill. In addition, this alternative would require a smaller berm, thereby impacting less wetland acreage.

**Compliance With ARARs**

Location-specific ARARs

The Coastal Zone Development requirements (NJAC 7:7E-3.27), Freshwater Wetlands Protection Act Rules (NJAC 7:7A-1.1 et seq.), and Section 404 of the Clean Water Act (33 U.S.C.A. §1344) are ARARs for this site. Therefore, wetlands destroyed as a result of non-compliance with past permitting requirements, the sideslope failure in 1984, and any encroachment due to remedial construction activities, would require mitigation in compliance with these ARARs. The type of wetland mitigation will be determined during the design of the selected remedy. Also, in order to comply with the provisions of the National Historic Preservation Act, a cultural resource study will be preformed during the design of the selected remedy. If cultural resources are found, a cultural resources mitigation plan will be developed to reduce the impact to these resources as much as possible.

All the containment alternatives would comply with the Coastal Zone Management Act (15 C.F.R. 930), Waterfront Development Law (New Jersey Statutes Annotated (NJSA 12:5-3) and the Wetlands Act of 1970 (NJSA 13:9A-1 et seq.) Because this project would impact freshwater wetlands, the requirements of the Freshwater Wetlands Statewide General Permit #4, under the Freshwater Wetlands Protection Act Rules (NJAC 7:7A-1.1 et seq.) are also applicable.

Activity-specific ARARs

The presence of hazardous waste in the landfill was confirmed, by excavation, in 1988. Therefore, requirements set forth in Subtitle C of RCRA, and the New Jersey Hazardous Waste Landfill Closure Regulations (NJAC 7:26-10.8(i)), as well as the appropriate Federal and State requirements for subsurface gas and leachate management systems, are relevant and appropriate for capping of Global Landfill.

The NJDEP Solid Waste Cap (Alternative 2), NJDEP Hazardous Waste Cap (Alternative 3), and the RCRA Cap (Alternative 4) have been developed using Federal and State capping guidelines. The Bentonite Clay Cap (Alternative 5) and Modified Hazardous Waste Cap (Alternative 6) are specialized modifications of those guidelines, that were developed as lightweight containment alternatives to address the slope stability concerns specific to Global Landfill; therefore, for either of these alternatives to be implemented, a waiver of New Jersey Hazardous Waste Landfill

Closure Regulations (NJAC 7:26-10.8(i)2) would be required based upon technical impracticability from an engineering perspective.

All leachate collection and treatment system options would be in compliance with requirements set forth in Sections 402 and 404 of the Clean Water Act (33 U.S.C.A. §§1342, 1344), the New Jersey Pollution Discharge Elimination System (NJAC-7:14 et seq.), the New Jersey Safe Drinking Water Act (NJAC 7:10 et seq.), New Jersey Water Supply Management Act rules (NJAC 7:19 et seq.), and Surface Water Quality Standards (NJAC 7:9-4 et seq.) Also, Option 3 (on-site treatment with discharge to surface water), would comply with Federal and State regulations concerning discharges to surface waters.

Under the NJAC Surface Water Quality standards, Cheesequake Creek is classified as a saline SE-1 surface water. The discharge to a POTW option would be subject to discharge limitations set by the agency receiving the pretreated wastewater. The construction efforts at the site will also be subject to the Noise Control Act of 1971 (NJAC 7:29-4 et seq.) In addition, trucking of the leachate would be subject to Department of Transportation regulations for hazardous wastes.

Air emissions of specific contaminants from Global Landfill can not be quantified based on data collected to date. Therefore, a comparison of ambient air quality at the landfill after capping, with applicable air quality standards, cannot be made at this time. Additional air and gas quality monitoring will be performed during the OU-1 design, and will be incorporated into the design of the gas management system.

**Long-Term Effectiveness and Permanence**

All five containment alternatives address this criteria by eliminating the potential risks associated with direct (on-site) contact with hazardous wastes, and with the off-site migration of contaminated dust or landfill wastes. The bentonite clay cap proposed in Alternative 5, and the textured synthetic material layer in the clay composite caps (Alternatives 3, 4, and 6) are relatively new technologies; their long-term performance as landfill capping materials are not well documented (as is the more conventional clay cap in Alternative 2).

All the capping alternatives address other existing site conditions that require attention. These include improvement of slope stability, leachate and gas management controls, and site access controls. After the construction of the slope stabilization berm and cap, the long-term factor of safety would be greater for all the alternatives. However, Alternatives 2, 5, and 6 are lighter, and would provide higher initial factors of safety, which would improve further as a result of construction.

Wetlands would be impacted during construction of the slope stabilization berms. The impact would be greatest with capping Alternatives 3 and 4 because of the larger sizes of the berms required to support the weight of those caps.

All the capping alternatives are expected to adequately control and manage wastes remaining on-site, and residuals generated after capping. The key to effective long-term performance is post-capping operation, maintenance, inspection, and monitoring. Factors that could effect long-term performance include the effects of differential settlement and sideslope creep. Differential settlement could damage the wells and piping systems of the gas collection and leachate collection systems, as well as the low permeability layer of the cap. Buildup of solids and biological growth on well screens and piping systems could also effect long-term operation. The appropriate O&M programs would be implemented to minimize these potential performance problems.

**Reduction of Toxicity, Mobility or Volume**

None of the containment alternatives reduce the overall toxicity, mobility or volume of wastes present at Global Landfill. The alternatives will not address contamination caused by waste materials in direct contact with shallow groundwater within the landfill. However, all containment alternatives provide for on-site containment of wastes, reduction in leachate generation, and collection and treatment of leachate surface seeps generated by the landfill. They would also eliminate the potential for direct human contact with hazardous waste, and assist in controlling erosion and sediment loss. In addition, the collection and treatment of gasses would reduce the toxicity, mobility, and volume of gaseous contaminants released through the surface of the landfill.

Alternative 2 (NJDEP Solid Waste Cap) reduces infiltration of rainwater by an estimated 94 percent. Alternative 3 (NJDEP Hazardous Waste Cap), Alternative 4 (EPA RCRA Cap), Alternative 5 (Bentonite Clay Cap) and Alternative 6 (Modified NJDEP Hazardous Waste Cap) would reduce the infiltration of rainwater through the landfill's surface by over 99 percent, diminishing the current rate of leachate generation, and therefore reducing the mobility and volume of contaminants migrating into the groundwater. All leachate collection and treatment options would be designed to collect all of the leachate seeps and gas condensate.

**Short-Term Effectiveness**

All five containment alternatives may cause potential short-term health and environmental impacts. These impacts are generally related to potential exposure to waste materials on-site, air emissions (on- or off-site), typical construction related safety hazards, increased truck traffic, noise, and potential soil

erosion. The short-term impacts, however, can be mitigated through appropriate design considerations and construction practices. In addition, health and safety plans including on- and off-site air monitoring, would be developed for protection of local residents and on-site workers.

Short-term health effects may be a concern during well drilling for the gas collection system. Protection of local residents and on-site workers can be achieved through air monitoring, minimizing the aerial extent of waste disturbance, and by employing standard dust control measures. Construction of the leachate collection system would also require similar measures.

The time required to construct Alternatives 2, 5, and 6 ranges from 1½ to 2 years, while Alternatives 3 and 4 would require approximately 2½ years to construct.

**Implementability**

Alternatives 3 and 4 would be difficult to implement due to the instability of the landfill sideslopes, and the potential for another slope failure to occur. The weight of the caps proposed in these alternatives, due to the amount of clay required, would result in an unacceptable factor of safety for sideslope stability. Alternatives 2, 5, and 6 are the most technically feasible for Global Landfill to assure the greatest factor of safety against sideslope failure. They are lighter in weight, and would minimize the additional load placed on the landfill during capping.

The Bentonite clay proposed in Alternative 5, and the textured geomembranes in the composite clay cap alternatives (3, 4 and 6), are presently available from a limited number of manufacturers, while natural clay is available from a number of sources. Alternatives 2, 3, and 4 employ technologies that are based on conventional construction procedures. The materials and techniques required to construct these alternatives have been used at other landfills and should be implementable. The construction of the cap, berm, leachate collection system, and gas treatment system will be performed in a manner which will minimize the impact to the wetlands.

No implementation difficulties are anticipated for the gas collection and treatment system. Implementation of all leachate collection and treatment options is also technically and administratively feasible.

**Cost**

Capital costs, first year O&M costs, and the total present worth of all the remedial alternatives are summarized in Table 6. Present worth costs are based on a 30-year period and a discount

rate of five percent. Alternative 2 is the least expensive in terms of total present worth ($23,722,000), while Alternative 3 ($28,420,000) is the most expensive. Alternative 2 also has the lowest capital ($16,915,000) and first year O&M cost ($489,000). The highest capital cost ($30,190,000) and first year O&M cost ($581,000) are for Alternative 3.

**State Acceptance**

The New Jersey Department of Environmental Protection concurs with the preferred alternative.

**Community Acceptance**

Community acceptance of the preferred alternative was evaluated after the public comment period. Local residents had no opposition to the preferred alternative, nor did they prefer any other alternative. Comments raised at the public meeting and during the public comment period are summarized in the attached Responsiveness Summary.

## SELECTED REMEDY

Based upon considerations of CERCLA, the detailed analysis of the alternatives, a detailed evaluation of all comments submitted by interested parties during the public comment period, both EPA and NJDEP have determined that Alternative 6 (Modified NJDEP Hazardous Waste Cap) is the most appropriate remedy for addressing source control at the Global Landfill site. This alternative involves:

- Capping of the landfill with a modified hazardous waste cap which includes:

  - 12" vegetated topsoil
  - 12" sand drainage
  - 30 mil textured synthetic material layer
  - 12" clay (with permeability of $1 \times 10^{-7}$ cm/sec)

- Slope stability enhancement through construction of a soil stabilization berm;

- Construction and operation of a gas collection and treatment system;

- Construction and operation of stormwater and leachate management systems;

- Installation of a perimeter security fence to restrict access to the site; and

- Implementation of a monitoring program to ensure the effectiveness of the remedy.

The estimated present worth for all tasks associated with the selected remedy (with Leachate Option 3) is $30,353,200. The capital cost is estimated to be $21,464,200, with an annual O&M cost of approximately $765,100.

The preferred leachate collection and treatment system is Option 3 (on-site treatment with discharge to surface water). However, Leachate Option 1 (Disposal at an Industrial Waste Treatment Plant) will be employed until the RI/FS for OU-2 is completed. At that time, the design and installation of a combined leachate and groundwater system can be considered. The leachate seep treatment option chosen here would be designed to be considerate of possible future expansion to accommodate additional treatment capacity.

The leachate collection and treatment system, and other associated remedial activities, will be designed to avoid further impacts to wetlands.

## STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, and is cost-effective. With the exception of cap construction, the selected remedy complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action. The remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. However, because treatment of the entire contents of the wastefill was not found to be practicable, the statutory preference for treatment as a principal element of the remedy will not be completely satisfied. This action does not constitute the final remedy for the site. Subsequent actions are planned to fully address the remaining principle threats posed by the site. A brief, site-specific description of how the selected remedy complies with the statutory requirements is presented below.

### Overall Protection of Human Health and the Environment

The selected remedy is protective of human health and the environment by preventing direct contact with contaminated wastes or leachate seeps, while effectively reducing leachate generation and serving as an effective barrier to the release of landfill gasses to the atmosphere. The remedy includes a composite cap which, when constructed in combination with the stabilization

berm (Zone 1), would provide an acceptable factor of safety for sideslope stability on all the landfill sideslopes. In addition, the selected remedy requires a smaller stabilization berm and, therefore, would encroach upon fewer wetland acres.

The combination of the Modified Hazardous Waste Cap with a Zone 1 stabilization berm, gas and leachate management systems, and perimeter security fence would eliminate site risks by limiting the off-site migration of contaminants and restricting access to the site. In addition, wetlands and surface waters would be protected from the discharge of leachate by reducing infiltration into the landfill, and by collecting the leachate for treatment. Furthermore, the spread of contamination in the water table aquifer, which affects the wetlands and possibly the Old Bridge Sand aquifer, would be greatly reduced.

**Compliance with ARARs**

The selected remedy will meet the appropriate RCRA Subtitle C regulations set forth in 40 C.F.R. §264.310(A). Pursuant to 40 C.F.R. §300.430(f)(ii)(C) a waiver of New Jersey Hazardous Waste Landfill Closure Regulations (NJAC 7:26-10.8(i)2) is invoked under this ROD. The basis upon which this waiver is invoked is technical impracticability; the specific engineering design criteria for the cap set forth in NJAC 7:26-10.8(i)2 cannot be implemented due to slope instability concerns and the additional impact to wetlands at the site. However, the selected remedy will attain a standard of performance that is equivalent to that required under the New Jersey Hazardous Waste Landfill Closure Regulations. The remedy will meet the appropriate Federal and State guidelines and requirements for subsurface gas management systems.

The selected leachate management system (Leachate Option 3) will be in compliance with the appropriate Federal and State regulations concerning discharges to surface waters. The interim leachate management system (Leachate Option 1) will also comply with appropriate Federal and State regulations concerning leachate disposal at a TSD facility.

Wetlands impacted as a result of non-compliance with past permitting requirements, the sideslope failure in 1984, and any encroachment due to remedial construction activities, will be mitigated in accordance with the appropriate State and Federal regulations. Also, in order to comply with the provisions of the National Historic Preservation Act, a cultural resource study will be undertaken.

**Cost-Effectiveness**

Of the alternatives which most effectively address the principal threats posed by the site, the selected remedy affords the

highest level of overall effectiveness proportional to its cost. Based on the information generated during the FS, the estimated total project cost, with Leachate Option 3, is $30,353,200.

**Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable and Preference for Treatment as a Principal Element**

The selected remedy utilizes permanent solutions and alternate treatment (or resource recovery) technologies to the maximum extent practicable by providing the best balance among the nine evaluation criteria. The remedy employs a textured synthetic material layer. This is a new technology developed for use on landfills with sideslopes greater than 7 percent. The sideslopes at Global Landfill range from 5:1 (20 percent) to 3:1 (33 percent) slopes. Smooth synthetic material layers have insufficient friction angles between overlying soil layers to maintain long term slope stability. The textured synthetic material layer will provide increased friction on the angles with soil material to render sufficient slope stability sideslopes.

The selected remedy does not satisfy the statutory preference for treatment. The landfill would require excavation and removal in order to effectively treat the on-site waste. Excavation of such a large volume of waste is technically impractical and not cost-effective. The principal threats to groundwater will be addressed under a separate ROD.

## DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Global Landfill site was released to the public in February 1991. The Proposed Plan identified the preferred alternative for containment of the landfill. EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the selected remedy, as originally identified in the Proposed Plan, were necessary.

# Appendix A: Figures

**FIGURE 1**

GLOBAL LANDFILL
OLD BRIDGE TOWNSHIP, N.J.

LOCATION MAP

SOURCE: SOUTH AMBOY U.S.G.S
7.5 MIN. QUADRANGLE
PHOTO REVISED 1981

SCALE: 1" = 2000'

Elson T. Killam Associates, Inc.
Environmental and Hydraulic Engineers
87 Shoptor Street Millburn, New Jersey 07041

POOR QUALITY
ORIGINAL

POOR QUALITY ORIGINAL

FIGURE 2

# Appendix B: Tables

**TABLE 1-A**

## Summary of Results of Priority Pollutant Analysis of Drum Contents

### DRUMS WITH SOLIDS AND SLUDGES CONTENT

| | CONCENTRATION RANGE (mg/kg) | NUMBER OF TIMES FOUND |
|---|---|---|
| **VOLATILE ORGANICS** | | |
| Carbon Tetrachloride | 72 - 4,940 | 3 |
| Chlorobenzene | 135 - 204 | 2 |
| 1,3 Dichlorobenzene | 49.2 | 1 |
| Ethylbenzene | 105 - 1,250 | 5 |
| Methylene Chloride | 207 | 1 |
| Tetrachloroethylene | 126 - 343 | 3 |
| Trichloroethylene | 309 - 510 | 2 |
| Toluene | 142 - 552 | 8 |
| Xylene | 112 - 4,890 | 6 |
| **BASE/NEUTRALS** | | |
| Bis (2-Ethylhexyl) Phthalate | 133 - 70,900 | 8 |
| Dimethylphthalate | 134 - 251 | 2 |
| Di-n-Butylphthalate | 126 - 3,830 | 3 |
| Naphthalene | 800 - 1440 | 3 |
| **METALS** | | |
| Arsenic | 0.32 - 146 | 18 |
| Cadmium | 0.23 - 7.47 | 4 |
| Chromium | 0.28 - 7,530 | 18 |
| Copper | 0.92 - 21.70 | 18 |
| Lead | 1.57 - 42,600 | 18 |
| Nickel | 0.22 - 154 | 14 |
| Mercury | 0.26 - 14.8 | 3 |
| Thallium | 1.18 - 6.21 | 3 |
| Zinc | 1.11 - 11,600 | 19 |

### DRUM WITH LIQUID CONTENT

| | | |
|---|---|---|
| **BASE/NEUTRALS** | | |
| Naphthalene | 80.00 mg/l | 1 |
| **METALS** | | |
| Arsenic | 0.32 mg/l | 1 |
| Chromium | 0.28 mg/l | 1 |
| Copper | 0.92 mg/l | 1 |
| Lead | 1.57 mg/l | 1 |
| Nickel | 0.22 mg/l | 1 |
| Zinc | 7.45 mg/l | 1 |

**Table 1-B**

Drum Waste Which Failed RCRA Characteristics
Resulting in Classificationas a Hazardous Waste

| DRUM WASTE SAMPLE | VOLATILE ORGANIC COMPOUNDS (VOCs) (mg/kg) | LEAD (mg/kg) |
|---|---|---|
| | | |
| TR5-D3 | 113 | BDL |
| TR4-D5 | 2,005 | BDL |
| TR4-D2 | 552 | 2.09 |
| TR5-D5 | 6,112 | 29.8 |
| TR5-D4 | 1,160 | BDL |
| TR4-D3 | 112 | 0.12 |
| TR4-D4 | 559 | 0.45 |
| TR4-D7 | 142 | 2.71 |
| P9-D1 | 7,027 | 4.25 |
| P9-D2 | 105 | BDL |
| TR4A-D1 | 182 | BDL |

VOC characteristic level 100 mg/kg

Lead characteristic level 5 mg/kg

Table 2-A

Comparison of Groundwater Quality
in Shallow Wells with Water Quality
Criteria for Heavy Metals and
Priority Pollutant Organics

| PARAMETER | STANDARD micrograms per liter (ug/l) | NUMBER OF SAMPLES EXCEEDING | TOTAL NUMBER OF SAMPLES | REPORTED RANGE OF CONCENTRATION (ug/l) |
|---|---|---|---|---|
| **Upgradient Wells** MW-1A, 7S, 9S | | | | |
| Methylene Chloride | 2[b] | 21[**] | 27 | ND - 150 |
| Tetrachloroethene | 1[b] | 2 | 27 | ND - 38 |
| Trichloroethene | 1[b] | 1 | 27 | ND - 65 |
| Vinyl Chloride | 2[b] | 1 | 27 | ND - 11 |
| Xylene | 44[b] | 1 | 27 | ND - 91 |
| Heptachlor Epoxide | 0.2[c] | 1 | 27 | ND - 0.3 |
| | | | | |
| **Downgradient Wells** MW-2S, 4S, 5S, 6S, 8S | | | | |
| Barium | 1000[a] | 3 | 45 | ND - 2000 |
| Cadmium | 5[c] | 21 | 45 | ND - 40 |
| Chromium (Hex.) | 50[a] | 4[*] | 40 | ND - 400 |
| Chromium (Total) | 50[a] | 18 | 45 | ND - 530 |
| Lead | 15[d] | 16 | 45 | ND - 340 |
| Selenium | 10[a] | 1 | 45 | ND - 27 |
| Silver | 50[a] | 2 | 45 | ND - 70 |
| Benzene | 1[b] | 39 | 45 | ND - 100 |
| Chlorobenzene | 4[b] | 42 | 45 | ND - 780 |
| Methylene Chloride | 2[b] | 36[**] | 45 | ND - 170 |
| Tetrachloroethene | 1[b] | 2 | 45 | ND - 2 |

Table 2-A, Continued

## Comparison of Groundwater Quality in Shallow Wells with Water Quality Criteria for Heavy Metals and Priority Pollutant Organics

| PARAMETER | STANDARD micrograms per liter (ug/l) | NUMBER OF SAMPLES EXCEEDING | TOTAL NUMBER OF SAMPLES | REPORTED RANGE OF CONCENTRATION (ug/l) |
|---|---|---|---|---|
| Xylene | 44[b] | 16 | 45 | ND - 140 |
| Aroclor - 1260 (PCB) | 0.5[b] | 1 | 45 | ND - 1.2 |
| Heptachlor | 0.4[c] | 1 | 45 | ND - 71 |
| Heptachlor Expoxide | 0.2[c] | 2 | 45 | ND - 2 |
| Aldrin | 0.003[a] | 2 | 45 | ND - 0.33 |
| | | | | |

ND Not Detected
* Elevated Concentrations are believed to be attributed to positive matrix interference during analysis
** Methylene chloride concentrations are subject to blank contamination, and are not believed to accurately reflect actual concentrations in groundwater

a NJDEP Water Quality Standards for GW-2 Groundwater
b NJDEP MCL (NJ A-280 Amendments)
c EPA Safe Drinking Water Act - MCL, Promulgated January 30, 1991
d EPA Safe Drinking Water Act - Action Level for Drinking Water, Promulgated May 7, 1991

Table 2-B

Comparison of Groundwater Quality in Deep Wells with Water Quality Criteria for Heavy Metals and Priority Pollutant Organics

| PARAMETER | STANDARD micrograms per liter (ug/l) | NUMBER OF SAMPLES EXCEEDING | TOTAL NUMBER OF SAMPLES | REPORTED RANGE OF CONCENTRATION (ug/l) |
|---|---|---|---|---|
| **Upgradient Wells** MW-7D | | | | |
| Methylene Chloride | 2[b] | 7** | 8 | ND - 120 |
| Tetrachloroethene | 1[b] | 5 | 9 | ND - 4.1 |
| 4,4-DDT | 0.001[a] | 1 | 9 | ND - 0.043 |
| | | | | |
| **Downgradient Wells** MW-2A, 3A, 4A, 5A, 6D, 8D | | | | |
| Cadmium | 5[c] | 3 | 54 | ND - 15 |
| Chromium (Hexavalent) | 50[a] | 2* | 54 | ND - 110 |
| Chromium (Total) | 50[a] | 1 | 54 | ND - 70 |
| Lead | 15[d] | 4 | 54 | ND - 280 |
| Benzene | 1[b] | 4 | 54 | ND - 3 |
| Chlorobenzene | 4[b] | 3 | 54 | ND - 43 |
| Methylene Chloride | 2[b] | 42** | 54 | ND - 110 |
| Tetrachloroethene | 1[b] | 3 | 54 | ND - 5 |
| Trichloroethene | 1[b] | 2 | 54 | ND - 10 |
| Vinyl Chloride | 2[b] | 3 | 54 | ND - 7 |
| 4,4-DDT | 0.001[a] | 4 | 54 | ND - 0.06 |
| | | | | |

ND Not Detected

* Elevated Concentrations are believed to be attributed to positive matrix interference during analysis

** Methylene chloride concentrations are subject to blank contamination, and are not believed to accurately reflect actual concentrations in groundwater

a NJDEP Water Quality Standards for GW-2 Groundwater

b NJDEP MCL (NJ A-280 Amendments)

c EPA Safe Drinking Water Act - MCL, Promulgated January 30, 1991

d EPA Safe Drinking Water Act - Action Level for Drinking Water, Promulgated May 7, 1991

## Table 3

## Comparison of Leachate Data with Groundwater Quality Data

| PARAMETER | STANDARD micrograms per liter (ug/l) | NUMBER OF SAMPLES EXCEEDING STANDARD (Total of 50 samples) | RANGE OF CONCENTRATIONS EXCEEDING STANDARD (ug/l) |
|---|---|---|---|
| | | | |
| Arsenic | 50[a] | 1 | 110 |
| Barium | 1000[a] | 6 | 1082 - 2019 |
| Cadmium | 5[c] | 13 | 5 - 27 |
| Chromium (Hexavalent) | 50[a] | 1 | 200 |
| Cyanide | 200[b] | 3 | 200 - 26,000 |
| Lead | 15[d] | 27 | 15 - 5530 |
| Benzene | 1[b] | 24 | 1 - 69 |
| Chlorobenzene | 4[b] | 28 | 4 - 4600 |
| Methylene Chloride* | 2[b] | 22 | 2 - 720 |
| Tetrachloroethene | 1[b] | 5 | 1 - 12 |
| Xylenes (Total) | 44[b] | 14 | 68 - 990 |

* Methylene Chloride concentrations are subject to blank contamination

a NJDEP Water Quality Standards for GW-2 Groundwater
b NJDEP MCL (NJ A-280 Amendments)
c EPA Safe Drinking Water Act - MCL, Promulgated January 30, 1991
d EPA Safe Drinking Water Act - Action Level for Drinking Water, Promulgated May 7, 1991

**TABLE 4-A**

SUMMARY OF NJDEP SURFACE WATER SAMPLING PROGRAM
OCTOBER 1986

| Parameter (ug/l) | Melvin's Creek | Southwest Side of Landfill |
|---|---|---|
| Phenols | 10 | 10 |
| Cyanide | <25 | <25 |
| Antimony | 4.3 | 4.3 |
| Arsenic | 5.4 | ND |
| Beryllium | 0.7 | 0.5 |
| Cadmium | 1.2 | 0.9 |
| Chromium | ND | 5.6 |
| Copper | 4.6 | 0.8 |
| Lead | 2.2 | 7.8 |
| Mercury | ND | ND |
| Nickel | 4.3 | 18 |
| Selenium | 2.4 | 0.8 |
| Silver | 2.5 | 0.8 |
| Thallium | ND | ND |
| Zinc | 16 | 20 |

Samples analyzed for Priority Pollutant organics and metals.
Organic fractions for both samples were non-detectable except for pesticides/PCB's for Melvin's Creek sample. This sample was reported lost due to boil over on a hot plate during laboratory preparation.

ND - Indicates parameter not detected in analysis.

POOR QUALITY
ORIGINAL

# TABLE 4-B

## SUMMARY OF RESULTS OF SURFACE WATER SAMPLING

## ADJACENT TO GLOBAL LANDFILL, OCTOBER 1987

| Parameter | Sample Location 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| $BOD_5$ | <3.0 | 4.3 | 3.3 | <3.0 | 6.3 | <3.0 | <3.0 | <3.0 | <3.0 | <3.0 |
| Cl | 34 | 47 | 1111 | 303 | 443 | 4927 | 7329 | 6004 | 7472 | 8069 |
| COD | 34 | 30 | 87 | 11 | 15 | 194 | 72 | 110 | 72 | 61 |
| Hardness | 103 | 60 | 407 | 153 | 193 | 2371 | 2579 | 2007 | 2770 | 2615 |
| $NH_3$-N | 2.0 | 7.0 | <2.0 | <2.0 | <2.0 | 15.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| $NO_3$-N | <0.5 | 1.10 | 1.99 | 0.83 | 1.22 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| pH (units) | 6.4 | 6.5 | 6.2 | 6.5 | 7.0 | 6.8 | 6.8 | 6.6 | 6.5 | 6.6 |
| Total Phenols | 0.075 | 0.015 | 0.012 | 0.011 | 0.533 | 0.005 | 0.010 | 0.012 | 0.011 | 0.172 |
| Na | 24 | 26 | 832 | 227 | 305 | 4350 | 4590 | 3630 | 5000 | 4770 |
| $SO_4$ | 18 | 58 | 190 | 65 | 93 | 754 | 995 | 767 | 1125 | 1093 |
| TDS | 1240 | 240 | 2402 | 77 | 1060 | 3410 | 16780 | 13240 | 17150 | 16310 |
| TOX | 0.047 | 0.046 | 0.089 | 0.045 | 0.075 | 0.540 | 0.080 | 0.068 | 0.210 | 0.067 |
| F. Coli (MPN/100mls) | 240 | 4600 | >24000 | 460 | 2400 | 1100 | >24000 | 2400 | 2400 | 230 |
| T. Coli (MPN/100mls) | 460 | >24000 | >24000 | 11000 | >24000 | 2400 | >24000 | 2400 | 2400 | 460 |
| DO | 9.1 | 7.1 | 4.0 | 8.5 | 8.9 | 7.5 | 8.2 | 7.8 | 7.8 | 8.6 |
| PHC | ND(<1.0) | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Fe | 10.6 | 2.03 | 4.21 | 2.47 | 2.06 | 2.45 | 2.65 | 6.88 | 3.77 | 3.67 |
| Cd | 0.0034 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | 0.003 | 0.0053 | <0.003 |
| Pb | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Cr | 0.0045 | 0.017 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | 0.289 | <0.004 | 0.020 |
| Ni | <0.010 | 0.015 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.061 | <0.010 | <0.010 |
| Zn | 0.031 | 0.116 | 0.255 | 0.053 | 0.063 | 0.027 | 0.033 | 0.136 | 0.068 | 0.064 |
| PCB's (ug/l) | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Aldrin/Dieldrin (ug/l) | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Benzidene (ug/l) | ND(<50) | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| DDT (ug/l) | ND | 0.12 | ND | ND | ND | ND | ND | ND | ND | ND |
| Endrin (ug/l) | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Toxaphene (ug/l) | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Other PP Pesticides (ug/l) | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Beta BHC (ug/l) | ND | 0.27 | ND | ND | 0.20 | ND | ND | 0.16 | ND | 0.10 |
| Gamma BHC (Lindane) (ug/l) | ND | ND | ND | ND | 0.13 | ND | ND | ND | ND | ND |
| Color (CPU) | 70 | 30 | 60 | 10 | 15 | 250 | 70 | 20 | 25 | 15 |

Units are mg/l unless indicated otherwise.

N[redacted] Indicates parameter not detected in ana[redacted]is.

## TABLE 4-C

## COMPARISON OF SURFACE WATER QUALITY WITH NJDEP WATER QUALITY CRITERIA AND STANDARDS

| Parameter | Standard or Criteria | No. of Samples Exceeding | Total No. of Samples | Maximum Reported Concentration[c] |
|---|---|---|---|---|
| Fecal Coliform Bacteria | 200 per 100ml[a] | 10 | 10 | 24,000 |
| Lindane | 0.004 ug/l[a] | 1 | 11 | 0.130 |
| DDT | 0.001 ug/l[a,b] | 1 | 11 | 0.120 |
| Cadmium | 4.5 ug/l[b] | 1 | 12 | 5.3 |
| Nickel | 7.1 ug/l[b] | 3 | 12 | 61 |
| Zinc | 58 ug/l[b] | 6 | 12 | 255 |
| Copper | 4.0 ug/l[b] | 1 | 2 | 4.6 |
| Silver | 2.3 ug/l[b] | 1 | 2 | 2.5 |
| Chromium | 50 ug/l[a] | 1 | 12 | 289 |

Monitoring was conducted in October 1986 by NJDEP and October 1987 by Killam Associates.

a - NJDEP Surface Water Quality Standards

b - NJPDES Criteria for Protection of Salt Water Aquatic Life.

c - Units are the same as for the appropriate standard or criteria.

**Table 5**

Substances of concern in the Global Landfill
Based Upon Concern Index Values

| Substance | Action Levels in Groundwater (mg/l) | Mean Conc. in Shallow Groundwater (mg/l) | Overall Conc. in Landfill (mg/kg) | Lowest Concern Index | Highest Concern Index |
|---|---|---|---|---|---|
| **Metals** | | | | | |
| lead | 0.015[d] | 0.035 | 97.5 | 2.30 | 6,500 |
| iron | 0.30[a] | 1.70 | 87.2 | 56.7 | 291 |
| chromium (total) | 0.05[a] | 0.0723 | 11.1 | 1.45 | 221 |
| mercury | 0.002[a] | 0 | 0.0468 | 0.00 | 23.4 |
| copper | 1.0[a] | 0.016 | 20.2 | 0.02 | 20.2 |
| arsenic | 0.05[a] | 0.0035 | 0.461 | 0.07 | 9.22 |
| cadmium | 0.005[a] | 0.0068 | 0.0396 | 1.36 | 7.92 |
| zinc | 5.0[a] | 0.134 | 15.4 | 0.03 | 3.07 |
| barium | 1.0[a] | 0.467 | 1.10 | 0.47 | 1.10 |
| **Substituted Alkane and Alkene Hydrocarbons** | | | | | |
| carbon tetrachloride | 0.002[b] | 0 | 15.4 | 0.00 | [illegible]95 |
| trichlorethylene | 0.001[b] | 0 | 3.12 | 0.00 | [illegible]115 |
| tetrachloroethylene | 0.001[b] | 0 | 2.12 | 0.00 | 2,115 |
| methylene chloride | 0.002[b] | 0 | 1.87 | 0.00 | 937 |
| 1,2-trans-dichloroethylene | 0.010[b] | 0 | 0.0343 | 0.00 | 3.43 |
| **Aromatic and Substituted Aromatic Hydrocarbons** | | | | | |
| chlorobenzene | 0.004[b] | 0.164 | 2.17 | 41.0 | 543 |
| xylenes, total | 0.044[b] | 0.0345 | 17.3 | 0.78 | 394 |
| benzene | 0.001[b] | 0.0210 | 0.0263 | 26.3 | 26.3 |
| DDT/metabolites | 0.000001[b] | 0 | 0.00001 | 0.00 | 10.3 |
| ethyl benzene | 0.7[c] | 0.0139 | 5.39 | 0.02 | 7.70 |
| aldrin | 0.000003[a] | 0.000007 | 0.00002 | 2.22 | 7.00 |
| heptachlor | 0.0004[c] | 0.0016 | 0.0016 | 4.08 | 4.14 |
| toluene | 1.0[c] | 0.00067 | 2.85 | 0.00 | 2.85 |
| **Miscellaneous** | | | | | |
| ammonia (as nitrogen) | 0.5[a] | 320 | 791 | 641 | 1,581 |
| sodium | 50[a] | 1840 | 3480 | 36.8 | 69.6 |
| chloride | 250[a] | 3420 | 5920 | 13.7 | 23.7 |
| cyanide | 0.2[a] | 0.00052 | 0.66 | 0.00 | 3.30 |
| nitrate (as nitrogen) | 10[a] | 5.55 | 20.9 | 0.56 | 2.09 |

a NJDEP Water Quality Standards for GW-2 Groundwater
b NJDEP MCL (NJ A-280 Amendments)
c EPA Safe Drinking Water Act - MCL, Promulgated January 30, 1991
d EPA Safe Drinking Water Act - Action Level for Drinking Water, Promulgated May 7, 1991

**Table 6**

Summary of Remedial Alternative Costs

| CONTAINMENT ALTERNATIVES | | |
|---|---|---|
| **Alternative 1:** | **No Action** | |
| | Estimated Capital Cost: | $ 0 |
| | Estimated Annual O&M Cost: | $ 210,000 |
| | Estimated Present Worth: | $3,228,000 |
| **Alternative 2:** | **NJDEP Solid Waste Cap** | |
| | Estimated Capital Cost: | $16,915,000 |
| | Estimated Annual O&M Cost: | $ 489,000 |
| | Estimated Present Worth: | $23,722,000 |
| | Estimated Construction Period: | 1½ years |
| **Alternative 3:** | **NJDEP Hazardous Waste Cap** | |
| | Estimated Capital Cost: | $30,190,000 |
| | Estimated Annual O&M Cost: | $ 581,900 |
| | Estimated Present Worth: | $38,420,000 |
| | Estimated Construction Period: | 2½ years |
| **Alternative 4:** | **RCRA Cap** | |
| | Estimated Capital Cost: | $26,739,000 |
| | Estimated Annual O&M Cost: | $ 554,000 |
| | Estimated Present Worth: | $34,548,000 |
| | Estimated Construction Period: | 2½ years |
| **Alternative 5:** | **Bentonite Clay Cap** | |
| | Estimated Capital Cost: | $18,909,000 |
| | Estimated Annual O&M Cost: | $ 504,000 |
| | Estimated Present Worth: | $25,945,000 |
| | Estimated Construction Period: | 1½ years |
| **Alternative 6:** | **Modified NJDEP Hazardous Waste Cap** | |
| | Estimated Capital Cost: | $19,938,000 |
| | Estimated Annual O&M Cost: | $ 512,000 |
| | Estimated Present Worth: | $27,101,000 |
| | Estimated Construction Period: | 2 years |

**TABLE 6 (Continued)**

Summary of Remedial Alternative Costs

| LEACHATE SYSTEM OPTIONS | | |
|---|---|---|
| **Option 1:** | **Off-Site Disposal at an Industrial Waste Treatment Facility** | |
| | Estimated Capital Cost: | $ 483,600 |
| | Estimated Annual O&M Cost: | $1,394,700 |
| | Estimated Present Worth: | $4,485,800 |
| | Estimated Construction Period: | 1 to 1½ years |
| **Option 2:** | **On-Site Pretreatment With Discharge to a Publicly Owned Treatment Works (POTW)** | |
| | Estimated Capital Cost: | $1,051,700 |
| | Estimated Annual O&M Cost: | $ 275,500 |
| | Estimated Present Worth: | $2,797,700 |
| | Estimated Construction Period: | 2 to 2½ years |
| **Option 3:** | **On-Site Treatment With Discharge to Surface Water** | |
| | Estimated Capital Cost: | $1,526,200 |
| | Estimated Annual O&M Cost: | $ 253,100 |
| | Estimated Present Worth: | $3,252,200 |
| | Estimated Construction Period: | 2 to 2½ years |

Notes:

1. The cap alternative costs (Alt. 1 through 5) include costs for the cap and slope stabilization berm (from Table 4-1), gas management (from Table 4-2), and groundwater monitoring plus and allowance for wetlands mitigation but exclude leachate management costs.

2. Leachate management costs are presented separately as Options 1A, 2A, 3A and Options 1B, 2B, 3B and are derived from Table 4-3.

3. All capital costs include a 30% allowance for indirect capital costs.

4. Construction of Leachate Systems would take place concurrently with cap construction.

# RESPONSIVENESS SUMMARY

## RECORD OF DECISION

## GLOBAL LANDFILL

## I. OVERVIEW

From February 19, 1991 through May 6, 1991, the New Jersey Department of Environmental Protection (NJDEP) held a public comment period to obtain verbal and written comments from citizens, elected officials, and other interested parties for the preferred remedy proposed by NJDEP and the United States Environmental Protection Agency (EPA) for Operable Unit I (OU-1) at the Global Landfill Superfund Site located in Old Bridge Township, Middlesex County. This Responsiveness Summary provides highlights of community involvement and NJDEP community relation activities at the site during the Feasibility Study (FS) and public comment period. In particular, the document summarizes community relations, legal questions and technical concerns pertaining to the FS and the Proposed Plan expressed by residents, local officials, and other interested parties.

At the public meeting held on March 12, 1991, NJDEP formally presented its preferred alternative, addressing the on-site controls for the Global Landfill site. The preferred alternative involves the construction of a modified NJDEP hazardous waste cap, which was detailed in the February 1991 Proposed Plan in Alternative 6. The components of this alternative include the following:

- Capping of the landfill with a modified hazardous waste cap;
- Slope stability enhancement through construction of a soil stabilization berm;
- Construction and operation of a gas management system;
- Construction and operation of stormwater and leachate management systems;
- Installation of a perimeter security fence to restrict access to the site; and
- Implementation of a monitoring program to ensure the effectiveness of the remedy.

Comments received during the public comment period focused on concerns with the actual design, the impact of costs on Old Bridge Township, relocation of the gas pipeline, traffic impacts from construction, and planting trees as a buffer. The Global Landfill Potentially Responsible Parties (PRP) Group requested an

extension of the comment period; the comment period was extended to May 6, 1991. Detailed answers to the Global Landfill PRP Group's technical comments are presented in this document.

Some of the community relations activities for the Global landfill include the following:

- NJDEP prepared a Community Relations Plan (February 1989). Copies of this plan are located in the public repositories for the site.
- Since January 1988, the Global Landfill/Sommers Brothers Property Site Task Group (Task Group) have met almost monthly. The Task Group consists of representatives from Citizens Helping Environmental Cleanup (CHEC), the Old Bridge Environmental Commission, the Old Bridge Health Department, NJDEP, and New Jersey Department of Health (NJDOH). This group is actively involved in overseeing the NJDOH health study on residents living near the sites.
- NJDEP held a briefing on February 13, 1991 with the Task Group to discuss on-site controls and the project schedule for Global.
- NJDEP held a public meeting on March 12, 1991 to discuss the preferred option for on-site controls on the landfill, and to respond to citizens' comments and questions. A transcript of the meeting is available at the public repository locations. NJDEP also held a public information session to answer citizens' questions on March 13, 1991.
- The public comment period on the Proposed Plan continued until May 6, 1991.

## II. BACKGROUND ON COMMUNITY INVOLVEMENT

Global Landfill, located in Old Bridge Township, Middlesex County, was in operation from 1968 until 1984. The site was closed in April 1984 by the NJDEP, after the southeast sideslope of the landfill failed and slid into the adjacent wetlands. A New Jersey court appointed an administrator to oversee the proper closure of the landfill on April 23, 1986.

The administrator authorized the consulting firm of E.T. Killam Associates of Millburn, New Jersey, to conduct an on-site investigation. The landfill was reported to contain municipal solid, bulky, vegetative, and industrial wastes. Drums containing hazardous waste were discovered during an exploratory excavation in March 1988.

The site was placed on EPA's National Priorities List (NPL) in March 1989. Killam Associates was authorized by NJDEP and the administrator to prepare a Feasibility Study (FS) for on-site

controls at the site. The FS provides only limited data on the nature and extent of contamination of groundwater, surface water, and air at the landfill. An investigation of the groundwater and other natural resources at the site, will be conducted during the ongoing Remedial Investigation/Feasibility Study (RI/FS) for Operable Unit 2 (OU-2).

The combination of high population density and high visibility of hazardous waste problems has resulted in significant community interest. In March 1986, residents of the London Terrace Apartments collected soil samples from the landfill for analysis. The test results indicated the presence of volatile organic compounds. Many of the local residents feel that the tests prove that the site is the cause of unexplained medical conditions and illnesses in surrounding communities. These residents formed CHEC in March 1986.

Two toxic tort action suits were filed in 1988 against numerous parties involved with operations at Global Landfill by plaintiffs seeking damages for health and economic distress caused by hazardous wastes. Continued community health concerns led to the passage of PL 1987, C.358, which appropriated $75,000 for a NJDOH study of local residents. NJDOH set up the Task Group to implement the legislation. The Task Group's main responsibilities included:

- Conducting a community cancer evaluation;
- Conducting a health risk assessment
- Implementing a soil monitoring program to confirm the absences or presence of a third landfill under the housing complexes;
- Establishing a pediatric health care service to monitor health of Old Bridge and Sayreville children;
- Conducting a community demographic profile; and
- Continuing community outreach and education.

The work performed under the grant to the NJDOH should be completed in the near future and presented to the Task Group.

## III. SUMMARY OF PUBLIC COMMENTS AND LEAD AGENCY RESPONSES

Verbal comments made during the March 12, 1991 public meeting are summarized below, followed by responses from the lead agency (NJDEP). Responses to written comments submitted by the Old Bridge Township Environmental Commission (OBEC), the Transcontinental Gas Pipe Line Corporation (Transco), and the Global Landfill Potentially Responsible Party Group are in a separate section of the Responsiveness Summary. Copies of the written comments received are attached as an Appendix of this document.

COMMENTS MADE AT THE PUBLIC MEETING ON MARCH 12, 1991

**A Task Group member requested an explanation of a synthetic geomembrane.**

Response: The synthetic geomembrane is about a quarter inch thick and composed of rubber and plastic. It is designed as an impermeable landfill liner. The geomembrane will be placed on the top of the landfill over the clay layer, to form a composite cap.

**A question was raised by a Task Group member regarding the shrinking and settling of the landfill over time and how this will affect the cap's integrity.**

Response: Organic decomposition of waste in any landfill will continue as long as moisture is present. This decomposition produces gas and causes shrinkage and landfill settling. As part of the operation and maintenance (O&M) phase, regular inspections will be made to assure the cap's integrity and, when necessary, the cap will be repaired. Geogrids are plastic lattices that provide strength and integrity to the cap to protect against damage due to settling of the landfill.

**Questions from a Task Group member concerning whether the landfill will be disturbed during the OU-1 construction, and if air monitoring will be conducted during the construction to protect the area residents.**

Response: Any intrusive work on Global will be controlled by disturbing only small areas at one time. As part of the Health and Safety Plan for the OU-1 construction, dust suppression and continuous air monitoring will be required. The NJDEP, in consultation with the community, will establish a program of perimeter air monitoring during the construction. The only proposed regrading of Global would occur on the top seven acres to provide proper drainage of precipitation.

**A Task Group member asked what other sites in New Jersey have the same type of NJDEP hazardous waste cap, and how has it performed.**

Response: This will be the first site in NJ to have this specific type of cap. A similar cap with a lighter weight geomembrane material was used at Kin-Buc Landfill in 1981. The Hackensack Meadowlands Development Commission is using the textured geomembrane with native soil as a cap on two landfills.

**A Task Group member requested information on how to obtain a Technical Assistance Grant.**

Response: The Task Group received a Technical Assistant Grant as requested.

**A question was raised by the OBEC about whether the proposed alternative for OU-1 has a foundation sand layer under the cap.**

Response: For the proposed capping alternative, the regraded landfill surface will be covered with new sand, a geogrid material (to stabilize the clay layer), and then the clay layer. A detailed description of Alternative 6 can be found in the Feasibility Study (FS) located in the listed repositories.

**Another inquiry from the OBEC concerned assurance that the engineering specifications for OU-1 will be fulfilled during construction.**

Response: The engineering specifications and plans will be public documents upon their completion. The NJDEP will hold a public meeting at the end of the design phase, and prior to the actual construction, to present the final design. Every item used in the construction for OU-1 will have detailed specifics in the final design. The NJDEP and the design engineering firm will have staff on-site during the construction phase to ensure that the required materials are used.

**The OBEC inquired about who is responsible for the post-closure funding.**

Response: Under the Superfund program, the state is responsible for the operation and maintenance phase. The NJDEP will establish funds to perform the O&M phase of the remediation. The Department has established a specific group to oversee this phase, although the O&M could be delegated to the county, the municipality, or responsible parties with NJDEP oversight. The O&M plan will be placed in the repositories with the other documents for Global.

**A question was raised by a Task Group member whether the leachate and gas treatment facilities will be located in wetlands.**

Response: During the design phase, the precise size, type and location of both facilities will be determined. Additional impacts on wetlands will be a consideration on where to locate these facilities.

**The OBEC inquired about what permits would be necessary for the leachate treatment on-site with discharge to Cheesequake Creek; who would be responsible for obtaining such permits; will the RI/FS process define the nature and type of permits required; and how, if any, will the Stormwater Runoff Regulations impact the treatment facility.**

Response: In the design phase for OU-1, statutory and technical requirements will determine the discharge limitations. Under the Superfund program, these discharge limitations must still meet

all normal permit requirements for any landfill, storm run-off, and surface water discharge to the Cheesequake, even though a permit is not issued. The monitoring and discharge requirements are the same as would be required for a permit. The NJDEP would make all monitoring data available to the public.

**A question was raised by a Task Group member regarding the "burning" of landfill gas for treatment and how clean the emissions would be.**

Response: The NJDEP will collect data during the design phase which will be used to develop a state-of-the-art gas treatment facility that must meet New Jersey State air quality standards.

**Two members of the Task Group stated that trees should be planted behind the London Terrace Apartments.**

Response: Whether or not tree planting can be funded by Superfund as a part of OU-1 will be evaluated during the design.

**An inquiry was made by a Task Group member concerning the access route for trucks during the construction phase of Global. A resident questioned the interaction between the Global construction phase traffic and the road construction at Ernston Road and Route 9.**

Response: As part of the design phase of OU-1, a transportation plan will be developed. The only route to Global is through that intersection. Depending on the schedule for road construction and the construction at Global for OU-1, there may be traffic problems. NJDEP will work closely with local officials to limit traffic impacts as much as possible.

**The OBEC requested copies of all reports concerning Global Landfill from NJDEP in addition to any placed in the site's repositories listed in the February 1991 Proposed Plan.**

Response: As a member Task Group, OBEC has had direct access to all reports concerning Global Landfill. In the future NJDEP will provide documents regrading the Global Landfill Site to the Old Bridge Environmental Commission, the Task Group, as well as to all the repositories listed in the February 1991 Proposed Plan.

**Comments from a Task Group member and the OBEC concerned the gas pipeline that runs through the Global Landfill, and whether it will be relocated, by whom, and who will pay for the relocation.**

Response: The Transcontinental Gas Pipe Line Corporation (Transco) has a 42-inch high pressure natural gas pipeline that transects the site, and is covered by 12 to 15 feet of waste, in the northwest section of the landfill area. The NJDEP is discussing the relocation of the pipeline with Transco. The

question of responsibility for the movement of the pipeline is a legal issue. The New Jersey Attorney General's Office is reviewing this issue.

**A resident inquired about time schedules, and the OBEC requested that a detailed explanation of the OU-1 design and construction processes, with estimated timetables - schedule of goals or milestones, be included in this document.**

**Response:** The following schedules are NJDEP's best estimates for each of the operable units:

| | | |
|---|---|---|
| OU-1 | Record of Decision | Summer 1991 |
| | Design Phase - Start | Winter 1992 |
| | Design Phase - Completion | Winter 1993 |
| | Construction Contractor Proposal Request | Winter 1993 |
| | Construction Contract Award | Summer 1993 |
| | Construction - Start | Fall 1993 |
| | Construction - Completion | Fall 1995 |
| OU-2 | Phase I Field Investigation | Ongoing |
| | Phase I Remedial Investigation Report Completion | Winter 1993 |
| | Phase 2 Field Investigation | Spring 1993 |
| | Phase 2 Remedial Investigation Report Completion | Winter 1994 |
| | Record of Decision | Spring 1994 |
| | *Design Phase - Start | Spring 1994 |
| | *Design Phase - Completion | Fall 1995 |
| | *Construction - Start | Winter 1995 |
| | *Construction - Completion | Winter 1997 |

* If required, based on Record of Decision for OU-2.

WRITTEN COMMENTS FROM THE GLOBAL LANDFILL PRP GROUP - Submitted May 6, 1991

The following Comments and Responses are presented in the format of the written comments from the Global Landfill PRP Group.

**I. Introduction**

Comment: The NJDEP was arbitrary in classifying Global Landfill as a hazardous waste site.

Response: While Global Landfill was not permitted as a hazardous waste landfill, evidence indicates that significant amounts of hazardous waste and hazardous substances were improperly disposed of at the site.

Former landfill employees, who were personally involved in the disposal of tens of thousands of drums of hazardous wastes and hazardous substances at the landfill, provided this information to NJDEP. Their information was corroborated in 1987, when test pits uncovered metal drums of hazardous wastes in areas designated by these former employees as containing buried drums.

Landfill facility reports, which summarize information regarding volume and types of waste disposed in landfills, indicate that tons of waste, including both hazardous waste and hazardous substances, were disposed of in the Global Landfill. These include the following: furnace flue dust, a source specific hazardous waste (K-061) under RCRA and New Jersey Hazardous Waste Regulations; paint waste; filter residuals containing the hazardous substances toluene, acetone, phenol, and formaldehyde; asbestos; heavy metals; organics; and polychlorinated biphenyls.

Based upon the evidence that hazardous wastes were disposed at Global Landfill, and the resultant documented potential threats to human health and the environment, New Jersey's Hazardous Waste Regulations are relevant and appropriate for the capping of Global Landfill.

**II. NJDEP has not complied with the NCP's data collection and analysis requirements and, as a result, has selected a preferred remedial alternative that is not cost-effective and is beset with serious technical deficiencies**

Comment: No Remedial Investigation was performed.

Response: EPA Guidance entitled "Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites" (OSWER Directive 9355.3-11, February 1991) (RI/FS Guidance), states that since most CERCLA municipal landfill sites are similar, the RI/FS process, including the Site Characterization (Remedial Investigation Report), Risk

Assessment, and the Development of Remedial Alternatives, may be streamlined. With respect to the Global Landfill site, NJDEP believes that the groundwater, leachate, and drum excavation data collected throughout the five year involvement of Killam Associates, provides the basis for an adequate site characterization of the site. As a result of this data and analysis it has been determined, pursuant to EPA guidance Directive:9355.3-11FS and the National Contingency Plan (NCP) Section 300.430(a)(1)(iii)(B), that a containment technology is appropriate at Global Landfill.

**Comment:** No Quantitative Risk Assessment was performed.

**Response:** The data presented in the FS clearly indicates that the leachate seeps and the shallow aquifer (which is in hydraulic contact with the lower potable aquifer) are contaminated with hazardous substances. Both aquifers discharge to the wetlands and surface waters at levels which exceed State and Federal standards. The release and migration of hazardous substances from the landfill pose a potential risk to human health and the environment. As stated in the RI/FS guidance on municipal landfills, a qualitative risk assessment that describes the exposure pathways, and qualitatively describes the risk to receptors, is sufficient to establish risk. While a Quantitative Risk Assessment is not required for OU-1, one will be performed during the RI/FS for OU-2.

**Comment:** NJDEP did not account for interdependence between the two operable units.

**Response:** NJDEP is well aware of the potential interrelationship of the remedy selected in this Record of Decision and the selected remedy for the second operable unit. For this reason, a decision has been made to implement off-site treatment as an interim remedy for leachate disposal, pending the selection of the remedy for the second operable unit.

The cap will employ collection systems for leachate seeps, landfill gasses, and stormwater management. The possible future collection systems for groundwater collection and treatment would be no less implementable or effective as a result of implementation of OU-1.

**Comment:** Insufficient geotechnical study was performed.

**Response:** The degree of geotechnical study performed at the site has been extensive and reiterative in nature. The study performed by French and Parello Associates (F&P) originated in 1989 and was based on soil boring data which was reviewed by NJDEP. This report was subsequently refined in 1991, based on additional soil borings. The U.S. Army Corps of Engineers reviewed the F&P report and concurred with the assumptions made

regarding site conditions, the method of calculation used, and the level of confidence attributable to the results. The allegation that an inadequate amount of geotechnical study was performed is inaccurate. The assumptions made in the development of remedial alternatives for the cap and berm were conservative due to the previous slope failure, which suggests the danger of a subsequent slope failure at the site. Due to the heterogeneous nature of the waste disposed of at the site, there is no practical way to gain a high level of confidence in certain geotechnical parameters such as shear strength of the refuse.

**Comment:** No treatability studies were performed on the leachate seep stream.

**Response:** Treatability studies may be performed in design.

**Comment:** There was inadequate data on landfill refuse characteristics to choose a gas collection and treatment system.

**Response:** The effects of settlement on subsurface structures (i.e. gas collection wells or associated piping), preferential flow paths and chemical characteristics of the refuse can be either predicted or estimated for the purposes of developing a gas collection and treatment alternative.

**Comment:** No Field Sampling Plan, Quality Assurance Plan or clearly defined data quality objectives.

**Response:** Although no Field Sampling Plan or Quality Assurance Plan were supplied for the Killam Feasibility Study, the data was collected in accordance with New Jersey Pollution Discharge Elimination System permit requirements and deemed by EPA and NJDEP to meet data quality objectives.

**Comment:** The refuse strength parameters used by F&P in their 1991 study were inappropriate. Although the 1984 Woodward Clyde Consultants report, the 1989 F&P report, and 1991 F&P report include the results of stability analyses for the landfill against sliding, all base the analyses on waste strength parameters that are neither site-specific nor appropriate. Inexplicably, the fieldwork ignored the strength of the refuse as a data needed. As a result of this omission, the Proposed Plan erroneously assumes that the Global Landfill is unstable.

**Response:** The analyses used by F&P to assess the stability of the landfill under present and proposed loading conditions placed a major emphasis on the geotechnical parameters. These parameters included the unit weights and strengths of the refuse materials and the underlying organic foundation soils.

F&P's evaluation assessed the merits of performing field measurements of the refuse parameters. Landfill materials are

extremely variable; if a field evaluation was performed, the question of representativeness would arise. Due to the heterogenous nature of the landfill, testing of particular sections may result in parameters which are not representative of the entire landfill, and would not provide any additional level of confidence in the parameters selected than what could be obtained from empirical published data. F&P chose data that are consistent with recently published parameters.

In order to back calculate the refuse strength, the following parameters have to be determined: geometry of failure surface, unit weight and strength of the organic soils, and the unit weight of the refuse. The unit weight of the refuse value is significant since it is the driving force producing instability. In the 1990 F&P study, a unit weight of 50 pounds per cubic foot (pcf), and a saturated unit weight of refuse below the water table of 70 pcf were used. This is within the range of typical values appearing in recent publications. The Global Landfill PRP Group selected a unit weight of 76.4 pcf, which is above the typical range of unit weights in any of the references F&P have seen. In order to establish equilibrium, the resisting strength must be increased if the driving force is increased. Therefore, by starting a back analyses with an unrealistically high unit weight or driving force, the refuse strength parameter required for equilibrium is also unrealistically high. The Global Landfill PRP Group's assessment of the refuse strengths is significant because they used the errant higher strength in their stability analyses, concluding that the factors of safety for the slopes under proposed loading conditions do not warrant construction of the berm.

Comment: The Proposed Plan is based on the premise that substantial movement of the southeast sideslope is now occurring, but NJDEP has not performed any monitoring for slope stability as called for in the NCP and EPA guidance.

Response: Sensitivity evaluation of the underlying soils indicates that the southeast sideslopes are subject to creep movement. Sensitivity is defined as the ratio of undisturbed strength to remolded (or disturbed) strength. Materials that are highly sensitive are susceptible to both acute slope stability failure, and long-term creep movement. In addition, there is some evidence of slope movement of the southeast sideslope as indicated by the hummocky ground surface. The U.S. Army Corps of Engineers concurs with this observation.

Comment: Since the drum excavation was outside the main landfill, and due to a lack of analysis of the leachate, the true characterization of the landfill waste is in doubt.

Response: RI/FS Guidance states that "Characterization of a landfill's contents is generally not necessary because

containment of the landfill contents, which is often the most practicable technology, does not require such information." Notwithstanding the fact that RI/FS Guidance requires minimal, if any waste characterization, characterization of the landfill contents was performed, and included: landfill facility reports, statements from former landfill employees, magnetometer studies, drum excavations, and leachate sampling and analyses.

Landfill facility reports, which summarize information regarding volume and types of waste disposed in landfills, indicate that tons of waste, including both hazardous waste and hazardous substances, were disposed of in the Global Landfill. These include the following: furnace flue dust, a source specific hazardous waste (K-061) under RCRA and New Jersey Hazardous Waste Regulations; paint waste; filter residuals containing the hazardous substances toluene, acetone, phenol, and formaldehyde; asbestos; heavy metals; organics; and polychlorinated biphenyls.

Former landfill employees stated that they were personally involved in the disposal of tens of thousands of drums of hazardous wastes and hazardous substances in both sections of the landfill. These allegations led to an exploratory excavation of the northwest extension. A total of 63 drums were discovered, 18 of which were removed for sampling and analysis; 11 contained hazardous waste based on EPA limits and an additional three drums contained hazardous waste based on NJDEP limits. The drums contained numerous hazardous substances including: xylenes, toluene, ethylbenzene, chlorobenzene, trichloroethylene, tetrachloroethylene, arsenic, chromium, copper, lead, nickel, zinc, and some base neutral compounds.

As part of a NJPDES quarterly monitoring program, leachate samples from exposed seeps have been collected for analysis from October 1987 to April 1990. Since 1987, concentrations of leachate indicator parameters (BOD, COD, ammonia, chlorides, TDS, hardness, and iron) were found to be elevated. Volatile organics detected in the leachate consisted primarily of benzene-related compounds. Chlorobenzene was found at concentrations up to 4,400 micrograms per liter (ug/l), which far exceeds the groundwater quality standard of 4 ug/l. This further illustrates the potential impact the leachate is having on the groundwater and wetlands.

These waste characterization efforts clearly comply with the requirements of the NCP and the RI/FS Guidance referred to above.

Comment: Insufficient air quality monitoring has been conducted at the site.

Response: NJDEP acknowledges that little air analysis was performed at the site. However, this analysis was not necessary

for the selection of the cap or the gas collection system. The selection of either a flare or a thermal oxidation unit will depend upon additional air characterization to be performed during design of OU-1. Based upon this information, the decision to employ either a flare or a more advanced gas treatment system will be made.

Comment: In view of the data gaps, and the resulting safety factors applied to protect against a future slide, a temporary cap is warranted until the settlement rate has stabilized.

Response: An analysis of temporary or interim cap alternatives was performed for Global Landfill. The alternatives ranged from a soil cover (no impermeable cap), exposed synthetic caps, to variations of conventional solid waste and hazardous waste caps. The less expensive alternatives (soil cover and exposed synthetic) were rejected due to either non-responsiveness to site concerns, or construction/maintenance difficulties. The remaining alternatives complied with NJDEP requirements, however, their costs were close to those for standard NJDEP cap designs. The decision was made to implement a final cap, rather than install an interim cap and upgrade or modify it in the future.

**III. The Proposed Plan alternative is not justified by the purported risks alleged to exist at the site.**

Comment: The Qualitative Risk Assessment is inadequate for the purposes of the study, and does not comply with the requirements of the NCP.

Response: This claim by the PRPs is erroneous. The RI/FS guidance states: "Because options for remedial actions at municipal landfill sites are limited, it may be possible to streamline or limit the scope of the baseline risk assessment by (1) using a conceptual model ... to perform a qualitative risk assessment ..." The Guidance goes on to state that "...Quantitative assessments ... are not necessary to initiate remedial action." Use of qualitative instead of quantitative risk assessments for municipal landfills is clearly an acceptable procedure under the RI/FS Guidance, and complies with the requirements of the NCP. One purpose for this option is to streamline remedial action decisions, and allow rapid implementation of protective measures for the major problems at municipal landfills. The need for "rapid implementation" of the remedy at this site is clearly warranted given the fact that: hazardous substances have been disposed of, and are present in the Global Landfill; contamination has been detected in both the leachate seeps and groundwater above State and Federal maximum contamination levels (MCLs); the landfill is marginally stable, having previously experienced a sideslope failure; and the landfill routinely receives infiltration which may flush

hazardous substances from the fill material into the groundwater and adjoining wetlands.

**Comment:** The Concern Index Approach is flawed.

**Response:** A Hazard Index is calculated by dividing the quantified dose of a toxic compound to a reference dose for that compound. In the absence of data necessary to derive Hazard Indices, the purpose of the Concern Index approach was to obtain a frame of reference to qualitatively evaluate the relative levels of source concentrations and their potential impacts on the public health and the environment. With respect to the applicability of the Concern Indices, they are put forward as a means of comparison of landfill concentrations to State and Federal MCLs.

**Comment:** Methane migration does not reach the residential areas and conclusions that air transport is a complete pathway is invalid.

**Response:** This PRP claim is invalid. The Superfund Public Health Evaluation Manual (1986) requires four elements to comprise a "complete" exposure pathway. These are a) a source and mechanism for chemical release in the environment; b) a transport medium; c) a point of potential environmental or human exposure; and d) an exposure route at the contact point.

The PRP's comment incorrectly implies a chemical from the site must be detected in the residential area before a "complete" pathway can be found to exist under EPA risk assessment protocol. The fact air samples were not taken in the residential zone for some specific site related chemicals does not support the PRPs conclusion that those chemicals have not or will not in the future reach the residential zone and come in contact with individuals in that zone. Only a potential point of exposure need exist; an actual exposure event or actual detection of a specific chemical in the residential area is not required for a determination that a "complete" pathway exists under risk assessment protocol.

## IV. The agency has failed to integrate the first Operable Unit with any later groundwater remediation operable unit.

**Comment:** The remedy proposed for OU-1 will be constructed entirely within the property boundaries.

**Response:** The remedy proposed for OU-1 will extend beyond the property boundaries if it becomes necessary for engineering implementation, as determined during the design phase.

With respect to the integration of the two operable units, the implementation of OU-1 will not result in an increase in the amount of wetlands disrupted as a part of OU-2.

Comment: No evaluation was made of the wetlands to be disrupted during implementation of OU-1.

Response: An evaluation of the wetlands in the area immediately surrounding the landfill which may be impacted by the implementation of OU-1 was performed. This evaluation was finalized in the April 1991 report entitled "Final Supplemental Report on Wetland Evaluation Technique (WET 2.0) Analysis", and is in the Administrative Record.

Comment: The construction of the berm may preclude the effective use of a slurry wall as a component of OU-2.

Response: It is the opinion of NJDEP that the proposed berm will not interfere with construction of a slurry wall, if a slurry wall is called for in OU-2. The slurry in the trench should maintain the trench stability until a cement-bentonite slurry is placed. If trench stability becomes a concern, then various construction methods, such as construction of the trench in sections, can be employed. Furthermore, a berm will actually facilitate slurry wall construction by providing a working pad from which equipment can operate.

Comment: OU-2 will in all probability extend beyond the property limit of the landfill, therefore, it is more logical to integrate OU-2 into OU-1, so that wetland impacts are reduced.

Response: NJDEP intends to minimize adverse impacts on wetlands in both OU-1 and OU-2, consistent with the need to take appropriate and timely actions to protect public health and the environment.

Comment: If NJDEP follows the preference for on-site treatment and discharge as part of OU-1, a treatment system for leachate could be designed and built prior to leachate characteristic and volume changes, and before the groundwater treatment system, if any, is analyzed and determined. This could lead to duplicate treatment systems, and therefore, is not cost-effective.

Response: The preferred leachate collection and treatment system is Option 3 (on-site treatment with discharge to surface water). In the interim, Leachate Option 1 (disposal at an Industrial Waste Treatment Plant) will be employed until the RI/FS for OU-2 is completed. At that time, the design and installation of a combined leachate and groundwater system can be considered. The leachate seep treatment option chosen here would be designed to be considerate of possible future expansion to accommodate additional treatment capacity.

**V. The agency has failed to include any interim action alternatives which account for data gaps and which are commensurate with the low level of risk at the site.**

Response: Various interim capping alternatives were evaluated in the FS. The alternatives ranged from a soil cover (no impermeable cap), exposed synthetic caps, to variations of conventional solid waste and hazardous waste caps. The less expensive alternatives (soil cover and exposed synthetic) were rejected due to either non-responsiveness to site concerns, or construction/maintenance difficulties. The remaining alternatives complied with NJDEP requirements, however, their costs were close to standard NJDEP cap designs. The decision was made to implement a final cap, rather than install an interim cap and upgrade or modify it in the future.

**VI. The geogrids, sand, berm, leachate treatment plant, and cap contained in the Proposed Plan alternative are neither necessary nor properly designed.**

Comment: Slope stability analyses with appropriate soil and refuse parameters indicate that the landfill slopes are stable, and therefore, geogrids are unnecessary. In addition, the need for geogrids is unjustified since the landfill has been closed for more than seven years, and it is far more justified to assume that the major part of final settlement has already occurred.

Response: Based on consolidation analyses of the organic soils, which vary in thickness around the landfill, some differential settlement will occur as these soils continue to consolidate under their existing loads. Since the nature of the landfill material is heterogeneous, the amount of settlement due to decomposition and possible structural collapse of buried objects is unpredictable, and can be very localized. This makes it difficult to assess the stresses and strains associated with the cap without destroying its integrity.

Geogrids are that component of the cap which provides the strength to mitigate differential settlement. It is important that the geogrids relieve the geomembrane of the stresses, because if the geomembrane tears, the integrity of the cap is compromised and costs for repair will be great.

NJDEP believes that geogrids are necessary and can be successfully installed. In the design phase, it will be determined if one or two layers of geogrid are required for the purposes of cap sliding stability and differential settlement concerns.

Comment: In order to repair the geogrids, bodkin connectors would have to be "needled" into the existing grids, an operation

which may not be successful in restoring the grid's strength and other properties.

**Response:** NJDEP is of the opinion that cutting and repairing the geogrids will not significantly reduce their effectiveness. It is common practice to use bodkin joint connections.

**Comment:** A geonet could be used instead of the sand drainage material immediately above the liner.

**Response:** This could be considered during design. However, NJDEP believes that replacement of the 12 inch sand, or sand and gravel layer, with a geonet does not represent a significant cost savings.

**Comment:** Other landfills under the jurisdiction of NJDEP, such as GEMS or Helen Kramer, do not include geogrids. This indicates an inconsistency on the part of NJDEP.

**Response:** Site characteristics are markedly different at each site. Geogrids have been determined to be necessary at the Global Landfill because of slope stability and surrounding wetlands.

**Comment:** A berm is unnecessary based upon back analyses.

**Response:** F&P stability analyses indicate that marginal factors of safety exist, and a berm is required at the toe of the east slope for construction of the proposed cap.

**Comment:** Monitoring may be necessary during construction of the berm. In addition, soils underlying the berm may contain waste that would permanently be trapped under the berm and outside the cap.

**Response:** During design, a monitoring program for berm construction will be established, along with the design of the berm. Also, the area under the proposed berm may be explored for possible refuse. At the present time, NJDEP does not intend to allow refuse to be left under the berm.

**Comment:** The leachate treatment plant is not cost-effective for two reasons. First, the Proposed Plan alternative does not take into account the sharp drop in flows after the first year. Second, it does not take into account the efficiencies associated with a comprehensive treatment program in OU-2. It would be more sensible and cost-effective to address any leachate treatment along with the groundwater treatment at the time of OU-2.

**Response:** The preferred leachate collection and treatment system is Option 3 (on-site treatment with discharge to surface water). However, a contingency system, Leachate Option 1 (disposal at an

Industrial Waste Treatment Plant), will be employed until the RI/FS for OU-2 is completed. At that time, the design and installation of a combined leachate and groundwater system can be considered. The leachate seep treatment option chosen here would be designed to be considerate of possible future expansion to accommodate additional treatment capacity.

Comment: The flexible membrane liner to be placed over clay material is accompanied by risks associated with moisture collecting under the liner during construction. Moisture may originate from condensation, or consolidation of the clay from the weight of the materials above, as was the case in the Kettleman Hills Waste Landfill slope failure. The wetted clay may lead to a stability problem.

Response: The referenced landfill experienced a failure in its liner system, not the cap, and a contributing factor was a buildup of moisture under the geomembrane overlying the clay. The moisture buildup was attributed to several possibilities that are not applicable here, since a cap system is being utilized at Global. In addition, the stability of the cap components will be evaluated during design.

Comment: Until its closure in 1984, the landfill, like other municipal landfills, was authorized to receive up to 100, and for a period of time, 1000 kilograms per month of hazardous waste from small quantity generators. Yet, the Proposed Plan would treat the site differently from a municipal site. This site should be closed as an ordinary municipal landfill. In addition, RCRA Subtitle C is not an ARAR. RCRA Subtitle C does not require a composite cap. A solid waste cap, or its equivalent, should be selected in the ROD.

Response: The environmental data collected at and near Global Landfill lead to a number of conclusions which support the need for the selected remedial action at the site. Hazardous substances have been disposed of, and are now present in the Global Landfill. Groundwater data collected to date reveals that groundwater quality in both the shallow aquifer and the Old Bridge Sand aquifer (a source of public water supply) exceeds MCLs for numerous hazardous substances, pollutants, and contaminants. Many of these substances were detected in drums buried at the landfill, and in leachate flowing out of the fill material. For these reasons, it would not be appropriate to cap this site as an ordinary municipal landfill.

Both New Jersey Hazardous Waste Landfill Closure Regulations, subchapter 10, and Resource Conservation Recovery Act (RCRA) Subtitle C have been identified as being relevant and appropriate (NCP, Section 300.400 (g)(2)) to the circumstances of the release at Global Landfill as iterated above. Both regulations address closure of hazardous waste landfills to provide long-term

minimization of migration of hazardous substances through the closed landfill. Also, many of the hazardous substances identified at Global Landfill are also listed as RCRA hazardous substances. The NCP states that EPA will often find RCRA requirements are relevant and appropriate at a site, and that these requirements may be relevant and appropriate where waste is just similar in composition, even where it is not identifiable as a RCRA listed waste, and even for waste disposed of prior to 1980 (55 Fed. Reg. 8763). In the case of Global Landfill the selected remedy would incorporate the composite cap features of NJDEP Hazardous Waste cap. The NJDEP Hazardous Waste Landfill Closure Regulations (NJAC 7:26-10.8(i)) require specific cap features that must be attained. The selected remedy includes a modified NJDEP Hazardous Waste cap that will attain a standard of performance that is equivalent to that required under the New Jersey Hazardous Waste Landfill Closure Regulations. Since the New Jersey Hazardous Waste Landfill Closure Regulations require specific cap features, such as a composite cap, then use of a NJDEP Hazardous Waste cap for remediation of a site such as Global is clearly consistent with the RI/FS Guidance and the NCP. The RI/FS Guidance states: "A composite-barrier cap is to be used when the landfill contains RCRA listed wastes, waste sufficiently similar to RCRA listed waste, or RCRA characteristic waste." A composite-barrier cap may also be used at landfills which contain much lower concentrations of hazardous contaminants than that of RCRA listed or characteristic wastes, depending upon site specific characteristics (RI/FS Guidance, p. 4-11). Composite-barrier caps minimize infiltration into the fill material, and provide greater protection against migration of contaminants out of the fill material than single barrier caps or closures with just soil cover.

RI/FS Guidance recognizes that where "... a groundwater contaminant problem exists, a RCRA cap would serve to "... limit infiltration of precipitation (RI/FS Guidance, p. 5-9). The NCP also recognizes that "... the mobility of the waste ... may be a key concern in evaluating" the need for a highly impermeable cap (55 Fed. Reg. 8763).

The purposes of closure under Subtitle C and the objectives of CERCLA remediation at Global are clearly the same (control of release of hazardous waste and other contaminants into the environment), thereby reflecting accord with 40 C.F.R. § 300.400(g)(2)(i). The media regulated by Subtitle C under 40 C.F.R. Part 264 include, inter alia, landfills, the same type of media to be affected by this remedial action, thereby meeting the intent of 40 C.F.R. § 300.400(g)(2)(ii). The substances "regulated by" Subtitle C (i.e. hazardous waste) were not only found at the site but also fall within the legal definition of those same substances affected by CERCLA (i.e. hazardous substances), thereby meeting the intent of 40 C.F.R. § 300.400(g)(2)(iii). Finally, the actions regulated by

Subtitle C (e.g. closure of landfills), are similar to this remedial action.

Therefore, the cap requirements of both New Jersey Hazardous Waste Landfill Closure Regulations and RCRA Subtitle C are relevant and appropriate for the capping of Global Landfill.

Comment: The risk assessment does not justify using a hazardous waste cap at the Global Landfill.

Response: This PRP claim misconstrues the relationship between remediation goals and risk assessments. Risk assessments and ARARs serve different functions. The baseline assessment is intended to be essentially an evaluation of the no-action alternative (55 Fed. Reg. 8711). The determination of whether particular requirements are ARARs for a site is to be made independently from the risk assessment (55 Fed. Reg. 8711).

**VII. Group's proposed alternative**

Comment: The group's proposed alternative is presented in their attached comments on the Proposed Plan, on pages 60 to 72.

Response: It is NJDEP's opinion that the Global Landfill PRP Group's proposed alternative is not cost effective from a geotechnical viewpoint. Based upon F&P's analyses, construction of the stabilization berm is necessary. The total amount spent at the beginning of this project to preclude failure will be much less than the amount which will be required should a failure occur. Given the sensitivity of the underlying organic soils, and the fact that the east slopes are in a remolded state of stress, NJDEP believes that slope failure will occur without a berm. The resultant effort to re-stabilize a slope after a failure would most likely include the construction of a berm much larger than presently proposed, impacting more wetlands than what are presently anticipated.

The NJDEP recognizes that there are alternate ways of achieving some of these intended functions. The preferred alternative achieves these objectives and minimizes disruption of the wetlands.

**VIII. ROD Flexibility**

Comment: Flexibility should be extended to the design of the cap and the determination of the necessity of the berm.

Response: Due to the unique slope stability problems, and the surrounding wetlands at Global Landfill, it has been determined that a berm is necessary.

**Comment:** The Global ROD should have as much flexibility with regard to cap design as the Sharkey Landfill ROD.

**Response:** Site characteristics are markedly different at each site. The selected remedy addresses the unique characteristics at the Global Landfill site.

**IX. Miscellaneous**

**Comment:** OU-1, as a phased remedy addressing only source control, is only governed by certain action-specific ARARs, and not contaminant-specific ARARs.

**Response:** OU-1 is governed by action-specific and location-specific ARARs.

**Comment:** Under Section 121 of CERCLA, permits are not required for any proposed treatment plant.

**Response:** Under the Superfund program, discharge limitations must still meet all substantive permit requirements even though permits are not issued. The discharge requirements are the same as would be required for a permit.

**Comment:** Without a requirement-by-requirement determination as mandated by CERCLA, no standard has an independent application to a cleanup under CERCLA. The FS assumes the application of, and includes standards wholesale without the type of ARARs analysis required. One example of this is that MCLs are not ARARs for either OU-1 or OU-2. MCLs may be "relevant and appropriate" only for "ground and surface water that is a current or potential source of drinking water." The water table aquifer is not a potable water source, and the nearest Old Bridge aquifer well is downgradient one mile from the landfill. In addition, groundwater quality data in the Old Bridge aquifer reflects "background levels" of contaminants.

**Response:** This claim is erroneous. The legislative history of the Superfund Amendments and Reauthorization Act of 1986 (SARA) indicates that aquifers which have any potential future use should be cleaned up to achieve MCLs. Furthermore, MCLs must be applied not only at the tap, but whenever contaminated [ground] waters are found (Senate Congressional Record, October 3, 1986, p. S14915).

Some of the hazardous substances present in the landfill and in the shallow aquifer may be migrating downward into the Old Bridge Sand aquifer, a source of public water supply. Under the NCP, MCLs and non-zero maximum contaminant level goals (MCLGs) are potential ARARs, and may appropriately be used as cleanup goals in groundwater where it is or may be directly used for drinking water.

Groundwater data collected to date reveals that groundwater quality in both the shallow and the Old Bridge Sand aquifers exceeds MCLs for numerous hazardous substances, pollutants, and contaminants, downgradient from the landfill. For example, cadmium, total chromium, benzene, chlorobenzene, and vinyl chloride were not detected in upgradient wells in the Old Bridge formation. However, they were detected above MCLs in downgradient samples, indicating that the landfill may have affected this public water supply. These downgradient contaminant levels clearly are not "background levels" as the PRPs assert. Many of these hazardous substances were detected in drums buried at the landfill, and in leachate flowing out of the fill material. The migration of these substances from the landfill into the underlying aquifers, and possibly into the nearby surface waterways will continue unless remedial actions are implemented. The selected remedy will limit and control infiltration and surface runoff of precipitation, thereby reducing leachate generation and migration into the groundwater and surface waters. The NCP states that operable units should not be inconsistent with nor preclude implementation of the expected final remedy. OU-1 is a response action to contain hazardous substances at the site which are impacting the groundwater. Therefore it is appropriate to examine MCLs as ARARs in this ROD.

Comment: Any drum removal at this site must be limited to the already excavated drums.

Response: The decision whether or not additional excavation of drums is necessary will be determined in design.

**X. Conclusion**

Comment: The Proposal suggested by the PRPs compares favorably with remedial alternatives implemented at other New Jersey landfills, and accepted by NJDEP as appropriate at those sites.

Response: Site characteristics are markedly different at each site. The selected remedy addresses the unique characteristics at the Global Landfill site.

WRITTEN COMMENTS FROM THE OLD BRIDGE ENVIRONMENTAL COMMISSION- Submitted on March 12, 1991, and May 6, 1991

**Comment:** Please provide a detailed explanation of remedial processes to be done at the Global Landfill, and provide an estimated timetable for completion of goals or milestones in the process.

**Response:** The components of this remedial action (OU-1) include the following:

- Capping of the landfill with a modified hazardous waste cap;
- Slope stability enhancement through construction of a soil stabilization berm;
- Construction and operation of a gas management system;
- Construction and operation of stormwater and leachate management systems;
- Installation of a perimeter security fence to restrict access to the site; and
- Implementation of a monitoring program to ensure the effectiveness of the remedy.

OU-2 will address groundwater contamination from the site. Selection of a remedial alternative for the OU-2 action will take place at a later date.

The following schedules are NJDEP's best estimates for each of the operable units:

| | | |
|---|---|---|
| OU-1 | Record of Decision | Summer 1991 |
| | Design Phase - Start | Winter 1992 |
| | Design Phase - Completion | Winter 1993 |
| | Construction Contractor Proposal Request | Winter 1993 |
| | Construction Contract Award | Summer 1993 |
| | Construction - Start | Fall 1993 |
| | Construction - Completion | Fall 1995 |
| OU-2 | Phase I Field Investigation | Ongoing |
| | Phase I Remedial Investigation Report Completion | Winter 1993 |
| | Phase 2 Field Investigation | Spring 1993 |

| | |
|---|---|
| Phase 2 Remedial Investigation Report Completion | Winter 1994 |
| Record of Decision | Spring 1994 |
| *Design Phase - Start | Spring 1994 |
| *Design Phase - Completion | Fall 1995 |
| *Construction - Start | Winter 1995 |
| *Construction - Completion | Winter 1997 |

* If required, based on Record of Decision for OU-2.

Comment: Will a protective sand bed be incorporated into the engineering design.

Response: For the proposed capping alternative, the regraded landfill surface will be covered with new sand, a geogrid material (to stabilize the clay layer), and then the clay layer. A detailed description of Alternative 6 can be found in the Feasibility Study (FS) located in the listed repositories.

Comment: How will the specifications be written to ensure compliance with engineering design, and what safeguards will be incorporated?

Response: The engineering specifications and plans will be public documents upon their completion. NJDEP will hold a public meeting at the end of the design phase, and prior to the actual construction, to present the final design. Every item used in the construction for OU-1 will have detailed specifics in the final design. NJDEP and the design engineering firm will have staff on-site during the construction phase to ensure that the required materials are used.

Comment: Who is responsible for the post-closure funding?

Response: Under the Superfund program, the state is responsible for the operation and maintenance phase (O&M). The NJDEP will establish funds to perform the O&M phase of the remediation. The Department has established a specific group to oversee this phase, although the O&M could be delegated to the county, the municipality, or responsible parties with NJDEP oversight. The O&M plan will be placed in the repositories with the other documents for Global.

Comment: What permits are necessary for the leachate treatment on-site with discharge to Cheesequake Creek; who would be responsible for obtaining such permits; will the RI/FS process define the nature and type of permits required; and how, if any, will the Stormwater Runoff Regulations impact the treatment facility.

Response: In the design phase for OU-1, statutory and technical requirements will determine the discharge limitations. Under the

Superfund program, these discharge limitations must still meet all permit requirements for any landfill, storm run-off, and surface water discharge to the Cheesequake, even though a permit is not issued. The discharge requirements are the same as would be required for a permit. The NJDEP would make all monitoring data available to the public.

**Comment:** Should relocation of the pipeline be necessary, who will pay for its relocation?

**Response:** The question of responsibility for the movement of the pipeline is a legal issue. The New Jersey Attorney General's Office is looking into the matter.

**Comment:** The OBEC requested copies of all reports concerning Global Landfill from NJDEP in addition to any placed in the site's repositories listed in the February 1991 Proposed Plan.

**Response:** As a member Task Group, OBEC has had direct access to all reports concerning Global Landfill. In the future NJDEP will provide documents regrading the Global Landfill site to the Old Bridge Environmental Commission, the Task Group, as well as to all the repositories listed in the February 1991 Proposed Plan.

**Comment:** The OBEC is concerned that the construction and the operation of the proposed on-site treatment plant and the associated costs, operation, and liability will someday fall under the jurisdiction of the Township. Unless the Township could be indemnified against any courses of action that may transpire as a result of any violations to any regulation, be it air or water should the Township take over operation of the plant, they would be exceedingly reluctant to agree with this course of action.

**Response:** Any on-site treatment plant will be constructed, operated and maintained for the life of the plant, and eventually dismantled by the agency or party funding the site remediation. It is not foreseeable how the construction, operation, and maintenance of an on-site treatment plant would fall under the jurisdiction of the Township of Old Bridge.

WRITTEN COMMENTS FROM TRANSCONTINENTAL GAS PIPE LINE CORPORATION-Submitted March 20, 1991

**Comment:** Transco is willing to relocate its existing facilities and loop around the site, however, Transco is unwilling to undertake the relocation from both a regulatory and an economic standpoint unless it is on a fully reimbursable basis.

**Response:** The question of responsibility for the movement of the pipeline is a legal issue. The New Jersey Attorney General's Office is reviewing this issue.

ENVIRONMENTAL COMMISSION
(201) 721-5600

MIDDLESEX COUNTY, N.J.

# TOWNSHIP OF OLD BRIDGE

Blanche D. Hoffman, Chairwoman
Joyce Caldon
Susan E. Knauf
George R. Koehler
William Schnitzerling
Robert Sommers
Gary Szelc

March 12, 1991

Ms. Grace L. Singer, Chief
Bureau of Community Relations
Division of Hazardous Site Mitigation
New Jersey Department of Environmental Protection
CN 413
401 East State St., 6th Floor
Trenton, NJ 08625

RE: Feasibility Study for Capping of the Global Landfill Superfund Site

Dear Ms. Singer:

On behalf of the Old Bridge Environmental Commission, we offer the following comments and questions regarding the proposed plan for the remedial alternative for the proper closure of the Global Landfill. We recognize that the capping alternative and the subsequent engineering design for the gas venting system and the leachate collection system as well as the remediation of contaminated groundwater will be incorporated into the Complete Feasibility Study for the closure of Global as a Superfund Site. We ask for a detailed explanation of the process, as well as an estimated time table for completion of goals or milestones in the process. It is assumed that these requirements will then be set forth in the Record of Decision (ROD). We also request an explanation of the steps in the remedial action, including the time frame of the remedial design, the subsequent remedial action and the plan both technical and financial for the operation and maintenance of the post closure monitoring.

The selection of Alternative 6, a modified NJDEP Hazardous Waste Cap, as the most technically feasible for Global, as presented did not include the incorporation of what is commonly referred to as a foundation layer. This layer generally consists of a protective sand bed and is laid first. Is this to be incorporated into the engineering design, and if not, was its incorporation considered and rejected as either not necessary or infeasible?

As in the capping of any landfill, the engineering specifications are critical. How will the specifications be written to ensure compliance with the engineering design? What safeguards will be incorporated and who will maintain supervision of the process? Who will be responsible for the post closure financial plan?

The proposed option for the treatment of the leachate raises many questions. Who would be responsible for the design, operation and maintenance of this facility and be responsible for the associated permits? Will the RI/FS process define the nature and type of the permits required? What will be the nature of the NJPDES permits required? How, if any, will the Stormwater Runoff Regulations impact this facility? Our concern here is deterioration of Cheesequake Creek, should it be determined to be the receiving body.

Our last question regards the Transcontinental Pipeline. Should relocation of the pipeline be necessary, who will pay for its relocation?

Regardless of alternatives chosen either for the capping of the landfill or final remediation design for Global as a Superfund site, the Environmental Commission respectfully requests to receive copies of all reports conducted in relation to the Landfill. This copy would be in addition to any sent to the Health Department or the Library.

We appreciate the opportunity to comment on this proposal.

Very Truly Yours,

Blanche D. Hoffman

Blanche D. Hoffman

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ENVIRONMENTAL COMMISSION
(201) 721-5670

MIDDLESEX COUNTY, N.J.

# TOWNSHIP OF OLD BRIDGE

May 6, 1991

Ms. Grace L. Singer, Chief
Bureau of Community Relations
Division of Hazardous Site Mitigation
New Jersey Department of Environment Protection
401 East State St., CN 413
Trenton, NJ 08625-0413

RE: Global Landfill Superfund Site, Township of Old Bridge

Dear Ms. Singer:

As a follow up to our comments and letter read during the Public Meeting on March 12, 1991 to discuss the completion of the Feasibility Study for the Global Landfill Superfund, the Old Bridge Environmental Commission wishes to augment our remarks as follows:

1) We are concerned that the construction and the operation of the proposed on site treatment plant and the associated costs, operation, and liability will someday fall under the jurisdiction of the Township. Unless the Township could be indemnified against any courses of action that may transpire as a result of any violations to any regulation, be it air or water should the Township take over operation of the plant, we would be exceedingly reluctant to agree with this course of action.

2) We recommend that the planting of trees along the buffer zone near London Terrace be given strong consideration from the Department for inclusion in the remedial design.

We appreciate the opportunity to comment on the Proposed Plan.

Very truly yours,

Blanche D. Hoffman
Chair, Old Bridge Environmental Commission

copy: Scott Weiner, Commissioner, NJDEP
Peter Latimer, NJDEP, Site Manager
Barbara Cannon, Council President, Township of Old Bridge
Arthur Haney, Mayor, Township of Old Bridge
Thomas Sikorski, Health Officer, Township of Old Bridge

MAR 21 1991

Transcontinental Gas
Pipe Line Corporation
A Transco Energy company

March 20, 1991

2800 Post Oak Boulevard
P. O. Box 1396
Houston, Texas 77251-1396
713-439-2000

Ms. Grace Singer, Chief
Bureau of Community Relations
New Jersey Department of Environmental Protection
CN413, 401 East State Street, 6th Floor
Trenton, New Jersey 08625-0413

RE: The Global Landfill Superfund Site ("Site") in Old Bridge Township, Middlesex County, New Jersey

Dear Ms. Singer:

Transcontinental Gas Pipe Line Corporation ("TGPL") would like to take this opportunity to thank both the United States Environmental Protection Agency ("EPA") and the New Jersey Department of Environmental Protection ("NJDEP") for allowing it to review and comment on the Proposed Plan ("Plan") forwarded under cover of Ronald J. Borsellino's letter.

TGPL is a major interstate natural gas pipeline operating a 12,000 mile system and transporting natural gas from Gulf Coast production areas to Northeast market areas. Upon review of the Plan, it appears a portion of TGPL's system lies within an easement which runs beneath the above-referenced Site. The easement was granted prior to commencement of activities at the Site and reserved specific rights, outside the control of TGPL, to the surface owner.

As previously discussed with NJDEP, regarding that portion of TGPL's system lying beneath the Site, TGPL is willing, if feasible, to relocate its existing facilities and loop around the Site to alleviate any potential future problems associated with NJDEP's maintenance and oversite of the Site. However, TGPL is unwilling to undertake the relocation from both a regulatory and an economic standpoint unless it is on a fully reimbursable basis (i.e., TGPL bears no cost of any type or nature).

TGPL again thanks both the EPA and the NJDEP for soliciting its comments.

Very truly yours,

R. G. Graves
Senior Vice President
Transmission Operations

M. D. Zagata
Vice President
Environmental and Safety Affairs

EDWARDS & ANGELL

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May 6, 1991

***VIA HAND DELIVERY***

Grace Singer, Chief
Bureau of Community Relations
New Jersey Department of Environmental Protection
CN 413
401 East State Street, 6th Floor
Trenton, New Jersey 08625-0413

***Re: Global Landfill Proposed Remedial Action Plan***

Dear Ms. Singer:

Enclosed herewith are the Comments of the Global Landfill PRP Group Concerning the February 1991 New Jersey Department of Environmental Protection Proposed Remedial Action Plan for Global Landfill, Old Bridge Township, Middlesex County, New Jersey ("Comments"), with appendices. Also enclosed herewith is a copy of the transcript of the deposition of Richard J. Sullivan, which was conducted on November 13, 1990 in a litigation caption Lamb, et al. v. Global Landfill Reclaiming, et al., Superior Court of New Jersey, Middlesex County Law Division, Docket No. W-15349-88.

The membership of the PRP group is set forth in Appendix E to the Comments. Please be advised, however, that the membership may change; if so, an amended Appendix will be submitted promptly.

The Comments are submitted pursuant to the provisions of CERCLA and the regulations promulgated pursuant thereto. The Comments do not constitute the waiver of any rights or positions on the part of the Global Landfill PRP Group or any of its members; additionally, the Comments do not constitute any admission of liability on the part of the Global Landfill PRP Group or any of its members. Finally, the members of the Global Landfill PRP Group do not purport to represent the views of any other person or entity.

By copy of this letter, three copies of the Comments and appendices, along with one copy of the Sullivan deposition transcript, are being delivered to John MacDonald, Esq. and Frank Cardiello, Esq., deputy attorneys general, for their use and information.

Any inquiries concerning the enclosed, and any response thereto, may be directed to this office or to the following:

Richard F. Ricci, Esq.
Lowenstein, Sandler, Kohl, Fisher & Boylan
65 Livingston Avenue
Roseland, NJ 07068

Mark G. Weisshaar, Esq.
Hunton & Williams
2000 Pennsylvania Avenue, N.W.
Ninth Floor
Washington, D.C. 20006

Thank you for your consideration.

Very truly yours,

Nancy B. Rohn

NBR:swx

Enclosures

cc: John MacDonald, Esq. (w/enc.)
Frank Cardiello, Esq. (w/enc.)
Global Landfill PRP Group (w/enc.)

# *COMMENTS OF THE GLOBAL LANDFILL PRP GROUP CONCERNING THE FEBRUARY 1991 NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION PROPOSED REMEDIAL ACTION PLAN GLOBAL LANDFILL, OLD BRIDGE TOWNSHIP MIDDLESEX COUNTY, NEW JERSEY*

*Submitted by the Members of the Global Landfill PRP Group*

*c/o Edwards & Angell*
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*Hunton & Williams*
*2000 Pennsylvania Ave., N.W.*
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## *I. INTRODUCTION*

Global Landfill, located in Old Bridge Township, Middlesex County, New Jersey, was a municipal landfill which operated from 1968 until April 1984. At that time, a side slope failure prompted administrative action: in connection with an Order to Show Cause with Temporary Restraints obtained by the State of New Jersey Department of Environmental Protection ("NJDEP") and entered by the Honorable Richard S. Cohen on April 17, 1984, Global was ordered to cease operations. Global was further ordered to "...immediately retain the services of an engineering firm, approved by [NJDEP], to prepare a final closure plan as required by the "Sanitary Landfill Facility Closure and Contingency Fund Act," N.J.S.A. 13:1E-100 et seq. and [NJDEP]'s rules and regulation promulgated pursuant thereto[.]..."

In January 1986, a consent order was entered in connection with the litigation commenced by NJDEP in 1984. In pertinent part, the consent order provided that Global

> ...shall forthwith retain the services of Richard J. Sullivan for the purpose of overseeing the expeditious, and cost effective closure of the landfill which is the subject matter of this litigation as soon as practicable and in accordance with the appropriate environmental requirements and law. More specifically, Mr. Sullivan shall hire an engineering firm, from a list agreed to by the parties, to prepare closure plans in accordance with the appropriate rules and regulations of the [NJDEP] and further, retain a contractor(s) to implement said plans provided they

> are approved beforehand by DEP. Mr. Sullivan's fees as well as the fees of the engineering firm he retains to prepare the closure plans for Global shall be paid for from the escrow accounts established by Global pursuant to the Sanitary Landfill Facility Closure Contingency Fund Act, N.J.S.A. 13:1E-100 et seq....

Consent Order entered by the Honorable John E. Keefe on January 13, 1986, ¶ 1. Clearly, the objective of NJDEP since April 1984 (if not earlier) was the complete, quick, final and cost effective closure of Global Landfill, in keeping with the spirit, intent, and letter of the Sanitary Landfill Facility Closure Contingency Fund Act.

Mr. Sullivan did retain the services of an engineering firm as contemplated in the January 1986 consent order: he retained E.T. Killam Associates. According to Mr. Sullivan's testimony, Killam's charge was to prepare the engineering design of all of the closure arrangements. See Deposition of Richard J. Sullivan, November 13, 1990, in Lamb, et al. v. Global Landfill Reclaiming, et al., Superior Court of New Jersey, Middlesex County Law Division, Docket No. W-15349-88 ("Sullivan Deposition") at T80-4 to -21. Although it was initially planned that Killam would prepare a "Focus Feasibility Study" regarding closure options, thereby bypassing the full and complete Remedial Investigation/Feasibility Study process, that plan ultimately yielded to a more extensive Feasibility Study (but without the benefit of a Remedial Investigation). Mr. Sullivan testified that an imminent threat to public health, as required in order to benefit from the



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shortcut procedure, had not been shown by the data presented. Sullivan Deposition at T112-5 to T118-11.

On or about August 22, 1989, NJDEP issued Directive and Notice to Insurers Number 1 pursuant to the Spill Compensation and Control Act, N.J.S.A. 58:10-23.11 et seq. This Directive, which named approximately twenty-one (21) Potentially Responsible Parties ("PRPs"), demanded the payment of $1,500,000 to fund a Remedial Investigation ("RI") plus another $225,000 in the cost of NJDEP's administrative oversight of that activity. During the course of discussions between the PRPs and NJDEP, it became apparent that the scope of the RI pertained to groundwater issues, and not to closure of the site, per se. In February 1991, NJDEP issued the Proposed Remedial Action Plan, which specified its preferred alternative for capping the site, inter alia. In March 1991, Directive and Notice to Insurers Number Two was issued, which added several PRPs and called for the payment of a reduced figure for the RI/FS (the same demand covered in Directive Number One), and to pay $500,000 for the Remedial Design, and $30,353,200 for the costs of Operable Unit Number One (which mirrored the preferred alternative identified in the PRAP) plus $4,652,980 in administrative oversight.

As NJDEP acknowledges, Global Landfill was a municipal landfill authorized to accept a variety of wastes for disposal; among the authorized wastes was "ID 27" which is described as "dry industrial waste." Encompassed within that category is,

inter alia, "asbestos and asbestos-containing waste.... N.J.A.C. 7:26-2.13(g)(vi). There is no dispute that much or most of the waste allegedly generated and/or transported by the PRPs named in both the First and Second Directives was properly disposed of at Global Landfill; insulation material containing asbestos is an excellent illustration. There is no dispute that NJDEP rules and regulations governing closure of municipal, or solid waste, landfills contemplate and anticipate the presence of such properly disposed of materials at such sites.

In the Proposed Remedial Action Plan issued on February 19, 1991, NJDEP maintains that the discovery of some drums in a discrete portion of the landfill, some of which are alleged to have contained hazardous materials, is enough to warrant the treatment of Global Landfill as something other than a municipal landfill. However, that conclusion is largely the result of assumption, extrapolation, and inadequate foundation. When all of the legal and technical deficiencies reflected in NJDEP's conclusions are considered, it is readily apparent that the preferred alternative promulgated by NJDEP is inappropriate. In fact, it is highly probable that if NJDEP had not interfered with the Focus Feasibility Study, the proper municipal landfill closure design, and the landfill construction process, no additional closure or remediation efforts would have been required at Global Landfill.

In the discussion which follows, the Global Landfill PRP Group ("PRPs" or "Group"), the membership of which is set forth in Appendix E, will address the inadequacies in the NJDEP preferred alternative (and the materials upon which it relies). Importantly, the Group also presents an alternative for closure of Global Landfill which complies with technical and legal requirements and addresses the alleged problems posed by this site -- in fact, the Group's alternative achieves everything expected in the NJDEP alternative, at a significant cost savings.

The Global Landfill PRP Group urges NJDEP to give meaningful consideration to the comments and suggestions set forth herein. At the very least, the Group stresses that any Record of Decision entered in connection with Global Landfill should be sufficiently flexible to meet site-specific circumstances and needs as they arise.

## *II. THE NJDEP HAS NOT COMPLIED WITH THE NCP'S DATA COLLECTION AND ANALYSIS REQUIREMENTS AND, AS A RESULT, HAS SELECTED A PREFERRED REMEDIAL ALTERNATIVE THAT IS NOT COST-EFFECTIVE AND THAT IS BESET WITH SERIOUS TECHNICAL DEFICIENCIES*

There can be no doubt that the action intended at Global Landfill is "remedial" -- final, complete, and thorough, not temporary or "stop-gap" -- indeed, that intent is reflected in the very label imposed by NJDEP. In its Proposed Remedial Action Plan for the Global Landfill (emphasis added) (hereinafter "Proposed Plan" or "PRAP"), the NJDEP plans two actions

to remedy this landfill. The first, known as Operable Unit Number 1 (OU#1), is a phased response action that addresses closure of the landfill. The Proposed Plan's preferred alternative for OU#1 (PRAP alternative) calls for the construction of a modified hazardous waste cap over the entire landfill, and the installation of a gas collection and active treatment system, and collection and treatment for surface leachate. NJDEP's estimated cost of the PRAP alternative is $30,353,200. A second remedial action, known as Operable Unit Number 2 (OU#2), may be needed to address groundwater. OU#2 will include an RI/FS to focus on OU#2 issues.

The selection process for the OU#1 remedy was flawed from the outset because NJDEP failed to complete a remedial investigation (RI), both of the overall site conditions and of the conditions specifically related to OU#1, prior to issuing its Proposed Plan. This is inconsistent with the National Contingency Plan (NCP), which establishes a systematic method of data collection and analysis as the basis for selecting remedial actions. The absence of the data that an RI is designed to provide has led to a misunderstanding by NJDEP of the site risks to human health and the environment posed by Global Landfill, a faulty Feasibility Study (FS), and a failure by NJDEP to realize and plan for the interdependence of the two Operable Units in achieving the overall effectiveness of the final remedy for this landfill, as required by the NCP. Most importantly, the lack of an RI has led to a failure by NJDEP to

develop the data on the landfill's soil strength, settlement rate, waste characteristics, and hydrogeology, all of which are essential to an evaluation of the alternatives considered in the Proposed Plan for capping the landfill and installing gas and leachate treatment systems for it.

With a thorough RI and an accurate FS, cost-effective and integrated remedies could have been selected on the basis of adequate data. Without these essential elements, NJDEP's premature and incorrect selection of the PRAP alternative for OU#1 makes it more likely that any decision relating to OU#2 will not be well integrated with OU#1. In summary, the NJDEP's failure to collect necessary technical data in an RI, NJDEP's defective FS, and its failure to consider the overall site remedy, has resulted in the premature selection of a PRAP alternative that is not cost-effective and is inconsistent with the NCP.

### *A. The Proposed Plan Is Not Based On a Remedial Investigation and Is the Product of Inadequate Data Collection and Site Characterization*

The NJDEP did not follow the methodology established by the NCP for characterizing the nature and extent of the contamination present at Global Landfill. Pursuant to the NCP, a lead agency must develop a sampling and analysis plan that provides data of sufficient quality to support the analysis and design of potential response actions for a Superfund site. 40 C.F.R. §§ 300.430(b)(8), (d)(2) (1990). The NCP specifies that

this sampling and analysis plan shall consist of a field sampling plan, a quality assurance project plan (QAPP), and often one or more treatability studies. 40 C.F.R. §§ 300.430(b)(8)(ii), (d)(1) (1990). As part of the field investigation, the RI must obtain data on the physical characteristics of the site, including soils, geology, and hydrogeology; characteristics of the air, surface water, and groundwater; characteristics of the waste; the extent to which the source can be adequately characterized; and actual and potential exposure routes. 40 C.F.R. §§ 300.430(d)(i)-(vi) (1990).

For municipal waste landfills, EPA, which is responsible for implementing the NCP, has identified certain types of data that at the minimum must be considered when evaluating specific elements of the potential remedial alternatives. Data on settlement rate, availability and adequacy of cover materials, and soil and waste characteristics are necessary to evaluate capping alternatives for these landfills.[1/]

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[1/] "Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites," OSWER Dir. No. 9355.3-11 at pp. 3-11, 4-8 (Feb. 1991) ("Municipal Guidance"). The development of capping alternatives relies on an analysis of landfill contents. For landfill contents, the objectives of data collection are to determine "total and differential settlement," "the distribution and concentration of contamination in surficial soils," "the integrity of any buried wastes," and "the degree of contaminiation of any unsaturated soil." Id. at 3-16 to 3-17. To "document settlement over time, a series of settlement markers should be established on a grid pattern of approximately 100 feet (more in areas with known settlement problem)." Id. at 3-17. The importance of determining settlement, particularly differential settlement, is difficult to overstate. It may be necessary to monitor settlement throughout the RI/FS and the design stage. Id. at 3-18.



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Data on hydrogeology and the chemical characteristics of the leachate, often coupled with a treatability study, are fundamental to an evaluation of leachate treatment options. Municipal Guidance at 4-22, 4-23.[2/] Finally, data on settlement rate, nature of the wastes, preferential flow paths, and chemical characteristics of the gas emanating from the landfill are required to evaluate gas collection and treatment alternatives. Id. at 4-28, 4-30.[3/]

The Proposed Plan for Global Landfill is not based on an adequate field investigation and NJDEP has therefore failed to consider in the Proposed Plan the specific data that is required by the NCP and that is necessary for evaluation of remedial actions for municipal landfills. The Administrative

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2/ For leachate, the objectives of data collection are to provide information that determines its "chemical characteristics," and its "impact on groundwater." Id. at 3-10. Leachate wells or collection drains should be used to define "soil" characteristics including permeability, grain size distribution, and moisture content" and "waste characteristics." Id. at 3-13.

3/ Landfill gas characterization has as its objectives "an assessment of human health risks due to air toxics and explosive hazards," and "the feasibility of gas collection and treatment." Id. at 3-26 to 3-27. Data should therefore include "contour maps," "geologic, hydrogeologic, and soil characteristics...to determine gas migration patterns," landfill gas "composition, moisture content, quality, and heat and methane content," and "types of microorganisms present." Id. at 3-29.

Record does not include a field sampling plan and a quality assurance project plan, the two essential elements in any NCP field investigation. 40 C.F.R. § 300.430(b)(8). The field effort for Global Landfill did not define data quality objectives and therefore failed to obtain essential categories of data. In particular, the Proposed Plan is not supported by an adequate field investigation of the nature and strength of the waste, the soil characteristics, or the landfill's settlement rate, all of which are necessary to evaluate capping and gas treatment alternatives. Furthermore, the Proposed Plan is not based upon treatability studies which are necessary to evaluate leachate treatment alternatives, or an investigation of preferential flow paths and characteristics of the gases from the landfill which are required for the evaluation of gas treatment alternatives. This is inconsistent with 40 C.F.R. § 300.430(d)(1) and the basic principles governing evaluation of municipal landfills. As a result, NJDEP could not and did not develop and effectively evaluate remedial alternatives for Global Landfill in its Proposed Plan.

NJDEP's failure to conduct an adequate RI for the landfill has caused it to erroneously assume that the landfill is unstable. The resultant deficiencies are discussed below.

*Strength of Refuse, Settlement, and Slope Stability*

The Proposed Plan is based on three investigations of soil conditions at the site:

- An investigation including fifteen test borings and five cone penetration tests in 1984 by Woodward Clyde Consultants following a major slope failure in April 1984.[4/]

- An investigation by French and Parello Associates including four test borings and in situ field vane tests in January 1989.[5/]

- An investigation by French and Parello consisting of eight borings and fifteen in-situ field vane shear tests in February 1990.[6/]

Although these reports include the results of stability analyses for the landfill against sliding, all base the analyses on waste strength parameters that are neither site-specific nor appropriate. Inexplicably, the fieldwork ignored the strength of the refuse as a data need. As a result of this

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4/ Geotechnical Investigation, Global Sanitary Landfill, Old Bridge Township, New Jersey, Woodward Clyde Consultants.

5/ Report of Geotechnical Exploration for the Closure Plan, Global Sanitary Landfill, Old Bridge Township, New Jersey, French and Parello Associates, April 1989.

6/ Report of Supplementary Geotechnical Evaluation for the Feasibility Study, Global Sanitary Landfill, Old Bridge Township, New Jersey, French and Parello Associates, February 14, 1991.

omission, the Proposed Plan erroneously assumes that Global Landfill is unstable.

The 1984 Woodward Clyde investigation used rotational slide analysis to back analyze the strength of the refuse. Notably, the actual failed slope profile followed a block slide failure; it did not represent the rotational slide mechanism. Several calculations of slope stability were performed with different refuse strengths, but with inappropriate slide mechanisms, until the calculated factor of safety reached unity. This back analysis led to Woodward Clyde's assumption that the correct refuse strength was a cohesion of 780 psf, using an undrained strength analysis. A back analysis had been performed, but led to an over-conservative result owing to the improper slide mechanism adopted.

In 1989 French and Parello Associates used the same improper rotational analysis approach, but with refuse strengths that were assumed from limited desk studies of available literature. The analysis assumed undrained strength parameters of 750 psf (similar to Woodward Clyde). No back analyses were performed on the landfill slopes prior to failure to justify the refuse strengths. The studies led French and Parello to conclude that the landfill was marginally stable. Had back analysis been used with a more appropriate block slide, it could have been realized that the refuse strengths were higher, and consequently the actual calculated factors of safety for the landfill were better than predicted.

In 1991, French and Parello reanalyzed the landfill stability using a block analysis, and found that the existing factor of safety was 1.34 for the North and South slopes, but that the East slope presented a factor of safety of 1.1. The refuse parameters used were drained values of 22 degrees for friction and 200 psf cohesion, as a result of a published literature review. Although an appropriate analytical method was now being used, the refuse strengths were still not based on appropriate site specific back analysis, in the absence of any field testing to determine refuse strengths. While the report did examine soils strengths in detail, less attention was apparently given to refuse strengths which are nonetheless of equal importance. The 1991 French and Parello analysis, therefore, used the appropriate slide mechanism, but the refuse strength parameters were again inappropriate.

In the case of the analysis of the North East slope existing stability evaluation, French and Parello did not recognize that measured vane soil strengths did not support the fact that the slope was stable. (If measured vane strengths are used, the calculated factor of safety for the existing slopes is less than or near unity.) This would have indicated to them that the vane strengths underestimated soil strengths. They used vane strength data to evaluate the stability of the East slope, leading to their conclusion that it is unstable, when site observations indicate it is also stable. The low soil strengths based on vane tests were later used in the

analysis of the East slope with a cap, which contributed their misconception that a berm is necessary.

By implementing the correct methodology, the analysis by the PRP group clearly demonstrates by back analysis with a block slide approach, that the refuse strengths are significantly higher than those stated by French and Parello. Back analysis has shown that parameters of a friction angle of 34 degrees and a cohesion of 334 psf are appropriate for the refuse, because with a block analysis, the calculated factor of safety for the landfill profile before failure was near unity, that is, it was at an incipient failure condition. Analysis of the Proposed Plan's preferred alternative with these parameters and method of analysis show that there is no need for a stabilization berm. See Appendix A.

There has been only one incident of slope stability failure at Global which was then corrected by regrading the landfill. Given that stability failure event, an experienced engineer would have known that ground movement monitoring information would be essential. It is difficult to understand why NJDEP did not subsequently install a series of vertical and horizontal movement monitors to follow the landfill behavior. Such an installation would have enabled NJDEP to better understand the stability of the landfill, and this would have provided critical data to the Feasibility Study in proposing realistic cap designs.



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The Proposed Plan is based on the premise that substantial movement of the southeast sideslope is now occurring but, contrary to the NCP and EPA guidance, the NJDEP has not performed any monitoring for slope stability or landfill settlement even though NJDEP, through the site Administrator for closure, has been in control of the site for over five years. An inspection of Global's existent cap by the PRPs in January 1991, accompanied by representatives of the NJDEP consultants, showed no evidence of ongoing instability or movement to the southeast. During the visit, there were no signs of settlement or creep monitoring points from which a firm conclusion on instability could be drawn through regular survey measurements. If NJDEP had conducted an adequate RI that (1) included survey points to measure the landfill's vertical and lateral movements soon after the original slide or (2) included routine settlement monitoring attendant to a landfill closure, the Proposed Plan could be based on actual data and not general observations or overly conservative assumptions.1/

Based on information that NJDEP has made available, it appears that the only survey source of data to quantitatively

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1/ The DEP's approach is based largely on the 1984 incident of slope failure. This type of failure is not expected to recur in the future. First, the 1984 slope failure occurred on the east slope where a large volume of refuse had been placed rapidly during the previous four to five months. Second, a heavy rainfall and extremely high tide were recorded immediately prior to the slope failure.

estimate movement is contours on successive aerial surveys. It is widely recognized that such surveys are not accurate enough for proper settlement monitoring, as the margin of error generally associated with such aerial surveys is one contour interval, which equates to two feet for the site drawings. From a comparison of two available topographical surveys dated June 1986 and March 1989, the landfill exhibited generally four to six feet of settlement. The 1986 topography is on the Feasibility Study drawing "Feasibility Study for On-Site Controls, Site Plan" by Killam Associates, and the 1989 topography was provided to the PRPs by Killam Associates in January 1991. The contour changes were consistent with normal landfill consolidation, were not isolated, but were general around the whole landfill. This is not a sign of landfill slope instability or incipient failure, but of the normal aging of the landfill. This also supports slope stability analyses performed by the PRPs.

Settlement measurements, in order to be meaningful, should generally be made to levels of accuracy of one tenth of a foot (or less), as they are when settlement monuments are installed. At a minimum, therefore, periodic monitoring with survey instruments is needed to determine the rate of settlement and degree of slope stability. Municipal Guidance at p. 3-17.

The Proposed Plan has been issued, therefore, without the essential site-specific data needed for a decision concerning a temporary or final response action and for development and analysis of capping and gas collection alternatives. Municipal Guidance at pp. 4-7, 4-8, 4-11, 4-12, 4-30.

In the absence of the required site-specific data, the NJDEP adopted very conservative values in the assessment of alternative cap designs. The final analysis assumed an angle of friction of 22 degrees and a cohesion of 200 psf. A more appropriate back analysis of the 1984 slope failure would have indicated that the strength of the waste is actually at an angle of friction of 34 degrees and has a cohesion of 334 psf.[8/] Thus, NJDEP has seriously underestimated the current stability of the landfill, overestimated the urgency to improve stability, and overdesigned various elements of the PRAP alternative.

*Nature of the Waste*

Only one investigation to determine the general characteristics of the waste was conducted on a portion of the smaller 6.5 acre section of the landfill. The much larger and distinct 51 acre area was not investigated, even though it obviously contains most of the waste and will cost the most to remediate. This omission is inconsistent with 40 C.F.R. §

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8/ See Appendix A.

300.430(d)(2)(iii), which requires general characteristics of the waste to be investigated. Moreover, although boreholes through the refuse were drilled by Woodward Clyde Consultants, the information from the boreholes was not used by NJDEP to assess the general characteristics of the waste. Again, this is inconsistent with 40 C.F.R. § 300.430(b)(1), requiring the evaluation of existing data at the site.

One important indicator of the nature of the waste in a landfill is the leachate. Through a site monitoring program, NJDEP has been collecting annual and some quarterly leachate data from the landfill since October 1986. NJDEP, however, has not performed any treatability studies on the leachate or groundwater, nor has NJDEP reviewed the leachate data and compared leachate chemistry with the Toxicity Characteristics Leaching Procedure (TCLP) to determine the nature of the waste. The failure to perform these analyses on the nature of the waste has prevented NJDEP from determining the viability and effectiveness of treatment and from adequately characterizing the nature of this landfill.

***Ambient Air and Landfill Gas Quality***

NJDEP also failed to perform a baseline study of the types and amounts of gases emanating from Global Landfill and the effect these gases have on ambient air. This is difficult to understand because the Proposed Plan claims that OU#1 is necessary to mitigate odor complaints from surrounding residents.

Furthermore, the baseline risk assessment included in the FS identified ambient air or windblown particles as complete exposure pathways.

The data available on air quality and landfill gas is very limited. It does not include an analysis of the constituents of representative gas samples, an analysis of preferential gas flow paths, or off-site ambient air monitoring data. The Feasibility Study indicates only that air monitoring was performed in 1986 in a fissure on the existing cap, in 1988 during the drum investigation, and in 1988 during a subsurface methane gas survey, which found continuous methane concentrations to be zero at a distance of 500 feet from the landfill toe. The data relied on is largely data from other landfills. The Proposed Plan has thus not complied with 40 C.F.R. § 300.430(d)(2)(ii) requiring an investigation of air, nor with 40 C.F.R. § 300.430(d)(2)(iii) requiring investigation of landfill gas which is a waste product. See also Municipal Guidance at p. 4-30.

### *B. The Omission of Necessary Data Led to A Flawed PRAP Alternative*

NJDEP's failure to obtain the necessary data discussed above has adversely affected the selection of several components of the PRAP alternative. These adverse consequences are most evident in the type of cap selected, the requirement that a toe berm be used for the cap, and the Proposed Plan's apparent preference for on-site leachate treatment.

The failure to provide accurate strength parameters for the calculation of cap stability led to an underestimation of the factors of safety against sliding failure of the existing landfill.[9] The failure to determine the settlement rate of the waste has resulted in the inclusion of unnecessary and ineffective geogrids. Moreover, the inadequate evaluation of the nature of the waste led to the unfounded assumption that a composite cap is necessary for this site. Together, these data deficiencies and the consequent reliance on overconservative assumptions directly led to an overdesign of the cap.

In spite of the lack of essential geotechnical studies on the strength of the waste, the PRAP alternative recommends the construction of a perimeter berm to enhance landfill stability. The analyses in the Feasibility Study indicate minimum factors of safety of 1.13 increasing to 1.37 with a toe berm. An analysis by the PRP Group with more realistic refuse strengths indicates a minimum factor of safety of 1.57 assuming no soil strength increases from aging and without a toe berm. The factor of safety of the East slope may be as high as 3.13 without a berm, if significant aging has occurred.[10] The landfill, under current conditions, does not pose a stability

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[9] In fact, if the landfill is as unstable as indicated in the Proposed Plan, a temporary cap would be warranted until the settlement rate has stabilized. Municipal Guidance at pp. 4-8, 4-11, 4-12.

[10] See Appendix A.



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risk. Because of the lack of proper data, the NJDEP overestimated the risk of stability failure, and consequently the alternatives with a berm are overdesigned.

The lack of adequate data on the groundwater quality and volumes, owing to the limited investigations that have taken place, represent a failure to adequately address the data needs for leachate treatment. Equally important, even if leachate treatment is to be performed in OU#1, the failure to analyze representative leachate has prevented an adequate consideration of treatment options. Significantly, the investigations have not included any treatability studies. Such studies can only be representative if they include water typical of that to be treated. Without the benefit of such studies, the Proposed Plan has indicated a preference for on-site treatment -- which may not be practicable, administratively feasible, or cost-effective for leachate at this site.

## *III. THE PRAP ALTERNATIVE IS NOT JUSTIFIED BY THE PURPORTED RISKS ALLEGED TO EXIST AT THE SITE*

It is fundamental that a remedial action is driven, at least in large measure, by the risks determined to exist at a site. In that regard, it is imperative that the risks be quantified. The risk assessment incorporated into the FS is admittedly a qualitative assessment, and not quantitative. Consequently, it is fatally flawed.

The National Contingency Plan provides in pertinent part:

> (d) Remedial Investigation. (1) The purpose of the remedial investigation (RI) is to collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives. To characterize the site, the lead agency shall, as appropriate, conduct field investigations, including treatability studies, and conduct a baseline risk assessment. The RI provides information to assess the risks to human health and the environment and to support the development, evaluation, and selection of appropriate response alternatives. . .or
>
> (2) The lead agency shall characterize the nature of and threat posed by the hazardous substances and hazardous materials and gather data necessary to assess the extent to which the release poses a threat to human health or the environment or to support the analysis and design of potential response actions by conducting, as appropriate, field investigations. . . . .
>
> (4) Using the data developed under paragraphs (d)(1) and (2) of this section, the lead agency shall conduct a site-specific baseline risk assessment to characterize the current and potential threats to human health and the environment that may be posed by contaminants migrating to ground water or surface water, releasing to air, leaching through soil, remaining in the soil, and bioaccumulating in the food chain. The results of the baseline risk assessment will help establish acceptable exposure levels for use in developing remedial alternatives in the FS. . . .

300 C.F.R. § 430(d)(1), (2) and (4) (emphasis added). There can be no doubt that data is required for the conduct of a quantitative assessment; absent that data, only a qualitative, judgmental, and subjective assessment is possible. A qualitative assessment cannot, and does not, satisfy the requirements of the NCP.

Risk assessments are required as part of the Superfund process to do that which the name implies: assess the risk posed by a given site. In this instance, the risk assessment incorporated in the Feasibility Study fails to accomplish the

obvious goal; this deficiency is admitted by the company performing the work. In summarizing the potential health risks posed by Global Landfill, Ram Trac Corporation, the subcontractor to Killam which prepared the risk assessment (see FS Appendix E) states, "[i]nasmuch as routes and pathways of exposure to substances of potential concern were not quantified, it is impossible to determine to what degree public health in the vicinity of the Global Landfill may be threatened." Feasibility Study, App. E, at p. 188.

This deficiency is recognized repeatedly throughout the FS. For example, the FS includes a detailed executive summary which sets forth the conclusions of the component parts of the FS. With regard to the requisite risk assessment, the executive summary states:

> Due to the limited data base for the site, only a qualitative health assessment could be performed for Global Landfill. Ten complete potential exposure pathways were identified but health risks could not be quantified based on available data. . . .

Id. at ES-5. Recognizing the deficiencies in a qualitative assessment, the executive summary concludes:

> Inasmuch as routes and pathways of exposure to substances of potential concern were not quantified as part of this study, it is impossible to determine to what degree public health in the vicinity of the Global Landfill may be threatened. . . .
>
> Based on presently available data, it is impossible to determine whether the facility poses non-cancer risks because such risks are typically associated with a threshold of toxic action below which they will not occur. Having not quanitified [sic] exposure, this risk assessment cannot determine whether or not levels

> of exposure via exposure pathways deemed to be complete are above or below applicable thresholds....

Id. at ES-8. By its own terms, therefore, the risk assessment incorporated into the FS, which gives rise to the Proposed Plan's preferred alternative, does not assess ". . . to what degree public health in the vicinity of the Global Landfill may be threatened. . . ."

The risk assessment then admits that:

> Health risk can be quantified only when exposures can be quantified through identification of a complete exposure pathway. . . . [T]en complete exposure pathways were identified but quantification of the level of exposure was not possible.

Id. at 1-22. Once again, the absence of quantitative data renders the interpretation of "complete" exposure pathways suspect. Ram Trac acknowledged this fatal deficiency. In its executive summary included in the risk assessment, Ram Trac states:

> . . .Although ten pathways were deemed complete based upon qualitative evidence, no conclusions could be drawn about the significance of these routes. Such conclusions require quantitative analysis of data....

Id. Appendix E, at p. 1 (emphasis added). Surely, if no conclusion can be drawn about the significance of the route of exposure, no conclusion can be drawn about the actual or potential risk to public health. Without any real ability to reach such a conclusion, the risk assessment is seriously deficient, and most certainly cannot form the basis upon which to propose, let alone select, a site-specific remedy.

Ram Trac states that because a quantitative assessment cannot be performed, a qualitative one must suffice. Id. at pp. 71-72. However, the basis upon which Ram Trac forms its qualitative judgment of a complete exposure pathway is the observation of "odors." Id. at pp. 74-82. Odors are clearly a matter of subjective judgment; nevertheless, the constituent parts of a discerned odor can and should be a matter of objective quantification. The risk assessment herein does nothing to consider the objectively determinable constituents. Importantly, Ram Trac specified the problem as follows:

> In the analysis of the completeness of exposure pathways, it is important to emphasize that completeness was judged based upon the reliability of available evidence documenting each pathway, but not necessarily quantifying it. Thus, some of the complete pathways listed above cannot be reliably quantified based upon presently available data. Whether or not a pathway can be reliably quantified based upon available data, it is important to note that no quantitative or qualitative judgment is being made about the magnitude of exposure or of potential health risk associated with the pathway. The bottom line is that, although the exposure pathways listed above have been deemed complete, the risk assessment is essentially non-quantitative, and does not permit differentiating complete pathways of exposure which are significant from those which are insignificant.

Id. at p. 187 (emphasis added).

Apart from the obvious doubts about the validity of deeming an exposure pathway "complete," the rationale for so concluding, even on a qualitative basis, is seriously flawed. For example, seven of the ten purportedly complete exposure pathways are derived from alleged transport of contaminants by



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air. See Feasibility Study at I-20 for list of sixteen potential exposure pathways, and I-21 for list of ten exposure pathways deemed "complete." Notably, the air monitoring data is remarkable in its lack of significance: air monitoring conducted during the March 1988 drum investigation revealed readings in the residential area which were basically non-detectable; readings taken at the excavation site specifically, and at the landfill generally, were hardly different. Id. at 1-16. To the extent any readings were possible, there was no consideration of the actual source!

Similarly, a December 1986 methane survey focused on the area between the northwest side slope of the landfill and the residential area. According to the results, ". . .at a distance of 500 feet from the toe of the slope, both peak and continuous methane concentrations were zero. Methane migration away from the site is therefore taking place in a northwesterly direction. However at the time of the survey the migration was limited and did not extend to the residential area located north and northwest of the landfill. . . ." Id. at 1-17 (emphasis added). This conclusion therefore casts significant doubt upon the basis for the determination of seven of the ten "complete" pathways:

> Seven of [the] pathways are associated with the off-site airborne transport of contaminants from Global Landfill. Although air monitoring data are unavailable for quantifying the exposure, these pathways were determined to be complete on a qualitative basis, due to the high vapor pressure of many of the substances known to exist at Global and the documented detection of off-site odors. Although the identity of

> the gases has not been established, the detection of landfill-associated odors is sufficient to confirm the presence of an effective transport medium.

Id. at 1-21. If the detection of odors is the prime justification for concluding that air transport of contaminants is an effective, or complete, exposure pathway, yet the only quantitative analyses of the transport of landfill gases reveals that it is not reaching the residential areas, it is clear that a qualitative conclusion that air transport is a complete pathway is invalid.

The deficiencies in the Ram Trac report are magnified when the other presumptions employed by that company are examined. For example, Ram Trac seeks to reach a source assessment based upon a multiplication of the estimated waste volume by the concentration of the substances of concern ". . .as measured in the environmental media for which data are available..." FS, Appendix E, p. 57. However, the media truly at issue is air; virtually no data exists for the concentration of substances of concern in air. Ram Trac then looks to data arising from media which are not purportedly complete pathways in this health risk assessment: groundwater, leachate, and excavated drums. This reliance upon data from media which are admittedly not part of the exposure pathways under review results in insupportable conclusions.

Moreover, the Ram Trac assumption that buried drums ". . .are of 55-gallon volume, and that they are distributed at this same density throughout the landfill. . ." is completely

without foundation. FS, App. E, p. 57. Drums were excavated in the 6.5 acre portion of the site which is separated from the main landfill mound by the Transcontinental Gas Company pipeline. No investigation, excavation or analysis has been performed in the main landfill mound. Consequently, there is no support for a conclusion that drums, of any particular content or density, are present in that portion of the landfill. Inasmuch as that mound portion of the landfill represents the overwhelming majority of the total acreage and volume of the landfill, the lack of any specific information to support the view that drums are present therein is a major, and obviously fatal, defect in the source assessment developed by Ram Trac.

The deficiencies in the calculation of the source term are acknowledged by Ram Trac. Id. at p. 58 ("[t]hese values are set forth with the caveat that significant uncertainties are associated with them"). Therefore, the source assessment upon which the risk assessment relies is gravely dubious -- any and all of the conclusions which flow from it are similarly doubtful.

The risk assessment is totally incapable of demonstrating a true exposure pathway that is based on quantifiable, objective information, and the calculation contained in the risk assessment of the contaminants which are travelling that purported exposure pathway is similarly unsupported. Unfortunately, the failings of the risk assessment do not end there

-- also insupportable is the determination of concern index which depends upon groundwater action levels.

There is no dispute that groundwater does not present an exposure pathway in connection with Global Landfill. See id. at I-21. There is also no argument that the Old Bridge Sand aquifer reflects ". . .leachate indicator parameters generally close to background levels," and that any remedial action relating to the groundwater will be the subject of OU#2. Id. at ES-4. Groundwater at or near Global Landfill is not a potable water source for the surrounding residents; indeed, the nearest well is both some distance away, and upgradient. Adoption of drinking water standards in connection with this site is therefore inappropriate and unreasonable.

Significantly, NJDEP similarly rejected Ram Trac's interpretation of "concern indices." In a memorandum dated November 13, 1990, which followed review of the October 1990 "final draft" of the FS risk assessment section, an NJDEP research scientist wrote the following:

> 1) The concept of using hazard index values [the label used for "concern index" in the predecessor document] as described on page 178 [the same page in the February 1991 FS, Appendix E] is unorthodox. As stated on page 178 "In particular, the hazard index value corresponding to a pollutant present in the Global Landfill is calculated as the concentration at which it was detected divided by the applicable NJDEP action level. Thus, with respect to any substance, a hazard index value equal to or exceeding unity denotes that the substance is present at levels of concern to NJDEP, and that remediation is appropriate." This approach is basically comparing site related levels to ARARs and determining if the ratio exceeds unity. This is not consistent with the EPA approach which

> compares a site related exposure level for any toxicant to a reference dose (based on a daily exposure for that toxicant and then sums the hazard quotients for the same exposure period. When the hazard index exceeds unity, there may be concern for potential health effects. It should be noted that some of the NJ action levels are not health based and therefore exceedance of these values does not accurately portray the potential for any site related adverse health effect. It is also incorrect to state that remediation is appropriate if there has been an exceedance of a NJ action level. Action levels can be exceeded without remediation.

See Appendix D, p. 1 (emphasis added). Insofar as the Ram Trac analysis depends upon the determination of "concern indices," which determination is questioned by NJDEP itself, the conclusions of the risk assessment are indisputably unfounded.

When the FS risk assessment is viewed in totality, the following can be gleaned: The landfill most likely emits odors, as all landfills do. The landfill most likely presents a leachate problem, as any landfill which was not properly maintained or covered by the operator would. These qualities or characteristics can be addressed readily by the implementation of gas (methane) controls and the addition of a simple, straightforward cover which will interfere with the rainwater infiltration thus significantly reducing, and ultimately eliminating, leachate creation and movement. No risks have been shown to exist at or near Global Landfill which call for more extreme measures.

## *IV. THE AGENCY HAS FAILED TO INTEGRATE THE FIRST OPERABLE UNIT WITH ANY LATER GROUNDWATER REMEDIATION OPERABLE UNIT*

The Proposed Plan artificially separates groundwater treatment from those elements of OU#1. Although the concept of dividing remedial actions into operable units is recognized in the provisions of the NCP, 40 C.F.R. Part 300, a lead agency may utilize operable units only if they are consistent with the expected final remedy and meet the basic statutory criterion of cost-effectiveness. 40 C.F.R. § 300.430(a)(1)(ii)(B); 42 U.S.C. § 9621(a).

The initial phase of the RI/FS process consists of the scoping of the project. The scoping process includes assembling and evaluating existing data for a site, developing a conceptual understanding of the site, and identifying operable units that may address site problems. 40 C.F.R. § 300.430(b). Yet, in developing the operable units described in the Proposed Plan, NJDEP has not properly scoped the nature of the site or the potential conflicts between OU#1 and OU#2. Thus, NJDEP has developed a final remedial action recommendation for OU#1 that may be inconsistent with the remedy for OU#2, that bears no relationship to the low short-term risks presented by the site, and that will result in an overall response which is not cost-effective.

The potential for inconsistency is manifest in a number of ways. First, the PRAP's alternative for OU#1 calls for the construction of a berm at the foot of the landfill in

order to provide the support that NJDEP claims is necessary for the weight of the cap. Yet, the presence of the berm may preclude as a component of OU#2, the construction of a slurry wall to arrest migration of groundwater (due to high pore pressures leading to slurry trench instability), even though slurry walls have been accepted as efficient and effective means of addressing groundwater conditions beneath municipal landfills. See, e.g., Record of Decision for Helen Kramer Landfill.

Second, OU#1 has been developed to close the landfill by constructing a cap, a gas collection and treatment system, and a leachate collection and treatment system, entirely within the property limits of the landfill. In so doing, the PRAP alternative significantly restricts placement of various structures required to be implemented as part of OU#1. Yet, the remedy for OU#2 will, in all probability, extend beyond the property limit of the landfill. In order to reduce the overall space requirements around the landfill to a minimum, it is more logical to wait for OU#2 and integrate it into OU#1, so that wetlands impacts are reduced.

Third, the Proposed Plan acknowledges that the preferred leachate collection and treatment system should not be constructed until NJDEP can evaluate whether a single treatment plant can be designed to address both landfill leachate and groundwater. The Proposed Plan addresses this problem by allowing, while this evaluation takes place, for a contingency system that requires collection of leachate in on-site tanks for

ultimate trucking off-site for disposal. Confusingly, the Proposed Plan nevertheless expresses a preference for on-site treatment and discharge as part of OU#1. If NJDEP follows this stated preference, a treatment system for leachate could be designed and built prior to a period of dramatic leachate characteristic and volume change, and before the groundwater treatment system, if any, is analyzed and determined. This could lead to potentially duplicative treatment systems -- one for leachate and one for groundwater -- and an overall response which is not cost-effective. Had the project been properly scoped, NJDEP could have avoided this inefficiency and lack of cost-effectiveness by providing for the design of the leachate and groundwater treatment systems concurrently (once the leachate generation, volume, and characteristics stabilize following construction of the cap).

Fourth, the Proposed Plan states that OU#2 will focus on the natural resources at the site. In spite of this expressed intent, OU#1 calls for the construction of a berm that will substantially impact the most obvious natural resource at the site, the wetlands, without making any evaluation of whether the need for the berm outweighs the destruction of the wetlands.

These numerous possibilities for inconsistency, coupled with the fact that the site, even in its present state, presents extremely low risks, compel the conclusion that the

operable units developed by the department are inconsistent with the NCP.

## V. *THE AGENCY HAS FAILED TO INCLUDE ANY INTERIM ACTION ALTERNATIVES WHICH ACCOUNT FOR DATA GAPS AND WHICH ARE COMMENSURATE WITH THE LOW LEVEL OF RISK AT THE SITE*

As described in the risk assessment, current site conditions present a low level of potential risk to public health and the environment. The only pathways for even these potential risks are direct contact and the air, both of which can be addressed by site controls, gas collection and treatment, and an interim cover. Moreover, based on NJDEP's understanding of the site conditions, the settlement rate for the landfill has not stabilized. If these analyses are correct, then NJDEP should have considered and adopted an interim action for the site. An interim action would have addressed the perceived risks at the site while developing an integrated and consistent approach to final remediation of the site. See 55 Fed. Reg. 8705, col. 1 (March 8, 1990). It is well-understood that "a temporary cap as an interim action may be warranted in situations where the settlement rate of the landfill contents has not stabilized." Municipal Guidance at pp. 4-8. Given the low level of current risk and NJDEP's understanding of the site, NJDEP's failure to consider an interim action operable unit to deal with the site on a temporary basis was inconsistent with the NCP.

## VI. *THE GEOGRIDS, SAND, BERM, LEACHATE TREATMENT PLANT, AND CAP CONTAINED IN THE PRAP ALTERNATIVE ARE NEITHER NECESSARY NOR PROPERLY DESIGNED*

### *A. Geogrids*

The PRAP alternative cap calls for two layers of reinforced geogrid to prevent settlement of the landfill from affecting the performance of the cap and to prevent the cap from "sliding." However, as noted previously, a quantitative assessment of future long term settlement of the cap has not been performed and no numerical justification for the geogrids is presented in the PRAP. And, with regard to slope stability, an analysis which uses the appropriate parameters for refuse strength and which takes account of soil aging indicates that the slope of the landfill has stabilized. There is, in short, no justification for the assumption that the layers of geogrid are needed. Slope stability analyses with appropriate soil and refuse parameters indicate that the landfill slopes are stable.

In fact, the geogrids are unnecessary. The cap's soil cover materials would be of sufficient strength so that reinforcement will not be required. There is no need to provide geogrids in order to reduce the tensile stresses in the cap materials that are due to a tendency for them to slide down the slope. The interface friction between the materials of the PRAP alternative cap is sufficient for slopes as steep as 2.5H:1V. The slopes at Global Landfill are much less steep,

generally ranging from 5H:1V to 3.5H:1V. Furthermore, the textured FMC that would be part of the PRAP alternative cap has roughened surface, which increases available friction.

There is no need to require geogrids to address the effects of depressions and crevices in the landfill surface that are due to large local absolute or differential settlement of refuse. There is no indication that such large deformations have formed or will form. Because the landfill has been closed for seven years, it is far more justified to assume that the major part of final settlement has already occurred.

The landfill shows no evidence to suggest it will present greater future settlements than other sanitary waste landfills. It is not general practice to include geogrids in the cover designs of sanitary waste landfills, and their inclusion at Global Landfill is unjustified. Other landfills under the jurisdiction of NJDEP, such as GEMS or Helen Kramer, do not include geogrids, even though they are Superfund sites and exhibit in certain cases slopes much steeper than Global Landfill. This indicates an inconsistency on the part of NJDEP in imposing geogrids at the Global Landfill site, where the settlement potential is no greater than other, similar sites where geogrids have not been implemented.

Furthermore, even if the geogrid layers were needed, they would not be effective if implemented in the manner set forth in the Proposed Plan. First, the PRAP alternative would place the upper layer only twelve inches below the surface. At

that depth, there would be inadequate load on the upper grid to generate enough shear resistance for the upper grid to be effective. Second, the Feasibility Study assumes a minimum factor of safety of 1.13 with a berm, which would produce disturbances for which the lower geogrid would, in any event, not be effective. The geogrids, therefore, do not add to the long-term effectiveness of the cap.

Moreover, the geogrids can create substantial implementability concerns. There are significant problems associated with their installation, which is an operation of some difficulty. Unlike geonets, which are uniaxially unrolled, geogrids are difficult to install when installed biaxially. When double grids have to be installed to provide biaxial strength as is the case for covers, the geogrids tend to roll up in two perpendicular directions. The contractor installing them on a slope has to provide additional labor to unroll the grids in two directions to hold them down as soil is placed above them. In addition, repairs to the gas header pipes of the gas extraction system, buried under the cover, will require cutting the geogrids, thereby losing any contribution they may make in the strengthening of the cap. In order to repair the geogrids, bodkin connectors would have to be "needled" into the existing grids, an operation which may not be successful in restoring the grid's strength and other properties. The need to repair gas header pipes raises the possibility that, however little effectiveness the geogrids would have contributed in the first

place, even that level of effectiveness would be undermined by the repairs.

*B. Sand*

The placement of the sand drainage material immediately above the liner is less implementable than would be a geonet, which is easier to control from a QA/QC aspect. The geonet could be more rapidly installed with a superior performance. Ease of installation is much enhanced by the fact that the geonet may simply be unrolled. The superior performance results because the geonet, with its crisscrossed plastic grids, is much more permeable than sand, producing better surface water drainage laterally.

*C. Berm*

The PRAP alternative would include a toe berm in order to increase slope stability. A berm is unnecessary. Even as proposed, the berm would not be effective. The inclusion of the berm also would have a significant adverse impact on the surrounding wetlands.

As discussed above, the landfill stability analyses have used erroneous strength parameters for the refuse, which is a critical parameter in determining slope stability. The proper use of back analyses would have demonstrated that the strength is nearer to a friction angle of 34 degrees and a cohesion of 334 psf, rather than the values of 22 degrees and 200



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psf that were used in the Feasibility Study for refuse strengths.[11/] Similar refuse strengths have been used in the design of caps for other solid waste landfills without berms, and with successful results. Thus, given the appropriate calculation of refuse strength and the data from the performance of similar landfills, the berm is unnecessary to achieve slope stability.

Moreover, construction of the berm would be a difficult operation, as it would involve substantial loading of the underlying soils. The increase in pore pressures in the underlying soils would have to be monitored carefully, to ensure that pure water could drain fast enough for the soil to withstand the loading. Any overloading could lead to a slide, with waste being pushed into the wetland. If wick drains were added, an additional 10,000 gpd of leachate would have to be treated.

In addition, construction of the berm could be accompanied by significant settlement of the underlying soils, which might also contain waste. This might lead to waste being permanently trapped under the berm outside the cap, and must preclude any subsequent attempts to address this trapped waste without removing portions of the berm. Because of the difficulties of the construction of the cap, and the risk that some

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11/ See Appendix A.

waste might be trapped by the berm, the implementability, well as the long-term effectiveness, of the PRAP alternative would be reduced by the inclusion of a berm.

Not only is the berm unnecessary and ineffective, it would harm the environment. Construction of the berm would require the destruction of approximately 2.4 acres of wetland. As construction of the berm will affect an area significantly greater than the berm footprint, the Feasibility Report has seriously underestimated the extent of wetlands impact. Thus, the proposed berm is not protective of the environment. Nor have practicable alternatives been explored to avoid the possible wetlands impacts, thus violating applicable wetlands requirements.

### *D. Leachate Treatment Plant*

Although leaving the final choice of treatment alternative to remedial design, the Proposed Plan expresses a preference for leachate collection and on-site treatment as part of the preferred alternative. The proposed leachate treatment plant is not cost-effective for two reasons. First, the PRAP alternative does not take into account the sharp drop in flows after the first year. Second, it does not take into account

the efficiencies associated with a comprehensive treatment program in OU#2, if any is needed.[12/] The leachate treatment plant was sized on the basis of 10,000 gpd of liquids to be treated. The expected generation rate of leachate provided in the Feasibility Study is 10,000 gpd for only the first year.[13/] The expected leachate flows are 1,000 gpd from year six onwards.[14/] Consequently, there is every reason to conclude that it would be more sensible and cost-effective to address any leachate treatment along with the groundwater treatment at the time of any OU#2, and provide an alternative and

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12/ The proper approach is represented in EPA's selection of a leachate treatment remedy at the Helen Kramer Landfill site. See Record of Decision for Helen Kramer Landfill at 32 (Sept. 27, 1985). There, EPA rejected the separation of groundwater from leachate into separate operable units. Id. at 34. The decision as to whether and to what extent on-site treatment of the leachate and groundwater was needed was reserved until treatability studies were completed, on which the decision was "dependent." Id. at 24 and 32. The results of the study would assist the determination of whether complete on-site treatment or pre-treatment with off-site discharge were the most cost-effective. Id. EPA noted that because of the "substantial flow decrease with time," alternatives to building a plant on the site might be preferable because they "should lower the capital cost." Id. "Thus, the Kramer ROD concluded that it would be possible 'to rent a number of package treatment plants instead of building a plant on site.' Id. The Kramer ROD retained sufficient flexibility to adapt to both the results of the Treatability Studies and substantial flow decreases."

13/ Feasibility Study, App. K, table 2. The levels for years 2, 3 and 4 are 4,700, 3,200 and 2,100 gpd respectively. Id.

14/ Id.

temporary solution for leachate until OU#2 is implemented.[15] More important, there is no reason to conclude that the proposed treatment plant would be effective. One of the most serious flaws in the technical work done to date is the absence of treatability studies. Leachate constituent concentrations will vary as the installation of any cap decreases precipitation infiltration and as the landfill continues to decompose. It is simply not possible to be confident that the proposed treatment plant will be effective or reliable because of the tremendous uncertainties relating to the landfill leachate.

Furthermore, there are implementability concerns. The leachate treatment plant study in the Feasibility Study indicates that priority pollutants are present in the influent in "trace amounts" and no difficulties are anticipated in meeting the discharge limits. The discharge limits have not yet been established but could be quite low. In the absence of treatability studies, it has to be demonstrated that such low levels can be met. See 40 C.F.R. § 300.430(e)(9)(iii)(F)(1) (implementability includes "[t]echnical feasibility"). Moreover, the NJDEP discharge limits are as yet unknown, which also seriously places in doubt the administrative feasibility of the discharge to surface streams. See 40 C.F.R. § 300.430(e)(9)(iii)(F)(2) (implementability includes "[a]dministrative feasibility").

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15/ The Feasibility Study identified a Chemical Waste Management facility only 25 miles from the landfill that was prepared to accept untreated leachate and gas condensate.

### *E. Composite Cap*

#### *Technical Issues*

The Proposed Plan's preferred alternative includes a synthetic geomembrane using a geotextile made from recycled plastic bonded to Hypalon. The availability and long-term performance of such materials are unproven, particularly given the size of the cover and its behavior when the landfill settles. Hypalon has an inherent weakness in that the scrim reinforcement from which it derives its initial strength can act as a wick, and the water in the wick can lead to separation of the multiple layers of polyethylene. This liner is therefore not as reliable as alternative synthetic liners, reducing its long-term effectiveness.

The construction of a composite cap, where a flexible membrane liner is to be placed over a clay material, is accompanied by risks associated with moisture collecting under the liner during construction. The moisture may originate from condensation, or consolidation of the clay from the weight of the materials above.[16/] The wetted clay may lead to a stability problem of the cover sliding, unless a great deal of care is

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16/ Mitchell, Seed and Seed, Kettleman Hills Waste Landfill Slope Failure; Liner System Properties, 116 J. Geotechnical Eng. (April 1990).

taken during the construction of the cap.[17] The liner cl would have to be carefully protected from rainfall and thermal effects during and after placement. This renders the actual emplacement of the PRAP alternative cap difficult. There exist, therefore, serious questions as to its implementability[18] and to its overall effectiveness.

***Legal Issues***

This site was operated, licensed, and closed as a municipal landfill. See Proposed Plan at 2. The landfill was authorized to and did receive various types of solid waste, including ID 10 (municipal), ID 13 (bulky), and ID 27 (industrial non-hazardous). Until its closure in 1984, the landfill, like other municipal landfills, was also authorized to receive up to

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17/ Id.

18/ In addition, no studies were made to identify locally available clay borrow materials. Hauling will be a major part of the cost of the clay, and inquiries made by the PRPs indicate that locally available clay is not of good quality and will require considerable working on the cover to achieve the permeability of 1x10-7 c./sec. As a result of this deficiency, the evaluation of costs and cost-effectiveness has been impaired.

100, and, for a period of time, 1000 kilograms per month of hazardous waste from small quantity generators.[19/] And, as described in the leachate monitoring data, the contamination at Global Landfill is similar to that found at other municipal waste landfills.

Yet, the Proposed Plan would treat the site differently from a municipal site. The PRAP alternative would include a modified hazardous waste composite cap that consists of a 12 inch clay layer, a synthetic layer of a non-woven geotextile spun from recycled plastic and bonded to a Hypalon-based containment membrane, a drainage layer, and a vegetative layer. Proposed Plan at 6, 9. In these circumstances, the Proposed Plan must be supported by independent reasons for this substantial departure from requirements and practice for closure of a municipal landfill. Such reasons are not to be found in the Proposed Plan or accompanying materials. On the contrary, the analyses contained in the Proposed Plan support the conclusion that this site is, and should be closed as, an ordinary municipal landfill.

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19/ Under RCRA until 1984, a small quantity generator was allowed to dispose of up to 1000 kilograms/month at an authorized municipal landfill. 40 C.F.R. § 261.5(g)(3)(iv) (1984). In 1981, New Jersey authorized disposal of up to 100 kilograms/month by small quantity generators at municipal landfills, a requirement that is currently in force in both New Jersey and RCRA regullations. See N.J.A.C. 7:26-8.3(f)(3)(iv); 40 C.F.R. § 261(f)(3)(iv)(1990).

### *1. A Hazardous Waste Cap Is Not Justified By The Risk Assessment*

The baseline public health assessment does not support the use of a hazardous waste cap. The assessment indicates no immediate danger to human health or the environment. No drinking water wells are located downgradient of the landfill. No studies have identified significant exposures or threats to human health from gas emissions from the landfill. Odor problems have been identified, but they have not been quantified in the Feasibilty Study as being different from any other municipal landfill.

The baseline public health assessment identified ten potential pathways which, upon further investigation, may be found to be complete. Most concerned ambient air or windborne particles, which a noncomposite cover would prevent.[20/] The other two pathways refer to on-site contact, which could be prevented by erection of a fence or a noncomposite cover. None of the identified pathways requires a very high performance cover

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20/ Although the public health assessment in the Feasibility Report has identified airborne pathways as the majority of all potential pathways, no ambient air quality investigation has been performed. Air quality data which is available has not been used in the choice of cover section.

to prevent escape of gas from the site. The choice of a composite cap is neither necessary nor a cost-effective means to address the identified pathways of direct contact in the risk assessment. Thus, the choice of a composite cover is simply not justified by the risk assessment.

### 2. *RCRA Subtitle C Is Not An ARAR*

The Proposed Plan, with no analysis, states conclusorily that "[h]azardous waste landfill requirements are relevant and appropriate for closure of the Global Landfill." Proposed Plan at 8. EPA describes "relevance" as addressing "similar situations or problems," and "appropriate" as addressing "whether the requirement is well-suited to the particular site." 55 Fed. Reg. 8743, col. 2 (Mar. 8, 1990). As EPA noted in the preamble to its proposed NCP, even the basic requirement to cap landfills upon closure is "an example of a requirement that may be relevant but not appropriate in certain situations. . . ." 53 Fed. Reg. 51437, col. 1 (Dec. 21, 1988).[21/] Thus, "[a]lthough capping may be appropriate for smaller areas, it may not be appropriate in some circumstances for large dispersed areas of low-level soil contamination such as may be found at many large solid waste landfill facilities." Id. A

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21/ Unless directly contradicted or superseded in the final NCP, "the preamble to the proposed rule reflects the EPA's intent in promulgating [the] revisions to the NCP." 55 Fed. Reg. 8666, col. 3 (March 8, 1990).



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hazardous waste cap is even less "relevant and appropriate" for Global Landfill.

The NCP requires that a determination of whether a requirement is an ARAR must be the product of an analysis of several factors. An analysis of these relevant factors established by the NCP does not direct the use of a hazardous waste cap at Global Landfill; rather, the factors reinforce the conclusion that use of the proposed hazardous waste cap would not be justified at this landfill.

*a. Nature of the Waste*

The NCP ARAR determination analysis requires, inter alia, a comparison of the "substances regulated by the requirement and the substances found at the CERCLA site." 40 C.F.R. § 300.400(g)(2)(iii). In order to find that RCRA closure requirements are "relevant and appropriate," there should be a showing that either RCRA hazardous wastes, or wastes similar to RCRA hazardous wastes, are present at the facility subject to these requirements. See 55 Fed. Reg. 8763, cols. 1-2 (Mar. 8, 1990); 53 Fed. Reg. 51447, col. 1. However, even if waste similar to RCRA hazardous wastes or containing RCRA hazardous constituents are present, there is no presumption that a RCRA requirement is relevant and appropriate. Preamble to Final NCP, 55 Fed. Reg. 8763, col. 2 (Mar. 8, 1990). To the contrary, EPA states that "low concentrations of a hazardous constituent, dispersed in soil over a wide area, would generally not trigger Subtitle C

as relevant and appropriate." "CERCLA Compliance With Other Laws Manual," at p. 2- 6 - 2-7 (Aug. 1988) (Interim Final). Thus, it is important to determine if a waste similar to hazardous waste is present and whether that waste is representative of the Global Landfill's contents.

Global Landfill consists of two distinct landfill areas. Proposed Plan at 2. The only investigation for hazardous wastes was performed at the smaller, 6.5 acre tract. That investigation claims to have revealed the presence of hazardous wastes in fourteen drums. However, the fourteen drums of hazardous waste constitute an isolated instance and are not representative of the contents of either the 6.5 acre tract or the 51 acre area. The drum investigation spanned a two week period and a few drums were encountered on eight different days. Excavations were performed at locations which had been identified by positive magnetometer readings. Although there were numerous areas of very high magnetic concentrations, most of these proved to represent buried metal representative of solid waste (such as stoves and refrigerators), rather than buried drums. Feasibility Study, at pp. 1-9, 1-11.

The drum excavation went to a depth of 15 feet through municipal waste and only discovered 63 drums -- relatively few for an area that size but consistent with the contents at municipal landfills, which would typically include relatively

small amounts of hazardous waste from small quantity generators. The Feasibility Study determined that "no organized pattern of drum disposal could be established" and that "no specific hot spots or areas of elevated contamination have been defined at Global Landfill." Feasibility Study at pp. 1-11, 2-13. Rather, the results of the drum excavation were summarized as follows:

> At Global Landfill, specific locations of hazardous wastes have not been identified. Instead, as indicated by the results of the drum investigation, drums containing hazardous waste were found randomly intermixed with municipal refuse, construction and demolition debris and other bulky wastes. During the drum investigation, a total of approximately 1900 cubic yards of waste material was excavated and 63 drums were encountered. Assuming all 63 drums were 55 gallons in capacity and originally contained hazardous waste, the volume of hazardous waste encountered was approximately one percent of the total volume of waste excavated.

Feasibility Study at pp. 2-21, 2-22 (emphasis added). The calculation of even this 1% value is based on overconservative assumptions.[22/] Moreover, because the excavation was already targetted toward the areas that registered positive during the

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22/ Feasibility Study at p. 2-22. The assumption that all 63 drums were "full" of hazardous waste is, of course, incorrect even under the facts as developed during the drum survey. Some of the drums were corroded or crushed, so there is no information on what they contained. In fact, only 18 out of the 63 drums were actually sampled; of those, 4 were determined not to contain hazardous waste. Thus, even to reach the "1%" estimate required unwarranted and overly conservative assumptions.

magnetometer survey, it is obvious that far less that 1% of the waste is likely to be hazardous. Under these circumstances, it is clear that the contents of the 6.5 acre tract are not representative of a hazardous waste landfill.

At least equally important, no such investigation was initiated for the 51 acre landfill tract. Id. In the absence of evidence establishing that hazardous waste is representative of the contents in that portion of the landfill, the documentary evidence supporting the Proposed Plan states that the 51 acre tract contains only "municipal solid, bulky, vegetative and non-chemical industrial waste." Id. Those are precisely the types of wastes which a solid waste landfill is licensed to accept and for which the solid waste closure requirements were designed.[23/] To extrapolate from the conditions found in isolated instances in a much smaller tract to a much larger and distinct area, and conclude that the entire site should be closed using a modified hazardous waste cap, is unjustified.[24/] The only evidence in the Feasibility Study supports

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23/ Moreover, given the authorized disposal of small quantity generator hazardous waste, the presense of isolated drums of hazardous waste is consistent with the site's operation and closure as a municipal landfill.

24/ The Feasibility Study merely states in one sentence, that "hazardous waste landfill closure regulations are relevant and appropriate due to the known presense of hazardous wastes at the landfill." Feasibility Study on-Site Controls at Global Landfill, Vol. I, p. 2-12 (Feb. 1991) (emphasis added).

the conclusion that the 51 acre tract should be closed as solid waste landfill.

A further indication of the nature of the waste at a landfill can be gleaned by comparing leachate data with RCRA's toxicity characteristic threshold levels. Under RCRA, waste can be characterized by its toxicity as hazardous waste. Toxicity is measured by the TCLP, a test designed to simulate leaching of the waste, and to measure the concentrations of metals, volatiles, semivolatiles and pesticides in the leachate. Examination of the leachate quality results contained in the Feasibility Study support the conclusion that this is a typical municipal landfill.[25/] Monitoring of leachate has occurred at ten locations at least annually and often quarterly for the last three and one-half (3½) years. These sampling results, in general, show a low level of toxicity. The average concentrations for the hazardous constituents found at Global Landfill which were evaluated by the TC procedure are between 100 and 1,000 times less than the leachate concentration levels established to designate a hazardous waste.[26/] There is only one value that barely exceeded the TC threshold, and the average

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25/ However, chemical concentrations measured in the drums from the 6.5 acre landfill cannot be compared with TC thresholds. TC thresholds take account of leaching from hazardous waste, and consequently the thresholds are less concentrated than "pure" waste.

26/ See Appendix C.

value for that constituent is far below the TC threshold value.[27/] Thus, these low leachate readings confirm that, based on the nature of the waste, Global should be classified

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27/ See Appendix C (the values for lead).
The leachate sample from leachate seep L4, taken in January 1988, measured 5.53 mg/l of lead, which compares to the TCLP threshold of 5 mg/l. See FS, Appendix D. That value is demonstrably an outlier. All other leachate samples taken from the same seep ranged from .025 mg/l to .41 mg/l of lead, less than 1/10 of this single value. Id. The leachate samples taken from the other locations had a range from below detectable limits to .576 mg/l of lead and averaged 1/100 of this single value. For a variety of reasons, this single sample does not overcome the overwhelming contrary data.
In the first place, the Feasibility Study does not disclose the methods used to collect and analyze this sample. Nor is there any evidence that a challenge was made to the laboratory analysis that produced this anomolous value. Thus, this value may well result from poor quality assurance. Seco the value for the single sample and the TCLP threshold. Sampling at leachate seep L3, only 250 feet away, during the same sampling event, produced a value of .465 mg/l, which is less than 1/10 of the value at L4. The other locations yielded average values of less than1/200 of the L4 value. These facts, and the fact that lead is not consistently the highest value in the readings of the other seeps, suggest that the most reasonable explanation is that the value reflects a small lead particle, rather than the concentrations from progressive leaching. In any event, in light of the consistent and overwhelmingly contrary leachate data and the other facts that surround this site, it is clear that this value is not representative of the landfill contents and has no bearing on the characterization of this site.



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and closed as a municipal landfill and not a hazardous waste landfill.

*b. Nature of the Site*

In order to determine when a closure requirement is appropriate, the NCP also requires a comparison between the "type and size of structure or facility" regulated by the potential closure requirement and that found at the CERCLA site. 40 C.F.R. § 300.400(g)(2)(vi), (vii). The nature of Global Landfill is very different from the usual RCRA unit, which is typically a discrete waste management unit that is the product of uniform construction and operating standards and that contains only listed or characteristic hazardous waste. Such unit precludes the type of unregulated landfill growth that results in widely dispersed waste as is the case with Global Landfill.

In fact, EPA has explicitly recognized that RCRA Subtitle C caps may not be "appropriate under certain circumstances for large municipal landfills. . .if the waste is generally of low toxicity and the contamination is dispersed over a large area that bears little resemblance to the discrete units regulated under RCRA." 53 Fed. Reg. 51447, col. 2; see also "CERCLA Compliance With Other Laws Manual," at p. 2-21 ("RCRA covers are generally not appropriate for large municipal landfills" that "bear[] little resemblance to the discrete units regulated under RCRA Subtitle C"). The conditions identified

by EPA which militate against the use of Subtitle C covers are met in this case. The Global Landfill leachate data shows consistently low levels of contamination, thereby indicating the waste is generally of low toxicity. Moreover, the landfill is unquestionably a large site, consisting of two distinct areas totaling approximately 57 acres, and the waste is widely dispersed over the 57 acre area. Based on the size and type of facility, therefore, it is clear that Global Landfill is appropriately capped as a solid waste landfill.[28/]

Moreover, the general principles governing the closure of municipal landfills in the Superfund program reaffirm that a noncomposite cap typically used for municipal landfills should also be used for this site. As explained by EPA, such a cap is appropriate where groundwater is not being used for drinking

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28/ EPA has underscored this principle in its September 30, 1988 Record of Decision for the Oak Grove Landfill in Oak Grove Township, Anoka County, Minnesota. EPA has stated that:

> The USEPA does not believe it appropriate to use a Subtitle C cap/cover to remediate a large sanitary landfill where we have such small documented quantities of hazardous waste known to have been disposed.

With respect to the important factor concerning the size of the facility, the EPA applied the NCP requirements described above and concluded:

> In view of the small documented quantity of hazardous waste and the potential wide distribution of the waste in a 45-acre sanitary landfill, there does not seem to be sufficient similarity between the OGSLF site and the type of circumstances Subtitle C requirements are intended to address.

water. Municipal Guidance pp. 4-7, fig. 4-1. As confirmed in the Proposed Plan, groundwater in the upper aquifer, which exhibits elevated levels of some contaminants, is not a present or potential source of drinking water. In the groundwater of the Old Bridge Sand, the Feasibility Study has detected only occasional and low levels of contamination. The Feasibility Study has determined that there is upward pressure from the Old Bridge Sand which confines contamination in the upper aquifer, thus indicating that the low levels of contamination detected may well be attributable to areawide contamination rather than Global Landfill. In any event, this portion of the Old Bridge Sand does not provide any drinking water supply. The nearest drinking water intake is upgradient and approximately one mile away, and as a result of gravity and attenuation, is not affected or threatened by Global Landfill. Thus, given the lack of use of groundwater as a drinking water supply, there is even greater reason to support a noncomposite cap, consistent with solid waste closure requirements. Id.

### *3. RCRA Does Not Require A Composite Cap*

In any event, even if it is assumed that RCRA requirements should be utilized for the cover on the landfill, these requirements do not justify or mandate the cap described in the Proposed Plan's preferred alternative. Under RCRA, the primary requirement applicable to the cover is that the top liner must be more impermeable than any bottom liner or any

natural subsoils. 40 C.F.R. § 264.228(a)(2)(iii)(E) (1990). At Global, the bottom of the landfill does not have a liner and rests on entirely natural materials. Under such circumstances, a noncomposite top cover will easily satisfy the RCRA requirement.

The idea of a composite cap derives not from the regulations of RCRA but from certain guidance issued thereunder. At best, this guidance is simply information to be considered (TBC), not an applicable or relevant and appropriate requirement for the cap. As stated in the Municipal Guidance, "RCRA provides technical guidance that defines the types of layers EPA considers to be appropriate for a cap for new RCRA landfill cells. This guidance is a TBC (to be considered)." Municipal Guidance at p. 4-11. Unlike an ARAR, a TBC is not mandatory and need not be followed in developing alternatives which comply with RCRA. 55 Fed. Reg. 8745, col. 3 (March 8, 1990). Moreover, unlike ARARs, the underlying validity of a TBC is at issue in the remedy selection process and a TBC can only be used if it is cost effective. Id.

Current experience with composite caps indicates the difficulty of their installation and the loss of their effectiveness if the clay becomes wet, thereby undermining the original rationale of the cap guidance. At least equally important, as demonstrated below, a composite cap is clearly not cost-effective when compared to a noncomposite cap. When

use of a TBC would produce a result that is not cost-effective it should not be used.

The proper application of this principle is illustrated in the ROD for Sharkey Landfill in Morris County, New Jersey. At the Sharkey Landfill, substantial hazardous waste disposal led to the consideration of RCRA Subtitle C closure requirements as ARARs. Record of Decision for Sharkey Landfill at 35 (Sept. 29, 1986). However, the ROD pointed out that the remedy would not meet the "compositional criteria of the RCRA 'model' cap." Id. Instead, the ROD considered the "model" to be "unwarranted for this site," and selected a noncomposite cap. Id. The reason provided was that the extra layer would not have increased effectiveness but would have increased the cost significantly -- the same situation that obtains here Id. at 8, 35. Thus, in light of past practice at other New Jersey sites, it is apparent that a non-composite cap meets Subtitle C requirements and is well-suited to Global.

*4. Summary*

In conclusion, a solid waste cap, or its equivalent, should be selected in the ROD. Global Landfill was authorized to and received various forms of solid waste, including residential waste, bulky waste, and non-hazardous industrial waste. Until its closure in 1984, Global was authorized, consistent with RCRA and New Jersey law, to receive hazardous waste from small quantity generators -- a situation applicable

to most municipal landfills. As demonstrated by the drum investigation, far in excess of 99% of the landfill's contents is solid waste.

Unquestionably, solid waste is representative of Global's contents. Moreover, Global is an extremely large landfill (100 feet in height and 57.5 acres in lateral extent) which is characterized by widely dispersed contamination of generally low toxicity. The solid waste capping requirements, rather than the hazardous waste requirements, were designed for precisely these situations -- large volumes of essentially solid waste giving rise to widely dispersed and low toxicity contamination. As stated by the NCP, RCRA hazardous waste caps are not appropriate for such municipal landfills; instead, the specifically tailored requirements governing solid waste caps should form the basis of the selected alternative.

Even if hazardous waste requirements are chosen for the Global cap, however, those requirements can be easily satisfied by a noncomposite cap. The composite cap found in the Proposed Plan's preferred alternative is based on a guidance document, not a regulation. It should not be used at Global because experience in the field has not confirmed its implementability or effectiveness and because it is not cost-effective. Moreover, at Sharkey Landfill, EPA reached this same conclusion and determined that a noncomposite cap fully satisfies RCRA's hazardous waste capping requirements.



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It would be unjustified and unreasonable to allow a nonco posite cap at Sharkey Landfill and not at Global.

## *VII. GROUP'S PROPOSED ALTERNATIVE*

### *A. Description*

The alternative recommended by the PRP group would begin by an investigation to fill identified site-specific data gaps. The investigation would include the following:

-- a field investigation of sampling the soils, with in situ vane tests and CPT tests to confirm shear strength and aging effects, and a field test to determine the refuse strength parameters, through back analyses of an excavated refuse fence;

-- bench scale treatability tests to evalua proposed leachate treatability;

-- ambient air monitoring including gas migration studies and quarterly monitoring of landfill gas constituents;

-- settlement and horizontal surface monitoring of the existing landfill, with survey points and inclinometers, and a current topography from an aerial survey with ground control to establish a base map; and

-- regular monitoring of leachate for flow rate and quality, using recognized protocols.

Based on the existing data and depending on the outcome of further testing, the Global Landfill PRP Group ("the Group") believes that the problems identified with the Proposed Plan can be solved by a different alternative. The alternative suggested by the Group ("Recommended Alternative") is comprised of the following: 1) a fence around the site; 2) a noncomposite cap with installation of a geonet and without geogrid layers; 3) grading of the cap to provide surface water controls; 4) an active gas extraction system; and 5) a temporary storage of leachate on-site with transportation to an off-site water treatment plant. The Recommended Alternative would not include construction of a toe berm.[29/]

The Recommended Alternative will include a comprehensive monitoring scheme of settlement markers on the existing cover on grids ranging from 500 to 100 feet, depending on location. This will enable landfill movements to be followed

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29/ The Group's Alternative is based on provision of a cover to meet the PRAP Remedial Action Objectives, which are to:

- prevent direct contact with exposed waste materials or leachate surface seeps that could result in exposure to substances of concern;
- prevent airborne transport of landfill gases or waste particles that would result in exposure to substances of concern; and
- develop controls and measures for stormwater and soil erosion management, establishing a vegetative cover, landfill gas and leachate surface seep management, correction of slope stability problems and site security.

as early as possible, including the design and bidding stage. The monitoring will indicate if there are signs of instability, and also enable landfill behavior to be followed during cap construction. In the unlikely event that the landfill is unstable, measures such as regrading or even stabilization in some form could be implemented.

The proposed cap consists of a top layer of stabilized vegetation. Below that mat would be a 12 inch layer of topsoil, a 12 inch layer of common borrow soil, and a geocomposite drain (geonet with non-woven geotextile bonded to both sides) which will together provide frost protection. The next lower layer would consist of a 60 mil textured VLDPE or HDPE geomembrane. The landfill surface would be regraded with 6 to 12 inches of clean backfill. The cover would not include the two geogrid layers proposed in the PRAP alternative.

The cover would be graded to include channels for surface water collection so that water velocities are controlled to prevent erosion. Surface water would be led via channels to sedimentation ponds before discharge. Surface seeps of leachate would be collected and stored in tanks before transportation and treatment off-site. An active landfill gas extraction system, together with containment from the liner, would lead to inward gradients to collect landfill gas, which would be flared in accordance with applicable air quality standards.

There are four principal differences between the Recommended Alternative and the PRAP alternative: these concern the cap, the berm and leachate treatment.

The first two differences between the Recommended Alternative and that presented in the PRAP address the cap. First, the Group's cover would delete the two geogrid layers in the PRAP alternative. For the reasons noted previously, those layers are unnecessary, ineffective as designed, and decrease the implementability of the cap. Second, the Group proposes a noncomposite cap. The proposed noncomposite cap would provide an essentially equivalent barrier to infiltration. Analyses with the current version of EPA's HELP software have been made of the Recommended Alternative.30/ These analyses demonstrate that the Recommended Alternative compares favorably with that in the Proposed Plan: it would yield a reduction efficiency of 99.95 percent as compared with an efficiency of 99.97 percent for the PRAP alternative. The noncomposite cap is less costly than the composite cap, and avoids implementability problems associated with a composite cap.

The third difference between the Recommended Alternative and that included the PRAP is that the Group's plan would not require the construction of a berm (in part because the Feasibility Study underestimated the strength of the

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30/ See Appendix B.

waste). The Recommended Alternative would provide factors safety against sliding that exceed those in the Proposed Plan, based on an evaluation of refuse strengths that have been the subject of back analysis.[31/] The Recommended Alternative also includes a limited program of investigation that would confirm the refuse and soil strength parameters used and set up points to monitor landfill movements, at an estimated cost of $120,000. Monitoring would be an integral part of the Recommended Alternative; such monitoring would provide sufficient notice so that any necessary measures to enhance slope stability can be performed in a timely manner.

Finally, the Recommended Alternative provides for transportation of leachate to an off-site treatment plant. As noted previously, construction of an on-site plant would either duplicate or prejudice the selection of a treatment plant, any, for groundwater in OU#2. Treatment at a larger facility off-site would also solve two lurking problems in the PRAP alternative: (1) it ensures that the leachate is brought to a facility designed to effectively treat the leachate, a result that is much less certain at the on-site plant in light of the omission of treatability studies; and (2) the inefficiencies produced by the dramatic reduction of leachate flows over time would be effectively addressed at a larger off-site facility

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31/ See Appendix A.

where the capacity is much less affected by the volume produced by the Global Landfill leachate.

### *B. Remedy Selection Analysis*

#### *1. Analysis of NCP Criteria*

An analysis of the criteria set forth in the NCP, see 40 C.F.R. § 300.430(e)(9), shows that the PRAP alternative does not reflect the best balance of these criteria. Both the Recommended Alternative and the PRAP alternative would protect human health. See Proposed Plan at 7. However, the Recommended Alternative would better protect the environment because it would not include the construction of a berm and on-site leachate treatment facility, and thus would not destroy the surrounding wetlands.

Both the Recommended Alternative and the PRAP alternative would comply with all pertinent closure ARARs.[32/] However, the PRAP alternative, which would construct a berm and expresses a preference for an on-site leachate treatment facility, would not comply with wetlands ARARs. While response actions under the NCP may be eligible for a nationwide permit, see 33 C.F.R. § 330.5(a)(20), they are subject to certain conditions. See 33 C.F.R. § 330.6(a). In particular, "to the maximum extent practicable," "[d]ischarges

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32/ The Group's proposed Alternative meets the New Jersey Solid Waste Regulations, N.J.A.C. 7:26-2A.9 for closure with a cover of a solid waste landfill.

. . . shall be avoided or minimized through the use of other practical alternatives"; and "[d]ischarges in wetlands areas shall be avoided." 33 C.F.R. § 330.6(a)(1),(5). See Executive Order 11990, Sec. 2(a) (new construction located in wetlands is permitted only if there is "no practicable alternative" to the construction). See also 40 C.F.R. § 230.10(a). Because there exists a practical alternative that fully protects human health and the environment -- the Recommended Alternative -- the PRAP alternative does not satisfy wetlands ARARs. See Municipal Guidance at 5-5, fig. 5-3.

The Proposed Plan does not suggest that the solid waste and hazardous waste cap alternatives reviewed in the Feasibility Study are distinguishable based on the criteria of "long-term effectiveness and permanence." See Proposed Plan at 8. In reality, though, the PRAP alternative suffers from several deficiencies which will undermine long-term effectiveness. In the first place, there are significant questions about the short-term effectiveness of a composite cap in light of the problems associated with moistening of the clay, which may undermine stability. Second, the PRAP and accompanying materials do not provide any data to demonstrate the reliability of a non-woven geotextile spun from recycled plastic beverage bottles, whereas the cap in the Recommended Alternative consists of a thick HDPE -- a demonstrated and reliable technology. The Recommended Alternative also offers essentially equivalent impermeability to that provided by the

PRAP alternative but without these significant deficiencies.[33/] Thus, the Recommended Alternative offers greater "long-term effectiveness."

The PRAP alternative is presumed "implementable" but this presumption is questionable. First, the PRAP alternative cap creates several problems associated with the combination of clay and synthetic liner. Measures must be taken to prevent wetting of the clay in order to avoid stability problems. It is difficult to reach satisfactory compaction and permeability with clay. As a result, placement of clay increases construction difficulty and time. A second set of implementability problems arises due to the presence of the geogrids. As settlement occurs, the gas headers and piping will need repairs, thus necessitating the cutting of the geogrids. Attempting to repair the geogrids will be a difficult and perhaps ineffective operation because it will require bodkin connectors when backfilling trenches. Finally, in the absence of treatability studies, the implementability of a leachate treatment plant is questionable. The Recommended Alternative, in contrast, does not contain these components with the associated implementability concerns. Consequently, the Recommended Alternative will be considerably quicker to construct and more "implementable."

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33/ See Appendix B.

"Reduction of toxicity, mobility, or volume" is not relevant factor as far as the choice of caps is concerned. See Proposed Plan at 8. To the extent that it is relevant to leachate or groundwater, in light of the uncertainty produced by the omission of treatability studies, the Recommended Alternative proposal of off-site treatment offers a greater likelihood that toxicity will be reduced. See 40 C.F.R. § 300.430(e)(9)(iii)(D)(2), (3) (factors include the "amount of hazardous substances. . .that will be treated," and "degree of expected reduction in toxicity"). In addition, there would be no outfalls into the wetlands, and thus no residuals left on-site. See 40 C.F.R. § 300.430(e)(9)(iii)(D)(5) (factors include "the type and quantity of residuals"). Thus, "reduction of toxicity" is more nearly achieved by off-site treatment.

"Short-term effectiveness," which addresses the effects of the alternative during both its construction and implementation phases, would be somewhat less for the PRAP alternative. This is because the construction of a berm and any leachate treatment would require measures that would result in greater impacts on wetlands. Moreover, the construction of the extra clay layer in the composite cap would result in

greater potential disturbance to the public due to the extra truck traffic associated with the transport of the clay.[34/]

The capital costs would be greater for the PRAP alternative because that proposal contemplates a composite cap, an unnecessary berm, unnecessary geogrid layers, and the additional costs of mitigating the impacts to wetlands. The estimated capital cost of the cap described in the Proposed Plan is $19.9 million. On the other hand, a rough estimate for the capital cost of the Recommended Alternative is $14.8 million, a savings of over 25%. Moreover, it can be expected that the Recommended Alternative would result in lower operation and maintenance expenses because repair would be simpler due to the absence of geogrids and the unnecessary extra composite layer.

As the preceding discussion demonstrates, the Recommended Alternative offers a far better balance of the relevant criteria than the PRAP alternative. Under such circumstances, the PRAP alternative should not be selected because it is inconsistent with the NCP. 40 C.F.R. § 300.430(f)(I)(i)(B) (1990).

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34/ See FS at 3-10 - 3-11 (berms under review would affect from 2.4 to 3.8 acres of wetlands and encroach on floodplains).

### 2. *Application of the NCP Factors to Remedy Selection Analysis*

The NCP requires that the selected alternative protect human health and the environment, comply with ARARs, offer "permanent solutions" to the maximum extent practicable, and be cost-effective. 40 C.F.R. § 300.430(f)(i),(ii) (1990). The Recommended Alternative meets all of these requirements. It is doubtful whether the PRAP alternative satisfies the first three requirements and it is clear that it violates the fourth.

Each alternative would be protective of human health, but the Recommended Alternative would provide greater protection of the environment. See 40 C.F.R. § 300.430(f)(I)(ii)(A). The PRAP alternative, which includes the construction of a berm, would violate wetlands ARAR;[35/] the Recommended Alternative would not. See 40 C.F.R. 300.430(f)(1) (ii)(B). With regard to whether an alternative offers "permanent solutions," it is uncertain whether the PRAP alternative's use of the recycled plastic liner will offer the equivalent "permanence" as the Group's demonstrated liner technology. See 40 C.F.R. § 300.430(f)(I) (ii)(E). Moreoever, as described above, the Proposed Plan's preferred alternative does not offer the better balance of the five relevant criteria, particularly long-term effectiveness.

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35/ Id. at 4-18

Finally and crucially, the NCP's requirement that the remedy be "cost-effective" would not be met by the selection of the PRAP alternative. See 40 C.F.R. § 300.430(f)(I)(ii)(D). In order to determine "cost-effectiveness," the NCP first requires the determination of "overall effectiveness" -- which includes (1) long-term effectiveness and permanence; (2) reduction of toxicity, mobility, or volume through treatment; (3) short-term effectiveness. Id. As noted previously, the Recommended Alternative and PRAP alternative offer equivalent performance with regard to impermeability but, for other reasons, the PRAP alternative provides less "short-term effectiveness" and "long-term effectiveness." Because it is uncertain how successful an on-site leachate treatment plant would be in light of the absence of treatability studies, it would offer less "reduction of toxicity" than the much more certain treatment at a facility with the full range of treatment methods. On balance, therefore, the PRAP alternative offers less "overall effectiveness."

The next step in the NCP requires that "overall effectiveness" be compared to "cost." The NCP states that a "remedy shall be cost-effective if its costs are proportional to its overall effectiveness." 40 C.F.R. § 300.430(f)(1)(ii)(D). As EPA states in the preamble to the final NCP, "proportional" is used to show that the determination is one that "compare[s] the cost and effectiveness of alternatives in relation to one another." 55 Fed. Reg. 8728 (Mar. 8, 1990).

In this situation, no "proportionality" could be said to exist. The capital costs associated with the capping portion of the PRAP alternative are approximately $5.1 million higher than the Recommended Alternative; the overall effectiveness of the PRAP alternative is the same or lower. This is therefore <u>not</u> a situation where the more costly alternative offers a significantly more effective remedy. The decision to select the more costly alternative -- with similar or less overall effectiveness -- would be, therefore, inconsistent with the NCP.

*VIII. ROD Flexibility*

In general, any alternative selected in a record of decision (ROD) should be flexible and should not constrain the ultimate design of a cap or other elements of the remedial alternative. If NJDEP decides to proceed based on the current inadequate information, it is even more important to provide a flexible ROD in order that the remedy can be adapted as essential data gaps are filled. The general requirement of ROD flexibility has been made explicit by EPA in its discussion of the development of remedial alternatives:

> One representative process is selected, if possible, for each technology type to simplify the subsequent development and evaluation of alternatives without limiting flexibility during remedial design. The representative process provides a basis for developing performance specifications during preliminary design; however, the specified process actually used to implement the remedial action at a site may not be selected until remedial design.

Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (Interim Final), 4-16 (October 1988). The ROD selects an alternative which has been developed pursuant to this process. The ROD sets forth the conceptual remedy, which is provided to inform the public about the basic elements of the remedy and to establish relative cost estimates among the possible remedial alternatives. The actual remedial design takes place after the adoption of the ROD. See 40 C.F.R. § 300.435. The performance of the ultimate design must meet the performance objectives set forth in the ROD, such as remedial action objectives and ARARs.[36/] See 40 C.F.R. § 300.435 (b)(1), (2) (1990). However, so long as these objectives are met, the ultimate design may depart from the remedy described in the ROD with no further action required unless the remedy design "differs significantly" from the ROD with respect to scope, performance, or cost. See 40 C.F.R. § 300.435(c)(2)

In some respects, the Proposed Plan already reflects this understanding of the relationship between the ROD alternative and the Remedial Design stage. Thus, the Proposed Plan proposes an "active gas collection and treatment system" as its preferred alternative, leaving to the design stage the details of how this component will be constructed and

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36/ For the first operable unit, most of the ARARs will consist of action-specific ARARs.

operated. See Proposed Plan at 9. In addition, though the Proposed Plan expresses a preference for "on-site treatment" as the preferred leachate treatment alternative, it appears to preserve needed flexibility: "The final option for leachate collection and treatment, however, would be selected during the design of this operable unit." Id. at 6.[37/]

This flexibility should be extended to the design of the cap and the determination of the necessity of the berm. With respect to the type of cap implemented at Global Landfill, the ROD could select a general type of cap or one achieving "equivalent performance." With respect to the berm, the ROD could select monitoring and an engineering evaluation to demonstrate slope stability during the post-closure period. In the event the required slope stability is not achieved, the installation of a berm to achieve the required stability may be made at that time. That decision would not be prejudiced by the implementation of the other components of OU#1.

This approach was used at the Sharkey Landfill in Morris County, New Jersey, described in the ROD for the site as a "hazardous waste site." Record of Decision for Sharkey

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[37/] In addition, the Proposed Plan provides the following: "However, a contingency system, which would include off-site disposal, may be used during this phase of the remedial action. This would provide sufficient time to evaluate whether a single treatment plant could be designed and constructed to address both the landfill leachate and underlying groundwater." Proposed Plan at 9.

Landfill, at 35 (Sept. 29, 1986). Although the Sharkey ROD concluded that RCRA Subtitle C closure requirements were to be utilized at the site, the cap selected did "not meet the compositional criteria of the RCRA 'model' cap," because it did not include a synthetic liner. Id. Instead, the preferred alternative was a noncomposite cap which met "the performance requirements of the relevant RCRA regulations." Id. Because of the site characteristics of Global Landfill discussed previously, the ROD should be similarly written to allow flexible remedial and cap design so long as performance criteria are met. In fact, given the circumstances at Global, it would be unreasonable for the Global ROD not to have at least as much flexibility with regard to cap design as the Sharkey ROD.

## *IX. MISCELLANEOUS*

### *A. ARARs*

The Feasibility Study was designed for a specific purpose -- the analysis of alternatives that address the on-site source control of contamination at Global Landfill. However, the Feasibility Study also purports to identify a universe of ARARs in order to assist the determination of remedial objectives at the site. See Feasibility Study at 2-1; App. F. That limited use should not be confused with whether OU#1 must comply with these contaminant-specific, ambient standards as ARARs. OU#1, as a phased remedy addressing only source control, is only governed by certain action-specific

ARARs[38/] and not contaminant-specific ARARs. See 55 F Reg. 8755, col. 3 (March 8, 1990).

Indeed, the Feasibility Study recognizes that none of the caps under consideration would produce compliance with the chemical-specific groundwater or surface water standards identified in Appendix F of the Feasibility Study. Id. at 4-18. Nor is there any present method of comparison of air ambient quality in relation to the gas management options that were analyzed. Id. at 4-6. Similarly, none of the leachate options under consideration would necessarily produce compliance with chemical-specific ARARs or groundwater and surface water. Id. at 4-38.

The reason is straightforward: ambient standards are not relevant at this stage for air, surface water, and groundwater because the Proposed Plan only covers OU#1. Even were they arguably relevant, they would be the subject of a waiver under CERCLA § 121(d)(4)(A), because OU#1 is "only part of a total remedial action that will attain such level or standard of control when completed." The Proposed Plan also treats the standards identified in Appendix F as not yet relevant beyond assisting in the formulation of remedial objectives. Thus, the discussion in the Proposed Plan

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38/ These action-specific ARARs will be different for distinct remedial alternatives. As EPA has stated, "ARARs will differ depending upon the specific actions and objectives of each alternative being considered. . . ." 53 Fed. Reg. 51438, col. 3 (Dec. 21 1988).

identifies only one ARAR as potentially relevant: closure requirements. Proposed Plan at 8.

Nonetheless, though the universe of ARARs identified in Appendix F does not apply to OU#1,[39/] the general formulation in Appendix F of what constitutes an ARAR at this site is noteworthy. First, the Proposed Plan apparently assumes that permits would be required for any proposed treatment plant. Proposed Plan a 6 ("effluent. . . .would meet NPDES requirements for discharge to surface water"). This is incorrect. Section 121(e) of CERCLA states that permits are not required for "the portion of any removal or remedial action conducted entirely onsite." See also N.J.A.C 7:14A-3.1(b)(3) (exception to NPDES permit requirements for CERCLA and Spill Act activities). The proposed treatment plant would be "onsite." Proposed Plan at 6.

Second, the justification for what constitutes an ARAR is not in accordance with law. The Feasibility Study states

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[39/] Further support for the proposition that the state ARARs identified in the Feasibility Study were identified solely to assist in determining remedial objectives can be found in the fact that there was no effort to specifically explain why each standard was either "applicable" or "relevant and appropriate." EPA has stated that "[i]t is not sufficient to provide a general 'laundry' list for statutes and regulations that might be ARARs for a particular site. The state . . . must instead provide a list of requirements with specific citations to the section of law identified as a potential ARAR, and a brief explanation of why that requirement is considered to be applicable or relevant and appropriate to the site." 55 Fed. Reg. 8746 col. 2 (Mar. 8, 1990) (emphasis added).

that "[f]or purposes of this FS, ARARs constitute Federal and State promulgated regulations, standards and criteria whose legality is not overridden by any clause of [CERCLA or SARA]." Feasibility Study at 2-2. This is a misreading of CERCLA, and reverses the proper burden for determining ARARs. The entire point of the ARARs process -- i.e., to determine whether a requirement is "applicable" or "relevant and appropriate" -- is that CERCLA alone determines those requirements that are subsequently applied to cleanups on a case-by-case basis. As noted in the preamble to the NCP, "the position that on-site CERCLA response actions are not independently subject to other federal or state environmental laws is a longstanding one, based on a theory of implied repeal or preemption." 55 Fed. Reg. 8742, col. 1 (March 8, 1990). In short, without a requirement-by-requirement determination as mandated by CERCLA no standard has an independent application to a cleanup under CERCLA. The result of this misconception is that the Feasibility Study assumes the application of, and includes, standards wholesale without the type of ARARs analysis required.

One example should suffice to make this point clear. The MCLs are not ARARs, for either OU#1 or OU#2. MCLs may be "relevant and appropriate" only for "ground and surface water that is a current or potential source of drinking water." 55 Fed. Reg. 8750, col. 2 (Mar. 8, 1990). However, the upper water table aquifer is not a potable water source. Proposed Plan at 4. It therefore could not serve as a current or

potential source of drinking water. And the Old Bridge Sand aquifer beneath Global Landfill is downgradient one mile from the nearest drinking water well. Id. It, therefore, does not serve as a current drinking water source. Nor can it serve as a potential drinking water source inasmuch as there is no significant likelihood of development or the installation of a drinking water intake downgradient from the site due to the proximity of the surrounding wetlands and Cheesequake State Park. See id. at 2.

*B. Excavation and Removal of Drums*

The Proposed Plan states that "also under consideration is the possible removal of the drums during the exploratory drum investigation in the 6.5 acre tract of land." Proposed Plan at 3. The number of drums discovered in that investigation was 63, and these were randomly intermixed with the surrounding solid waste. From the face of the Proposed Plan, it appears that the contemplated removal is limited to these 63 drums and does not extend to a search for and ultimate removal of any other drums or the landfill's contents. The Feasibility Study considered an alternative of full-scale excavation and off-site disposal for the 6.5 acre tract and properly rejected this option during screening due to the increased risks to the workers and the public, the lack of

available disposal capacity,[40] and the prohibitive cos Feasibility Study at 2-22, 2-23. The rejection of this alternative is consistent with the NCP and EPA's governing principles because the few, random drums are clearly not a principal threat at this site and because the alternative is completely impracticable for an area as extensive as the 6.5 acre tract. 55 Fed. Reg. 8703, col. 1 (March 8, 1990); 53 Fed. Reg. 51427, col. 2 (Dec. 21, 1998); Municipal Guidance at 4-12. Thus, any drum removal at this site must be limited to the already excavated drums.

## X. *CONCLUSION*

The foregoing discussion amply demonstrates that the preferred alternative suggested by NJDEP in the PRAP is result of inadequate data and overconservative assumptions which are not warranted by the site or the evidence. On the other hand, the proposal advanced by the Global Landfill PRP Group is in complete keeping with the site conditions, the regulatory requirements, and the potential risks posed by the site. Importantly, the proposal suggested by the PRPs is one which compares favorably with remedial alternatives being implemented at other New Jersey landfills, and accepted by NJDEP as appropriate at those other sites.

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[40] The lack of available disposal capacity renders this alternative unimplementable.