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Lipari Landfill, NJ
(Second Remedial Action, 09/30/85)

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16. ABSTRACT

The Lipari Landfill site is located in Mantua Township, Gloucester County, New Jersey and is adjacent to the towns of Pitman and Glassboro. The site is approximately fifteen acres in size; six acres of which were used for hazardous waste landfilling activities. Trenches excavated for sand and gravel were backfilled with municipal refuse, household wastes, liquid and semi-solid chemical wastes, and other industrial wastes. Although no detailed records were kept, it has been estimated that 12,000 cubic yards of solid wastes and 2.9 million gallons of liquid wastes were disposed of at the site. Wastes reported to have been disposed of include solvents, paint thinners, formaldehyde paints, phenol and amine wastes, dust-collector residues, resins and ester press cakes. Initial removal and remedial actions completed at the site include: fencing the entire fifteen acres, installing a bentonite/soil slurry wall keyed into the underlying aquitard, covering the site with an impermeable synthetic membrane liner, and installing a passive gas-venting system (see the ROD dated 8/13/82 for additional information).

The cost-effective remedial actions selected for this site include: installation of ground water/leachate and injection wells within the con-

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tainment system to dewater and flush the system; pumping and treating the ground water/leachate from within the containment system (treatment preference of the collected leachate is onsite pretreatment and discharge to the POTW); installation and monitoring of ground water wells downgradient of the site;flushing the containment system to cleanse the encapsulated material of water-borne contaminants; and continued pumping and treating of the ground water should applicable standards not be met once flushing is terminated. Identification of remedial action alternatives to mitigate potentially contaminated offsite areas will be made in the near future. The estimated capital cost for this project is $3,464,000 and annual O&M costs are estimated to be $715,000. These cost estimates will be affected by the offsite/onsite treatment systems ultimately designed.

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION

Site

Lipari Landfill, Mantua Township, New Jersey

Documents Reviewed

I am basing my decision primarily on the following documents, which describe the analysis of cost-effectiveness of remedial alternatives for the Lipari Landfill site:

- Treatability Study of Contaminated Groundwater from the Lipari Landfill, Radian Corporation;
- On-Site Feasibility Study for Lipari Landfill, Camp, Dresser & McKee, Inc.;
- On-Site Hydrogeological Remedial Investigation of Lipari Landfill, Camp, Dresser & McKee, Inc.;
- Summary of Remedial Alternative Selection, Lipari Landfill;
- Staff summaries and recommendations;
- Responsiveness Summary for the Lipari Landfill.

Description of Selected Remedy

1. Install groundwater/leachate extraction and injection wells within the containment system for dewatering and flushing of the system.

2. Pump and treat the groundwater/leachate from within the containment system until it reaches an elevation of approximately 100 feet above Mean Sea Level (Upper Cohansey). The treatment preference for collected leachate is on-site pretreatment and discharge to the POTW. Implementation is dependent on timely approval by the State of New Jersey and the local POTW. If such approval is not provided, the leachate may be treated on-site and discharged to nearby surface waters, or transported off-site for treatment at a permitted hazardous waste facility.

3. Install and monitor groundwater wells downgradient of the site within the Kirkwood Aquifer.

4. Flush the containment system to cleanse the encapsulated material of water-borne contaminants. This operation will be coordinated with any off-site remedial action, especially with regard to leachate treatment. An estimated 15 years is required to remove 90% of the water-borne contaminants from the groundwater within the containment system. Throughout the operation, regular evaluations will be made to determine the effectiveness of the flushing program; as well as, the need to continue this program or to take other actions.

5. The flushing operation will achieve the reduction of contaminants in the containment system to the limits of its technology. Should it be determined that the resulting groundwater does not meet applicable standards, then pumping and treatment of the groundwater/leachate from within the containment system will be maintained, after the flushing operation is terminated, to control lower water levels within the system than outside.

Declarations

Consistent with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR Part 300), I have determined that flushing the containment system and monitoring the Kirkwood Aquifer groundwater constitute the selected Phase II on-site remedial alternative for the Lipari Landfill site.

The State of New Jersey has been consulted and agrees with the proposed remedy. A determination of potential Phase II off-site remedial actions to mitigate potentially contaminated off-site areas will be made in the near future.

The action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites. In addition, flushing the containment system and monitoring of the Kirkwood Aquifer are cost-effective, implementable and technically sound when compared to other remedial action alternatives, and are necessary and adequate to protect public health, welfare and the environment.

September 30, 1985
Date

Christopher J. Daggett
Christopher J. Daggett
Regional Administrator

Summary of Remedial Alternative Selection
Lipari Landfill Site
Mantua Township, New Jersey

Site Location and Description

The Lipari Landfill site is a partially remediated inactive waste disposal site in Mantua Township, Gloucester County, New Jersey, adjacent to the towns of Pitman and Glassboro. The site is approximately fifteen acres in size; six acres of which were used for hazardous waste landfilling activities. The landfill is approximately 0.3 miles north of U.S. Route 322 and 1.5 miles west of Glassboro State College. Single family homes stand close to the northeast border of the site; and apple and peach orchards surround the east and southern border.

Figure 1 shows the general location of the Lipari Landfill site. Figures 2 and 3 present more detailed information concerning the site and its surrounding area.

Initial removal and remedial actions completed at the site include: fencing the entire fifteen acres, installing a bentonite/soil slurry wall keyed into the underlying aquitard, covering the site with an impermeable synthetic membrane liner, and installing a passive gas-venting system.

Two surface water drainage systems flow near the landfill, as shown on Figure 2. The main drainage system, Chestnut Branch, has its headwaters east and south of the landfill area. Flowing past the eastern and northeastern borders of the site, Chestnut Branch discharges to Alcyon Lake, approximately 1000 feet downstream. Continuing from Alcyon Lake, Chestnut Branch empties into Mantua Creek, which discharges into the Delaware River approximately nine miles northwest of the site. Rabbit Run, a small tributary of Chestnut Branch, derives its headwater flow from a small spring located adjacent to the landfill site. This stream flows along the north-western edge of the landfill and discharges into Chestnut Branch north of the landfill.

Parklands surrounding Alycon Lake are used for recreational purposes. However, recreational activities on the lake itself have been banned by the Gloucester County Health Department.

SITE HISTORY

Disposal Operations

The site was purchased in 1958 by Nick Lipari for use as a sand-and-gravel pit. Approximately six acres of the site were utilized for this operation. Trenches excavated to remove the sand and gravel were backfilled with municipal refuse, household wastes, liquid and semi-solid chemical wastes, and other industrial wastes. The nonsalable portions of the excavated sands and gravels were used to cover the disposed wastes. Liquid wastes were dumped into the landfill from 1958 to 1969 and solid wastes were disposed of there until May 1971, when the site was closed by the New Jersey Solid Waste Authority. During this period, at least one explosion and two fires were reported at the landfill.

Although no detailed records were kept, it has been estimated that 12,000 cubic yards of solid wastes and 2.9 million gallons of liquid wastes were disposed of at the site. The liquids disposed of at the site are thought to be largely uncontained. The wastes reported to have been disposed of include solvents, paint thinners, formaldehyde, paints, phenol and amine wastes, dust-collector residues, resins and ester press cakes.

Numerous organic compounds have been identified at the site, mostly in leachate samples. The most noteworhty compound identified is bis (2-chloroethyl) ether, a suspected human carcinogen, found in high concentrations. Other noteworthy compounds include benzene, ethylbenzene, phenol and toluene. Table 1 shows the compounds and their concentrations found in the Lipari Landfill leachate. Table 2 lists the chemicals of concern for the Lipari Landfill.

EPA has initiated enforcement action against the following firms who have generated or transported hazardous wastes to the landfill: Rohm and Haas; Owens-Illinois; an Manor Health Care; CBS, Inc; and Marvin Jonas, Inc.

Hazardous wastes dumped at the landfill have percolated into the groundwater under the landfill. The wastes have also leached out into the embankments of Rabbit Run and Chestnut Branch, contaminating the surface waters that run into these streams and Alcyon Lake.

Current Site Status

A removal action at the site was initiated in July 1982 by the U.S. Environmental Protection Agency. The removal action consisted of the installation of a fence to limit access to the landfill (see Figures 3 and 4). In August 1983, a second fence was installed along the eastern side of Chestnut Branch to discourage the nearby residents from entering the contaminated marsh area along the stream.

Based on the Record of Decision (ROD) signed August 3, 1982, (Attachment No. 1) remedial construction activities at the landfill began on September 7, 1983. A 30-inch wide, soil-bentonite slurry wall completely surrounding 15.3 acres of the site was constructed under the supervision of the U.S. Army Corps of Engineers. The wall was designed to segregate the bulk of the contaminants in the landfill from the surrounding aquifer through the use of a low-permeability bentonite slurry wall, keyed into the underlying low permeability Kirkwood Clay Formation. In addition, a 40-mil thick synthetic cap of high density polyethylene (HDPE) was placed over the site to exclude infiltration of precipitation. The remedial action also consisted of a passive gas-venting system, a surface drainage system, final grading and revegetation. Construction of the containment system was completed in November of 1984.

EPA determined in the 1982 ROD that a second phase of the remedial action should be implemented to improve the reliability of the containment system. At that time, the second phase was defined as collection and treatment of the contaminated groundwater within the containment system. The implementation of this remedial action was deferred in the 1982 ROD until the compatability of the pretreated discharge with the local Publically Owned Treatment Works (POTW) was evaluated. In addition, EPA determined that it was necessary to proceed with the installation of the containment system and cap while this evaluation was being done.

In the spring of 1985, in response to citizens' concerns, EPA extended the existing chain link fence east of Chestnut Branch (Figure 4) to further restrict access to the contaminated marsh area.

REMEDIAL INVESTIGATION ACTIVITIES AND RESULTS

On-site Remedial Investigation Activities

The on-site remedial investigation activities at the Lipari Landfill site included the following hydrogeological investigations of the landfill and the immediate area:

- Surveying the casing elevation of all the existing groundwater monitoring wells.
- Slug-testing 26 wells along the interior and exterior circumference of the slurry wall.
- Yield-testing all wells greater than 2-inches in diameter.
- Pump and injection-testing the contained Cohansey Formation.
- Pump-testing the Kirkwood Formation.
- Collecting samples of the leachate for analysis and for submittal to potential privately-owned treatment facilities.

On-site Remedial Investigation Results

The results of these investigation activities indicated the following:

- While there is some seepage out of the containment system, the system effectively segregates the bulk of the contaminated groundwater/leachate from the surrounding Cohansey Aquifer.
- Currently, the net direction of potential seepage through the slurry wall is inward at the southwest portion of the site and outward at the north, northeast and southeast portion of the site. An estimated 700 to 800 gallons per day (gpd) are currently seeping through the slurry wall into the upgradient Cohansey Aquifer.
- The Cohansey Aquifer is flowing in a northeasterly direction toward the Chestnut Branch.
- The hydraulic conductivity of the Kirkwood Clay is approximately 1.1×10^{-7} centimeters per second (cm/sec). Seepage will continue to flow into the Kirkwood Sands below the Kirkwood Clay Formation as long as the groundwater level within the system is higher than 93 feet above Mean Sea Level (MSL). It is estimated 1,700 gpd are currently seeping into the Kirkwood Clay.

- The saturation of the entire Kirkwood Clay and the continuous seepage of contaminants into the Kirkwood Sands has not been confirmed by analysis of samples taken of the Kirkwood groundwater.

- The estimated seepage flows are consistent with design predictions and are not attributed to construction deficiencies.

- Groundwater flow in the Kirkwood Sands is northeasterly towards Alcyon Lake.

- Dewatering of groundwater/leachate from, and injecting clean water into, the Upper Cohansey portion of the containment system is technically feasible.

- Only three of the existing wells screened in the Cohansey Formation can be used as extraction or injection wells.

- The Lower Cohansey sands are approximately ten times less permeable than the Upper Cohansey sands, making dewatering of the Lower Cohansey technically impracticable.

- Hydrofracturing of the slurry wall is not probable with a fifteen foot head differential across the wall. Channeling of the wall is also not likely.

- Assuming that the leachate quality does not significantly differ with the samples submitted, all of the privately-owned treatment facilities contacted would accept and treat leachate from the Lipari Landfill.

- Potential seepage of contaminants to the Cohansey and the Kirkwood Aquifers presents an environmental and public health hazard. Groundwater modeling indicates that bis (2-chloroethyl) ether will persist in the groundwater and migrate to the streams and lake. Eventually, this compound may attain concentrations considered potentially hazardous to human health.

- The compatability of raw leachate with the treatment systems used at the local POTW has been confirmed in the treatability study. Therefore, pretreated leachate will have no adverse affects on the POTW treatment process.

- Leachability tests on extracted Lower Cohansey sands demonstrate that the water-transportable contaminants are reduced by 90% in the leachate after 10 pore volumes have been passed through the sample.

REMEDIAL ACTION ALTERNATIVES

Remedial Action Objectives

The 1982 ROD determined that the overall objective of further on-site remedial action is to "improve the reliability of the containment system." At that time, it was determined that this should be accomplished through installation of groundwater collection wells within the containment system and treatment of this groundwater prior to discharging to the local POTW.

During the On-site Remedial Investigation, it was determined that, should no further action be taken to enhance the containment system, two pathways of potential risk to the environment and human health would persist: (1) slow but continuous seepage of contaminants through the slurry wall into the downgradient Cohansey Aquifer and into the nearby surface streams, and eventually into Alcyon Lake; and (2) seepage of contaminants downward through the Kirkwood Clay into the Kirkwood Aquifer, which flows towards Alcyon Lake.

Therefore, to meet the overall objective (as defined in the 1982 ROD) of improving the reliability of the contaminant system, minimizing or eliminating the flow of contaminants from these two pathways is essential. This could be achieved in any of several ways:

(1) Complete removal of the source of contaminants;

(2) Reversal of the hydraulic gradient across the slurry wall, causing all potential flow to be inward;

(3) Capture of the contaminants entering the Kirkwood Aquifer;

(4) Solubilization and extraction of contaminants from the landfill.

Remedial Alternative Options

According to the draft National Oil and Hazardous Substances Contingency Plan (NCP) and current policy, five categories of remedial alternatives must be considered when evaluating candidate remedial options. These categories are:

I. Off-site storage, destruction, treatment or secure disposal of hazardous substances at a facility approved under the Resource Conservation and Recovery Act (RCRA). Such a facility must also be in compliance with all other applicable EPA standards (e.g., Clean Water Act, Clean Air Act, Toxic Substances Control Act);

II. Alternatives that attain all applicable or relevant Federal public health and environmental standards, guidance, and advisories;

III. Alternatives that exceed all applicable or relevant Federal public health and environmental standards, guidances, and advisories;

IV. Alternatives that meet the CERCLA goals of preventing or minimizing present or future migration of hazardous substances and protect human health and the environment, but do not attain the applicable or relevant standards;

V. No Action.

Potential on-site remedial alternatives for the Lipari Landfill site have been classified into four broad options. A description of these options and their related NCP categories are discussed below:

1. Complete Removal (Category I)

Under this option, the containment system would be dewatered and the leachate/groundwater would be treated in the most cost-effective manner.

After the site has been dewatered, the cap would be removed and the site would be excavated to remove the contaminated soil, refuse and miscellaneous bulk material. This material would be disposed of in a RCRA-permitted treatment, storage or disposal facility. Such a facility must also be consistent with EPA's Off-site Policy for CERCLA. The excavated site would be filled with clean material, compacted, graded to approximate local conditions, and seeded. Excavation would need to be carried out within an enclosure to minimize the release of volatile organic compounds to the environment.

2. Enhanced Containment (Category IV)

This option consists of dewatering the groundwater/leachate from within the containment system until the aqueous level within the containment system is below that of the groundwater outside. This change in hydraulic gradients would ensure that any potential flow through the slurry wall is into the system, thus precluding any additional off-site migration of contaminants. The groundwater/leachate pumped from the containment system would be treated and disposed of in a cost-effective manner.

The Enhanced Containment Option with on-site pretreatment and discharge to the local POTW was the second phase remedial action as described in the 1982 ROD.

3. Flushing of the Encapsulation System (Cleanup) (Category II, III or IV depending on the level of treatment achieved)

   Under this option, an attempt would be made to clean the site by flushing the contaminants out of the soils and debris in the encapsulation system. Flushing is accomplished by injecting clean water into the system, saturating the system and "flushing" the contaminants from the soils and debris. The now-contaminated water would be treated and disposed. Different alternatives to this option consist of how flushing would be carried out; that is, whether it would be a continuous or batch-type operation.

   Other alternatives to this option consider whether the flushing water should be clean upgradient groundwater, public water, or treated post-flushing water pumped from the site.

   Should treated post-flushing water not be used for reinjection, it would have to be disposed of in a cost-effective manner.

4. No Action (Category V)

   Under this option, the site would be left in its present condition and a groundwater monitoring program would be implemented.

Components of the Remedial Action Options

The remedial action options described above can be broken down into the following components:

- Disposal
- Leachate collection
- Treatment of various waste streams

A variety of technologies exist that could make up these components (Table 3). These technologies were subjected to a technical, environmental, public health, institutional, and cost screening respectively. Those technologies that passed this screening (Table 4) were integrated into candidate remedial alternatives and evaluated in detail.

Groundwater modeling revealed that the bulk of future potential contamination from the landfill to the environment would be through the Kirkwood Clay into the Kirkwood Aquifer. Therefore, capturing the leachate entering the Kirkwood Aquifer by pumping the aquifer became a component of candidate remedial alternatives.

Candidate Remedial Alternatives

Seven candidate remedial alternatives (Table 5) were evaluated in detail. Each of these alternatives have subalternatives which were in turn evaluated. The following are descriptions and evaluations of all alternatives, and subalternatives.

Alternative 1 - Complete Removal

Dewater the containment system and treat and dispose of the collected leachate. Remove the existing cap, excavate the contaminated soil, refuse and miscellaneous bulk material, and transport this material to a RCRA-permitted secure landfill that meets EPA's Off-site Policy for CERCLA wastes. Fill with clean material, compact, grade to approximate local conditions and seed. Excavation would have to be carried out within an enclosure to minimize the release of volatile organic compounds to the environment.

The subalternatives represent alternate means of treating and disposing of the leachate and are as follows:

(a) Off-site Treatment at a Privately-Owned Treatment Storage and Disposal Facility.

Store the leachate on-site in a holding tank sized to contain a three-day flow. Transfer the leachate from the holding tank to a series of tank trucks using a 5-day work week schedule. Transport the leachate to an off-site facility for treatment and disposal.

(b) On-site Pretreatment and Discharge to the Local POTW

An on-site pretreatment facility will have to comply with the pretreatment requirements of both the local POTW and the NJDEP. Therefore, an on-site pretreatment facility at Lipari would include: a flow equilization basin, a precipitation/flocculation/sedimentation reaction system to remove metals and suspended solids, air stripping to remove volatile organics, a filtration/activated carbon adsorption system to remove phenols, and treated leachate holding tanks to permit monitoring and to ensure discharge acceptability by the POTW.

Sludge generated will be disposed at a permitted off-site facility. Air emissions will be controlled by the use of vapor-phase carbon units.

(c) On-site Treatment and Discharge to Chestnut Branch

Discharge to Chestnut Branch would require the removal of solids, BOD, COD, and TOC, as well as reduction of priority pollutants in compliance with NJDEP's discharge criteria for Chestnut Branch. Two alternate technologies could be used to meet these criteria, the PACT (powdered activated-carbon treatment) process or a physical/chemical treatment process. Waste streams generated by either facility would be treated on-site or disposed of at an appropriately permitted facility.

Under the complete removal alternative, the source of the contamination would be removed by excavation, thereby achieving the goals of site remediation. However, major risks are associated with the implementation of this alternative.

This alternative is the most difficult to implement because of the problems associated with excavation within a controlled environment. In addition, by removing the existing cap from the containment system, the trapped volatile organics would probably be released. Even though excavation would be done within an enclosure, the potential for release into the atmosphere and the impacts on the local community are expected to be significant.

Excavating, handling, and transporting approximately 864,000 cubic yards (CY) of hazardous material pose numerous hazards. Exposed wastes would constitute an extreme direct-contact hazard to on-site workers, and would create a hazardous atmosphere within the excavation structure. Therefore, this the least desirable of any of the alternatives with regards to worker safety. Because of the large number of trucks used to transport the hazardous material to a RCRA-permitted facility, additional safety hazards exist under this alternative in the form of potential traffic accidents and hazardous waste spills.

It is EPA's policy to pursue response actions that use treatment, reuse or recycling over land disposal to the greatest extent praticable consistent with CERCLA requirements for cost-effective remedial actions. Because of the limited land disposal facilities available and the inherent problems with land disposal, it is EPA's policy to use land disposal only when other alternatives are impracticable or do not sufficiently safeguard public health and the environment.

Finally, this alternative has the highest cost of all alternatives considered.

Alternative 2 - No Action but Pump the Kirkwood Sands (Enhanced Containment)

Leave the encapsulation system in its present state but pump the Kirkwood Sands beneath the site. Utilize four wells to capture vertical seepage from the containment system which percolates through the Kirkwood Clay into the underlying Kirkwood Sands. Treat this collected leachate by one of three subalternatives:

(a) Off-site Treatment at a Privately Owned Treatment Storage or Disposal Facility;

(b) On-site Pretreatment and Discharge to the Local POTW;

(c) On-site Treatment and Discharge to Chestnut Branch.

The concept for this alternative is that once the entire thickness of the Kirkwood Clay is saturated with contaminated groundwater/leachate, the bulk of the contaminants leaving the site would be through this pathway into the Kirkwood Aquifer. Therefore, the goals of the second phase remedial action would be partially met through the implementation of this alternative. While the potential remains for seepage of contaminants through the slurry wall into the Cohansey Aquifer and ultimately into the streams and lake remains under this alternative, the potential for seepage of contaminants into the Kirkwood Aquifer would be removed. It would take approximately 4 years for the groundwater in the containment system to naturally reach a steady state at the 107 foot elevation. At this elevation, approximately 150 gpd would seep through the slurry wall and approximately 1500 gpd would seep vertically through the Kirkwood Clay.

Seepage of contaminants through the slurry wall would violate applicable groundwater criteria and pose a potential risk to human health. As noted above, seepage through the slurry wall eventually reaches the surrounding streams and lake. The estimated concentration of bis (2-chloroethyl) ether in the lake due to potential slurry wall seepage would be 0.13ppb ppb which would pose a health risk.

Disregarding this risk, this alternative is technically feasible and implementable.

It is unknown how long it would take for the contaminant concentrations found in the groundwater in the containment system and in the Kirkwood Aquifer to be reduced to levels that would meet all relevant and applicable groundwater standards. However, it is estimated that it would take 35 years to reduce the contaminant concentrations of the groundwater in the containment system to 10% of the initial concentrations found. Likewise, it is estimated that it would also take 35 years for the contaminant concentrations found in the Kirkwood Aquifer to be less than 1% of the initial concentration observed in the containment system. This contaminant concentration reduction phenomenon is expected to occur due to natural flushing of the material in the containment system.

Due to these unknowns, the actual life of the operation cannot be determined at this time. The time estimates given were used for alternative comparison and cost-estimation purposes only. The actual life for this alternative will be determined during actual operation. Throughout the operation, periodic evaluations will determine the effectiveness of the alternative and the need to continue the operation or establish alternative concentration limits.

The time estimates for the other alternatives discussed below were also used for alternative comparison and cost estimation purposes only. However, since the effectiveness of each alternative discussed below will have to be determined during the operation of that alternative, the periodic evaluation process would need to be performed for each alternative.

<u>Alternative 3</u> - Dewater the Encapsulation System (Enhanced Containment)

Dewater the Upper Cohansey formation within the containment system and dispose of the collected leachate by one of the following subalternatives:

(a) Off-site Treatment at a Privately Owned Treatment, Storage and Disposal Facility;

(b) On-site Pretreatment and Discharge to the Local POTW;

(c) On-site Treatment and Discharge to Chestnut Branch.

Dewatering the Upper Cohansey within the containment system removes a portion of the water-transportable contaminants, preventing this fraction from eventually migrating through the containment system into the environment. By maintaining the groundwater level within the containment system below the outside level, the hydraulic gradient across the slurry wall would be inward.

Other benefits to dewatering the containment system include a decrease in the vertical seepage through the Kirkwood Clay due to the decrease of driving head, and a decrease of potential degradation of the slurry wall due to the decrease of the wetted surface area.

As indicated before, Alternative 3(b) was the Phase II remedial action identified in the previous Lipari ROD to achieve the objective of improving the reliability of the containment system. However, there is a health risk associated with this alternative. During the Phase II on-site remedial investigation and feasibility study, it was found that the majority of the potential seepage out of the containment system would be through the Kirkwood Clay. Because the Kirkwood Aquifer is believed to discharge to Alcyon Lake, this potential seepage poses an environmental and public health risk at the lake. Modeling results show that bis (2-chloroethyl) ether would persist in the lake in concentrations exceeding federal Water Quality Criteria (0.41 vs. 0.03 ppb).

Disgregarding this risk, this alternative is technically feasible and implementable.

An estimated 28 years would be required to reduce the contaminant concentrations of the groundwater in the containment system to 10 percent of the initial concentrations.

As stated above, this concentration reduction phenomenon is expected to occur because of natural flushing of the material in contact with the groundwater. Under this alternative, care would need to be exercised in deciding when to terminate the operation. Should the contaminant concentration be reduced enough for the responsible agencies to decide to terminate the operation of this alternative, it is likely that the groundwater levels would rise and saturate materials that had been dry during the operation of the facility. This resaturation of materials could potentially cause leaching of chemicals, again threatening the environment and human health.

<u>Alternative 4</u> - Dewater the Encapsulation System and Pump the Kirkwood Sands (Enhanced Containment)

Dewater the Upper Cohansey formation within the containment system. In addition, pump and collect the vertical seepage from the encapsulation into the Kirkwood Sands beneath the site. Under this scenario, two different waste streams would be collected (leachate/groundwater from the Cohansey within the encapsulation and leachate/groundwater in the Kirkwood Aquifer). Treat both waste streams using one or more of the following subalternatives:

(a) Off-site Treatment at a Privately Owned Treatment Storage and Disposal Facility;

(b) On-site Pretreatment and Discharge to the Local POTW;

(c) On-site Treatment and Discharge to Chestnut Branch.

Because this alternative goes beyond Alternative 3, it meets the objective of the Phase II remedial action of improving the reliability of the containment system. In addition, this alternative action mitigates potential risks resulting from the possible seepage of leachate into the Kirkwood Aquifer. Therefore, should the perceived risk of contamination of the Kirkwood Aquifer be accurate, this alternative is considered superior to Alternative 3 on an environmental/public health basis.

This alternative is considered technically feasible and implementable.

An estimated 23 years would be required for the contaminant concentrations of the groundwater to be reduced to 10% of the initial concentrations found. In addition, an estimated 25 years would be required for the contaminant concentrations in the Kirkwood to be less than 1% of the initial concentrations observed in the containment system.

As in Alternative 3, should the operation of the system be terminated, leaching of contaminants may recur due to the resaturation of materials previously kept artificially dry. This potential leaching of chemicals would again threaten the environment and human health.

<u>Alternative 5</u> - Flush the Encapsulation System (Cleanup)

Dewater the Upper Cohansey Formation within the containment system. Once this operation is completed, re-fill the containment system with "clean water". Extract the now-contaminated water from the containment system while injecting clean water into the system to "flush out" the contaminants from the soils and debris. Continue this operation until the water within the containment system meets all relevant and applicable groundwater crtieria or until concentrations are achieved that would not cause adverse risk to any receptors should they be released. Variations in what makes up the clean flushing water and how the extracted leachate is handled constitutes the following subalternatives:

(a) Treat the extracted leachate/flushing water on-site using either a PACT process train or a physical/chemical treatment train. Re-inject the treated effluent for flushing water;

(b) Pretreat the extracted leachate/flushing water on-site and discharge to the local POTW. Use either upgradient groundwater or water from local public supply as clean water;

(c) Treat the extracted leachate/flushing water on-site and discharge to Chestnut Branch;

(d) Proceed as in 5(a), but omit the initial dewatering of the system.

This alternative partially meets the objective of the Phase II remedial action of ensuring the reliability of the containment system. This alternative is an active attempt to remove the water-borne contaminants in the containment system. However, there are two potential risks involved:

1. The water level inside the containment system will be kept higher than the groundwater level in the north, east, and southeast side of the site, resulting in a potential flow out of the containment system in these areas. This outward flow potential could result in additional contamination of the Cohansey Aquifer, the marsh area, the surrounding streams, and Alcyon Lake.

2. There is no provision for capture of potential seepage to the Kirkwood Aquifer. Risks associated with this condition have been defined above.

The potential contamination of the streams and Alcyon Lake due to potential flow through the slurry wall could be mitigated under a seepage collection system, which may be developed under the authorization of a subsequent Lipari ROD. As stated previously, an Off-site Remedial Investigation and Feasibility Study (RI/FS) is presently being prepared for the Lipari Landfill. This Off-site RI/FS will look at the need for and alternatives to remedial action for the off-site areas. These off-site areas consist of the marsh area, the streams surrounding the site and Alcyon Lake.

Disregarding these risks, this alternative is technically feasible and implementable.

The main advantage of this alternative is the potential to cleanse the material in the containment system of water-borne contaminants. The removal of the water-borne contaminants reduces the future risk of contaminants leaching from the material within the containment system after operations at the site are terminated. Therefore, after the termination of a successful flushing operation, on-site presence would be limited to a monitoring program.

The technical components of this alternative, ie. extraction and injection of groundwater, are proven technologies. The extent of reduction of contaminants will be limited by the technology available. Based upon a laboratory soil leachability test conducted with soils from Lipari, it is expected that 90% of the water-transportable contaminants will be removed from the leachate with the passing of 10 pore volumes of water.

Nevertheless, the potential of permanently removing the threat of future contaminants entering the environment from the site makes this alternative attractive. While it is unknown when the contaminant concentration in the groundwater within the containment system will meet all applicable and relevant standards and statutes under this alternative, it has been estimated that it would take 9 years to remove 90% of the water-borne contaminants from the containment system. Termination of this alternative would have to be determined during operation. As with all other alternatives, the above time estimate was used for alternative comparison and cost estimating purposes only.

Alternative 6 - Flush the Encapsulation System and Pump the Kirkwood Sands (Cleanup)

Under this scenario, subalternatives 6(a) through 6(d) would coincide with subalternatives 5(a) through 5(d) except that Alternative 6 subalternatives would include pumping of the Kirkwood Sands to draw potential vertical seepage out of the containment system.

While this alternative addresses the potential contamination of the Kirkwood Aquifer through pumping of the Kirkwood groundwater, the other concerns identified in the discussion of Alternative 5 are the same. Under Alternative 6, the estimated time required to reduce the water-borne contaminants from the system is 8 years as compared to 9 years for Alternative 5.

Alternative 7 - No Action

Under this option, the site would be left in its present condition and a groundwater monitoring program would be implemented. In this program, water level measurements would be taken in all wells on a regular basis. In this manner, differential head conditions could be monitored that would indicate the direction of groundwater flow across the containment wall. In addition, all wells screened within the Kirkwood Formation and all paired Cohansey wells would be sampled on a quarterly basis. These samples would be analyzed quarterly for indicator pollutants and annually for priority pollutants to assess changes in any seepage conditions from the containment system. In this manner, the extent and nature of any migration of contaminants out of the containment system would be monitored and the need for any future remedial action could be planned accordingly.

This alternative does not meet the objective of the Phase II remedial action to improve the reliability of the containment system. In addition, the groundwater within the containment system does not meet any of the relevent and applicable groundwater criteria.

Modeling has determined that continued seepage out of the containment system, even at the estimated potentially slow rate, poses a threat to the environment and human health. Concentrations of chemicals of concern, specifically bis (2-chloroethyl) ether, a suspected human carcinogen, would persist at levels considered a potential threat to human health (1.2 ppb).

Alternative 8 - Batch Flush the Containment System (Cleanup)

This alternative is substantially similar to Alternatives 5 and 6, except in the mode of operation. In Alternatives 5 and 6, once the containment system is initially dewatered and filled, the dewatering-reinjection operation would be continuous and concurrent.

In contrast, under Alternative 8, flushing would be a batch-type operation. That is, the dewatering and the injection operations would not be done at the same time, but in sequence. Under this system, certain problems perceived with flushing should be mitigated. Under the continuous flushing operation described for Alternatives 5 and 6, a potential exists for short-circuiting - a phenomenon in which water seeks the path of least resistance. Channels between injection wells and extraction wells can develop when short-circuiting occurs, allowing potential pockets of contaminants that would remain unflushed. This phenomenon would be expected to occur at

Lipari because of the heterogeneous makeup of the landfill and the varying compaction of layers. It is believed that short-circuiting could be overcome by completely draining and re-saturating the system consecutively.

An estimated 15 years would be required to flush 90% of the water-soluble contaminants from the system. This is 6 to 7 years longer than the estimates for the other flushing alternatives. However, this mode of operation is expected to remove the contaminants more effectively.

Variations to Alternative 8 are identical to those described under the discussions for Alternatives 5 and 6. The other considerations discussed under the other flushing alternatives hold true for Alternative 8. Therefore, this alternative is considered technically superior to both Alternatives 5 and 6.

As discussed under Alternative 5, the intent of a flushing operation is to cleanse the site so that, should the containment system fail, the rise in groundwater within the system and the resaturation of the soil and debris would not cause future off-site contamination. Therefore, after a successful flushing operation, long-term involvement would be limited to a monitoring program.

<u>Evaluation of Subalternatives for Leachate Treatment Process and Ultimate Disposal</u>

Most of the alternatives discussed above showed subalternatives which varied by their treatment process and ultimate discharge locations. Below is a discussion of these subalternatives:

(a) Off-Site Treatment at a Privately Owned Treatment, Storage and Disposal Facility.

This subalternative is technically feasible, implementable and poses minimum risks. There are several privately owned treatment, storage and disposal facilities in the area that would accept Lipari's wastes for treatment and disposal. For this option to be implemented, the particular facility's compliance with all environmental laws would have to be ensured. Two disadvantages to this subalternative exist: (1) risk of potential traffic and spill accidents, and (2) a high present-worth cost. However, use of an off-site treatment facility for a short-term operation - e.g. initial dewatering of the containment system - may be competitive with other short-term subalternatives.

(b) On-site Pretreatment and Discharge to the Local POTW.

The pretreatment process train is necessary to comply with the local POTW's pretreatment regulations. This subalternative is feasible, poses the least risk, and has the lowest present-worth cost of the leachate treatment subalternatives. However, the implementation of this subalternative will be the most difficult of the leachate disposal subalternatives. Negotiations with the local POTW are ongoing. The potential choice of this subalternative will depend on these negotiations. Significant legal and liability concerns are central to these negotiations. Table 6 shows the discharge limitations for the local POTW.

(c) On-site Treatment and Discharge to Chestnut Branch

This subalternative is technically feasible. However, there is concern over its implementability and certain risks associated with treatment efficiencies for several chemicals. The public may perceive discharging effluent, even though treated, as continuing the discharge of contaminants into Chestnut Branch and Alcyon Lake.

Two treatment processes were investigated for this subalternative, the PACT process and a physical/chemical process. There is concern that some substances, specifically bis (2-chloroethyl) ether, would not be adequately removed from the effluent and may pose a health risk at the lake if the effluent is discharged to Chestnut Branch. For this leachate disposal option to be considered further, this risk must be mitigated. Table 7 shows the draft effluent limitations for the critical toxic pollutants with respect to discharge to Chestnut Branch, as determined by the State of New Jersey. Pilot studies for these treatment processes may be required to refine treatment efficiencies.

As indicated above, except for a short-term process, the most cost-effective, technically feasible, implementable and environmentally-sound subalternative for leachate treatment and disposal is to pretreat the leachate/groundwater on-site and discharge it to the local POTW. As such, for the purposes of comparing the eight major alternatives, it was assumed that the leachate/groundwater for all the alternatives would be treated at the local POTW.

Comparison of Alternatives

Table 8 identifies the eight alternatives as described above and summarizes the costs and the technical, environmental and institutional factors associated with each alternative. The alternative comparison process by which the recommended alternative was chosen is described below.

As discussed above, the No-Action Alternative does not achieve the goal of the Phase II remedial action for the Lipari Landfill. The potential for groundwater/leachate seeping through the containment system threatens the environment and public health. Bis (2-chloroethyl) ether is estimated to be found in the lake at levels of 1.2 ppb which is of concern. The life of the encapsulation system has been estimated to be 30 years. However, this expected life could be shortened due to the degradation effect of the chemicals in the containment system. Should effectiveness of the containment system be reduced, the threat to the environment and public health would be increased. Therefore, Alternative 7 (No Action) was determined not to be appropriate.

At the other end of the spectrum, the Complete Removal Alternative removes the source of the contamination and so the threat to the environment and human health. However, the risks associated with the implementation of this alternative and the inherent difficulties of such a large-scale operation makes this alternative impractical. Two other factors disfavor the Complete Removal Alternative, the high cost of the alternative ($288 million vs. $10.2 million for the next most costly alternative) and the scarcity of secure RCRA-permitted landfills that could and would accept approximately 864,000 cy of hazardous materials. Therefore, it was determined that Alternative 1 (Complete Removal) is not feasible for the Phase II Remedial Action for the Lipari Landfill.

The two major groups of alternatives to be considered are what have been categorized as the "Enhanced Containment" and the "Flushing" Alternatives. Both of these alternatives have various subalternatives with and without the accompanying pumping of the Kirkwood Aquifer.

In the discussions above, it was mentioned that potential seepage from the landfill through the Kirkwood Clay into the Kirkwood Aquifer would pose a threat to the environment and public health because of the resultant concentrations of the chemicals of concern in the streams surrounding the landfill and Alcyon Lake. The data available do not support the contention that these contaminants have already saturated the entire thickness of the Kirkwood Clay and are continuously seeping into the Kirkwood Aquifer. The contamination currently observed in the Kirkwood Aquifer (under the landfill only) may be due to improperly installed wells which have subsequently been corrected. Therefore, the contamination may have been the result of a past singular event and may not be continuing.

To protect the environment and public health, capture of any continuous seepage into the Kirkwood Aquifer should be undertaken. However, since it is not known whether the Kirkwood Clay is saturated with contaminants throughout its thickness and seepage of contaminants into the aquifer is continuous, the implementation of this action would be premature. To determine whether seepage is continuous, wells should be installed to further monitor the quality of the Kirkwood Aquifer downgradient of the landfill. Should the data confirm the above and the groundwater exceed applicable and relevant criteria, pumping of the Kirkwood Aquifer to capture the seepage and treatment of this groundwater/ leachate would be warranted.

The "Enhanced Containment" alternatives meet the objective of the Phase II Remedial Action as defined in the previous ROD for the Lipari Landfill: to improve the reliability of the containment system. With enhanced containment the seepage of contaminants out of the system is controlled at the source. However, there are several disadvantages to these alternatives:

(1) The length of time the enhanced-containment program is likely to be operating is estimated to be 23 to 28 years and potentially longer.

(2) The source of the contamination remains on-site. Since the containment system has been dewatered, the contaminated debris and soils in the Upper Cohansey remain dry during the enhanced-containment operation. Any natural flushing that would have occurred due primarily to groundwater contact will have been stopped. The means of contaminant reduction under this alternative is biological and chemical decomposition. In addition, some contaminant removal would occur through the dewatering operation.

(3) Future seepage of contaminants from the landfill is possible. Once implemented, should the operation of the enhanced-containment operation cease, the water level within the containment system will gradually rise to the 107-feet MSL elevation. The level may rise higher, depending on the degree of potential degradation of the slurry wall. This increase in water level will resaturate the contaminated materials previously kept artificially dry which may in turn leach contaminants into the groundwater. The potential for contaminants leaving the site will, therefore, again pose a health threat.

The future risks identified with the Enhanced Containment Alternatives could be mitigated through a good monitoring program to alert the regulatory agencies to the existence of new leachate and the need to remediate this potential off-site contamination.

The Flushing Alternative has the potential for addressing the risks associated with the Enhanced Containment Alternative, at an incremental investment in capital costs. Therefore, the Flushing Alternative has been chosen for the Phase II Remedial Action for the Lipari Landfill. The Flushing Alternative will be discussed in detail in the following section.

Recommended Alternative

As stated above, Flushing has been chosen as the recommended alternative. The rationale for this choice is further described below.

The Flushing Alternative meets the objective of the Phase II remedial action for the Lipari Landfill: to improve the reliability of the containment system. By controlling the leachate, the containment properties of the encapsulation system are enhanced. Removing the water-soluble contaminants from the system mitigates the potential for future contamination and improves the overall remedial action for Lipari.

Using the flushing mode described in Alternative 8, it would take 15 years to flush 90% of the water-soluble contaminants from the system. This is 6 to 7 years longer than the estimates determined for the other flushing alternatives. However, since the Alternative 8 mode is considered to be technically superior to the other alternatives and since it is expected to mitigate the short-circuiting problem, the time differential is not considered significant.

While there is the potential for contaminants to seep through the slurry wall during flushing, this problem can be mitigated through an off-site remedial action to be developed under the current Off-site RI/FS. Under the mode of flushing operation contemplated, the water level will increase and decrease throughout the operation. Therefore, this potential exists only 50 % of the time. The long-term benefits that could be realized under the flushing alternative are considered to be worth the short-term risks, especially since these risks could be mitigated.

The National Contingency Plan states that: "The appropriate extent of remedy (for a remedial action) shall be determined by the lead agency's* selection of a cost-effective remedial alternative which effectively mitigates and minimizes threats to and provides adequate protection of public health, welfare and the environment". The Flushing Alternative meets this requirement. While the Flushing Alternatives show a higher present-worth cost when compared to the Enhanced Containment Alternatives, (see Table 6), they are within the level of accuracy associated with cost estimates developed under an RI/FS. In addition, the Enhanced Containment costs shown do not include the possible need for replacement of the slurry wall. When this cost is included ($2.1 million), the present worth costs of the respective alternatives are more comparable. The added benefits of removing the water-soluble contaminants, and removing the potential future environmental and public health risks, are worth the added cost.

EPA's CERCLA Off-site Policy discusses the Agency's preference for treatment, reuse or recycling of materials. This policy states: "When developing remedial alternatives, treatment, reuse or recycling must be considered.... Detailed analysis of these alternatives should include considerations of long-term effectiveness of treatment and comparative long and short term costs of treatment as compared to other alternatives". Flushing of the Lipari Landfill is considered treatment of the contaminants within the system. The Agency's position is that the benefits of cleansing the containment system of water-soluble contaminants justifies the additional cost relative to enhanced containment.

While the actual reduction in contaminants during the flushing operation is unknown, studies on Lower Cohansey Sands from the Lipari Landfill have shown that 90% of the contaminants in the leachate can be removed by flushing ten pore volumes of water through a sample. The actual degree of success of removing the contaminants from the landfill will be determined by the technology available and the actual site conditions.

If warranted, the flushing operation at the site could easily move into the "Enhanced Containment" mode. Since the equipment needed for enhanced containment would also be used for flushing, this shift should be relatively simple. The change in operation would lower the operation and maintenance costs of the containment operation. The extra costs already invested in the flushing alternative are the capital costs of the injection wells, injection water facilities and a somewhat

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*For the Lipari Landfill, the U.S. Environmental Protection Agency is the lead agency.

larger groundwater/leachate treatment facility. The capital construction cost differential between the enhanced containment and flushing alternatives is $1 million. However, the potential benefits to be derived from the flushing operation have been determined to outweigh this cost differential.

To ensure the integrity of the Kirkwood Aquifer, the recommended alternative includes the installation of monitoring wells down-gradient of the landfill. Should contaminant concentrations in the aquifer be found to exceed applicable and relevant criteria, the groundwater pumping to capture this contamination would be warranted.

In summary, flushing was chosen as the recommended alternative because:

1. Ninety percent of the water-transportable contaminants can be removed from the landfill so that the potential for future seepage of these contaminants is significantly reduced or eliminated.

2. The operating duration of the flushing program at the landfill is estimated to be ten to fifteen years shorter than other alternatives.

As noted above, the need for and identification of remedial action alternatives for the off-site area are presently being investigated. The on-site recommended alternative may impact the off-site area because of the potential for seepage through the containment system. This impact will have to be incorporated into the off-site investigation. In addition, additional treatment capacity may be needed as a result of potential off-site remedial actions. On-site treatment facilities for the flushing operation and off-site treatment facilities should be coordinated. Implementation of the recommended on-site alternative should proceed in phases as described below:

- Install groundwater/leachate extraction and injection wells within the encapsulation system for dewatering and flushing of the system.

- Pump the groundwater/leachate from within the containment system until it reaches approximately 100 feet MSL above (i.e., the top of the Lower Cohansey). The groundwater/leachate may be treated either on-site prior to discharge to the local POTW or stream, or off-site at a permitted privately owned treatment, storage and disposal facility.

- Install and monitor groundwater wells downgradient of the site and screened across the entire thickness of the Kirkwood Aquifer.

- Flush the encapsulation system to attempt to cleanse the encapsulated material of water-borne contaminants. This flushing operation will be coordinated with potential off-site remedial actions.

  Throughout the operation, regular evaluations will be made to determine the effectiveness of the flushing program; as well as, the need to continue this program or the need to take other actions.

The State of New Jersey recommends that Alternative 8 should be implemented as described above.

The following listed figure represent a cost estimate for the proposed remedial action. The EPA will be responsible for paying 100% of the project design. Cost sharing for project implementation is 90% Federal and 10% State of the cost to implement the remedial action.

<u>Cost Summary for the Implementation of the Recommended Alternative</u>

Alternative No. 8b - Flushing

	Remedial Measure Component	Capital Costs	O & M Present-Worth	Total Cost Present-Worth
1.	Install extraction and injection wells	$688,000	$2,139,600	$2,827,600
2.	Pump, treat and dispose of one pore volume		340,000†	340,000†
3.	Install Kirkwood groundwater wells	122,500	88,300	210,800
4.	Monitor Kirkwood Aquifer		179,500	179,500
5.	Monitor wells within the containment system		775,800	775,800
6.	Operate and Maintain Treatment and Flushing System	2,653,500*	1,918,000*	4,571,500*
	TOTAL	$3,464,000*	$5,441,200*	$8,905,200*

† Cost is for on-site pretreatment with permanent on-site treatment system and discharge to local POTW.

* Estimates based on flushing only. Changes in these costs will be dependent upon the off-site/on-site treatment systems ultimately designed.

__Consistency With Other Environmental Laws__

The recommended alternative for the Lipari Landfill site includes extraction and disposal of groundwater/leachate. The groundwater/leachate will be treated on-site prior to discharge to the local POTW or to Chestnut Branch, or will be transported off-site and treated at a RCRA-permitted facility. Under any scenario, this alternative meets all the regulatory criteria.

The Draft National Contingency Plan states that "Federal, State and local public health or environmental permits are not required for Federally financed remedial action... However, remedial actions that involve storage, treatment or disposal of hazardous substances, pollutants or contaminants at off-site facilities shall involve only such off-site facilities that are operating under appropriate Federal or State permits or authorizations." This requirement will be met for the remedial action taken at the Lipari Landfill.

An assessment was made as to whether the groundwater in the encapsulation system would meet all relevant and applicable standards after completion of the remedial action. Thirteen "indicator" chemicals were chosen to make this assessment. Since it is impossible to determine how clean the groundwater would be at a given time, a gross evaluation was made to see whether 99% removal of contaminants would meet the relevant and applicable standards. Table 9 shows the results of this assessment.

As can be seen from this table, if 99% removal of the contaminants was achieved, the only criteria that could be met are the 1-day EPA SNARLS limits and the 1-day NAS SNARLS. The RCRA Part 264 groundwater standards could also be met, depending on the initial concentration of chromium assumed in the leachate. Even at 99.9% removal of the contaminant concentration (if this could ever be achieved), the entire array of potential remediation criteria could not be met. Since it is unlikely that the technology available would exceed 99.9% removal efficiency, the groundwater in the landfill will probably never meet all applicable or relevant standards.

As stated earlier, the regulatory agencies will make regular evaluations of the effectiveness of the remedial action and determine the need for alternate concentration limits.

Operable Units

The overall Lipari Landfill remedial action has been broken into three operable units:

1. Installation of the containment system. (completed)

2. Implementation of Phase II - On-site Remedial Action.

3. Implementation of Phase II - Off-site Remedial Action.

The subject of this ROD is the implementation of the Phase II on-site Remedial Action.

Extent of Remedy

During development of the RI/FS, an analytical procedure which included bench scale laboratory testing, was utilized to simulate the leaching and removal of contaminants from the landfill for different source control alternatives under consideration. In order to compare the cost of different landfill flushing options on a common basis, a standard performance level of 90 % removal was chosen. The analytical procedure is considered as adequate for the comparison of alternatives and is a reasonable application of existing data and knowledge of the site. However, this procedure is based on several assumptions; and the actual rate at which contaminants are flushed from the landfill can not be verified until the actual operation begins.

In general, the first flush cycle should remove the greatest mass of contaminants from the landfill. Subsequent flush cycles will yield smaller quantities until eventually the yield from successive flushes will approach a constant value which will be greater than zero for the forseeable future. The level of contaminants which are leached from the landfill at any given time should be directly related to the quality of the leachate which is released to the groundwater. Thus, during the early stages of operation, the ratio of the cost to treat one pore volume (batch volume) to the improvement in leachate quality (ie. difference in total mass removed between successive flushes) will be relatively small. However, with continued operation of the flushing and treatment alternative, this ratio should increase because the cost to treat a pore volume of leachate will be relatively constant but the improvement in leachate quality will approach zero.

A practical definition of a feasible level of source control can be determined from an analysis of the ratio of costs to leachate improvement. The flushing system should be operated as long as it continues to produce improved leachate quality. However, the system is no longer cost-effective to operate when continued flushing produces no significant improvement in leachate quality even though small quantities of contaminants may continue to be removed from the landfill. Thus a practical treatment level for source control should be viewed as an operational time after which the marginal benefits from successive flush cycles are inconsistent with the continuing cost for operation.

During operation of the flushing system there will be sampling to determine the mass of contaminants removed during each flooding and pumping cycle. If an analysis of performance data indicates that a practical level of source control has been reached, then operation of the system should cease and an analysis of any leachate which may be released to the groundwater should be undertaken. If resulting ground water concentrations are projected at that time to exceed applicable standards, then either an ACL or a groundwater cleanup program should be developed. In addition, operation of the source control system should cease sooner if it is determined that leachate from the landfill will not result in a violation of applicable groundwater and surface water standards. In any event, however, within five years there should be a comprehensive evaluation of the source control system along with the performance of the chosen groundwater and surface water remedial actions. The analysis will assess the effectiveness of the different cleanup efforts to assure coordination and consistency in the event that reasonable performance objectives are not being realized in any one of these areas.

Operation and Maintenance

Upon completion of the recommended remedial action, the following are the operation and maintenance requirements:

- Monitoring of groundwater elevation and quality in the Cohansey Aquifer;
- Monitoring of groundwater quality in the Kirkwood Aquifer;
- Operation and maintenance of the flushing system, including pumping and treatment facilities.

Future Actions

Schedule	Date
- Amend State Superfund Contract - Obligate Funds for Remedial Design - Initiate Design - Complete Design	Upon Reauthorization of CERCLA or funding by the State of New Jersey (October 1985)
- Complete Phase II Off-site RI/FS	January 1986
- Issue Phase II Off-site ROD	March 1986
- Initiate Design	May 1986
- Complete Design	January 1987

Community Relations

A public information meeting was held on July 12, 1984 at Pitman Borough Hall. Notices of the meeting were sent to all local officials and interested parties as outlined in the Lipari Landfill Community Relations Plan. At this meeting, EPA officials met with the public to hear citizens concerns regarding the On-site and Off-site RI/FS.

Another public meeting was held on January 23, 1985 at Pitman Borough Hall to discuss the work to be undertaken by EPA's consultant as part of the RI/FS. Letters were sent to all local officials and interested parties to notify them of the meeting. At this meeting, EPA officials provided an overview of the actions taken to date under the Superfund program and discussed in detail the RI/FS activities which were to be performed as part of the On-site and Off-site projects for Lipari. Following this presentation, a question and answer session was conducted.

On August 5, 1985, EPA transmitted copies of the draft Final On-site Feasibility Report for the Lipari Landfill to the Pitman Environmental Commission, starting the public comment period. The Pitman Environmental Commission placed this report on repository for public review. Letters were sent by EPA to all public officials and interested parties informing them of the availability of the report and the initiation of the public comment period.

A subsequent public meeting was held on August 15, 1985 at Pitman Borough Hall to discuss the remedial investigations undertaken for the on-site portion of the project, those being undertaken for the off-site portion, and the remedial alternatives developed for the on-site portion of the project. An information package, including an agenda and a fact sheet, was provided to each of the approximately 65 persons attending. EPA sent letters to all public officials and interested parties to notify them of the meeting. EPA officials and their consultant presented the preliminary findings of the off-site remedial investigation, the findings of the on-site remedial investigation, and the on-site remedial alternatives. Afterward, they responded to the concerns and questions raised by the public.

Responses to the written comments have been addressed in the attached Responsiveness Summary. In addition, more detailed information regarding the Community Relations Program is included in the attached Responsiveness Summary.

Enforcement

In August 1982, a settlement was reached with Mr. Nick Lipari, owner/operator, in the form of a Civil Action Consent Decree. During preliminary negotiations, the Potentially Responsible Parties (PRPs) indicated they will discuss settlement proposals with EPA. Further negotiations will take place following the issuance of this ROD. A Civil Referral was sent to EPA-HQ and the Department of Justice; and a complaint against the PRPs has recently been filed.

Volatile Organics (Results in ppb)	Radian Corp.[1] 1983 Field Sample	Radian Corp.[2] 1983 Lab Sample	JRB[3][4] Sept. 26, 1983	II Corp.[4]. Sept./Oct. 1984	JRB [4] Feb. 1985	JRB [4] Mar. 1985	Environmental[6] Measurements and Analysis March 1985
Acrolein				<500			
Acrylonitrile			ND	<500			
Benzene	3,000	4,500	5,900	2,200	29,000	8,700	371
Bromoform			<500 ND	<50			
Carbon Tetrachloride			<100 ND	<50			
Chlorobenzene	18	<50	270	110			1005
Chlorodibromomethane			<100 ND	<50			
Chloroethane	12	<50	47,<100 ND	<50			
2-Chloroethylvinyl ether			<250 ND	500			
Chloroform	8	48	760	<50			
Dichlorobromomethane			300	<50			
Dichlorodifluoromethane			<250 ND	<500			
1,1-Dichloroethane	54	<50	760	18	1	630	588
1,2-Dichloroethane	5,900	8,100	5,500,<69,000[5]	41,000	8,300	54,000	75,459
1,1-Dichloroethylene	4	<50	78	<50			148
1,2-Dichloropropane			24,<50 ND	<50			
1,3-Dichloropropylene			7,<250 ND	50			
Ethylbenzene	1,000	420	4,400	2,000			619
Methyl bromide			<500 ND	<500			
Trans 1,2-Dichloroethane							219
Ethylene dibromide (EDB)							ND

TABLE 1

LEACHATE CHARACTERISTICS AT LIPARI LANDFILL

	Radian Corp.(1) 1983 Field Sample	Radian Corp.(2) 1983 Lab Sample	JRB(3)(4) Sept. 26, 1983	IT Corp.(4) Sept./Oct. 1984	JRB (4) Feb. 1985	JRB (4) Mar. 1985	Environmental(6) Measurements and Analysis March 1985
Volatile Organics (cont'd)							
Methyl chloride	510	3,300	<1,000 ND	<500			
Methylene chloride			39,000	2,800	29,000	61,000	17,450
1,1,2,2-Tetrachloroethane			<500 ND	<50			
Tetrachloroethylene	7	<50	40,<100 ND	130			92
Toluene	9,900	30,000	75,000	37,000	73,000	87,000	
1,2-Trans-dichloroethylene	26	<50	360	88			
1,1,1-Trichloroethane	1	<50	73,<100 ND	<50			
1,1,2-Trichloroethane			<250ND	<50			
Trichloroethylene	14	<50	21,<100 ND	220			177
Trichlorofluoromethane			<250 ND	<50			699
Vinyl chloride	10	<50	96,<100 ND	<500			
Total VOC							176,962
Acid Extracts							
(Results in ppb)							
2-Chlorophenol			<500 ND	<40			
2,4-Dichlorophenol	9	ND	15,<500 ND	13,<40			
2,4-Dimethylphenol			<500 ND	<40			
4,6-Dinitro-o-cresol			<5,000 ND	<40			
2,4-Dinitrophenol			<5,000 ND	<40			
2-Nitrophenol			<500 ND	<40			
4-Nitrophenol	110	ND	<500 ND	<40			
p-Chloro-m-cresol			<500 ND	<40			

TABLE 1

LEACHATE CHARACTERISTICS AT LIPARI LANDFILL
(continued)

	Radian Corp.(1) 1983 Field Sample	Radian Corp.(2) 1983 Lab Sample	JRB(3)(4) Sept. 26, 1983	IT Corp.(4) Sept./Oct. 1984	JRB (4) Feb. 1985	Environmental(6) Measurements and Analysis March 1985
Acid Extracts (cont'd)						
Pentachlorophenol			<500 ND	<40		
Phenol	11,000	22,000	22,000	9,000	565	
2,4,6-Trichlorophenol			<500 ND	<40		
Base/Neutral Extracts (Results in ppb)						
Acenaphthene			<100 ND	<40		
Acenaphthylene			<100 ND	5.6,<40		
Anthracene			<100 ND	<40		
Benz.dine			<1,000 ND	<160		
Benzo(a)anthracene			<1,000 ND	<40		
Benzo(a)pyrene			<1,000 ND	<40		
3,4-Benzofluoranthene			<100 ND	<40		
Benzo(g,h,i)perylene			<250 ND	<40		
Benzo(k)fluoranthene			<100 ND	<40		
bis(2-chloroethoxy)methane			<200 ND	<40		
bis(2-chloroethyl)ether			83,000	15,600	76,000	
bis(2-chloroisopropyl)ether			<200 ND	<160		
bis(2-ethylhexyl)phthalate			65,<100 ND	<40		
4-bromophenyl phenyl ether			<100 ND	<40		
Butylbenzyl phthalate			<100 ND	4.0,<40		
2-Chloronaphthalene			<200 ND	<40		

TABLE 1

LEACHATE CHARACTERISTICS AT LIPARI LANDFILL
(continued)

	Radian Corp.[1] 1983 Field Sample	Radian Corp.[2] 1983 Lab Sample	JRB[3][4] Sept. 26, 1983	JRB[4] Feb. 1984	IT Corp.[4] Sept./Oct. 1984	Environmental[6] Measurements and Analysis March 1985
Base/Neutral Extracts (cont'd)						
4-Chlorophenyl phenyl ether			<100 ND		<40	
Chrysene			<100 ND		<40	
Dibenzo(a,h)anthracene			<250 ND		<40	
1,2-Dichlorobenzene	150	ND	370,<400 ND		440	
1,3-Dichlorobenzene			<400 ND		<40	
1,4-Dichlorobenzene			190,<400 ND		3.0,<40	1,619
3,3'-Dichlorobenzidine			<100 ND		<40	
2,4-Dichlorotoluene					5,018	
M-Chlorotoluene					2,903	
Diethyl phthalate	10	<1	350		94	
Dimethyl phthalate			<100 ND		<40	
Di-n-butyl phthalate	6	<1	44		<40	
2,4-Dinitrotoluene			<100 ND		<40	
2,6-Dinitrotoluene			<100 ND		<40	
Di-n-octyl phthalate			<100 ND		<40	
1,2-diphenylhydrazine (as azobenzene)			<100 ND		<40	
Fluoranthane			<100 ND		<40	
Fluorene			<100 ND		<40	
Hexachlorobenzene			<100 ND		<40	
Hexachlorobutadiene			<200 ND		<40	
Hexachlorocyclopentadiene			<200 ND		<40	
Hexachloroethane			<400 ND		<40	
Ideno(1,2,3-cd)pyrene			<250 ND		<40	
Isophorone	180	160	<200 ND		<160	

TABLE 1

LEACHATE CHARACTERISTICS AT LIPARI LANDFILL
(continued)

	Radian Corp.[1] 1983 Field Sample	Radian Corp.[2] 1983 Lab Sample	JRB[3][4] Sept. 26, 1983	IT Corp.[4] Sept./Oct. 1984	JRB [4] Feb. 1985	JRB [4] Mar.1985	Environmental[6] Measurements and Analysis March 1985
Base/Neutral Extracts (cont'd)							
Naphthalene	70	280	430	120			
Nitrobenzene			<200 ND	<40			
N-nitrosodimethylamine			ND	<40			
N-nitrosodi-n-propylamine			ND	<40			
N-nitrosodiphenylamine			<100 ND	<40			
Phenanthrene			<100 ND	<40			
Pyrene			<100 ND	<40			
1,2,4-Trichlorobenzene			<200 ND	<40			5965
1,2-Bis(2-chloroethoxy)ethane			140,000		61,000		
Bis(chloroethoxy)ethane	30,000 to 70,000	30,000 to 70,000					
Bis(chloroethyl)ether	8,000	12,000					
Bis(chloromethyl)ether				<40			
2,3,7,8-Tetrachlorodibenzo-p-dioxin				<40			
1,2-Bis(2Chloroethoxy)ether			83,000	240,000			
Pesticides/PCBs (Results in ppb)							
Aldrin			< 2*	<1.0			
BHC,Alpha			< 2*	<1.0			
BHC,Beta			< 2*	<1.0			

TABLE 1

LEACHATE CHARACTERISTICS AT LIPARI LANDFILL (continued)

	Radian Corp.(1) 1983 Field Sample	Radian Corp.(2) 1983 Lab Sample	JRB(3)(4) Sept. 26, 1983	JRB(4) Feb. 1984	IT Corp.(4) Sept./Oct. 1984	Environmental(6) Measurements and Analysis March 1985
Pesticides/PCBs (cont'd)						
BHC, Gamma			2.2		<1.0	
BHC, Delta			< 2*		<1.0	
Chlordane			ND		<10	
4,4'DDT			ND		<1.0	
4,4'DDE			ND		<1.0	
4,4'DDD			ND		<1.0	
Dieldrin			ND		<1.0	
Endosulfan-alpha			2.1		<1.0	
Endosulfan-beta			2.1		<1.0	
Endosulfan sulfate			ND		<1.0	
Endrin			< 2*		<1.0	
Endrin aldehyde			2		<1.0	
Heptachlor			< 2*		<1.0	
Heptachlor epoxide			2		<1.0	
PCB-1242			<25 ND		<10	
PCB-1254			<25 ND		<10	
PCB-1221			<25 ND		<10	
PCB-1232			<25 ND		<10	
PCB-1248			<25 ND		<10	
PCB-1260			<25 ND		<10	
PCB-1016			<25 ND		<10	
Toxaphene			ND		<10	

TABLE 1

LEACHATE CHARACTERISTICS AT LIPARI LANDFILL
(continued)

Volatile Non-Priority Pollutant Compounds (Results in ppb)	II Corp[4] Sept./Oct. 1984
Acetone	620
2-Butanone	100,<500
Carbon disulfide	<50
2-Hexanone	23,000
4-Methyl-2-pentanone	7,700
Styrene	1,100
Vinyl acetate	<50
o-Xylene	9,200
Total Xylenes	3,500

Base-Neutral Extractable Non Priority Pollutant Compounds (Results in ppb)	
Aniline	<40
Benzoic acid	460
Benzyl alcohol	29,<40
4-Chloroaniline	5.2,<40
Dibenzofuran	<40
2-Methylnaphthalene	2.1,<40
2-Methylphenol	180
4-Methylphenol	100
2-Nitroaniline	<40
3-Nitroaniline	<40
4-Nitroaniline	<40
2,4,5-Trichlorophenol	<40

TABLE 1

LEACHATE CHARACTERISTICS AT LIPARI LANDFILL (continued)

	II Corp.[4] Sept./Oct. 1984	DuPont[6] March 1985	Environmental Measurements and Analysis[6] March 1985
Conventional Parameters (Results in ppm)			
Dissolved organic carbon		863	
pH		6.3	6.3
Total suspended solids		70	532***
BOD			1,319
COD			2,820
Ammonia-nitrogen			55.5
TKN			57.6
Phosphorous			
Phosphate			0.37
Total dissolved solids			1,536
Total volatile suspended solids			164
Volatile dissolved solids			490
Conductivity			1,900 mho/cm
Oil and grease	4.8		7.73
Total organic carbon	240		
Chlorides			318
Nitrates			.03
Alkalinity			327
Hardness as $CaCO_3$			188

Temperature: Field measurements performed by CDM in March 1985 indicated leachate temperatures ranging from 10°C to 16°C.

TABLE 1

LEACHATE CHARACTERISTICS AT LIPARI LANDFILL
(continued)

NOTES

1. Lab Composite of samples collected in the field from monitoring wells C-10a, C-6a and C-4a.

2. Composite of sample drums upon receipt at laboratory.

3. <..ND - element is less than the value given and not detected by the technique employed.

4. Highest value (i.e., "worst case") values are indicated.

5. Due to the high level of interference encountered, an unusually high detection limit exists. An undeterminable amount of the sample response may be due to 1,2-dichloroethane.

6. Collected from production well PW-1 at conclusion of 24-hour pump test.

ND = Not Detected

* Below method detection limit. Quantitation and/or identification may be uncertain at this level.

** Highest value represents the maximum concentration found in shallow driven wells outside of containment system.

*** May be low due to extended holding time of sample.

TABLE 1

LEACHATE CHARACTERISTICS AT LIPARI LANDFILL
(continued)

Chemical	Concentration*	
Volatile Organics:		
• Benzene	29,000ppb	
• 1,2-Dichloroethane	75,459ppb	
• Methylene Chloride	61,000ppb	
• Toluene	87,000ppb	
Base/Neutral Extracts:		
• Bis(2-chloroethyl)ether	83,000ppb	
Acid Extracts:		
• Phenol	22,000ppb	
Metals:		
• Chromium	51.0ppm†	, 5.1ppm
• Nickel	0.70ppm†	, 0.30ppm
• Lead	0.92ppm†	, 0.12ppm
• Mercury	0.13ppm	
• Selenium	0.21ppm	
• Arsenic	0.087ppm†	,0.074ppm
• Silver	0.080ppm†	,0.026ppm

* Highest concentration recently reported (see Table 1)

† Concentration appeared in groundwater well external to the encapsulation system and is shown here as the highest concentration recently reported. Corresponding value was highest value appearing in wells inside the encapsulation.

TABLE 2

CONCENTRATIONS OF CHEMICALS OF CONCERN

I. No Action
II. Complete Removal
III. Enhanced Containment and IV Cleanup:

Disposal

A. Leachate

1. Surface Water (i.e., Chestnut Branch)
2. Reinjection to containment system
3. Local POTW
4. Privately-owned Treatment Facility

B. Sludge

1. Privately-owned Treatment, Storage and Disposal Facility
2. Local POTW

C. Contaminated Soil

1. Privately-owned Treatment, Storage and Disposal Facility

Leachate Collection

A. Pump leachate from containment system at a rate above the seepage rate until the system is emptied.

B. Pump leachate from the containment system at a rate equivalent to the natural seepage rate so as to maintain a static leachate level.

C. Pump leachate from the containment system at a rate that exceeds the natural seepage rate; reinject treatment leachate or "clean" water to maintain a static head condition and flush out the contamination.

D. Pump leachate from the containment system to empty the system. Allow the system to refill and then empty the system again so that the encapsulated soil is naturally flushed.

Leachate Treatment

A. Physical/Chemical Technologies

1. Activated carbon adsorption
2. Air stripping packed column
3. Reverse osmosis
4. Wet air oxidation
5. Incineration
6. Resin adsorbents
7. Filtiration
8. Precipitation, flocculation, sedimentation
9. VerTech

B. Biological Treatment Technologies

1. Activated sludge (PACT Process)
2. Rotating biological contractor
3. Anaerobic treatment
4. Aerobic fluidized bed

C. In-Situ Treatment

1. Bioreclamation

TABLE 3

CANDIDATE REMEDIAL TECHNOLOGIES

I. No Action
II. Complete Removal
III. Enhanced Containment and IV. Cleanup!

Disposal	Leachate Collection	Leachate Treatment
A. Leachate 1. Surface water (i.e. Chestnut Branch) 2. Reinjection to containment system	A. Pump leachate from the Upper Cohansey until elevation 100' MSL is reached (i.e., top of the Lower Cohansey). Then, either let the system seek its steady-state elevation of 107' MSL or incorporate one of two pumping schemes: (1) continuously pump the Upper Cohansey at a rate of 1 to 2 gpm after it is dewatered to maintain water levels inside the containment below water levels outside the containment, or (2) if exterior water levels rise due to snow-melt or precipitation, pump the Upper Cohansey down to 100' MSL after it recharges back to the level where hydraulic gradients tend be outward.	A. Physical/Chemical Technologies 1. Activated carbon adsorption 2. Air stripping packed column 3. Filtration 4. Precipitation

TABLE 4

SURVIVING CANDIDATE REMEDIAL TECHNOLOGIES

B. Sludge 1. Privately-owned treatment, storage and disposal facility	B. Pump leachate from containment system at a rate that exceeds the natural seepage rate; reinject treated leachate or "clean" water to maintain a static head condition and flush out the contamination.	B. Biological Treatment Technologies 1. Activated Sludge (PACT process)
C. Soil 1. Privately-owned treatment, storage, and disposal facility	C. Pump the Kirkwood Sand to contain/collect contaminated seepage from the overlying encapsulation system.	C. In-situ Treatment None

TABLE 4
(Continued)

SURVIVING CANDIDATE REMEDIAL TECHNOLOGIES

TABLE 5

CANDIDATE REMEDIAL ALTERNATIVES

Alternative 1	Complete Removal
Alternative 2	No action but pump Kirkwood Sands (Enhanced Containment)
Atlernative 3	Dewater the Encapsulation System (Enhanced Containment)
Alternative 4	Dewater the Encapsulation System and pump the Kirkwood Sands (Enhanced Containment)
Alternative 5	Flush the Encapsulation System (Cleanup)
Alternative 6	Flush the Encapsulation System and pump the Kirkwood Sands (Cleanup)
Alternative 7	No Action
Alternative 8a	Flush the Encapsulation System with a batch-type process and pump the Kirkwood Sands (Cleanup)
Alternative 8b	Flush the Encapsulation System with a batch-type process (Cleanup)

Parameter	GCUA Limitation* (ppm)†
Ammonia	100
Arsenic	0.1
BOD**	300
Cadmium	0.5
Chromium	2.5
COD	600
Copper	1.8
Cyanide	0.23
Iron	5.0
Lead	0.3
Manganese	10.0
Mercury	0.01
Nickel	1.8
pH	6.5 - 9.0 range
Phenol	0.05
Silver	0.5
Zinc	1.8
Suspended Solids	300
Total Solids	1300
Oil and Grease	100
Total Dissolved Solids	1000

* Concentration based on 24-hour composite
† Limitation in ppm except where noted

TABLE 6

GCUA DISCHARGE LIMITATIONS

Pollutant	FW at 0.0576 MGD (40 gpm) Flow (mg/1)	FW at 0.0792 MGD (55 gpm) Flow (mg/1)
Cadmium	0.00013	0.00010
Chromium, Hex.	0.0032	0.0024
Copper	0.063	0.046
Cyanide	0.039	0.029
Iron	---	---
Lead	0.0084	0.0061
Mercury	0.0000064	0.0000046
Nickel	0.63	0.46
Silver	0.0013	0.00098
Zinc	0.53	0.38
Benzene	59.4	43.2
1,2,4, Trichlorobenzene	2.80	2.04
1,1 Dichloroethane	---	---
1,2 Dichloroethane	224	163
1,1 Dichloroethylene	130	94.5
Ethylbenzene	358.5	260.8
Methylene Chloride	123.2	89.6
Trichloroethylene	504	366.7
Tetrachloroethylene	9.41	6.84
Trichloroflouromethane	123.2	89.6

TABLE 7

DRAFT EFFLUENT LIMITATIONS FOR CRITICAL TOXIC POLLUTANTS

Alternative	Cost ($1000)[a] Capital	O&M	Present Worth	Technical Evaluation: Reliability	Implementability	Safety	Years to Achieve Site Cleanup[b]	Years Required to Pump Kirkwood	Environmental	Institutional
Complete Removal										
1	289,000	160	290,000	Most reliable of alternatives in terms of source control.	Practically infeasible, requires site dewatering and excavation - most likely within an air-supported structure to prevent the escape of VOC's to the environment.	Most dangerous of all of the alternatives. Would provide the greatest probability for direct contact of the buried waste by onsite workers.	N/A	N/A	Best alternative in terms of source control onsite. May create other environmental problems, however, if cap is removed from landfill without provisions to capture volatile organic compounds.	Requires permits for offsite disposal of leachate and contaminated soil. Probably most acceptable alternative to the public.
Enhanced Containment										
2 No Action but Pump the Kirkwood Sand	2,223	414	6,212	Equally reliable with Alternative 3, less reliable than Alternative 4 in terms of Enhanced Containment. Possesses merits of capturing seepage into Kirkwood clay; however by not dewatering the Upper Cohansey, flow gradients will tend to be out of system	Easily implemented, on a par with Alternatives 3 & 4. Enhanced Containment, in general, is easier to implement than any other candidate remedial alternative with the exception of No Action	Safer than Alternatives 1, 5 and 6. No direct contact by onsite workers with landfilled wastes. Will require handling of some hazardous residues from an onsite treatment plant. Safety is on a par with Alternatives 3 and 4	35 years	35 years	Does not address need to stop continuing seepage into the Cohansey aquifer. Does address Kirkwood seepage issue	Requires permits for offsite disposal of contaminated water drawn from the Kirkwood. Perceived to be undesirable to the public since seepage into the Cohansey outside the containment system is not addressed.
3 Dewater Encapsulation System	2,414	170	3,786	Equally reliable with Alternative 2 in terms of achieving enhanced containment. Less reliable than Alternative 4. Possesses merits of dewatering the Upper Cohansey (i.e. inward gradients, decrease in slurry wall degradation potential); however, the Alternative would not capture seepage into the Kirkwood Sand	Easily implemented, on a par with Alter- 3 and 4. Enhanced Containment, in general, is easier to implement than any other candidate remedial alternative with the exception of No Action.	Safer than Alternatives 1, 5 and 6. No direct contact by onsite workers with landfilled wastes. Will require handling of some hazardous residues from an onsite treatment plant. Safety is on a par with Alternatives 3 & 4	28 years	N/A	Dewatering will address problem of Cohansey seepage however, issue of Kirkwood seepage is ignored in this alternative.	Requires permits for offsite disposal of leachate from the Upper Cohansey within the encapsulation Perceived to be undesirable to the public since the Kirkwood seepage is not addressed.

TABLE 8

SUMMARY OF EVALUATION OF ALTERNATIVES

Alternative	Cost ($1000) Capital	O&M	Present Worth[a]	Technical Evaluation: Reliability	Implementability	Safety	Years to Achieve Site Cleanup[b]	Years Required to Pump Kirkwood	Environmental	Institutional
[illegible] Dewater the Encapsulation System and Pump the Kirkwood Sand	2,960	434	8,897	More reliable than Alternative 2 in terms of achieving enhanced containment because of the merits of dewatering the Upper Cohansey (i.e. inward gradients, decrease in driving head, decrease in slurry wall degradation potential. More reliable than Alternative 3 because of capture of seepage into Kirkwood Sands	Easily implemented, on a par with Alternative 3 and 4. Enhanced Containment, in general, is easier to implement than any other candidate remedial alternative with the exception of No Action	Safer than Alternatives 1, 5 and 6. No direct contact by onsite workers with landfilled wastes. Will require handling of some hazardous residues from an onsite treatment plant. Safety is on a par with Alternatives 3 and 4	23 years	25 years	Addresses both Kirkwood seepage and Cohansey seepage. Is the best Enhanced Containment Alternative from an environmental/ public health viewpoint.	Requires permits for offsite disposal of leachate from the Upper Cohansey and and Kirkwood. Perceived to be not as desirable from a public viewpoint as Alternatives 1, 5 or 6.
Cleanup										
5 Flush the Encapsulation System	3,310	633	8,121	Flushing, as it relates to the LiPari site, is an unproven technology. That is, this technology has not been demonstrated to be effective under similar operating conditions to those found at Li-Pari hence the reliability of this technology is questionable	Difficulties abound in terms of O&M. Clogging and corrosion of injection wells are major technical considerations Monitoring of the system is anticipated yield unclear results as to whether flushing is effective. More difficult to implement than Enhanced Containment	Safer than Alternative 1 for onsite workers. On a par with Alternative 2, 3, 4 and 6. Not as safe as Alternative 7.	9 years	N/A	Does not address Kirkwood seepage issue. Does attemp to actively cleanup the source of contamination.	May require underground injection permits and permits to dispose of pretreated leachate at an offsite location should that option be chosen. May not be an acceptable alternative to the public since the Kirkwood seepage is is not addressed.
6 Flush the Encapsulation System and Pump the Kirkwood Sands	3,745	700	9,025	Flushing, as it relates to the LiPari site, is an unproven technology. That is, this technology has not been demonstrated to be effective under similar operating conditions to those found at Li-Pari hence the reliability of this technology is questionable.	Difficulties abound in terms of O&M. Clogging and corrosion of injection wells are major technical considerations Monitoring of the system is anticipated yield unclear results as to whether flushing is effective. More difficult to implement than Enhanced Containment	Safer than Alternative 1 for onsite workers. On a par with Alternatives 2, 3, 4, and 5. Not as safe as Alternative 7.	8 years	15 years	Attempts to actively cleanup the source of contamination. Does address the Kirkwood seepage issue	May require underground injection permits and permits to dispose of pretreated leachate at an offsite location should that option be chosen. Perceived be an acceptable option to the public

TABLE 8

SUMMARY OF EVALUATION OF ALTERNATIVES
(Continued)

Alternative	Cost ($1000)[a] Capital	O&M	Present Worth	Technical Evaluation Reliability	Implementability	Safety	Years to Achieve Site Cleanup[b]	Years Required to Pump Kirkwood	Environmental	Institutional
7 No Action	-0-	132	1320	Least reliable Alternative in terms of source control or diminishing impacts on environment. Seepage of contamination to the environment outside the encapsulation will continue to occur without provision for collection.	Easiest Alternative to implement since only activities required will be routine cap maintenance and a regularly scheduled monitoring program	Safest Alternative for onsite workers: no treatment equipment to operate, little or no chance for workers to come into contact with any hazardous materials	42 years	N/A	Ignores the continuing seepage into both the Cohansey and and Kirkwood aquifers	No permits to obtain. Perceived to be the least desirable alternative to the public
8 Flush the Encapsulation on a Batch Basis and pump the Kirkwood Sand	4,103	815	10,251	Flushing, as it relates to the LiPari site, is an unproven technology. That is, this technology has not been demonstrated to be effective under similar operating conditions to those found at Lipari hence the reliability of this technology is questionable. However, the process of filling the encapsulation with clean water, dewatering the site, and refilling the encapsulation is considered to be a more reliable flushing technology than that proposed under Alternatives 5 and 7	Difficulties abound in terms of O&M. Clogging and corrosion of injection wells are major technical considerations although the criticality of clogged wells in terms of uniform flushing or prevention of short-circuiting is not as important as in Alternatives 5 and 6.	Safer than Alternative 1 for onsite workers. On a par with Alternatives 2, 3, 4, 5 and 6. Not as safe as Alternative 7 .	15	15	Attempts to actively cleanup the source of contamination. Does address the Kirkwood seepage issue.	May require underground injection permits and permits to dispose of pretreated leachate at an offsite location should that option be chosen. Perceived to be an acceptable option to the public although not as acceptable as Alternative 1.

TABLE 8

SUMMARY OF EVALUATION OF ALTERNATIVES (Continued)

	Cost ($1000)[a]			Technical Evaluation						
Alternative	Capital	O&M	Present Worth	Reliability	Implementability	Safety	Years to Achieve Site Cleanup[b]	Years Required to Pump Kirkwood	Environmental	Institutional
8b Flush the Encapsulation on a Batch Basis	3,464	719	8,909	Flushing, as it relates to the LiPari site, is an unproven technology. That is, this technology has not been demonstrated to be effective under similar operating conditions to those found at LiPari hence the reliability of this technology is questionable. However, the process of filling the encapsulation with clean water, dewatering the site, and refilling the encapsulation is considered to be a more reliable flushing technology than that proposed under Alternatives 5 and 7.	Difficulties abound in terms of O&M. Clogging and corrosion of injection wells are major technical considerations although the criticality of clogged wells in terms of uniform flushing or prevention of short-circuiting is not as important as in Alternatives 5 and 6.	Safer than Alternative 1 for onsite workers. On a par with Alternatives 2, 3, 4, 5, 6 and 8. Not as safe as Alternative 7.	15	N/A	Does not address Kirkwood seepage issue. Does attempt to actively cleanup the source of contamination.	May require underground injection permits and permits to dispose of pretreated leachate at an offsite location should that option be chosen. Perceived to be undesirable to the public since the Kirkwood seepage is not addressed.

Notes:

(a) Costs reflect only the option of discharging to GCUA.

(b) "Cleanup" is defined as discharging 10 pore volumes within the encapsulation so as to remove 90+% of the water transport contamination.

TABLE 8

SUMMARY OF EVALUATION OF ALTERNATIVES
(Continued)

Chemicals of Concern	Initial (1) Concentration	99% Removal	Background Quality	RCRA 264 GW Table	MCL	Potential Remediation Criteria: Water Quality Criteria, Initial Cancer Risk	Water Quality Criteria, Final Cancer Risk	EPA SNARLS 1 Day	EPA SNARLS 10 Day	EPA SNARLS Chronic	NAS SNARLS 1 Day	NAS SNARLS 7 Day	NAS SNARLS Chronic	Acceptable Daily Intake
bis (2-chloroethyl) ether	83,000 ppb	830 ppb	< 10 ppb	—	—	0.042 ppb	0.03 ppb	—	—	—	—	—	—	—
chromium	14.0 ppm (2) 5.1 ppm	0.14 ppm 0.051 ppm	< 0.75 ppm	0.05 ppm	0.05 ppm	0.0000000 ppm	—	—	—	—	—	—	—	—
benzene (3)	20,000 ppb	200 ppb	< 1 ppb ND	—	ND	1.5 ppb	0.66 ppb	—	230 ppb	70 ppb	—	230 ppb	—	—
nickel	0.30 ppm (2) 0.30 ppm	0.003 ppm 0.003 ppm	< 0.05 ppm	—	—	0.05 ppm	0.0134 ppm	—	—	—	—	—	—	—
1,2 dichloroethane (3)	73,450 ppb	730 ppb	< 1 ppb ND	—	—	0.07 ppb (Tox.)	0.94 ppb (Tox.)	—	—	—	—	—	—	—
lead	0.98 ppm (2) 0.13 ppm	[illegible]	< 0.02 ppm	0.05 ppm	0.05 ppm	—	—	—	—	—	—	—	—	—
toluene	87,000 ppb	870 ppb	< 1 ppb	—	—	17,400 ppb (Tox.)	14,300 ppb (Tox.)	21,500 ppb	2,200 ppb	340 ppb	—	—	—	—
phenol	22,000 ppb	220 ppb	< 25 ppb	—	—	3,400 ppb (Tox.)	3,500 ppb (Tox.)	—	—	—	—	—	—	—
methylene chloride (3)	60,000 ppb	600 ppb	< 5 ppb	—	—	—	0.19 ppb	1,300 ppb	1,300 ppb	150 ppb	35,000 ppb	5,000 ppb	—	—
mercury	0.013 ppm	0.00013 ppm	< 0.002 ppm	0.002 ppm	0.002 ppm	0.2 ppb (Tox.)	0.144 ppb (Tox.)	—	—	—	—	—	—	—
selenium	0.21 ppm	0.0021 ppm	< 0.01 ppm ND	0.01 ppm	0.01 ppm	0.010 ppm (Tox.)	0.010 ppm (Tox.)	—	—	—	—	—	—	—
arsenic	0.002 ppm (2) 0.074 ppm	0.00002 ppm 0.00074 ppm	< 0.01 ppm ND	0.05 ppm	0.05 ppm	0.000002 ppm	0.0000022 ppm	—	—	—	—	—	—	—
silver	0.080 ppm (2) 0.036 ppm	0.0008 ppm 0.00036 ppm	< 0.01 ppm	0.05 ppm	0.05 ppm	0.050 ppm (Tox.)	0.050 ppm (Tox.)	—	—	—	—	—	—	—
Chemicals whose concentrations are above the Remediation Criteria if 99% removal is achieved			bis, benzene, 1,2 dichloroethane, nickel, methylene chloride	chromium (?)	chromium (?), benzene	arsenic, bis, benzene, chromium, 1,2 dichloroethane	arsenic, bis, benzene, chromium, 1,2 dichloroethane, methylene chloride		benzene	benzene, methylene chloride, toluene		benzene		
Chemicals whose concentrations are above the Remediation Criteria if 99.9% removal is achieved			bis, benzene, 1,2 dichloroethane, methylene chloride	chromium (?)	chromium (?), benzene	arsenic, bis, benzene, nickel, 1,2 dichloroethane	arsenic, bis, benzene, nickel, 1,2 dichloroethane, methylene chloride							

Notes:
(1) Highest concentration recently reported (see Table 1.1)
(2) Concentration reported in groundwater until [illegible] the encapsulation ... [illegible] corresponding value was highest value shown in wells inside the encapsulation.
(3) Identified in New Jersey Assembly Bill 280 for establishment of MCL.

ND = not detected
? = concentration may be below standard depending upon the initial concentration assumed

TABLE 9

COMPARISON OF POTENTIAL REMEDIATION CRITERIA TO CONTAMINANT CONCENTRATIONS WITHIN THE ENCAPSULATION INITIALLY AND WITH 99% REMOVAL

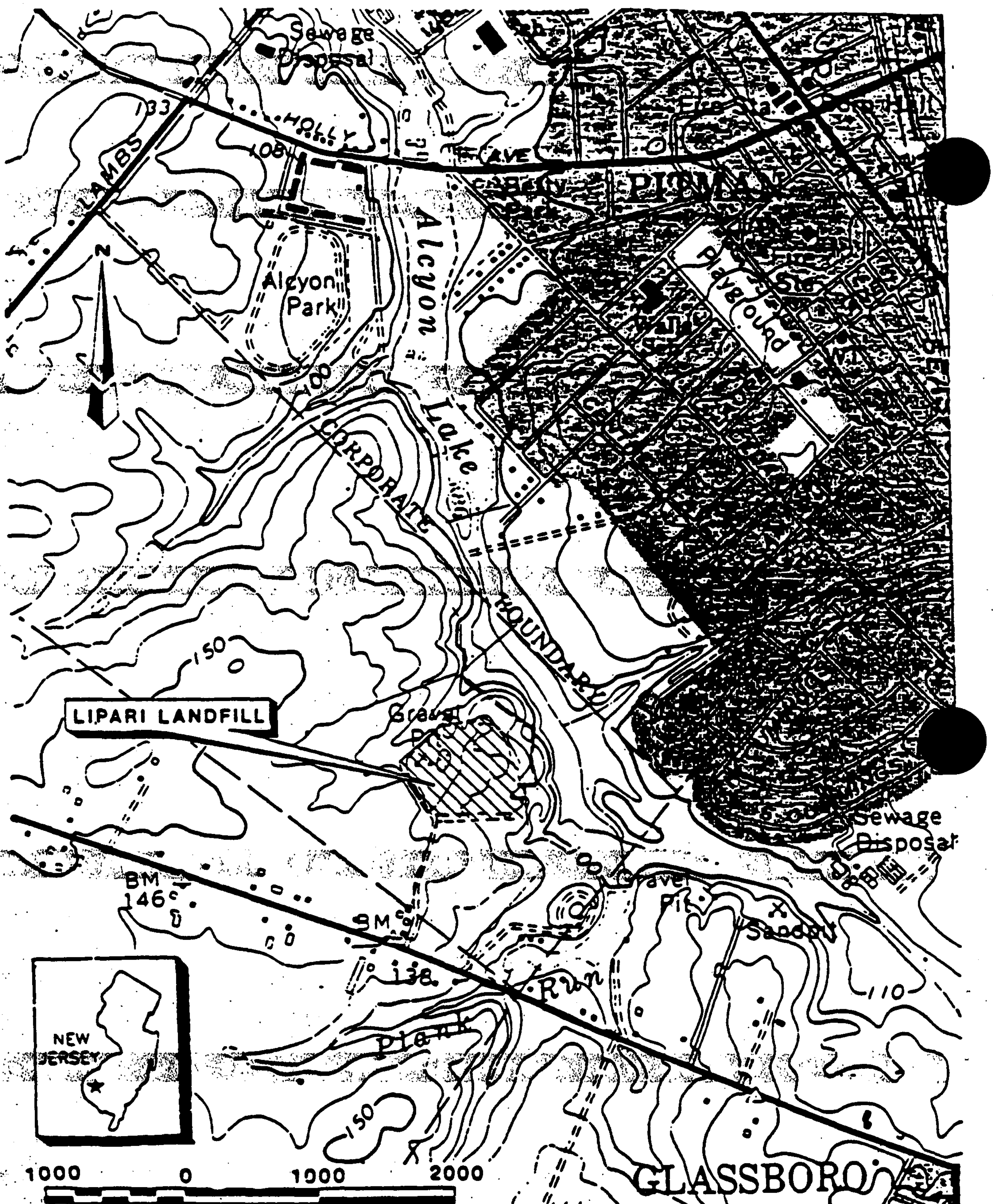

FIGURE 1

GENERAL LOCATION PLAN

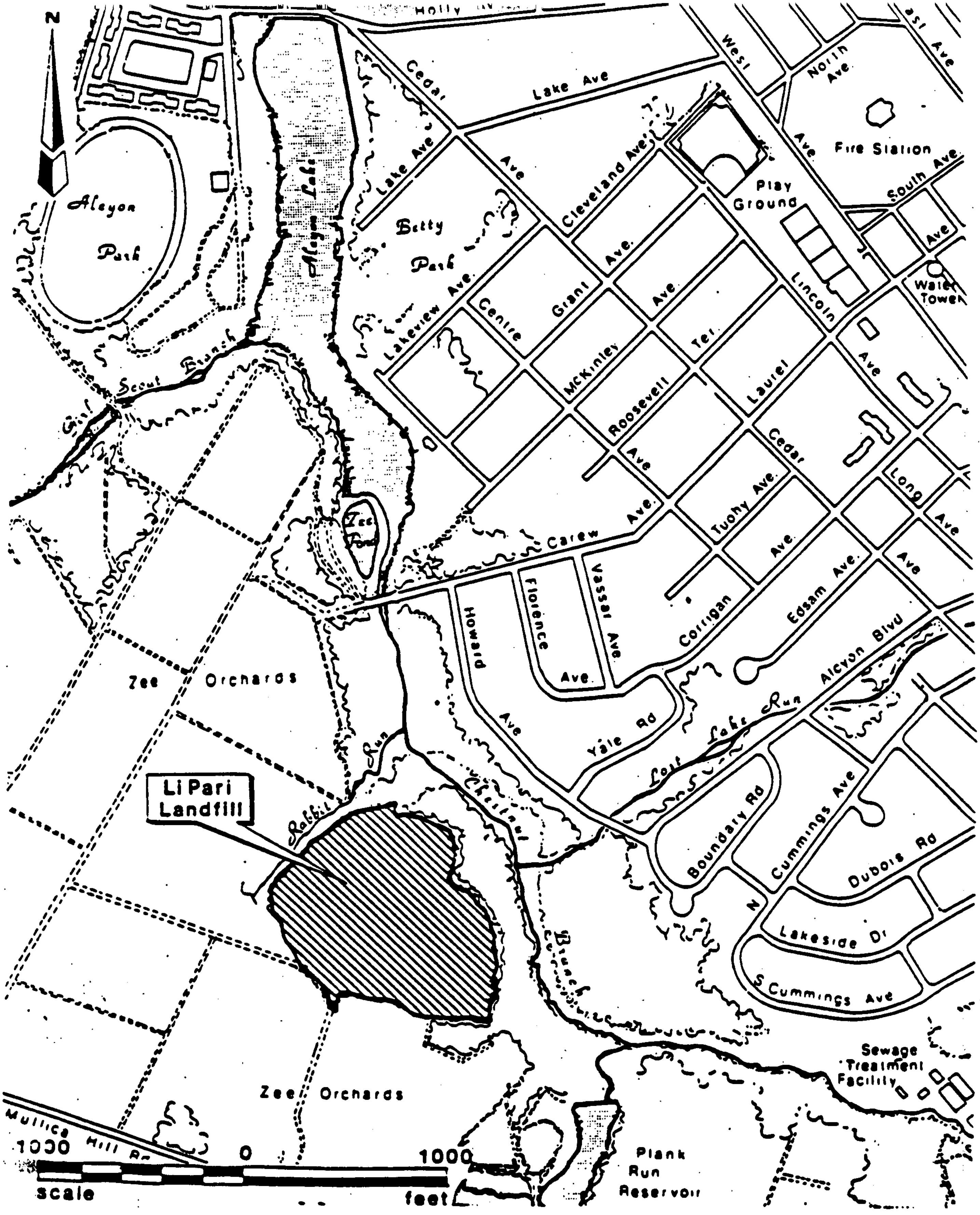

FIGURE 2

GENERAL AREA PLAN

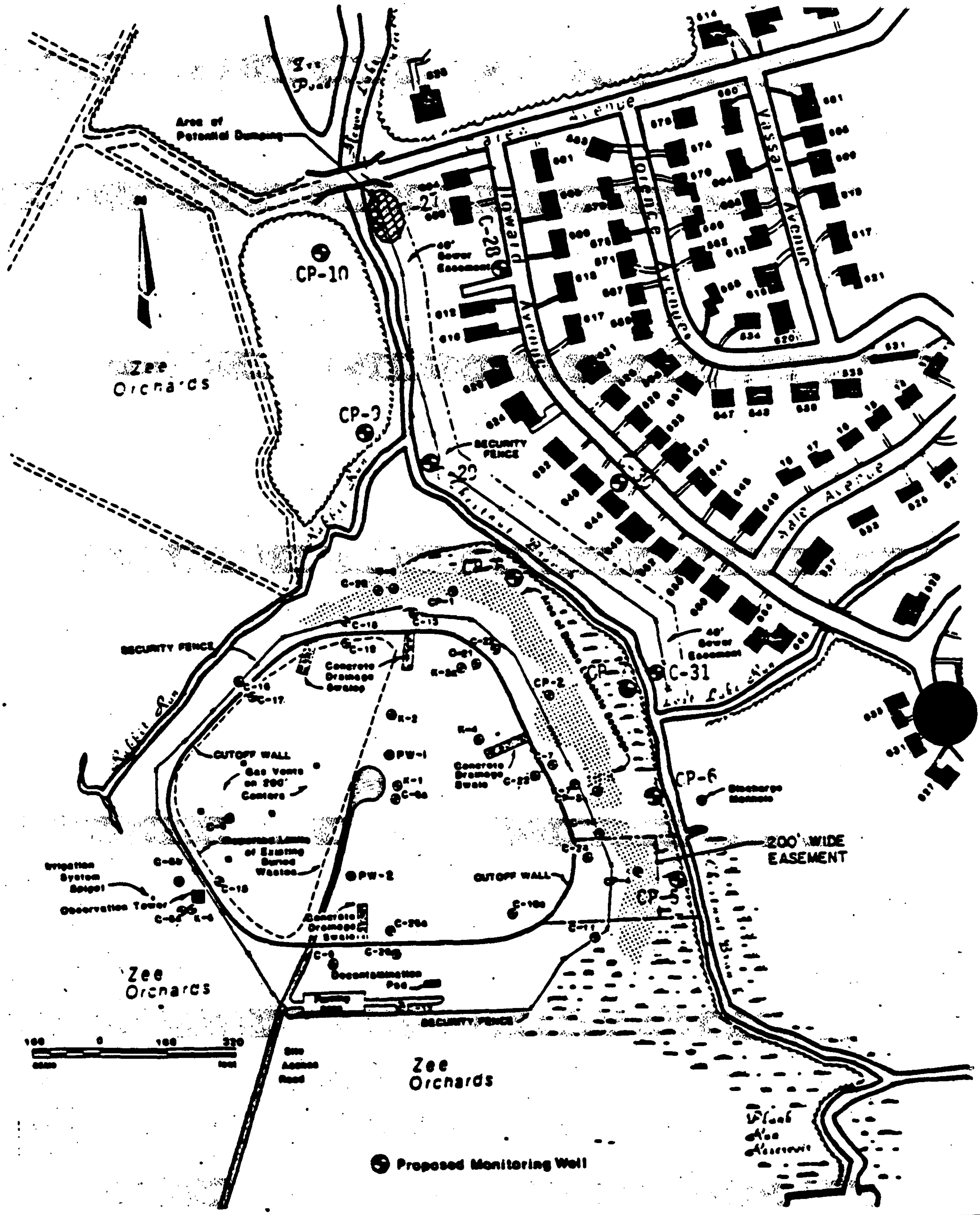

FIGURE 3

DETAILED AREA PLAN

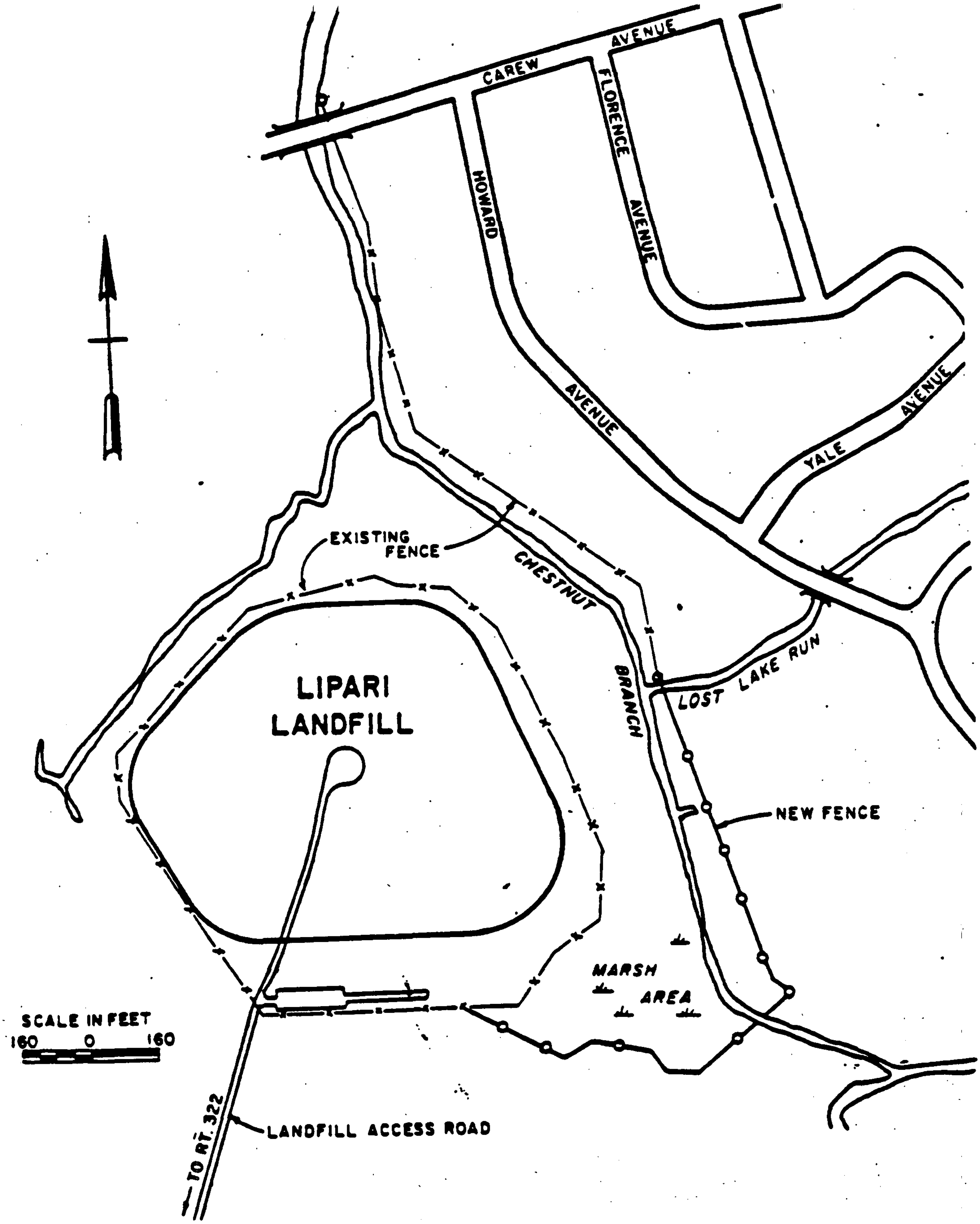

FIGURE 4

FENCE INSTALLATION

Record of Decision
Remedial Alternative Selection

Site: LiPari Landfill Site, Pitman, New Jersey

Analysis Reviewed: I have reviewed the following documents describing the analysis of cost-effectiveness of remedial alternative at the LiPari Landfill Site:

- Draft Cost-Effectiveness Assessment of Remedial Action Alternatives LiPari Landfill, Radian Corporation, July 1982
- Draft Environmental Information Document for Remedial Actions at the LiPari Landfill, Pitman, New Jersey, Radian Corporation, July 1982
- Preliminary Engineering Study, LiPari Landfill, Pitman, New Jersey, Betz, Converse, Murdoch, Inc., May 1982
- Abatement Alternatives - Uncontrolled Chemical Leachate Discharge from the LiPari Landfill, Pitman, New Jersey, R.E. Wright Associates, Inc. October 1980 revised December 1980
- Technical considerations For The Selection Of An Abatement System At The LiPari Landfill, Pitman, New Jersey, R.E. Wright Associates, September 1981
- Staff summaries and recommendations

Description of Selected Option:

- Phase I:

  Emplacement of a 360° cutoff wall with cap over 16 acres (enclosed area would include the six acre landfill and the 10 acre contaminated area between the landfill and Chestnut Branch).

- Phase II:

  Installation of ground water collection wells (located both within the contaminated zone and waste body itself) Treatment of the ground water contained within the slurry wall.

Declarations: Consistent with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), and the National Contingency Plan, I have determined that the containment and treatment strategy for the LiPari Landfill site is a cost-effective remedy, and that it effectively mitigates and minimizes damage to, and provides adequate protection of public health, welfare and the environment. I have also determined that the action being taken is appropriate when balanced against the need to use Trust Fund money at other sites.

The collection and treatment of the contained contaminated ground water is desirable in order to improve the reliability of the containment. The associated costs are based upon utilization of a local publicly owned treatment works (POTW) without significant pretreatment.. The proper evaluation of the treatment system is being conducted by a consultant to the U.S. Environmental Protection Agency (USEPA). I have determined that it is necessary to proceed with the installation of the slurry wall and cap concurrent with the final treatability evaluation of the leachate with the existing treatment process at the POTW. I will make a future decision on the necessary groundwater pretreatment processes after completion of the technical analysis and evaluation which will determine the compatibility of the leachate with the existing treatment processes of the local POTW.

S/ 7/3/82

Rita M. Lavelle
Assistant Administrator
Office of Solid Waste and Emergency Response

LiPari Landfill Remedy Approval
Briefing Sheet

- Purpose of this briefing is to obtain AA approval for the remedy recommended by the Region and the State for the LiPari Landfill site. A "Record of Decision" has been prepared to document the approval.

- LiPari Landfill occupies approximately six acres. Between the period 1958 and 1971, the Landfill received household waste as well as liquid and semi-solid chemical wastes and other industrial wastes and materials for disposal. Best estimates indicate approximately 3 million gallons of liquid wastes have been disposed at the site.

- Groundwater and surface water contamination is the primary concern at LiPari Landfill. Rabbit Run, Chestnut Branch and Alcyon Lake are shown to be contaminated. Strong volatile chemical odors are evident at the on-site leachate seeps.

- In March 1980, a feasibility study was initiated by R.E. Wright Associates through Clean Water Act, Section 311 funding. R.E. Wright Associates completed a second report in September 1981 wherein the previous conclusion was revised, and a two phase approach was recommended.

  Phase I: Slurry wall containment with cap

  Phase II: Further evaluation to collect and treat encapsulated contents.

- EPA held a Public Meeting in November 1981 wherein the Agency made an announcement of the consultant's recommendations, EPA's Region II concurrence and possible schedule for construction initiation by Spring of 1982.

- In January 1982, the consultant to the responsible parties (Betz, Converse and Murdoch), submitted a new alternative clean-up plan to the EPA proposal. EPA Region II, EPA/ORD, and Radian, Inc. subsequently initiated a cost-effective analysis of alternatives, including the responsible party's alternative and the preparation of an Environmental Information Document to comply with CERCLA requirements.

- The Radian Corporation completed their cost-effectiveness evaluation on remedial alternatives studied previously by R.E. Wright, 1980, 1981, and Betz, Converse and Murdoch 1982 as well as a no action alternative. Nine alternatives were initially considered highly/cost-effective and were evaluated further in the Environmental Information Document (July 1982):

	Million $
- 360° Cutoff wall with Cap (16 acres)/Collect with wells/Treat at POTW	2.0
- Upgradient Deflection wall with Cap (6 acres)	1.2
- Upgradient Deflection wall with Cap (6 acres)/ Collect with wells/Treat at POTW	1.7
- 360° Cutoff wall with Cap (6 acres)	1.0
- 360° Cutoff wall with Cap (16 acres)	1.5
- 360° Cutoff wall with Cap (6 acres)/ Collect with wells/Treat at POTW	1.4
- Collect with wells/Treat at POTW	[illegible]
- Deflection wall/Upgradient Drain/Cap (22 acres)	2.1
- Deflection wall/Upgradient Drain/Cap (22 acres)/ Collect with Wells/Treat at POTW	2.5

- Further evaluation of these alternatives by EPA staff at both the Region and Headquarters level, with technical assistance provided by the zone contractor (Camp, Dresser, & McKee) and information contained in the Environmental Information Document, has led to the further elimination of alternatives as environmentally unacceptable except for the following three:

	Million $
- 360° Cutoff wall with Cap (16 acres)/ Collect with wells/treat at POTW	2.0
- 360° Cutoff wall with Cap (16 acres)	1.5
- Deflection wall/Upgradient Drain/Cap 22 acres/ Collect with wells/Treat at POTW	2.5

- This has led to the selection of one alternative as the most cost-effective, environmentally sound remedial action. It is: The 360° cutoff wall with Cap (16 acres).

- The recommended alternative action, however, includes in addition to the encapsulation of the 16 acre site, active groundwater control through collection and treatment at a local POTW to enhance the reliability of the encapsulation. Additional evaluation to assure the compatibility of the leachate with the existing treatment processes of the local POTW need to be conducted prior to proceeding with the second phase (collection and treatment). The total cost for design and implementation of the cutoff wall and cap in addition to further evaluation related to the collection and treatment of leachate has been estimated at $1,769,150.

- Another public meeting was held on July 23, 1982. The Region described the remedy and addressed concerns raised by the public.

- The "Record of Decision" certifies that:

  - The selected remedy is the cost-effective remedy for the site.

  - Off-site disposal of the leachate is under investigation as a cost-effective approach for that portion of the project.

  - Monies are available in the Fund to finance the remedy.

- The following actions are required to move the project into construction:

-	Prepare Record of Decision	Region
-	Begin Design Phase	HSCD/Region
	• Preparation of Bid Package and safety plan for wall construction	
	• Complete treatability study	
	Prepare Action Memo (for construction)	HSCD
-	Approve Action Memo	AA, OAWER
-	Prepare State Superfund Contract	Region/State
-	Sign State Superfund Contract	AA, OSWER/State
-	Prepare IAG with Corps	HSCD
-	Complete and Award Construction Contract	Corps
-	Begin Construction	Corps

Remedial Implementation Alternative Selection
LiPari Landfill Superfund Site
Township of Mantua
Gloucester County, New Jersey
July 30, 1982

History

The LiPari Landfill occupies approximately six acres in the Township of Mantua, Gloucester County, New Jersey. A stream known as Chestnut Branch flows in a north-westerly direction along the northern and northeastern borders of the landfill. Another stream, Rabbit Run, flows in a northwesterly direction and borders the western area of the landfill. Rabbit Run enters Chestnut Branch at a point on the northern border of the landfill. Chestnut Branch flows into Alcyon Lake approximately 1000 feet downstream from the landfill.

For 13 years running from 1958 to 1971, the owner, Mr. Nicholas LiPari, began accepting and disposing of waste at the LiPari Landfill. The landfill has been inactive since 1971, and a portion has been and is now used for a fruit orchard. The top of the landfill rises approximately 40 feet above the Chestnut Branch. The land surface slopes from an elevation of 134 mean sea level ("msl") down towards both Rabbit run and Chestnut Branch where the elevation of this northern border is 120 feet msl.

Occupied homes are located just across the edge of the northeastern border of the landfill site on the opposite side of Chestnut Branch.

During the years between 1958 and 1971, the owner, Mr. LiPari, accepted and disposed of household waste as well as liquid and semi-solid chemical wastes, and other industrial wastes and materials.

The hazardous wastes dumped at LiPari Landfill were generated by Rohm and Hass Company from its Bristol, Pennsylvania plant; Owens-Illinois, Inc. from its Pitman, New Jersey plant and Owens-Corning Fiberglas, Inc. from its Barrington, New Jersey plant.

The hazardous wastes dumped at the landfill by the generators and haulers have percolated into the groundwaters under the landfill. The wastes have leached out the embankments of Rabbit Run and Chestnut Branch further contaminating the surface waters which run into these respective streams. Hazardous wastes leaching from the landfill have contaminated the Chestnut Branch, Rabbit Run and Alcyon Lake and continue to contaminate these bodies of water.

Current Status

The LiPari Landfill has been inactive since 1971. The main routes for contaminant migration from the landfill are ground water and surface water. Leachate seeps are visible along the landfill escrapement adjacent to Chestnut Branch, east of the landfill area and along Rabbit Run. Ground water and surface water contamination has been documented. The presence of BCCE in fish from Alcyon Lake has also been reported. Local residents have complained about the presence of odors they attribute to the landfill.

The cost-effectiveness evaluation prepared by Radian Corporation (July 1982) reviewed the previous feasibility studies of R.E. Wright (1980, 1981) and Betz, Converse and Murdoch (1982). Radian evaluated 32 possible alternative remedial actions, of which 9 were determined to be highly cost-effective options:

	Estimated Cost	
	Capital	Total O&M
- 360° Cutoff wall with Cap (16 acres)/ Collect with wells/Treat at POTW	1.8m	180[illegible]
- Upgradient Deflection wall with Cap (6 acres)	1.2m	---
- Upgradient Deflection wall with Cap (6 acres)/Collect with wells/ Treat at POTW	1.4m	273k
- 360° Cutoff wall with Cap (6 acres	985k	---
- 360° Cutoff wall with Cap (16 acres)	1.5m	---
- 360° Cutoff wall with Cap (6 acres)/ Collect with wells/Treat at POTW	1.2m	180k
- Collect with wells/ Treat at POTW	210k	180k
- Deflection wall/Upgradient Drain/ Cap (22 acres)	2.1m	---
- Deflection wall/Upgradient Drain/ Cap (22 acres)/Collect with Wells/ Treat at POTW	2.3m	273k

After giving careful consideration to the cost-effectiveness and Environmental Assessment of each alternative and evaluating comments we have received, the Region recommends that the containment, active groundwater control alternative be implemented at the site (Attachment A). A letter from the State of New Jersey concurring with the approach is enclosed as Attachment B.

Considerations leading to the need for collection and treatment of the encapsulated leachate include:

1. Undefined long term integrity of the slurry wall.

2. Collection of the leachate contents will lower the internal head, minimizing infiltration through the underlying clay and the potential for contamination of the Kirkwood Aquifier, a drinking water supply.

3. Current cost estimates indicate that the reliability of the encapsulation action can be enhanced at a reasonable cost, thereby providing additional assurance for protection of public health and the environment.

Recommended Alternative

Section 300.68(j) of the National Contingency Plan (NCP) (FR 31180; July 16, 1982) states that the appropriate extent of remedy shall be determined by the lead agency's selection of the remedial alternative which the agency determinates is cost-effective and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare or the environment. Based on our evaluation of the cost-effectiveness of each of the proposed alternatives, the comments received from the public, our technical consultants, and information/comments from the State, we have determined that the two phase: Phase I, 360° cutoff wall with Cap (16 acres) encapsulation, in conjunction with Phase II, collection wells and treatment at the local POTW strategy identified in the cost-effectiveness report meets the NCP criteria.

The encapsulation, collection and treatment option entails the specific activities identified in Attachment C. The cost breakdown for this remedial alternative is listed below.

Activity		Estimated Costs
Phase I:		
Preparation of Detailed Design		$ 100,000
Cutoff wall and cap Construction		$1,589,150
Treatment Feasiblity Study		$ 80,000
	TOTAL	$1,769,150
Phase II:		
Collection and treatment construction		$ 209,120
POTW disposal and operation and maintenance		$ 91,250 per year

Proposed Action

We request your approval of the Encapulation, Collection and Treatment option as the remedial action alternative for LiPari Landfill. In addition, we request the allocation of $1,769,150 for the Phase I project activities as indicated above which includes associated engineering costs.

Tentative Schedule	1982
• Final opportunity for private party clean-up	mid August
• State/EPA sign Superfund State Contract	late August
• Complete design of slurry wall and cap	October 1

- Receive bids, award contract, and begin construction (Phase I) — November
- Complete treatability study (Phase II) — December

If you have any questions, please contact Robert Ogg at (212) 264-2647.

Remedial Implementation Alternative Selection
LiPari Landfill Superfund Site
Township of Mantua
Gloucester County, New Jersey

EPA has completed the following remedial Superfund activities at the LiPari Landfill site located in Gloucester County, New Jersey:

Activities	Date Completed
Remedial Investigation/ Feasibility Study	October 1980, December 1980 revised
Remedial Investigation/ Feasibility Study	September 1981
Public Meeting	November 1981
Cost-Effectiveness Analysis of Alternatives	July 1982
Fence Isolation of the Site	July 1982
Draft Environmental Information Document	July 1982
Public Meeting	July 23, 1982

Region II has reviewed the information presented in each of these reports and given careful consideration to the comments received from the State of New Jersey, our technical consultants and the public. Based on our review, Region II has determined that the following actions at the site are cost-effective, environmentally sound, and effectively mitigate and minimize damage to and provide adequate protection of public health, welfare or the environment.

Action	Estimated Cost
Phase I	
Containment Design	$ 100,000
Waste Containment Construction	$1,589,150
Collection and Treatment Feasibility Study	$ 80,000
	$1,769,150

____
Date

____
Jacqueline E. Schafer
Regional Administrator

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARD MANAGEMENT
OFFICE OF THE DIRECTOR
CN 028
TRENTON, NEW JERSEY 08625
(609) 292-4026

July 16, 1982

Mr. Robert Ogg
USEPA - Region II
26 Federal Plaza
New York City, New York
10007

Dear Robert:

As you requested during your July 15, 1982, meeting with Anthony Farro of this Division, we have reviewed your general concept for the final remedial action plan for the Lipari Landfill. According to your representation to Mr. Farro, EPA's conceptual plan includes:

1) The construction of a 360 degree cutoff wall with clay cap over 16 acres (the enclosed area would include the six acre landfill and the 10 acre contaminated area between the Landfill and Chestnut Branch).

2) The installation of groundwater collection wells (located both within the contaminated zone and the waste body itself).

3) The transport of contaminated groundwater, collected under #2 above after primary treatment on site if necessary, to a public owned treatment works (POTW) for final treatment and discharge.

After requesting the review of this plan by the appropriate, interested Divisions within the Department, I can report to you that the Department is in general agreement with the conceptual plan stated above; provided, of course, the POTW involved is satisfied that it has the capacity to receive and satisfactorily treat, as necessary, the contaminated groundwater transported to it under item #3 above. Consequently, if we find that the POTW is not a satisfactory treatment facility for the contaminated groundwater, another treatment method will be utilized.

continued . . .

As you know, we expect to execute a Superfund Agreement to implement this remedial action by mid-August. Recent discussions between DEP and EPA have convinced me that this is also your agency's intention. I am confident that, with continued cooperation, we can refine this conceptual plan into a detailed remedial action expeditiously and accomplish our goal.

Sincerely,

JACK STANTON
Director

ejs
cc: G. Tyler, Asst. Commissioner
J. Vernam
T. Farro
D. Mack
G. King

360° CUTOFF WALL WITH CLAY CAP [SIXTEEN (16) ACRES]; COLLECT WITH WELLS; TREAT AT POTW

Phase I

Deflection/Encapsulation System

A 360° cutoff wall with clay cap over the landfill area (6-acres) and the contaminated area (10-acres) between the landfill and Chestnut Branch to isolate the source of leachate as proposed in the Wright report (November 1980) involves:

- installation of an impermeable slurry wall around the entire affected 16-acre area, and
- installation of an impermeable cap over the 16-acre area.

360° Cutoff Wall Over 16-Acres Area. A 360° slurry wall as shown in Figure 1 will completely isolate the entire area (16-acres) from the groundwater flow system. The cutoff wall would be installed vertically from the ground surface downward to a location 2 to 3 feet into the Kirkwood clay. It was estimated that an average slurry wall depth of 30 feet would be required throughout most of the affected area, with as much as 50 feet in depth along western perimeter of the disposal area. The slurry tren[illegible] would be installed to achieve a maximum permeability of 1.0×10^{-7} to 1.0×10^{-8} centimeters per second.

Bentonite Clay Cap Over the Landfill. A bentonite clay cap over the entire area (16-acres) will minimize infiltration of rainwater into the area. The installation of a cap would include regrading the 16-acre area, disking bentonite SG-40 at 1.5 lb/ft^2, compaction, 12 inches cover and seeding.

Phase II

Collection System

The well design for this option is based on the following assumption

- The cutoff wall and clay cap completely isolate the system from ground water and surface recharge; and
- The cutoff wall is able to withstand a significant gradient between the ground-water system and the enclosed area, which is subject to pumping.

TABLE 3-6. OPERATIONAL PARAMETERS AND PERFORMANCE DATA FOR THE GLOUCESTER COUNTY MUNICIPAL UTILITIES AUTHORITY WASTEWATER TREATMENT PLANT

Operational Parameters

Average flow = 14.5 MGD

Total aeration tank volume = 2.76×10^6 gallons

Total Mixed Liquor Volatile Suspended Solids (MLVSS) under aeration = 42,000 - 65,000 lb

Sludge age = 5-7 days

Performance Data

	Influent (mg/L)	Effluent (mg/L)
BOD_5	160 - 200	8 - 15
COD	350 - 400	20 - 50
[illegible]	200 - 220	6 - 12

The well field needed to remove the contaminated ground water from within the 16 acre enclosed area is located throughout the waste and plume areas.

Ten wells, spaced as shown in Figure 1 could theoretically remove all of the enclosed ground water within 1 year. This assumes a pumping rate of 10 gpm/well continuously. Since there is no recharge, however, the wells will dewater before the entire volume can be pumped out. It will be necessary, at some point, to reduce the pumping rate and maintain maximum yield. The ability to remove all contaminated fluid and the associated pumping time needed are exponential functions. It will be cost-effective to remove only a portion of the total fluid volume, perhaps 80%. Based on this, the following pumping rates are suggested:

First Year:	All wells @ 10 gpm/well until drawdown is near maximum. (Estimate 6-8 months)
	Reduce all wells as needed to maintain maximum yield. (2-3 gpm or less)
Second Year:	Continue pumping at reduced rates until a satisfactory amount of fluid has been removed.

At 10 gpm/well for 6 months and 3 gpm/well for an additional year, approximately 86% of the contaminated fluid would be recovered.

Treatment Systems

The collected leachate is currently planned to be routed to the Gloucester County Utilities Authority (GCUA) wastewater treatment plant. This is a 16.5 MGD modified contract stabilization plant. Average flows currently run at approximately 14-14.5 MGD with peak flows of 18-19 MGD (GCUA, May 18, 1981). The predicted leachate pumping rates are relatively low (28,000 - 144,000 gal/day). The hydraulic capacity of the plant and the collection system are adequate for treatment of the leachate. The main trunk line is designed for 24.1 MGD. In addition, GCUA is planning to expand plant capacity in the near future (GCUA, May 17, 1981). Operational parameters and performance data for the GCUA are summarized in Table 3-6. A sewer line tie-in across Chestnut Branch would be necessary.

Approximately 10-12% of the wastewater flow at GCUA is from industrial contribution with 8% contributed by Shell Chemocal Company (GCUA, May 18, 1981). Preliminary contacts with the plant general manager and operations manager indicate that the plant can handle this waste stream; however, GCUA will require a certified laboratory report characterizing the leachate and will perform their own laboratory tests to determine the potential effects of the wastes on the plant.

The predicted performance of the GCUA plant in treating LiPari leachate is presented in Table 3-7. Influent concentrations are based on combining the GCUA average flow of 14.5 MGD with the predicted high leachate pumping rate. Removal efficiencies were estimated from plant data for the conventional pollutants and a review of the literature for organic species. A full scale treatability study is currently underway to assure the compatibility of the leachate to the treatment system.

...ANCE OF THE GCMUA WASTEWATER TREATMENT PLANT AS APPLIED TO LIPARI LEACHATE

Parameter	Influent [1/] (mg/L)	Effluent (mg/L)	Effluent (lb/day)	% Removal	Reference [2/]
BOD	203 - 228	10.2 - 11.4	--	95	4
COD	381 - 411	38.1 - 41.1	--	90	4
Phenol	0.02 - 0.13	0.001 - 0.006	0.12 - 0.73	95	1, 2, 3
Bis-2-(chloro-ethyl) ether	0.13 - 0.87	0.027 - 0.174	3.27 - 21.05	80	2, 3
s-2-(chloro-ethoxy) methane	0.23 - 1.50	0.230 - 1.50	27.8 - 181	0	2, 3
Benzene	0.02 - 0.04	0.00- - 0.011	0.73 - 1.33	70	2, 3
Toluene	0.22 - 0.42	0.043 - 0.083	5.2 - 10.04	80	3
Ethyl Benzene	0.01 - 0.06	0.003 - 0.011	0.36 - 1.33	80	2, 3
Methylene Chloride	0.07 - 0.36	0.007 - 0.036	0.85 - 4.36	90	2
1,2-Dichloroethane	0.08 - 0.33	0.025 - 0.099	3.02 - 11.98	70	2

1/ Based on mass balance: $\frac{(14.5 \text{ MGD})(x \text{ GCMUA}) + 0.144 \text{ MGD } (x \text{ leachate})}{14.644 \text{ MGD}}$

Concentration of organic species in GCUA influent was assumed to be 0 mg/L.

2/ References:
1) Stamoudis, 1979
2) Patterson, 1981
3) Tabak, 1981
4) GCMUA, May 18, 1981

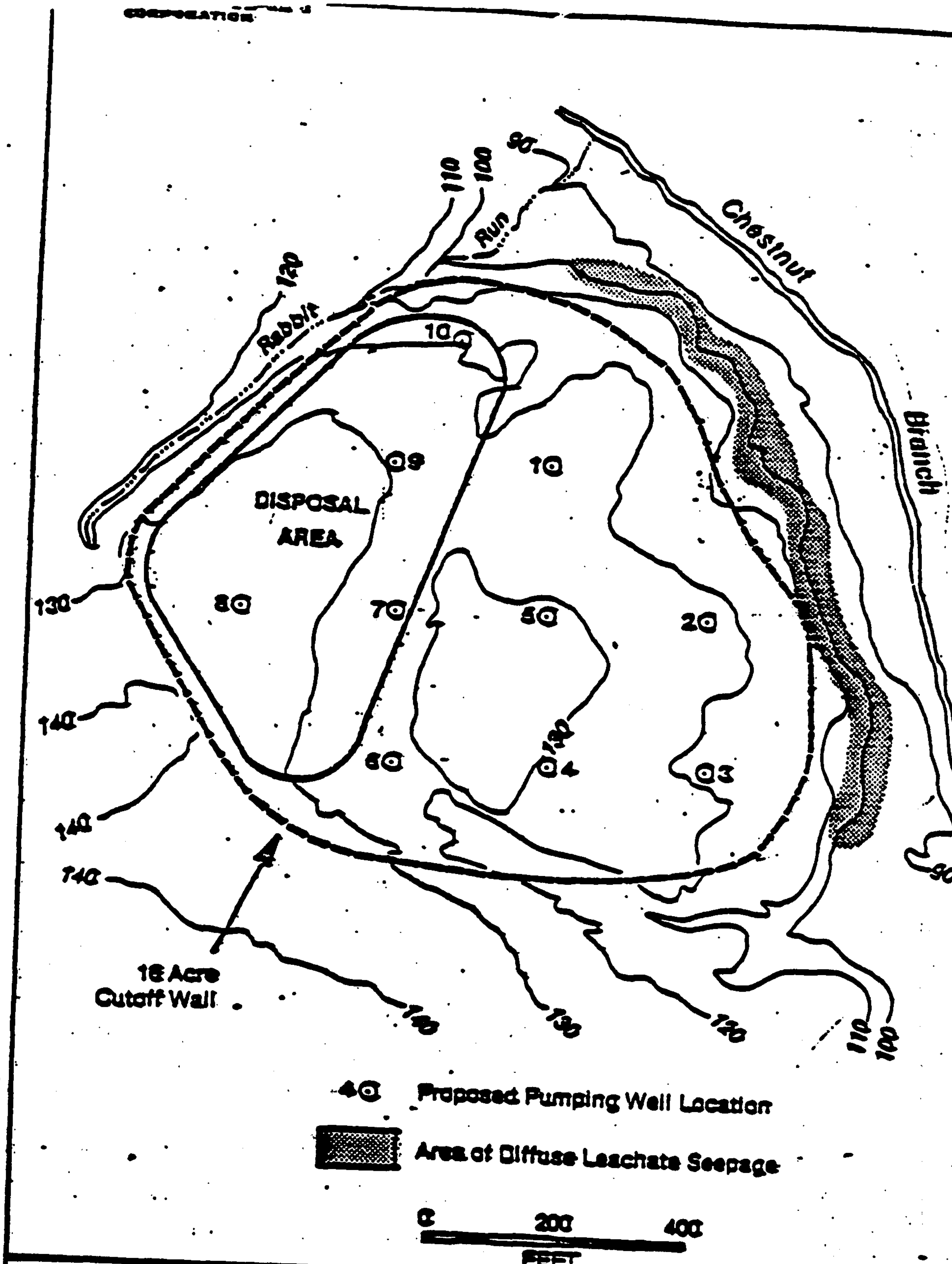

Figure [illegible] The Preferred Alternative
360° Cutoff Wall with Cap (16 acres)/
Collect with Wells/ Treat at POTW

…… OF THE GCMUA WASTEWATER TREATMENT PLANT AS APPLIED TO LIPARI LEACHATE

Parameter	Influent [1/] (mg/L)	Effluent (mg/L)	Effluent (lb/day)	% Removal	Reference [2/]
BOD	203 - 228	10.2 - 11.4	--	95	4
COD	381 - 411	38.1 - 41.1	--	90	4
Phenol	0.02 - 0.13	0.001 - 0.006	0.12 - 0.73	95	1, 2, 3
Bis-2-(chloro-ethyl) ether	0.13 - 0.87	0.027 - 0.174	3.27 - 21.05	80	2, 3
s-2-(chloro-ethoxy) methane	0.23 - 1.50	0.230 - 1.50	27.8 - 181	0	2, 3
Benzene	0.02 - 0.04	0.00- - 0.011	0.73 - 1.33	70	2, 3
Toluene	0.22 - 0.42	0.043 - 0.083	5.2 - 10.04	80	3
Ethyl Benzene	0.01 - 0.06	0.003 - 0.011	0.36 - 1.33	80	2, 3
Methylene Chloride	0.07 - 0.36	0.007 - 0.036	0.85 - 4.36	90	2
1,2-Dichloroethane	0.08 - 0.33	0.025 - 0.099	3.02 - 11.98	70	2

1/ Based on mass balance: $\frac{(14.5\ MGD)(x\ GCMUA) + 0.144\ MGD\ (x\ leachate)}{14.644\ MGD}$

Concentration of organic species in GCUA influent was assumed to be 0 mg/L.

2/ References:
1) Stamoudis, 1979
2) Patterson, 1981
3) Tabak, 1981
4) GCMUA, May 18, 1981

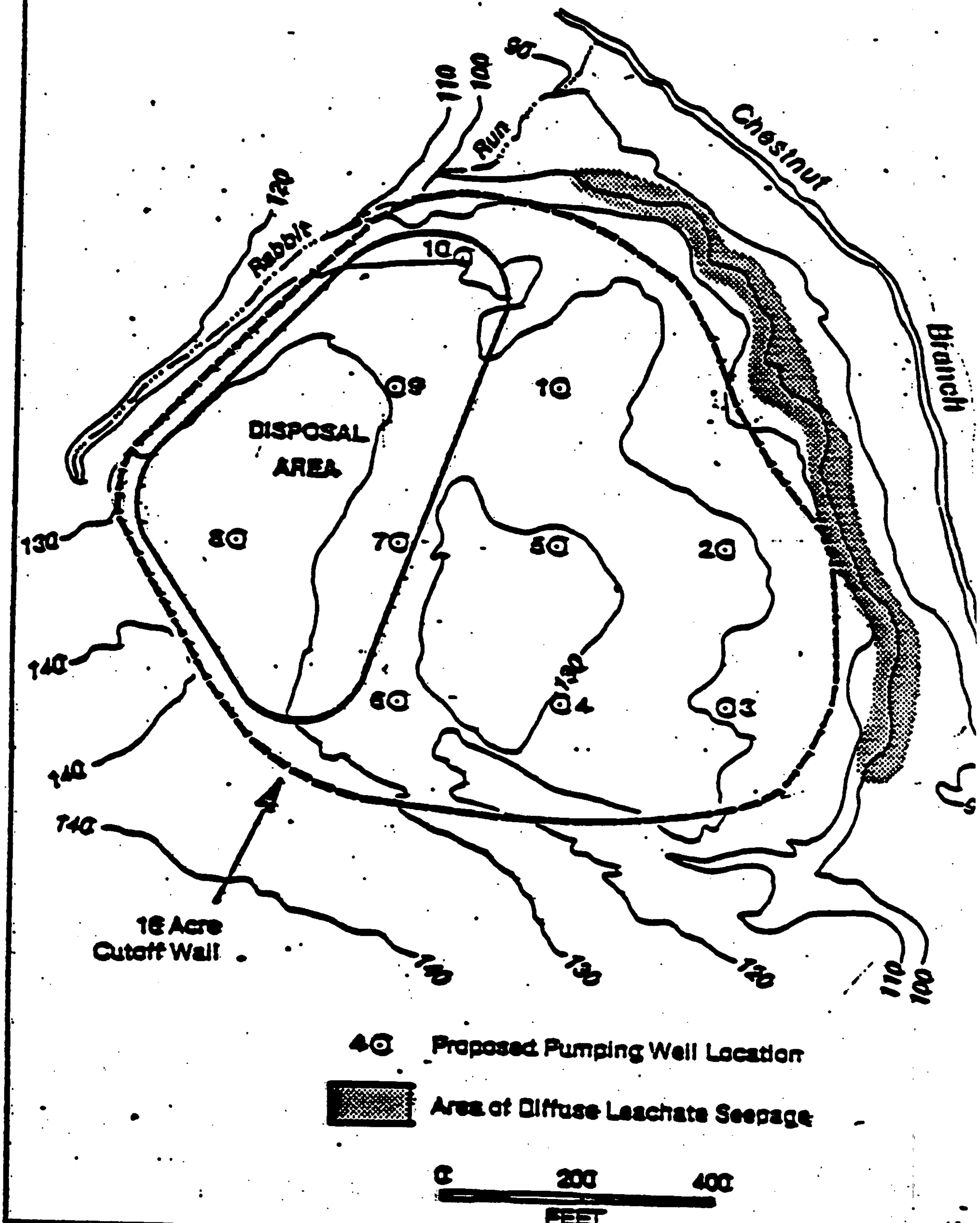

Figure [illegible] - The Preferred Alternative
360° Cutoff Wall with Cap (16 acres)/
Collect with Wells/ Treat at POTW

LIPARI LANDFILL SITE
BOROUGH OF PITMAN, GLOUCESTER COUNTY
NEW JERSEY

FINAL RESPONSIVENESS SUMMARY
FOR THE
ON-SITE REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

This community relations responsiveness summary is divided into the following sections:

Section I — Background on Community Involvement and Concerns.

This section provides a brief history of community interest in the Lipari Landfill site and a chronology of community relations activities conducted by the Environmental Protection Agency (EPA) during the on-site remedial investigation and feasibility study (RI/FS).

Section II — Summary of Major Questions and Comments Received During the Public Comment Period and the EPA Responses to the Comments. This section summarizes major questions and comments made verbally to EPA during the Public Meeting and the Public Comment Period by relevant topics. EPA responses to these comments are also provided.

Section III — Remaining Concerns. This section discusses remaining community concerns that EPA should be aware of in conducting the remedial design and remedial action at the Lipari Landfill site and in conducting the RI/FS of the off-site contamination problems at the Lipari Landfill site.

Section IV — Written Comments Submitted During the Public Comment Period and EPA Responses. This section addresses the comments submitted to EPA by letter during the Public Comment Period.

I. BACKGROUND ON COMMUNITY RELATIONS ACTIVITIES AND CONCERNS

Pitman Borough residents have been aware of the LiPari Landfill since the owner began accepting liquid and solid wastes in the late 1950s. Residents complained to local officials about odors coming from the landfill. In addition, residents were aware that fires occurred on the property during the period of landfill operations.

In July 1982, EPA constructed a fence around the property and installed a slurry wall containment system in September 1983 to prevent access to the site. Residents, however, remained concerned that children would still be able to gain access to the contaminated Chestnut Branch marsh area from the east side of Chestnut Branch. In August 1983, EPA constructed a second fence near Chestnut Branch. EPA recently completed a third additional fence connecting the fence surrounding the site to the fence east of Chestnut Branch. In September 1983, EPA initiated the installation of a slurry wall containment system around the LiPari Landfill.

During this period, residents expressed concern about the following issues: (1) the integrity of the slurry wall containment system; (2) the effectiveness of the leachate treatment system; (3) maintenance and security of the site; (4) the potential for ground water and drinking water contamination; and (5) the availability of site records. In addition, residents indicated their concern about possible off-site health and environmental effects from the landfill.

In January 1985, EPA released its draft work plan for the on-site and off-site RI/FS activities at the site. At that time, residents and local officials expressed concern about the following issues: (1) the structural integrity of the containment system; (2) the permeability of the Kirkwood layer; (3) the sampling and testing methodology used by EPA at the site; and (4) scheduling of the off-site RI/FS and availability of data results.

In August 1985, EPA released the draft Phase II on-site FS report to the public. EPA held a Public Comment Period on the draft FS report from August 5 to September 9, 1985. EPA held a Public Meeting in the Borough of Pitman on August 15, 1985 to receive verbal comments on the study.

The following is a brief chronology of community relations activities at the LiPari Landfill site.

November 30, 1981	EPA holds a briefing for local officials to give a status report on the activities at the LiPari Landfill site.

July 23, 1982	Congressman Florio holds a public meeting in Mantua, NJ to discuss the LiPari Landfill contamination problems with Gloucester County residents. EPA participates in the session.
September 1983	EPA prepares a community relations plan for the LiPari Landfill site.
September 1983	EPA establishes three information repositories for the LiPari Landifill site. These information repositories are located at the Pitman Borough Municipal Building, the Pitman Environmental Commission, and EPA Region II office in New York City.
July 12, 1984	EPA holds a public information meeting in the Borough of Pitman to discuss citizen concerns regarding an on-site and an off-site RI/FS.
January 23, 1985	EPA holds a public information meeting in the Borough of Pitman to provide the community with current information regarding the draft work plan for the on-site and off-site RI/FS.
August 5, 1985	EPA begins a five-week Public Comment Period on the draft on-site FS report. Citizens submit written and verbal comments to EPA.
August 15, 1985	EPA holds a Public Meeting to receive verbal comments on the draft on-site FS report from local residents.
September 9, 1985	EPA ends the Public Comment Period on the draft on-site FS report.

II. SUMMARY OF MAJOR COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSE

Major comments and questions raised during the LiPari Landfill site Public Comment Period are summarized briefly below. Examples of comments and questions raised and EPA responses are also provided. EPA held the Public Comment Period from August 5 to September 9, 1985 to receive comments from the public on the draft feasibility study. The comments received during the Public Comment Period are organized by the following relevant topics:

1. Candidate remedial alternatives
2. Other remedial alternatives
3. Contamination of the Kirkwood aquifer
4. Nature and extent of contamination
5. Off-site contamination concerns
6. Cost/funding issues
7. Health studies
8. Public Comment Period and schedule

1. CANDIDATE REMEDIAL ALTERNATIVES

<u>Complete Removal - Alternative 1</u>

Several residents who commented on the draft feasibility study preferred Alternative 1 which involves the complete removal of the contamination from the landfill. These residents believed that this option would remove the hazardous waste material and eliminate any additional environmental damage to off-site areas. In addition, some residents questioned the validity of the cost-benefit criterion for remedial alternative selection. These residents indicated that the cost-benefit of a remedial action should not influence the selection of alternatives.

EPA indicated that Alterntive 1 is not a favored option because a potential health risk exists to workers and nearby residents from the excavation of the hazardous waste at the landfill. In addition, the selection process stipulated in the National Contingency Plan is the one that EPA uses in the decision process for remedial actions at the LiPari Landfill site. This criteria includes the cost-benefit determination that first considers the technical feasibility and environmental effectiveness of the site remedy and then compares the costs and benefits among those alternatives that meet this effectiveness criteria. In the case of the LiPari Landfill site, the cost for Alternative 1 are significantly higher than other effective options.

In addition, EPA believes that it is unlikely that a Resource Conservation and Recovery Act (RCRA) permitted landfill located outside of New Jersey will accept the amount of material that would be removed from the LiPari Landfill site.

a) Question: A resident asked if EPA considered safety and transportation issues concerning the total removal of the contamination in the landfill as well as financial considerations.

Response: EPA considered safety and transportation issues related to the total removal of the hazardous waste at the LiPari Landfill. EPA assessed the financial costs and health risks associated with excavating and transporting the hazardous waste material away from the site. EPA has determined that the financial costs and health risks are too great to select total removal of the contamination in the landfill as the remedial action at the site. In addition, EPA believes that the disposal alternatives for the hazardous waste material to be limited.

b) Question: A resident asked if EPA will reject the complete removal alternative because a disposal site does not exist that will accept the waste.

Response: EPA has not rejected the complete removal alternative because a disposal site has not been currently identified. At this time, EPA does not consider the complete removal alternative appropriate because of the high cost and a potential health threat to workers and the public from the excavation of the landfill. EPA believes, however, that an acceptable disposal site would be difficult to identify.

c) Question: A resident questioned why EPA included waste disposal companies in the draft feasibility study report which may be in violation of federal and state environmental standards.

Response: EPA is not recommending waste disposal firms in the draft on-site FS. EPA considered specific waste disposal firms in the assessment of the remedial technologies to estimate costs only. EPA has adopted an off-site disposal policy which ensures that any decision on disposal complies with all existing laws. When an alternative is selected for remedial action at the LiPari Landfill site, EPA will request proposals from qualified waste disposal companies.

Enhanced Containment - Alternatives 2, 3, and 4.

A few residents seemed somewhat skeptical as to whether or not the alternatives which involve enhanced containment (Alternatives 2, 3, and 4) are as effective as the complete removal option (Alternative 1) or the flushing options (Alternatives 5 and 6). These residents were generally concerned about the further contamination of the Kirkwood aquifer and the integrity of the slurry wall. Several residents and members from the Pitman Environmental Commission were supportive of enhanced containment for the LiPari Landfill because of the reliability and past experience with this type of system. In particular, one resident was supportive of Alterative 4 because he believed that the option addresses most adequately environmental concerns regarding the Kirkwood and Cohansey aquifers.

EPA responded that the enhanced containment options provided an opportunity to address both environmental and health concerns related to contamination of the Cohansey and Kirkwood aquifers. In addition, EPA indicated that sufficient experience with the technologies involved in the enhanced containment alternatives provided both reliability and predictable results from the system. EPA, however, stressed that the enhanced containment options do not remove or clean up the landfill as described in Alternative 1, the complete removal option, or Alternatives 5 and 6, the flushing options.

a) Question: A resident asked if enhanced containment had been used before at a landfill like the LiPari Landfill.

Response: According to information available to EPA, enhanced containment has not been used before at a chemical hazardous waste landfill like LiPari. The technologies, however, that make up the enhanced containment system alternative have been proven at LiPari during the remedial investigation phase of the project. These technologies include: (i) pumping the leachate from within the encapsulation system; (ii) pumping the Kirkwood aquifer; and (iii) lowering the water level in the landfill; and (iv) treating the leachate.

b) Question: A resident asked if the permeability of the slurry wall was impacted due to the hazardous waste in the LiPari Landfill.

Response: EPA responded that the permeability of the encapsulated system and its seepage are normal and expected occurences. The permeability of the wall, however, could be impacted by the hazardous wastes at the LiPari Landfill site. Because the use of slurry walls in situations like the LiPari Landfill site is new, there is no history of what impacts hazardous waste may have on the slurry wall at the site.

c) Question: A resident asked EPA to define hydro-fracturing? The resident inquired if hydro-fracturing will cause the enhanced containment system to fail.

Response: Hydro-fracturing is a process that causes the permeability of the slurry wall to increase two to three times above its design permeability. The potential for hydro-fracturing to occur at the LiPari site is increased when a difference of fifteen feet exists between the top of the slurry wall and the water table on either side of the containment wall. This difference could be reached if the containment system is dewatered. The result of hydro-fracturing is an increase in permeability of the slurry wall. It does not occur throughout the system, but is a localized phenomenum. Hydro-fracturing is not a break or crack in the slurry wall.

At LiPari, where the differential of the water level across the wall would approach or exceed fifteen feet at the southwest corner if the encapsulation is dewatered, there is the potential for hydro-fracturing. EPA believes, however, that the risk of hydro-fracturing will not greatly impact the effectiveness of this alternative. In addition, long-term monitoring will ensure that EPA is aware of any significant effects to the enhanced containment system.

d) Question: A resident asked why EPA does not install a well that is screened from top to bottom in order to catch floating or sinking contaminated material within the encapsulation system.

Response: EPA is still considering the design of the extraction wells for this candidate alternative. EPA believes, however, with properly designed wells and effective utilization, wells screened at various points in the encapsulation system will capture floating and sinking contaminated material.

Flushing - Alternatives 5 and 6

Several residents supported Alternatives 5 and 6, the flushing options. Although an unproven technology, these residents believed that flushing may be the most effective solution to clean up the majority of the hazardous waste contamination at the LiPari Landfill. Several Pitman residents, however, questioned the technical feasibility of flushing. These residents expressed concern, frustration, and anger about the experimental character of flushing as an unproven technology. These residents believed that the risk of further contaminating the Kirkwood aquifer and Alcyon Lake was too great for EPA to select either Alternative 5 or 6.

EPA responded that the flushing option provides an opportunity to clean the water soluble contaminants from the system. Because LiPari Landfill is a small, contained system, with a slurry wall and cap, EPA believes that adequate controls exist to attempt the flushing option. EPA stressed that it is necessary to try flushing or it will always remain an unproven technology. In addition, EPA indicated that if flushing is selected and proves ineffective, EPA could then shift to enhanced containment. EPA intends to continue long-term monitoring under the flushing option to observe any changes in the ground water and off-site conditions. Placement of recovery wells will preclude contamination seeping into the Kirkwood sand formation from migrating off-site or discharging into Alcyon Lake.

a) Question: A resident asked EPA to explain flushing.

Response: Flushing is the injection of clean water uniformally into the containment system such that the chemical contamination that is within the slurry wall and is water soluble would come in contact with clean water. This flushing water is pumped out of the system and treated to remove the contaminants before being returned to the flushing cycle. Flushing will remove water soluble contamination that would otherwise remain physically bound to the soil in the containment system indefinitely, or seep through the slurry wall or Kirkwood clay bottom and into the off-site environment.

b) Question: A resident questioned EPA about what is done with the contaminated water that is pumped from the encapsulated containment system.

Response: EPA intends to treat the contaminated water that is pumped from the system by: (i) treating the water on-site and discharging into the Gloucester County Utilities Authority Wastewater Treatment Plant; (2) treating the water on-site and reinjecting into the landfill: or (3) transporting the contaminated water to an off-site treatment facility for disposal.

c) Question: A resident asked EPA about what is done with the insoluble contaminated waste (sludge) that is left in the encapsulated containment system.

Response: After the flushing of the system, the sludge will be left in the landfill with a long-term monitoring system to measure any significant changes in water soluble contamination levels. Since this sludge is water insoluble, it is not expected to leech out and escape the containment system.

d) Question: A resident asked EPA what percentage of contamination will be flushed from the system.

Response: EPA does not know the total volume of contamination in the landfill. It is impossible to estimate the percentage that will be left after flushing. The purpose of flushing, however, is to remove as much of the water soluble contamination as possible from the system in order to prevent the contaminated material from being transported by ground water through the slurry wall or the Kirkwood sands.

e) Question: A resident asked EPA if it is possible for the hazardous waste materials in the landfill to react with the water and create an explosion.

Response: EPA responded that it is not likely that an explosion or reaction will occur with the introduction of water during flushing of the landfill. The water will be injected slowly into the landfill. It will take six months to fill the landfill one time. The water soluble and water insoluble contaminants have already been exposed to water for many years.

f) Question: A resident asked how many gallons of water are necessary to fill the containment system.

Response: EPA responded that it will take approximately ten to twelve million gallons of water to fill the containment system.

g) Question: A resident asked from where the water will be obtained for flushing the LiPari Landfill.

Response: Three locations have been identified as possible sources of water including: (i) Pitman Municipal Water Supply; (ii) upgradient monitoring well(s); and (iii) nearby Plank Run Reservoir.

h) Question: A resident inquired if there is an advantage in using treated water from Alcyon Lake and then reinjecting it into the LiPari Landfill for flushing.

Response: EPA has not yet determined the source of water that would be used for flushing the landfill. Certainly, Alcyon Lake might be considered as a possible source of water for flushing.

i) Question: A resident commented that if undamaged drums exist in the LiPari Landfill, flushing would not remove the contamination in those drums. The resident asked how EPA intends to address this problem.

Response: EPA responded that it is true that only ruptured and rusted drums would have released their contents into the landfill, presenting the opportunity for removing the contamination through flushing. EPA does not believe that any of the drums that were placed in the landfill are left intact. However, EPA would continue to monitor the landfill in order to determine if any new or increased concentrations of contamination are found.

2. OTHER REMEDIAL ALTERNATIVES

Residents and the Pitman Environmental Commission expressed interest in remedial alternatives in addition to the candidate remedial alternatives included in the draft on-site feasibility study. In particular, these citizens asked questions about in situ biological processes, incineration of the LiPari Landfill leachate, and deep well injection of the leachate.

o In situ biological processes. EPA considered using in situ biological processes including injecting the landfill with biological nutrients and/or mixing the excavated landfill material with biological nutrients. EPA rejected these options, however, because the technology is unproven for situations like the LiPari Landfill site.

A resident asked if EPA had considered using biological microbes in the treatment of the contaminated leachate. EPA indicated that it may be possible to add biological microbes to improve the efficiency of an on-site leachate treatment system. EPA had not considered this type of treatment in the FS report. EPA would consider, however, adjusting an on-site treatment system with biological microbes.

o Incineration of leachate. EPA considered and screened out incineration as an alternative remedial treatment option for the LiPari leachate. EPA believes that the lack of application of incineration technology in treating leachate, its dependence on other concentrating processes that are not proven technologies, and its required operator sophistication, would not make incineration a viable option at LiPari. In addition, the dilute nature of leachate at LiPari is not conducive to incineration.

o Deep well injection. Based on environmental and institutional considerations, EPA rejected deep well injection as a possible alternative for remedial action at the LiPari Landfill.

3. NATURE AND EXTENT OF CONTAMINATION

Residents requested information about the nature and extent of contamination in the LiPari Landfill. In addition, residents expressed concern that the selected remedial alternative address the exact type and properties of the hazardous waste that is found within the landfill as well as outside the slurry wall.

EPA responded that mostly volatile organic compounds have been found at the LiPari Landfill including benzene, 1,2-dichloroethane, methylene chloride, and toluene. Phenol, an acid extract, and bis (2-chloroethyl) ether, a base/neutral extract were identified. In addition, metals were identified in the landfill including chromium, nickel, lead, mercury, selenium, arsenic, and silver.

EPA indicated that the nature and the extent of contamination at the LiPari Landfill was carefully assessed in the identification of remedial technologies and candidate alternatives. In addition, EPA will continue to assess the effectiveness of the selected alternative during the off-site RI/FS. Long-term monitoring will continue at the LiPari Landfill so that the level of contamination can be measured in the landfill as well as off-site.

a) <u>Question</u>: A resident asked if the leachate is currently seeping through the slurry wall in a more concentrated form than before the construction of the slurry wall.

<u>Response</u>: EPA believes that it is unlikely that the slurry wall concentrates the leachate. EPA indicated that it is more likely that seepage through the wall or Kirkwood clay layer comes in contact with predominantly clean water which dilutes the seepage substantially.

b) <u>Question</u>: A resident asked if EPA had evidence that contaminants exist in the landfill in two phases, a floating phase and a sinking phase. The resident asked if two phases would effect the selection of a remedial alternative.

<u>Response</u>: EPA has no evidence of a phase separation. The existance of a phase separation would not impact the selection of a remedial alternative.

c) <u>Question</u>: A resident asked if EPA would select the on=site remedial alternative before the results from the gas testing at the air vents on the landfill are available.

<u>Response</u>: EPA does not feel that it is necessary to have the data on the air vents before the on-site remedial alternative is selected. Controls for the air vents on-site can be independent from an on-site leachate control system. EPA will address the air quality concern in the off-site RI/FS report.

4. CONTAMINATION OF THE KIRKWOOD AQUIFER

Residents, the Pitman Environmental Commission, and Pitman Township and Gloucester County officials expressed concern about the contamination to the Kirkwood aquifer. These citizens feared that the contamination to the Kirkwood sands would result in a long-term ground water contamination problem that could impact potable ground water supplies in the region. Residents requested technical information regarding the following: (i) the rate of deterioration of the Kirkwood clay; and (ii) the extent of deterioration of the Kirkwood clay layer and the contamination to the Kirkwood sands.

EPA responded that the Kirkwood clay layer would last as long as the geologic formation of the Kirkwood aquifer remains intact. EPA is concerned, however, with the potential degradation of the Kirkwood clay from its chemical exposure at the LiPari Landfill. Recent laboratory tests have not been conducted on the Kirkwood clay layer. EPA believes that it is not certain that laboratory tests would provide additional information about the future impact of chemical contact to the clay. Modeling indicates that it would take a single particle approximately twenty-eight years under ideal conditions to permeate from the top to the bottom of the clay layer. The presence of chemicals in the Kirkwood sands indicates that some seepage has already occured. The cause of this contamination is unknown. The contamination could have been caused by improperly sealed wells. These wells have subsequently been properly sealed. Contamination downgradient of the site has not been found in the Kirkwood aquifer.

EPA is uncertain whether there is any present deterioration. EPA intends to monitor the Kirkwood aquifer carefully to detect changes in the concentrations of contaminants in the ground water.

a) Question: A resident asked if the Kirkwood clay layer had been punctured when monitoring wells were installed to test the ground water.

Response: When a monitoring well is properly installed a technique is used of grouting and sealing to prevent the movement of materials from one layer to another in the aquifer. It is possible that a minor amount of ground water contamination in the Kirkwood aquifer resulted from one or two old ground water monitoring wells which may have been installed improperly. EPA stated that these wells have been sealed and replaced. EPA intends to monitor the Kirkwood aquifer during the remedial action at the LiPari landfill and address the existing contamination to the ground water.

b) Question: A resident asked how many towns are currently drawing their potable water supplies from the Kirkwood aquifer.

Response: Although most potable water supplies draw water from deeper aquifers, EPA will assess the region-wide impact of contamination to the Kirkwood aquifer during the off-site RI/FS. EPA has asked its contractor to use a comprehensive data base to study the potential impact to area ground water supplies from contamination of the Kirkwood aquifer.

5. OFF-SITE CONTAMINATION CONCERNS

Residents and the Pitman Environmental Commission indicated significant concern about the environmental and public health impacts resulting from the hazardous waste at the LiPari Landfill. Residents requested that EPA discuss the status of the off-site water, soils and sediment RI/FS activities. In addition, residents requested that EPA provide available results from the off-site sampling and testing. Specifically, residents expressed concern about the presence of the chemical bis (2-chlorethyl) ether, an animal and suspected human carcinogen, that had been detected in the LiPari Landfill.

EPA has nearly completed the field sampling activities in the off-site areas. Soil borings were taken in four locations in Alcyon Lake to define the nature of the bottom sediments in the lake. Surface water and sediment samples were taken from eleven locations along Chestnut Branch, Rabbit Run, Lost Lake Run, and Girl Scout Branch. Soil samples were taken in five locations and ground water monitoring wells were installed in eleven locations in the marshland east and west of Chestnut Branch. Three Pitman municipal wells, Nos. 2, 3, and 4, were tested. Soil samples were taken in five locations in Alcyon Park, two locations in Holly Dell, and six locations in Betty Park.

EPA tested for all priority pollutants in the ground water, surface water, sediments and soils, and air. At this time, EPA has limited test results from Betty Park. This data indicates that there is no public health threat to children playing in the park. Specifically, EPA identified small levels of three contaminants that were not found at the LiPari Landfill. These contaminants found in Betty Park include chlorinated hydrocarbon solvents, pesticides, and polynuclear aromatic hydrocarbons. EPA believes that these contaminants do not present a health risk to residents in the area. EPA's available test results indicate that bis (2-chlorethyl) ether is not found in Betty Park. In addition, EPA's available test results on the Pitman municipal wells do not indicate any contamination. In the next four months, EPA will receive the remaining test data from the off-site RI. EPA indicated that the test results will be available to the public as soon as possible.

a) Question: A resident asked how accurate are the EPA and contractor testing and sampling instruments.

Response: EPA and the contractor use state-of-the-art equipment to conduct field sampling and testing activities. The testing instruments and data are checked carefully by the contractor quality assurance staff as well as EPA quality assurance personnel.

b) Question: A resident asked where air testing had been conducted. In addition, the resident inquired about what pollutants were evaluated and if bis (2-chloroethyl) ether was included in the evaluation.

Response: Air testing was conducted at the air vents on the landfill site, in the marsh area west of Chestnut Branch, along the spill way of Alcyon Lake, and at Alcyon Lake. The air testing was completed at the end of July. EPA does not have the results at this time. Air samples at the vents were tested for the NJDEP TVOS compounds. The remaining air samples were tested for the full 129 priority pollutants including bis (2-chlorethyl) ether.

c) Question: A resident asked why basements along Howard Avenue and Lakeside Avenue were not tested for air quality. A homeowners expressed concern that past flooding may cause contaminants to volatize in the air.

Response: NJDEP conducted air testing on July 25, 1984 in nineteen homes on Howard Avenue. The purpose of the testing was to detect levels of volatile organics in the basements. Levels of volatile organic compounds were not identified in eighteen homes. NJDEP detected one low level reading in one home which was attributed to several open paint cans stored near the testing location.

d) Question: A resident asked why EPA did not sample the surface water and sediments in the southeast portion of Alcyon Lake. Several residents commented that they had observed pools of bright orange and green color floating on the lake after a rainfall.

Response: EPA and the contractor conducted tests where they believed the best representation of data could be obtained from Alcyon Lake. Sediment samples were taken from Chestnut Branch which contains the same sediment constituents as those which flow into the southeast side of Alcyon Lake. EPA will release the results of the off-site remedial investigation when the tests are analysed and the data is assessed.

e) Question: A resident asked if EPA, the contractor, and the U.S. Army Corps of Engineers have Professional Engineering licenses. In addition, the resident wanted to know if these individuals and the local and state elected officials were accountable for the work being conducted at the LiPari Landfill.

Response: Personnel from EPA, the contractor, and the U.S. Army Corps of Engineers are licensed Professional Engineers. EPA is responsible for and committed to cleaning up hazardous waste sites in New Jersey. Although EPA has completed the RI/FS on the on-site contamination problem at the LiPari Landfill, EPA is working on the second RI/FS of the off-site contamination problem to ensure that there is no environmental or health concern for Pitman residents from the contamination from the LiPari Landfill.

f) Question: A resident wanted to know where people currently are disposing of hazardous waste.

Response: EPA responded that all hazardous waste must now be disposed of at facilities permitted under RCRA.

6. COSTS/FUNDING ISSUES

Residents expressed concern about the funding for the cleanup of the LiPari Landfill site and any off-site contamination. A Gloucester County Freeholder indicated concern about the current status of the reauthorization of the Superfund program. In particular, he expressed a generalized community fear that the potential expiration of the authorization for Superfund may impact the off-site RI/FS and the remedial action at the LiPari Landfill and Alcyon Lake.

EPA responded that if the Superfund program is not reauthorized by Congress this year, funding will probably be sustained for the administration of the Superfund program through December 1985. Lee Thomas, Administrator of EPA, is currently prioritizing sites in order to ensure funding for those sites where emergency action is required or a public health threat exists. In the case of the LiPari Landfill, however, it is unclear whether the delay in the reauthorization of Superfund will impact the on-site remedial action. EPA indicated that the remedial action of Alcyon Lake would probably be affected.

a) Question: A resident asked who pays for the cleanup.

Response: The remedial action at the site would use 90 percent federal Superfund money and 10 percent state money. Normally, the operation and maintenance cost will use 90 percent federal Superfund money and 10 percent state money for the first year. After the first year, the operation and maintenance of the remedial action is the responsibility of the State of New Jersey. However, for the LiPari Landfill site, ninety percent federal funding for operation and maintenance may extend beyond the first year.

7. HEALTH STUDIES

Several citizens wanted to know if EPA was planning to conduct a health study for Pitman residents. Residents expressed concern about the possible health effects to citizens from the off-site contamination from the LiPari Landfill. Residents requested that local and state officials assist them in having a health study conducted in the Borough of Pitman.

EPA responded that EPA is not planning to conduct a health study in the Borough of Pitman.

8. PUBLIC COMMENT PERIOD AND SCHEDULE

Pitman residents expressed concern about the significance of the public comment period on the on-site FS report. These residents asked if their questions and comments have any impact on the EPA decision on the selected candidate alternative.

EPA indicated that the Public Comment Period is provided to receive comments from concerned citizens on the draft on-site FS report on the LiPari Landfill site. EPA accepts all written and verbal comments during this period. The comments are taken into consideration when EPA makes its final selection of a candidate alternative for remedial action. EPA prepares a responsiveness summary to address these comments. The responsiveness summary is incorporated into the Record of Decision stating the selected remedial action.

a) Question: A member of the Pitman Environmental Commission asked when EPA will select the on-site FS remedial action alternative.

Response: EPA will make a decision in four to six weeks from the public meeting after the Public Comment Period.

b) Question: A resident asked if residents and the Environmental Commission will be notified of the remedial alternative selected by EPA.

Response: EPA will notify the public through a press release as soon as the Record of Decision is signed.

c) Question: A resident asked when EPA will release the data on the off-site remedial investigation. In addition, the resident asked when the draft off-site RI/FS report will be available to the public.

Response: EPA will release the data from the off-site testing and sampling in the late fall of 1985. The off-site draft RI/FS report will be available in the winter of 1985.

III. REMAINING CONCERNS

Because of EPA's unique two phase approach to the LiPari Landfill site, the on-site RI/FS and off-site RI/FS, Pitman residents, the Environmental Commission, and local officials will continue to be concerned and interested in the remedial activities at the site. Pitman residents, the Environmental Commission, and local officials will be interested in how the findings from the off-site RI/FS impact the selected remedial action at the LiPari Landfill. During the remedial design and construction of the selected on-site remedial alternative, EPA should provide interested residents with the available test results from the off-site RI/FS.

Pitman residents and the Pitman Environmental Commission requested that EPA not schedule the Public Comment Period and Public Meeting on the off-site RI/FS report during the December holidays so that all interested citizens have the opportunity to comment on the off-site candidate remedial alternatives.

Pitman residents, the Pitman Environmental Commission, and Pitman and Gloucester County local officials will remain concerned about the funding availability for the on-site remedial action and off-site RI/FS and remedial action activities at Alcyon Lake while the reauthorizaton of the Superfund Program is considered by the U.S. Congress. The Pitman Environmental Commission should be kept informed of any impact to the schedule of EPA activities because of this delay in the reauthorization of the Superfund Program.

IV. WRITTEN COMMENTS SUBMITTED DURING THE PUBLIC COMMENT PERIOD AND EPA's RESPONSE

1. Comments of Rohm and Haas Company

On September 6, 1985, Dechert, Price and Rhoads submitted comments for Rohm and Haas as prepared by BCM Eastern Inc. to EPA (Attachment A). At EPA's request, CDM reviewed these comments and in its September 18, 1985 letter responded to them (Attachment B). EPA has reviewed both Rohm and Haas' comments and CDM's response, and concurs with CDM.

2. Comments of the Pitman Lipari Landfill Community Association

On September 7, 1985 the Pitman Lipari Landfill Community association submitted it comments to EPA (Attachment C).

Below is EPA's response to these comments in the order they were raised.

Questions for Concern

Comment A

Why was a Remedial Investigation Report (On-site) not completed in May 1985?

Response:

A draft On-site Hydraulic Remedial Investigation (RI) Report for the Lipari Landfill was prepared by Camp, Dresser, and McKee (CDM) in May 1985. This report discusses the results of the on-site testing done which defines the hydrogeologic conditions existing at the site. The site conditions found under the remedial investigation were subsequently used during the feasibility study.

During the review process, it was determined, because of the time-frame involved, that the resources dedicated to the Lipari project would be better spent proceeding with the feasibility study and not finalizing the Remedial Investigation Report. However, the RI work was complete and the conclusions used in the preparation of the Feasibility Report. The finalization of the RI report is needed just to formally incorporate the regulatory agencies' comments.

The complete findings of the On-site Remedial Investigation were incorporated into Section 2 of the Final draft Report for the On-site Feasibility Study for the Lipari Landfill.

The Off-site RI will not be completed in October 1985 as previously scheduled for two reasons: (1) all the results of the analysis of samples taken for the off-site study have not yet been recieved from the laboratory; and (2) more samples need to be taken in response to citizens' concerns, and to complete the data needed to evaluate the off-site conditions and to develop potential off-site remedial actions. The Off-site RI is tentatively scheduled to be complete in November of 1985.

Comment 8

How effective is the flushing method in removing toxic chemicals from the containment system?

Response:

A leachability test on a contaminated sample of the Lower Cohansey sand was performed under laboratory conditions by R.E. Wright Associates, Inc. (REWAI) in 1981. The results of this test generally indicated that 90+% of the watertransportable contamination could be removed from the leachate if 10 pore volumes of "clean" upgradient groundwater were exchanged through a laboratory column containing the contaminated sample. Unfortunately, REWAI did not analyze for the entire mass of contamination within the sample. Without this information, the precentage of contamination which is in fact water-transportable is unknown.

Technical concerns with regards to a landfill flushing operation is documented throughout the FS and include: the potential for short circuiting, operation and maintenance (O&M) problems associated with a pump/inject system, maintenance of a vertical hydraulic driving head on the Kirkwood Clay, and the innovativeness of landfill flushing. Despite these concerns, however, there are positive aspects to the flushing scenario. For example, if the fill and draw flushing methodology associated with Alternative 8 is implemented, the concerns about short-circuiting and O&M problems are minimized. The potential for short-circuiting is applicable when water is introduced to an unsaturated zone and when a pump/inject methodology is operating simultaneously. In Alternative 8, the pump/inject system would be a cyclical operation, that is the containment system would first be entirely filled with clean water prior to initiating a pump down or "draw" operation. In this manner, shortcircuiting is not expected to occur. Furthermore, should well clogging occur, this situation would not be critical to the effectiveness of the flushing operation since the draw or fill mode could be temporarily halted if necessary, until the well problem is rectified.

With regards to maintaining a head on the Kirkwood Clay, this would only be a temporary situation until such time as 10 pore volumes of clean water had been exchanged within the containment system (estimated to require 15 years). Therefore, this drawback to the flushing technique is only applicable in the short-term and would be expected to diminish over time as contamination is flushed and removed from the containment system. In addition, since the liquid contents of the containment system will be consecutively raised and lowered, the mean head on the Kirkwood Clay would be lower than current heads.

It is presently unknown whether contaminants have saturated the Kirkwood Clay layer and are presently seeping into the Kirkwood Aquifer. The contamination found directly under the containment system could has been a one time event during improper well installion, which have subsequently been rectified. It is EPA's intention to monitor the Kirkwood Clay; and to mitigate potential off-site migration by pumping and treating should continuous seepage of contaminants into the Kirkwood Clay exist and cause a potential health risk.

Finally, with regard to the "unproveness" of flushing, it is true that this has not been tried at landfills such as Lipari. However, the technical components, (i.e., pumping and injection of groundwater) are proven technologies. Furthermore, this technique does represent a concerted effort to actively cleanse the landfill of its contamination, unlike the No-Action or any of the Enhanced Containment alternatives evaluated within the FS.

In this regard, flushing of the landfill to remove contamination is a superior alternative with regards to long-term public health and environmental benefits.

<u>Containment C</u>

How effective is the Enhanced Containment Alternative in removing toxic chemicals from the containment system.

<u>Response</u>:

If Enhanced Containment Alternative #4 is implemented, contaminated groundwater will still have a potential to seep into the Kirkwood Clay layer and ultimately into the Kirkwood Aquifer but at a rate much less than currently being experienced because of a 14 feet decrease in the hydraulic head. This decrease would be a direct result of dewatering the Upper Cohansey Aquifer within the containment system - the first remedial step included within this Alternative. The contamination could be captured by a series of Kirkwood pumping well, so as to preclude any further contaminant migration into the "off-site" areas via this route. Another advantage of dewatering the Upper Cohansey with the containment system is that hydraulic gradients across the slurry wall area would tend to be inward. This inward hydraulic gradient would exist because the resulting water level within the containment system subsequent to dewatering would be less than the exterior water levels observed. Once the initial dewatering is completed, maintenance of low head conditions within the containment system can be accomplished with pumping at an estimated 1 gallon per minute rate (gpm). This Enhanced Containment System is anticipated to be effective as long as the integrity of the slurry wall is maintained. Should the integrity of the wall be suspect, either the wall would need to be repaired, or the contents of the containment system would need to be pumped at a faster rate to maintain low head conditions. Removal of contaminants from the containment system via the enhanced containment alternative would take place only due to natural flushing conditions (i.e. seepage into and out of the containment system).

Comment D:

Can the containment system be guaranteed not to further leak any of the 155 toxic chemicals, jeopardizing the health and safety of nearby residents, for the next 8 to 35 years, under the cleanup alternatives suggested by EPA?

Response:

The containment system currently in place at Lipari represents the State-of-the-art in encapsulation system design. The materials used in the construction of the encapsulation system (as described in the FS) have varying degrees of permeability and therefore, by definition, experience some degree of seepage. The containment system has been very sucessful in decreasing the amount of contaminated groundwater entering the offsite areas. Prior to installation of the containment system, it was estimated that 40,000 gpd of contaminated groundwater was migrating offsite and contaminating the Upper Cohansey. A potential 4,200 gpd seeped into the Kirkwood Clay layer. Subsequent to installation of the containment system it is estimated that the flow of contamination into the offsite area has been reduced by 98% into the Cohansey Aquifer and 60% into the Kirkwood Clay. The remaining seepage out of the containment system is addressed in the Enhanced Containment, Cleanup (Flushing), and Complete Removal alternatives evaluated in the FS.

The amount of seepage from the containment system under Alternative 4 will be further decreased once the Upper Cohansey is dewatered to the 100' MSL evaluation. At that point, flow from the containment system into the Cohansey is expected to cease because of the reversal of hydraulic gradients. Instead flow would tend to be from the Cohansey into the containment system. With regards to seepage into the Kirkwood Clay this rate would be expected to decrease by almost 50% to 900 gallons per day. As noted before, should contamination of the Kirkwood Aquifer be confirmed and found to pose an environmental and public health risk, the contaminants would be captured by a series of Kirkwood pumping wells and treated.

Under Alternative 8 (Flushing), seepage could occur across the slurry wall where and when the inside groundwater level is higher than outside. However, the capture of this potential seepage will be incorporated into any off-site remedial action to be taken.

Comment E

Isn't complete removal of toxic wastes from the containment system a realistic alternative to the Lipari Landfill problem?

Response:

The complete removal option was evaluated as part of the FS. The advantage of this alternative is the removal of the source materials and, therefore, the removal of the potential of further off-site migration of contaminants.

The drawbacks to a Complete Removal alternative were also enumerated in the Onsite Feasibility Study. From an implementation viewpoint, complete removal of contaminated material from within the containment system is practically infeasible. This operation would require site dewatering with associated treatment and disposal of contaminated groundwater. In addition, it is possible that such a dewatering and excavation operation would need to be carried out within the confines of some type of structure which would prevent the escape of toxic volatile organic compounds to the atmosphere - in itself posing a health threat the nearby Howard Avenue homes. Finally, excavation of the landfill contents clearly is the most dangeous alternative to the safety to onsite personnel.

The concept of partial removal with associated onsite storage, was proposed by Citizen's Clearinghouse for Hazardous Waste, Inc. The important consideration here is the definition of "source". At the begininning of landfill operations, the "source" was the landfilled materials. However, in the several decades since landfilling began, the "source" is no longer just the landfilled debris, but also the nearby contaminated soil and groundwater, which is now presently contained by containment system. In other words, removal of the landfilled materials will not, of and by itself, solve the on-site contamination problems at Lipari. R.E. Wright Associates indicated in 1981 that the Lower Cohansey Sand was contaminated. More recent analytical work by JRB Associates has indicated that the groundwater throughout the existing containment system is contaminated. Therefore, removal of the landfilled materials, while representing a partial solution to the on-site contamination problems, would nonetheless need to be combined with either a Cleanup (flushing) alternative or an Enhanced Containment remedial action to produce an effective remediation of the on-site area. A combination of the Complete Removal option and the Enhanced Containment Alternative would include:

- Excavate the contents of the intial Lipari landfill - an area encompassing approximately 6 acres, at an average depth of 15 feet. (Note that the Citizen's Clearinghouse did not provide an indication of the limits of excavation).

- Store the excavated materials in an above ground concrete structure onsite.

- Monitor the concrete structure on a regular basis to assess its integrity and undertake repairs if necessary.

- Collect and treat the contaminated groundwater within the Upper Cohansey inside the containment system.

- Monitor the Kirkwood Aquifer and potentially collect and treat contaminated groundwater when the need is indicated.

- Destroy/detoxify the contaminated materials within the concrete structure once available technology becomes more cost-effective.

Preliminary estimates of partial removal and on-site storage adds a present worth cost of approximately $12.7 million dollars to the cost of Alternative 4, for a total present worth cost of $19.6 million. This cost does not include the final destruction of the material which would likely be a significant cost. For this additional expenditure of funds, it is possible that the "source" of contamination would be diminished, potentially resulting in a shorter duration for pumping and treating contaminated groundwater. However, as stated above a significant portion of the "source" material may have migrated from the original landfill area to throughout the containment system. Therefore, it is conceivable that removal of the landfilled materials would only reduce the source of contamination in an insignificant manner.

The drawbacks of this partial excavation alternative include:

- The danger to on-site workers from direct contact with the waste materials and excavation operations;

- The potential danger to off-site receptors from the release of volatile organic substances associated with removal of the landfill cap, unless such an excavation operation was carried out within the confines of a structure (perhaps air-supported).

- Maintainance of slurry wall integrity. To ensure the structural integiety of the slurry wall, excavation must be undertaken at least 20 to 30 feet away from the slurry wall - this would exclude excavation of all the landfill material

- The storage facility, because of its weight, would not be able to be sited on the existing containment system. Constructing a storage facility on top of the containment system would cause settlement which would be expected to tear the existing synthetic membrane liner cap. Therefore, procurement of additional land would be necessary so as to be able to site such a concrete structure.

In regards to the Wilsonville, Illinois excavations noted in comments, EPA is not undertaking the excavation of 84,000 buried drums at Wilsonville. Representatives of the State of Illinois have indicated that excavation of buried drums is being undertaken by the owners of the site under a court order.

The advantage to above-ground storage, over in-situ storage within the containment system, is better control of leachate leaving the storage system. In evaluating the alternatives discussed in the on-site Lipari FS, EPA analyzed the potential for off-site contamination for each alternative. In choosing "Flushing" as the recommended alternative, EPA intends to ensure that potential seepage from the containment system be mitigated prior to implementation of the flushing operation.

In addition to the controls for off-site migration which will be implemented during the flushing operation, the operation itself will ultimately remove the water-transportable contaminants from the soils and debris within the contaminants system. The water-transportable contaminants are those contaminants which could migrate off-site. If the contaminants can not solubilize and leave the site in groundwater, it cannot affect off-site areas. Therefore, it is felt that flushing, if implemented, could achieve the effect of complete removal, that is, the elimination of the potential for off-site migration of contaminants.

Implementation of the "Enhanced Containment" alternative is analogous to constructing a buried storage tank with seepage controls. Under Enhanced Containment, the "tank" (i.e. the existing containment system) is already constructed. This system has not failed, but is working as designed. Should enhanced containment be implemented, the groundwater within the encapsulation would be lowered so that there would be no potential for flow to leave the system through the slurry wall.

Potential seepage out of the containment system will not be allowed to migrate off-site under either the Flushing or the Enhanced Containment alternatives. Therefore, EPA has determined that the additional cost of an above-ground storage facility would not be warranted.

EPA has recently brought the Potentially Responsible Parties to court for reimbursement as allowed under CERCLA.

III. Other Issues

Comment A

Why have the laboratory analysis of Pitman's drinking water, not been received to this date?

Response:

To date, only the inorganic fraction of the chemical analysis of Pitman's drinking water has been received from the Contract Laboratory Program (CLP). The results to date indicate that Pitman's water supply meets the Primary and Secondary drinking water standards. This informaion is currently being transmitted to the Pitman Department of Public Works. As pertains to the organic fraction of the analysis and why it has not yet been received, we can only presume that the backlog of samples to be analyzed in addition to stringent quality assurance/quality control procedures have created a delay in receiving sample results. Typically, 4 months are required to receive validated data from the CLP. Each of the samples collected from the municipal water supply were analyzed for priority pollutants.

Comment B

Were any levels of volatile organcis found in the air of the basements on Howard Avenue? Why were the basements in homes adjacement to Alcyon Lake on Lakeside Avenue not tested for toxic chemicals?

Response:

The State of New Jersey conducted an air quality survey of the basements of homes on Howard Avenue using an HNu/PID meter to test for elevated volatile organics. Of the homes surveyed, two showed elevated levels of volatile organics above background. The elevated levels found in the first home was determined to be related to an open paint can filled with paint thinners. The levels found in the second home were found to be just above background and not to be of concern. The results of this survey was transmitted to the Gloucester County Health Department.

EPA did not plan testing of the homes adjacent to Alcyon Lake because it did not have reason to believe that there would be cause for concern. Results of the previous survey indicated that there are no problems in the homes in the area. In addition, air samples have been taken in the lake area. Once the results of these samples are recieved, EPA will again evaluate whether further air testing is required.

Comment C

Has the chain link fence been extended "east of Chestnut Branch to a point west of Chestnut Branch" as indicated in the report?

Response:

The chain link fence east of the Chestnut Branch has been extended as shown on Figure 1-4 of the Feasibility Study. (See Attachment D)

Comment D

Why was bis(2-chloroethyl) ether not indicated as having been tested for on Table VII-6 in the Interim Draft Work Plan, August 1984? What chemicals are being tested for in the air sample testing currently being conducted by EPA above the lake and over the surrounding areas?

Response:

Thirty-one air samples were collected by the REM II team during the remedial investigation phase. Each of these samples was fowarded to the laboratory for analysis during the last two weeks of July 1985. Each sample will be analyzed for priority pollutants including bis(2-chloroethyl)ether. The locations of sampling events and the number of samples collected at each locale are as follows:

- Onsite gas vents (11 samples)
- Contaminated marsh area (14 samples)
- Alcyon Lake outfall (2 samples)
- Alcyon Lake (4 samples)

Comment E

Would you explain the discrepancy concerning the buried drums in Lipari Landfill?

Response:

While there is no scientific "statistical" evidence that buried drums at the Lipari would no longer be in-tact, experience with other superfund sites similar to Lipari indicates that buried drums have a limited life span. In addition, people who worked at the Lipari Landfill have testified that prior to landfilling, drums were punctured and their contents drained. However, it is not contradictory to say that some drums might be intact causing a potential hazard during excavation. It is also logical that a drum which may not contain liquids may trap explosive gases, such as methane, common in landfills. Excavation of such gasfilled drums is another cause for concern during an excavation procedure.

Comment F

Was bis(2-chloroethyl)ether tested for in the soil samples from Betty Park?

Response:

See letter dated September 16, 1985 to Mr. Douglas Stuart (Attachment E).

Comment G

Why aren't all 155 chemical compounds, which have been identified at the Lipari Landfill listed in the report?

Response:

All chemical compounds identified at the LiPari Landfill appear in Table 1-1 of the Onsite Feasibility Study. Tables 3-15 and 3-14 were not meant to be additive.

Comment H

Whata does a 10^{-5} carcinogenic risk mean concerning the jealth and safety of the families living on the lake? Based on this information, isn't EPA morally obligated to initiate health studies or tests in cooperation with New Jersey State Board of Health?

Response:

A 10^{-5} carcinogenic risk concentration means that at exposure to a chemical at this concentration, one person in 100,000 has a potential to develop cancer. This risk is determined under a health risk assessment. The following is a excerpt from Risk Assessment and Mangement Framework for Decision Making, EPA, December 1985:

> Health risk assessments are conducted by scientists, but they are not "classical science" in the strictest sense. For regulatory purposes, risk assessments represent a tool that can be used to analyze scientific evidence in order to evaluate the relationship between exposure to toxic substances and the potential occurrence of disease. The risk assessment process involves, on one extreme, scientifically verifiable findings, and, on the other extreme, judgements about the use of various kinds of scientific information. No one should be misled into believeing that results using present techniques have the status of incontrovertible scientific agreement. Despite its uncertainities, however, risk assessment is the only tool EPA has for discriminating among environment health problems.

Under CERCLA actions, EPA generally does not provide health surveys of local residents, however, in some instances epidemiologic studies have been performed. State Health Departments, in conjunction with local health departments, apply to EPA to undertake such studies. Prior to making a decision, EPA requests the Center for Disease Control to review the merits of a study and to make a recommendation. To date, EPA has received no request from the New Jersey Department of Health, to undertake any such study for the Lipari Landfill area.

Comment I

Isn't it imperatative that the results of the air samples collected from the five on-site gas vents be released as soon as possible, and not held until the December meeting?

Response:

The analytical results of the air samples collected on the onsite gas vents and at the off-site areas will be released to the Pitman Environmental Commission when it is received and analyzed.

Comment J

Why were not test core borings done at the back of Alycon Lake, where Chestnut Branch enters the lake and where the majority of sediment and silt is deposited?

Response:

The core test boring locations were chosen to provide what was believed would be representative samples of the Alcyon Lake sediments. In response to requests made at the August Public Meeting by concerned citizens that an additional core boring be taken where Chestnut Branch enters the lake, arrangements are currently made to take such a sample at the location requested.

Comment K

Is it possible that contaminants could follow the pathway of the sewer line, west of Chestnut Branch, away from the landfill and under the street Lakeside Avenue?

Response:

Five groundwater wells were installed east of the Chestnut Branch for the express purpose of accertaining the direction of groundwater flow and its quality in this area. To date we have no evidence that contaminated groundwater has traversed Chestnut Branch or is approaching the sewer line. The question will be able to be more clearly addressed once analytical results concerning the groundwater conditions east of Chestnut Branch have been received from the laboratory.

Comment L

Has testing of the private wells that exist near the Lipari Landfill or contaminated areas been conducted?

Response:

As far as is known, there are no private wells in the Pitman area near the Lipari Landfill. The Pitman Environmental Commission was to survey the area for yet undiscovered private wells. The results of such a survey has not been submitted to EPA. However, EPA has installed and tested 6 wells west of the Chestnut Branch, 3 wells just east of Chestnut Branch and 2 wells along Howard Avenue. The result of laboratory analysis of these wells will indicate the extent of potential Cohansey Aquifer contamination.

Attachment A

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FEDERAL EXPRESS

September 6, 1985

James C. Woods, Esquire
General Enforcement Branch
Enforcement Division, Region II
Environmental Protection Agency
26 Federal Plaza
New York, NY 10278

Re: Comments of Rohm & Haas Company with Respect to the Final Draft Report, Onsite Feasibility Study for the Lipari Landfill

Dear Mr. Woods:

On behalf of our client, Rohm & Haas Company, we are submitting herewith the technical comments received from our consultants, BCM Eastern Inc., professional hydrogeologists, with respect to the Final Draft Report, Onsite Feasibility Study for the Lipari Landfill, which was prepared by Camp, Dresser & McKee, Inc. As you know, we requested permission from EPA to submit our technical comments on September 18, 1985 in view of the magnitude of the draft report and technical issues contained therein. EPA has insisted that our comments be submitted by September 9, 1985. Accordingly, we are submitting herewith a synopsis by our consultant of the technical deficiencies, which are significant, with respect to the alternatives evaluated by Camp, Dresser & McKee. In addition, we have asked our consultants to prepare a more detailed description of the alternative plan for upgradient groundwater management which is discussed in the enclosed comments. We expect to have that proposal within two weeks.

I would appreciate it if you would bring this letter and our comments to the immediate attention of the EPA staff so that they may be considered as part of the record of any future EPA decision with respect to the Lipari landfill.

Sincerely yours,

Bradford F. Whitman

BFW/kfg
Enclosures

cc: Ellen Friedell, Esquire
Laurence Maddock, AUSA

BCM

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September 6, 1985

Ellen S. Friedell, Esquire
Senior Counsel
Rohm and Haas Company
Independence Mall West
Philadelphia, PA 19105

Subject: Review of Onsite Feasibility Study
for Lipari Landfill
BCM Project No. 00-5371-06

Dear Ellen:

BCM has completed our preliminary review of the "Final Draft Report - Onsite Feasibility Study for Lipari Landfill" prepared by Camp Dresser & McKee, dated August 1985. Due to the extreme time limitations placed on the review, we had not been able to perform the comprehensive evaluation a project of this size and significance requires. Nonetheless, our examination has revealed that, for reasons unknown to us, the USEPA and their contractor continue to ignore the passive containment approach to managing this problem and, as a result, the feasibility study is quite incomplete in its analysis of alternatives.

Background

The fundamental problem being addressed in this report is that, having built a containment wall and cap completely surrounding the landfill, the site will nonetheless continue to discharge groundwater (presumably contaminated) through the natural Kirkwood clay underlying the site. This continuing discharge is brought about because of the head (pressure) difference between the outside of the slurry wall, the inside of the slurry wall, and the Kirkwood clay and underlying sand - each having a higher head than the following one. The slurry wall, although highly impermeable, will allow some leakage of clean groundwater into the inside of the containment system. This leakage in turn maintains a higher water level (head, pressure) inside the containment system forcing contaminated flow downward into the lower pressure Kirkwood formation.

EPA Solution

The alternatives examined by EPA in the report are all analagous to "end-of-pipe" approaches, i.e., rather than prevent the leakage of clean water into the containment area (and subsequent contamination) they have chosen, in the final analysis, pumping the Kirkwood sands to remove and dispose of contaminated water. This action in effect encourages flow into the deeper zones and leakage through the slurry wall.

Alternative

We have not found in the report any reference to controlling water levels outside of the containment wall. In our report to you in May 1982, we supported the concept of the slurry wall at upgradient locations (as opposed to complete containment) and recommended, at that time, the installation of an upgradient drain to prevent leakage through the slurry wall. Quoting from pages 12 and 13 of our report:

> "Although the slurry trench cut-off wall ... provides a vertical barrier to groundwater movement beneath the site, a secondary diversion method, a groundwater interceptor drain at an upgradient location, is also recommended. The performance of the cut-off wall can be maximized by reducing the groundwater level upgradient of it ... The underdrain system would be installed with a high point on the west side of the landfill. Discharge to the lower end of the existing Lipari ditch and Rabbit Run would be accomplished through the use of exit headwalls.

The upgradient drain concept may prove to be technologically and environmentally superior to the alternatives presented in the EPA report when subjected to the same rigorous evaluation.

The benefits of diverting clean water around the site are effectively to cease the discharge of any contamination from within the landfill, to protect the physical integrity of the slurry wall, and to prevent the downward migration of contaminants to the Kirkwood sands.

Additional Comments

In our May, 1982 report to you we recommended that the installation of the cap begin as early as possible, even before actual slurry wall construction, to minimize the "bath tub" effect, i.e., filling the enclosed area with infiltrated water and, in effect, saturating the entire landfill area. The EPA report alludes to an apparent problem resulting from poorly planned and implemented construction sequencing such that for the period December, 1983 to September, 1984 the containment system did in fact fill up, causing, among other things, the contamination of an additional 25-50 million gallons of water.

Therefore, the implementation of the alternative upgradient drain system described above may require partial dewatering of the contained area. If so, the volume of contaminated water and the concentration of contaminants are probably much higher now (perhaps twice in both cases) than would have been the case had proper construction sequencing been used.

Summary

Based on its expedited review of the Onsite Feasibility Study by CDM and without any additional site investigation, BCM believes that the CDM Report has failed to consider perhaps the most advantageous remedial solution to the problem of managing leachate at the Lipari Landfill; namely, the installation of an upgradient diversion trench. This alternative should be fully examined before any decision is made by the U.S. Environmental Protection Agency.

Very truly yours,

Alan M. Robinson for

Richard J. Grzywinski, P.E.
Senior Vice President

/pd

Attachment 8

CDM
environmental engineers, scientists, planners, & management consultants

CAMP DRESSER & McKEE INC

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September 18, 1985

Mr. Ronald J. Borsellino, P.E.
Regional Site Project Officer
U.S. Environmental Protection Agency
Emergency and Remedial Response Division
26 Federal Plaza - Room 711
New York, New York 10278

Project: REM II - EPA Contract No: 68-01-6939

Document Control No: 104-RI1-EP-BNHP-1

Subject: LiPari Landfill
Response to Comments by Rohm & Haas Company
Re: Final Draft Report, Onsite Feasibility Study

Dear Mr. Borsellino:

Introduction

The purpose of this letter is to respond to comments (see enclosed) on the subject report which were recently forwarded to USEPA by Mr. Bradford F. Whitman of Dechert Price & Rhoads, legal counsel to the Rohm & Haas Company. These comments were prepared by Rohm & Haas' technical consultants, BCM Eastern, Inc., and generally address the issue of an additional remedial alternative to be evaluated as part of the Onsite Feasibility Study prepared by the REM II team. This alternative was initially proposed by BCM in their May 1982 Preliminary Engineering Study of the LiPari Landfill site. BCM recommended at that time, and continues to recommend, the installation of a groundwater diversion system to be located upgradient of the landfill site. Such a system, according to BCM, would serve the purpose of diverting clean upgradient groundwater around the landfill so as "to cease the discharge of any contamination from within the landfill, to protect the physical integrity of the slurry wall, and to prevent the downward migration of contaminants to the Kirkwood sands."

Alternative Description

Our review of BCM's 1982 report revealed that the system proposed would consist of a diversion trench running along the northwestern, western, and southwestern portions of the site (BCM sheet 2 of 3). The bottom of the trench would consist of a 6-inch diameter PVC pipe acting as an underdrain. A 3-foot wide by 6-foot high section of broken stone or gravel (size 3/4-inch to 2-inch diameter) would surround the perforated PVC pipe. Two layers of plastic filter cloth would be wrapped around the stone. The underdrain system would be installed with a high point elevation 107 feet above Mean Sea Level (MSL) on the west side of the landfill. Discharge to the lower end of the existing LiPari ditch (elevation 104 feet) and Rabbit Run (elevation 105 feet) would be accomplished by the use of exit headwalls. The high point of the underdrain system was designed to correspond to the suspected low point elevation of the landfilled waste materials.

Technical Evaluation

The inherent difficulties envisioned with this system as currently proposed are as follows. The "source" of contamination currently encapsulated by the slurry wall/synthetic membrane liner system consists of more material than just the landfilled debris. In actuality, the Upper Cohansey sand (generally at an elevation above 100 feet) and the Lower Cohansey sand (generally at an elevation between 90 and 100 feet) are both contaminated. Contamination within the Lower Cohansey was reported as early as 1981 in R.E. Wright Associates report entitled "Technical Considerations for the Selection of an Abatement System at the LiPari Landfill, Pitman, New Jersey". It should be noted that this spread of contamination into the lower formation occurred prior to installation of the slurry wall in 1983. Because the contamination occurs at least to the top of the Kirkwood clay (elevation 90 feet), installation of a groundwater diversion trench having a highpoint of 107 feet, in our opinion, is inappropriate. The major concern is that at some point in the future the slurry wall will become increasingly permeable due to chemical degradation. With the diversion system as currently proposed by BCM, a portion of the upgradient groundwater would be able to seep into the encapsulation via the Cohansey Formation by migrating beneath the diversion trench, pick up water transportable contaminants present throughout the encapsulation, and carry the contaminants into off-site areas thus perpetuating the existing environmental problems.

Revised Alternative

Perhaps a better approach to upgradient groundwater diversion would be to install the underdrain system at an elevation along the top of the Kirkwood clay. If properly designed and constructed this system may be effective in depressing upgradient groundwater levels in the trench to the 90 to 95 foot elevation and preclude groundwater from migrating beneath the trench by virtue of the less permeable Kirkwood clay which would form the diversion trench base. To perform such a task, preliminary design dictates the following:

- The trench would need to be located 30 feet away from the existing slurry wall so as to not impair the integrity of the wall

- o The length of the trench would be approximately 2,000 feet
- o The base of the trench would be 3 feet wide with an average depth of 30 to 35 feet
- o The underdrain would consist of a 6-inch diameter perforated PVC pipe. The trench would be double-lined with filter cloth and backfilled with gravel to an elevation of at least 115 feet. The trench would then be backfilled with clean fill to existing grade

With such a system in place, it is estimated that the water level within the encapsulation would decrease to an elevation of 93 feet above Mean Sea Level in approximately 10 years and reach equilibrium after 20 years at 91' MSL. Contaminated water presently within the encapsulation would continue to leave the encapsulation via the Kirkwood clay beneath the site and through the northeast portion of the slurry wall. Installation of an upgradient groundwater diversion system will not "...cease the discharge of any contamination from within the landfill..." for at least 20 years, if ever.

Revised Alternative Evaluation

The deeper trench system described above: however, also has many problems associated with it - many of which are also applicable to the shallower BCM design. For example:

- o The groundwater diversion trench system must perform its intended function - forever. If it does not, and upgradient groundwater is able to traverse the system, water-transportable contamination within the encapsulation will be able to be picked up by the groundwater, particularly as the slurry wall becomes more permeable, and moved into offsite areas which presumably will have been remediated. This scenario would result in a re-birth of the existing environmental problems
- o Most likely, personnel will be required at the base of the trench to properly place the underdrain system. BCM's 1982 report indicated that the 3-foot wide trench would extend vertically from its base a total of 6-feet before a wider trench opening would be necessary. Because of the nature of the material in which such a trench would be excavated (i.e., sand) we would preliminarily suggest that 3:1 side slopes be used. Based on a 30-foot deep excavation with only a 3-foot deep trench this would result in a top width of the excavation equivalent to 165 feet. Even if 2:1 slopes were utilized a trench opening of 111 feet would be necessary. With such a

large trench opening required, and since the excavation would be required to be no closer to the slurry wall than 30 feet, construction of such a diversion system would require the acquisition of additional land from Mr. Douglas Zee whose apple and peach orchards currently surround the site

The necessity of opening such a large trench could be eliminated if sheeting and bracing were utilized to hold open an excavation of the magnitude envisioned. However, this provision would again add significantly to the cost of this alternative. An additional consideration should sheeting be used would be the possibility of puncturing the Kirkwood clay during installation of the sheeting. Such a situation would need to be avoided to preclude any chance for groundwater contamination in the Cohansey migrating into the underlying Kirkwood aquifer

- To construct either the shallow or deep trench will require a large amount of groundwater control. Presumably the pumped groundwater could be discharged into either Rabbit Run or Chestnut Branch if a discharge permit is granted by the New Jersey Department of Environmental Protection

- During a trench dewatering operation, whether it be BCM's design or the "deeper" alternative, the REM II team's groundwater computer model indicates a strong probability that contaminated groundwater will be drawn into the trench. Existing water level elevations within the encapsulation are at 114' MSL. The water levels within the trench during its construction (and after construction) are estimated to be in the 90 to 95 foot range, therefore hydraulic gradients will be reversed from their present condition with seepage of contaminated groundwater tending to flow from the encapsulation area toward the trench. Should contaminated groundwater enter the trench, discharge to Chestnut Branch or Rabbit Run will be prohibited. Therefore, utilization of an onsite treatment plant or collection and disposal at a permitted hazardous waste treatment facility will be necessitated. In addition, the issue of worker safety would become magnified. Without groundwater contamination in the trench, Level D personnel protection could be utilized. With the presence of this contamination: however, Level C and perhaps Level B would be required - resulting in significantly higher construction costs. The head differential between the diversion trench and the water level inside the encapsultion could be diminished if the contents of the encapsulation were dewatered. As indicated in the Onsite Feasibility Study, dewatering of the Upper

Cohansey inside the encapsulation is feasible. If implemented this operation could lower the water level to an elevation of approximately 100' MSL, thus diminishing the head differential between the diversion trench to approximately 5 to 10 feet. This would decrease the rate of seepage toward the trench but not eliminate it. Seepage into the trench could perhaps be prevented by installing sheet piling between the encapsulation and the trench. This operation may however significantly impact the integrity of the slurry wall in addition to significantly raising construction costs

It should also be pointed out that should the water level within the encapsulation not be lowered, the potential for hydrofracturing of the slurry wall exists in the vicinity of the diversion trench since a greater than 15 foot head differential would exist across the wall in this area. Dewatering the encapsulation would alleviate this concern

- BCM submits in their 1982 report that "because the ground surface elevation will be on the order of only twelve feet above the pipe invert elevation, maintenance or repair of the underdrain pipe (if required) would not be a major problem". In our opinion, maintenance and repair of the underdrain, should it be located a distance of 35 feet beneath the ground surface, would be a major problem. Particularly important in such a situation, for reasons previously stated, is the need to insure that during maintenance and repair or in the event of underdrain failure, upgradient groundwater does not traverse the diversion system

- Monitoring of the diversion system discharge to Chestnut Branch and Rabbit Run would need to be performed on a regular basis to note and halt any flow of contamination to these water bodies.

Conclusions

In conclusion, BCM's proposed groundwater diversion trench is another alternative which can be categorized in the terminology of the REM II team's Onsite Feasibility Study as an Enhanced Containment alternative. That is, the source of contamination is not remediated but rather it is left in place for eternity or until appropriate treatment technologies are developed and proven effective. What is different about this alternative: however, as opposed to those previously evaluated Enhanced Containment alternatives is that it does not represent an "end of the pipe" solution. From a technical perspective, we consider the BCM alternative outlined in their May 1982 report to be an unacceptable solution as it in fact does not offer any "enhanced containment". Rather, seepage would continue to escape the encapsulation without any provisions for prevention of contaminant migration into offsite areas. Carrying the diversion trench idea one step further by extending the trench to the top of the Kirkwood clay makes this alternative a sounder technical solution than the BCM-proposed shallow trench but it too is wrought with technical difficulties as discussed. From an environmental/public health viewpoint the diversion trench alternative should be acceptable providing that contaminated groundwater is not drawn into the diversion system and providing that appropriate safety practices for deep excavations are followed during construction. Institutionally, difficulties may exist with the point discharge of groundwater to Rabbit Run and Chestnut Branch. We are currently discussing this situation with NJDEP and will respond to you with their conclusions under separate cover. As concerns public acceptability, it is our judgement based upon the August 15, 1985 public meeting in Pitman that a groundwater diversion trench would meet considerable resistance and be considered by the public to be an unacceptable alternative. Finally, with regards to cost, we have considered two different "deep" excavation scenarios and costed them accordingly. These costs are estimted to range from approximately $2.2 to $2.6 million (see attachment).

We trust that you will find this information suitable for inclusion in your evaluation of remedial actions for the onsite portion of LiPari Landfill. Shuld you have any questions or desire any additional information concerning the above, please contact me at your convenience.

Very truly yours,

CAMP DRESSER & McKEE INC.

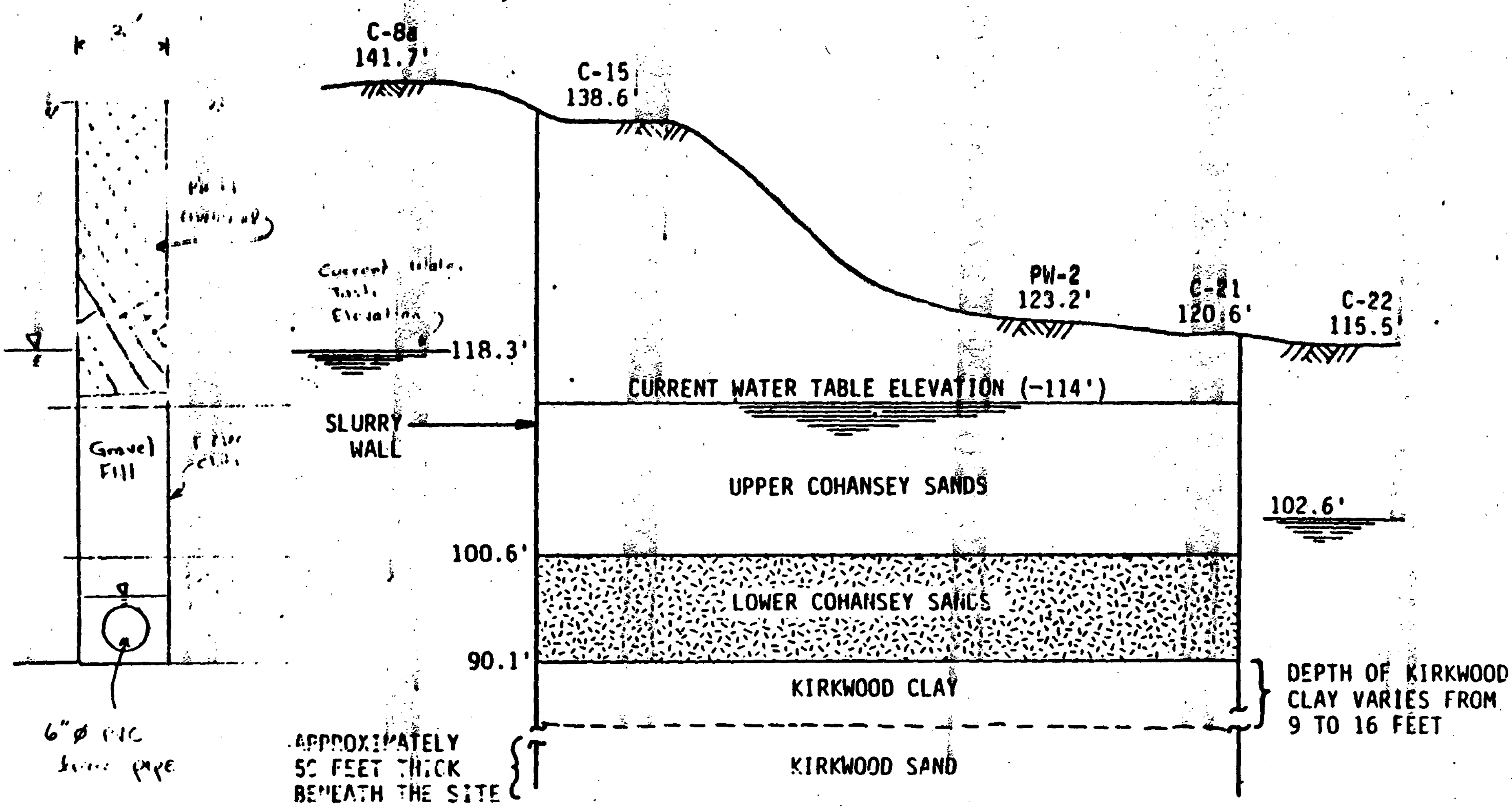
Robert A. Hyde, P.E.
Site Manager

RAH/rw

Enclosures

cc: G. Rief CDM/NY
G. Benson CDM/NJ
J. Fillos CDM/NY
R. Schreiber CDM/Bos.
L. Partridge CDM/Bos.
C. Winklehaus - Clement Associates
R. Coad - WCC

(RW11/23)


C-8a
141.7'
C-15
138.6'
PW-2
123.2'
C-21
120.6'
C-22
115.5'
118.3'
CURRENT WATER TABLE ELEVATION (~114')
SLURRY WALL
UPPER COHANSEY SANDS
102.6'
100.6'
LOWER COHANSEY SANDS
90.1'
KIRKWOOD CLAY
DEPTH OF KIRKWOOD CLAY VARIES FROM 9 TO 16 FEET
KIRKWOOD SAND
Gravel Fill
CLIENT
PROJECT
DETAIL
DATE CHECKED
CHECKED BY

CAMP DRESSER & McKEE
CLIENT Lipari Landfill
PROJECT Groundwater Diversion Trench
DETAIL Capital Costs
JOB NO
DATE CHECKED
CHECKED BY
DATE
PAGE NO

ATTACHMENT C

Item	Unit Cost	Alternative 1	Alternative 2		Alternative 3	
		$	Quantity	$	Quantity	$
Excavation						
• Trench	$6.00/yd³	$359,000 ②	2000 yd³	$12,000	11,100 yd³	$67,000
• Bulldozer or Pan	$3.50/yd³		162,000 yd³	$567,000	—	—
Backfill by bulldozer	$3.50/yd³		156,400 yd³	$547,000	5,600 yd³	$20,000 ④
Filter Cloth, double wrap	$1.00/yd²		14,700 yd²	$15,000	14,700 yd²	$15,000
Piping, 6"Ø, PVC, perforated	$3.00/LF		2000 LF	$6,000	2000 LF	$6,000
Crushed stone, 3/4"Ø to 2"Ø	$15.00/yd³		5600 yd³	$84,000	5600 yd³	$84,000
Dewatering, wellpoint system	$15,000/well ③		40 wells	$600,000	20 wells	$300,000
Steel sheeting and bracing	$650/ton		—	—	1620 tons	$1,053,000
Subtotal		$359,000		$1,831,000		$1,545,000
Engineering & Contingency	42% ②	$151,000		769,000		649,000
TOTAL		$510,000		$2,600,000		$2,194,000

Note: in the Alternative 1 column a single brace spans the rows from Trench through Crushed stone, with the one amount $359,000 ②.

Notes

Alternative 1 = Berm May 1982 report

Alternative 2 = Deeper groundwater diversion trench, to top of Kirkwood clay, open excavation, 3' wide bottom trench, 3:1 side slopes

Alternative 3 = Same as Alternative 2 except utilize sheet piling

① All costs shown above are capital costs only. These estimates do not include the cost of any permits to discharge to surface waters, monitoring of discharges, land acquisition from Zee orchards, or maintenance of the underdrain system. These costs assume Level D worker protection is acceptable. No costs for any onsite treatment plant or offsite disposal of contaminated materials is included.

② From 1982 BCM report, quantities not provided.

③ [illegible]le. cost of pump

④ [illegible]le. cost for air tamping

PITMAN LIPARI LANDFILL COMMUNITY ASSOCIATION
COMMENT RESPONSE
TO
FINAL DRAFT REPORT, ONSITE FEASIBILITY STUDY
FOR LIPARI LANDFILL

SEPTEMBER 7, 1985

I. INTRODUCTION

From our careful examination of the Final Draft Report, Onsite Feasibility Study for Lipari Landfill, and after the Public Town Meeting on August 15, 1985, many alarming questions and issues have arisen. These concerns cover a multitude of areas which will be presented in the following sections. Additionally, and most importantly, a comment response from Stephen Lester, Science Director for Citizen's Clearinghouse for Hazardous Wastes, Inc., is attached and is to be considered part of our comment report.

II. QUESTIONS FOR CONCERN

A. Why was a Remedial Investigation Report (Onsite) not completed and given to Pitman for review and study in May 1985, as scheduled in the February 6, 1985 letter to Mr. Campbell, from Salvatore Badalamenti. (letter attached) Mr. Borsellino, Project Manager, indicated that an incomplete Remedial Investigation Report was included in the Onsite Feasibility Study. We understand that it has been routine for EPA to complete this report prior to the Feasibility Study. Why was this done differently? Is EPA rushing through the normal procedure? How can we or EPA intelligently select a cleanup alternative without thoroughly understanding the scope of our problem? Will a Remedial Investigation Report (Off-Site) be completed in October 1985 as scheduled in the above mentioned letter? If not, why not?

B. How effective is the flushing method in removing toxic chemicals from the containment system? Your answer should consider and address the following:

1. Is it true that "flushing should not be viewed as being completely effective?" (FS 3-65)

2. Is it true that "short circuiting caused by the heterogeneities in the soil and especially in the landfill area, will reduce the effectiveness of the (flushing) system?" (FS 3-65)

3. Is it true that "other operational problems, such as clogging and maintenance of the pump/inject system, will lessen the effectiveness of the (flushing) system?" (FS 3-65)

4. Is it true that "vertical seepage and flushing through this lower unit (Lower Cohansey) will, however, continue to occur" with the flushing method? (FS 3-65)

5. Is it true that "if flushing of the soil within the containment were carried out repeatedly until the flushing water showed only trace amounts of contaminants, this would not indicate that the soil is free of contaminants" (FS 3-118) since "no information is available on the absorption, ion exchange, and similar mechanistic behaviors of the chemical/soil combinations found in the landfill?" (FS 3-116)

6. Is it true that "flushing of the encapsulation system to actively attempt to remove water soluable contamination from the Cohansey Formation is not considered to be a reliable technology?" (FS 4-48)

7. Is it true that "residual contamination around the encapsulated soil matrix and not presently removable by hydraulic flushing might be released and become water transportable at some future time due to changes in the soil micro-environment?" (FS 4-49)

8. Is it true that the percentage of water soluable chemicals in Lipari Landfill is not known?

C. How effective is the Enhanced Containment Alternative in removing toxic chemicals from the containment system? Your answer should consider and address the following:

1. Is it true that the containment system would continue to seep chemicals for the next 35 years under this alternative?

2. Is it true that "active cleanup of the site would not be practiced and contaminated soil would be left in place" (FS 3-3) further endangering the lives of residents around the landfill and lake?

3. Is it true that "if the Upper Cohansey is dewatered, as proposed in Alternatives 3 and 4, then the potential for hydrofracturing would exist...?" (FS 3-108)

4. Is it true that "enhanced containment, in general, is a reliable alternative as long as the integrity of the encapsulation system is maintained?" (FS 4-46)

5. Is it true that under the alternative of dewatering the encapsulation system and pumping the Kirkwood, the existing encapsulation system "would need to be replaced at such a time as its hydraulic conductivity is considered to have degraded?" (FS Table 4-4)

6. Is it true that "if at some future date water levels within the containment are found to be rapidly rising, indicating a loss of wall integity, and repair of the wall is not undertaken exterior groundwater will be able to enter the encapsulation, pick up water transportable contamination, and migrate into the offsite areas?" (FS 4-46)

7. Is it true that the report raises many questions about the integrity of the containment system?

". Can the containment system be guaranteed not to further leak any of the 155 toxic chemicals, jeopardizing the health and safety of nearby residents, for the next 8 to 35 years, under the cleanup alternatives suggested by EPA? Your answer should consider and address the following:

1. Is it true that the Kirkwood layer is leaking chemicals at a faster rate than anticipated, due to "improperly sealed wells or because of the degradation of the structure of the clay soils by organic solvents?" (FS 4-71)

2. Is it true that the "clay layer may deteriorate and become more permeable without being able to be repaired?" (FS 4-59)

3. Is it true that EPA stated that 1800 gallons of contaminated water a day is presently seeping through the Kirkwood bottom?

4. Is it not true that "if non-aqueous pools of solvents reach the interface between the bottom of the Cohansey sand aquifer and the top of the Kirkwood clay layer, the effects of the latter material and its permeability are likely to be severe?" (4-73)

5. Is it true that if the slurry wall comes in "contact with aqueous solutions, suspensions or emulsions of organic chemicals, it is likely to impair the walls integrity over time?" (FS 3-116)

6. Is it true that "little information is available regarding soil-bentonite waste interaction?" (FS2-37)

7. Is it true that "it cannot be precluded that non-aqueous phase liquid organics do not exist at the site?" (FS 2-38)

8. Is it true that "during excavation of the slurry trench, several cave-ins of sidewalls and sediment events occurred?" (FS 2-32)

9. Is it true that "in those areas where cave-ins occurred during construction of the slurry trench, permeabilities may be greater than specified?" (FS 3-116)

10. Is it true that "it is these areas (cave-ins) where the occurrence of hydrofracturing would be more susceptible?" (FS 2-32)

11. Is it true that "little is published in the literature describing the phenonmenon of hydrofracturing through a soil bentonite slurry trench cut off wall?" (FS 2-34)

12. Is it true that under alternatives 2,3,4, and 7, "the existing encapsulation system would need to be replaced at such a time as its hydraulic conductivity is considered to have dgraded to an unacceptable level" at a cost of $2,144,000 in present day dollars?" (FS Table 4-4)

13. Is it true that "bis(2-chloroethyl)ether is predicted to occur in Alcyon Lake at concentrations that exceed its criterion for human health" even after the completion of the containment system?" (FS 4-76)

14. Is it true that "estimated long term concentrations in Alcyon Lake of bis (2-chloroethyl)ether does indicate the potential for increased risk to public health?" (FS 4-76)

15. Is it true that only 13 indicator chemicals have been tested for? Therefore, is it not reasonable to assume that many of the other 155 known chemicals could be escaping from the containment system at dangerous levels?

16. Is it true that little is known about low level concentrations of toxic chemicals on human health?

17. Is it true that there are 155 chemicals in the landfill with the potential to leak, and in regards to interaction of these chemicals, 'it is generally assumed that compounds that affect the same target interact additively, ie., the toxic affect is the sum of the effects of each substance separately?" (FS 4-78)

18. Is it true that if the chemiclas remain indefinitely in the landfill, that they might eventually seep through the Kirkwood and contaminate our water supply or a neighboring towns water supply in the future?

19. Is if true that if the chemicals are allowed to remain in the landfill, that they will continue to seep out of the containment system and "pose a direct risk not only to human receptors, but to other living things in the environment, including such receptors as fish, birds, and other wildlife, as well as vegetation?" (FS 3-101)

20. Is it true that "children who may come in contact with possibly contaminated soil or water while at play in offsite areas..." are more affected by the toxic effects of the 155 chemicals in Lipari Landfill and Alcyon Lake? (FS 3-101)

E. Isn't complete removal of toxic waste from the containment system a realistic alternative to the Lipari Landfill problem? Your answer should consider and address the following:

1. Is it true that this alternative of complete removal was successfully used by EPA in the excavation of 84,000 buried drums of toxic wastes at Wilsonville, Illinois? If so, why not at Lipari Landfill?

2. Is it true that toxic waste could be stored onsite in above ground facilities, greatly reducing the over'all cost of the project?

3. Is it true that complete removal would address the source of contamination, unlike the other alternatives which would allow the chemicals to remain in a faulty containment system subjecting residents to long term exposure of toxic chemicals?

4. Is it true that high risk exposure during excavation could be greatly reduced in a variety of ways?

5. Is it tru that cost was a major factor in EPA eliminating the complete removal alternative? It is our understanding that the Superfund Act of 1980 was designed to make responsible parties liable for clean-up operations. Furthermore, if the responsible parties refused to clean up the designated sites, they could be sued for reimbursement and assessed damages of up to three times the cost of the clean-up. As stated in a 1982 court document (USA vs. Nick Lipari) Civil Action No. 80-79, hazardous wastes were generated by Rohm and Haas Company, Owens-Illinois, Inc., and CBS Records, Inc., at Lipari Landfill. What legal action has been taken in regards to financial obligations by these companies?

III. OTHER ISSUES TO ADDRESS

A. Why have the laboratory analysis of Pitman's drinking water, sampled in March 1985 by the REM II team, not been received as of this date? We understand that water analysis usually takes a maximum of six weeks to complete. We would like to know if all of the priority pollutants were tested for (If not, why not.) and why these tests are taking so long.

B. Were any levels of volatile organics found in the air of the basements on Howard Avenue? What does the phrase "not a significant level' mean concerning these tests? (FS 1-14) What kinds of tests were conducted, what chemicals were tested for, and would you send a copy of these test results to us? Also, why were the basements in homes adjacent to Alcyon Lake on Lakeside Avenue, not tested for toxic chemicals since bis was detected in the lake at health risk concentrations and many of these basements have underground streams flowing beneath them?

C. Has the chain link fence been extended "east of Chestnut Branch to a point west of Chestnut Branch" as indicated in the report? (FS 1-14

D. Since "the major hazard associated with the Lipari Landfill contamination has been considered to be the presence of bis(2-chloroethyl)ether" and one of the "typical routes of entry for this compound includes inhalation of vapor" (FS 1-17) why hasn't an extensive monitoring program occurred before this time? As early as 1979, the DEP confirmed the presence of bis(chloroethyl)ether in the air in Pitman, 100 yards away from the major leachate stream (Letter from Richard Katz, NJDEP, Oct. 22, 1979 to Dr. Lipsky) Furthermore, why was bis(2-chloroethyl)ether not indicated as having been tested for on Table VII-6 in the Interim Draft Work Plan, August 1984? What chemicals are being tested for in the air sample testing currently being conducted by EPA above the lake and over surrounding areas?

E. Would you explain the discrepancy concerning the buried drums in Lipari Landfill? The report states that "there is also the possibility during excavation that buried drums could be ruptured or disturbed to such an extent that fires or explosions might occur" (FS 4-44). However, at the August 15th Town Meeting, a resident asked how flushing could be an effective alternative if buried drums were still in tact in the containment system. An EPA official replied that according to statistical data, all of the drums would have disintergrated by now. Which account is the accurate one and what statistical information is there to support or confirm it?

F. Was bis(2-chloroethyl)ether tested for in the soil samples from Betty Park? Would you please send us the following information, as requested in our letter of August 19th, 1985, which no reply has been received as of this date: (copy of letter attached) the type of tests taken, the chemicals tested for, test results and any other data that could alleviate our concern?

G. Why aren't all 155 chemical compounds, which have been identified at the Lipari Landfill, listed in the report? There are 123 chemicals listed on Table 3-15 (FS) and 13 indicator chemicals on Table 3-14 (FS) which total to a sum of 136. What are the missing 19 chemicals?

H. When the report states that "preliminary calculations have demonstrated that one of the indicator chemicals- bis(2-chloroethyl) ether is present at a point of potential exposure at concentrations that could result in a greater than 10^{-6} carcinogenic risk" (FS 3-106), what does this mean concerning the health and safety of the families living on the lake? Based on this information, isn't EPA morally obligated to initiate health studies or tests in cooperation with the New Jersey State Board of Health?

I. Since the report states that several of the organic compounds will partition to the air and then be "carried by the local air currents to any receptors, for example, the houses on Howard Avenue in Pitman..." (FS 4-66) isn't it imperative that the results of the air samples collected from the five on-site gas vents be released as soon as possible, and not held until the December meeting?

J. Why were no test core borings done at the back of Alcyon Lake, where Chestnut Branch enters the lake and where the majority of sediment and silt is deposited? In actuality, the the core borings were taken on the opposite side of the outlet, where the sediment is considerably lower. To further substantiate our concern, over the last eight years, the water level at this location of Alcyon Lake has gone from five feet deep to an actual island with many multi-colored layers, persumably chemical buildup, surrounding it. It is our contention that core borings should be taken at this area so as to give us a more accurate evaluation of the toxic problem and the potential health risks it creates for residents. Furthermore, did EPA know th location of the stream bed in Alcyon Lake? We believe that the three core borings done across from Betty Park were taken very close to this stream and not in the areas where the chemical laden sediment has been deposited over the twenty years.

K. Since the County Sewer Line runs parrellel to the landfill and lake, and is situated between Chestnut Branch and Howard Avenue, is it not possible that contaminants could have reached the underlying stones, which would act much as a french drain system, and followed the pathway of the sewer line away from the landfill and under the street Lakeside Avenue? If so, will EPA test in these areas?

L. Has testing of the private wells that exist near the Lipari Landfill or contaminated areas been conducted? These tests were discussed at the January 1985 Town Meeting and referred to in the February 6, 1985, letter sent to Mr. Campbell, Chairman of the Pitman Environmental Commission, from Mr. Salvatore Badalamenti. (letter attached) If the testing has not taken place to date, why hasn't it?

IV. CONCLUSION

We are extremely unhappy with the cleanup alternatives being considered by EPA for Lipari Landfill. These three alternatives do not address the contaminated soil or much of the toxic waste, and the degree of their success is seriouly questioned by our expert, Stephen Lester, and the Feasibility Study itself. The encapsulation system is not as effective as we had been lead to believe and over a long period of time, its integrity is extremely doubtful. Furthermore, we feel that EPA has not thoroughly examined other realistic alternatives, in particular, the Complete Removal with onsite storage. This alternative addresses the source of the contamination and would alleviate further long term chemical exposure to residents. Finally, we conclude that a lack of data and the lack of significant air/soil/water testing have seriously jeopardized both our ability and EPA's ability to evaluate and ascertain the scope of our problems.

We would also like to make mention that many of these concerns were not stated prior to this date due to the fact the the Draft Work Plan for the Lipari Landfill Site was never put into the town library and made available for public review until May 1985, four months after the January Town Meeting.

V. RECOMMENDATIONS

A. That a written response be made by EPA to address all questions and concerns in our comment report.

B. That more acceptable clean-up alternatives be explored which would remove the majority of the 155 known chemical compounds and contaminated soil from Lipari Landfill and surrounding areas.

C. That Complete Removal and On-site Storage is a feasible and realistic alternative and should be considered.

D. That EPA hire an independent environmental consultant to assist the community in the evaluation of data and in the selection of alternative solutions to the Lipari Landfill and Alcyon Lake probler (As done in Stringfellow Acid Pits and Love Canal)

- That [illegible] hire an environmental inspector to oversee the entire cleanup operation.

- That a Citizen's Committee be developed to define and assist in the alternative selection.

We realize that you are the experts. However, we live with the problem and feel it is important that we participate in the decision making process concerning the Lipari Landfill and Alcyon Lake clean-up. Furthermore, Lipari Landfill/Alcyon Lake is the number one toxic waste site and the rest of the country will be watching and waiting for its successful completion. Let's work together to make Pitman a safe place to live again.

Sincerely,

Pitman Lipari Landfill
Community Association

Douglas Stuart
President

Patricia Stuart
Project Coordinator

Terry Lindsay
National Liaison

Douglas Stuart
205 Lakeside Avenue
Pitman, N.J. 08071

August 19, 1985

Mr. Robert Hyde
Project Officer
Camp Dresser & McKee
EPA's Consultants

Dear Mr. Hyde:

At the August 15th Public Meeting concerning the Lipari Landfill Site, soil test results of Betty Park indicated that there was no harmful risk to human health. However, the tests did not reveal any data concerning bis(2-chloroethyl)ether which is a known carcinogen and has been predicted by your recent report to occur in Alcyon Lake at concentrations that exceed its criterion for human health. The question as to the absence of bis(2-chloroethyl)ether was explained as follows:

1. The chemical had not registered any amounts, therefore, it was not mentioned in the findings.

   OR

2. The soil was never tested for bis(2-chloroethyl)ether.

Obviously, the latter of these explanations raised serious questions and concerns, which you must share, since you stated that you planned to investigate this matter. Would you please send us the following: the type of tests taken, the chemicals tested, test results and any other data that could alleviate our concern. Since this is a serious issue, a quick response would be appreciated.

This letter is not to construted as a comment to the EPA presentation on alternatives to the Lipari Landfill problem, as that will follow in more detail.

Sincerely,

Douglas Stuart

Douglas Stuart
President of Pitman Lipari
Landfill Community Associatio

cc: Mayor Hannum
Pitman Environmental Commission

06 FEB 1985

Mr. Edward Campbell, Chairman
Pitman Environmental Commission
Pitman Borough Hall
6 North Broadway
Pitman, New Jersey 08071

Dear Mr. Campbell:

I would like to take this opportunity to thank you and the Pitman Environmental Commission for your attention and contribution to the Environmental Protection Agency's (EPA) presentation of the Phase II Remedial Investigation and Feasibility Study for the Lipari Landfill at the January 23, 1983 Public Meeting.

As promised at the Public Meeting, I have enclosed an inventory of all reports concerning the Lipari Landfill that are in EPA's possession. I have also enclosed copies of those documents that were readily available. This office is currently in the process of photo copying the remaining reports for which there were no extra copies; and will be fowarding them to you as soon as possible.

In discussing those reports which are on repository with Mr. Robert Dixon of the Gloucester County Planning Department, I did not wish to imply that he had all existing reports. Recently, few reports were sent to him, since few have been generated. As you can see by the enclosed inventory, few reports were completed since 1982. The type of activities undertaken at the site over the last two years - mainly design and construction of the leachate containment system - does not generically generate reports.

The long-term monitoring program being performed by JRB Associates has been the only other suplemental activity that was initiated and is currently being undertaken at the Lipari Landfill as part of a research effort by EPA's Office of Research and Development. While some data has been produced by this activity, a report has not been compiled. When this effort results in a report, we will make it available to your Commission. In the interim we are enclosing some of the preliminary data from this effort.

Reports that will be available in the near future are shown below with the estimated date of completion:

- Remedial Investigation Report (On-Site) - May 1985
- Remedial Feasibility Study (On-Site) - August 1985
- Remedial Investigation Report (Off-Site) - October 1985
- Remedial Feasibility Study (Off-Site) - December 1985

This office will forward to your Commission these Phase II reports as they are completed.

I hope that the Pitman Environmental Commission will find these reports useful in its evaluation of the circumstances and actions taken at the Lipari Landfill. As always, should you or any member of the Pitman Environmental Commission wish any additional information concerning the Lipari Landfill, please contact Mr. Ronald Borsellino of my staff at (212) 264-1913.

As also discussed at the Public Meeting, you had indicated that the Pitman Environmental Committee will undertake a survey of private wells that may still exist in the area and which apparently are used for lawn irrigation. I would like to thank the Committee for their future efforts in this matter; and I would request that the Committee send the information to this office when it is compiled.

Your continued concern and input concerning the Lipari Landfill, is very much appreciated.

Sincerely yours,

Salvatore Badalamenti, Chief
Southern New Jersey Remedial Action Section
New Jersey Remedial Action Branch

cc: Robert Dixon
Michael Hammum, Mayor

CCHW

CITIZEN'S CLEARINGHOUSE FOR HAZARDOUS WASTES, INC

A Grassroots Environmental Crisis Center

August 30, 1985

Mr. Douglas Stuart
President
Pitman-Lipari Landfill
Community Association
205 Lakeside Avenue
Pitman, NJ 08071

Dear Mr. Stuart:

I have completed my review of the "Final Draft Report, On-Site Feasibility Study for Lipari Landfill" prepared by Camp Dresser and McKee, Inc. (CDM) for the U.S. Environmental Protection Agency (EPA), August 1985. This review was initiated at your request on behalf of the Pitman Lipari Landfill Community Association (PLLCA). These comments are offered to assist the residents of Pitman to better understand the proposed cleanup options and to provide a basis for the community to better articulate their concerns about the risks posed by the landfill and the different cleanup options.

The Final Draft Report, On-Site Feasibility Study (FS Report) for Lipari Landfill is prepared differently than any other EPA investigation of a Superfund site. This report encompasses both the Remedial Investigation (RI) of the site as well as the Feasibility Study (FS). In the past, these study areas have been prepared and reported in separate documents. The RI phase is intended to establish the extent of the contamination caused by the site under investigation. Normally a substantial amount of new data is generated and reported in the RI report. The FS then evaluates and recommends options for cleaning up the site problems defined in the RI phase.

This report suffers from combining both phases primarily because significant portions of data normally reported in a RI report is omitted. Typical information not included in this report include:

1. Well logs and boring descriptions. This information describes well depths, well construction, water levels, soil characteristics, and well locations and is critical to understanding the direction and rate of groundwater flow.

POST OFFICE BOX 926, ARLINGTON, VIRGINIA 22216
(703) 276-7070

2. Sampling procedures for leachate, groundwater, surface water and soil samples. How was the sample taken? Were proper collection, storage and transport methods used? Were field samples filtered?

3. Analytical procedures. What methods and test procedures were used to determine the amount of different chemicals present in a sample? What were the detection limits? What chemicals were tested for? Were the same procedures used for each sample (from the same medium)? What quality assurance/ quality control (QA/QC) procedures were followed? There is no mention of QA/QC procedures at all in the report. This is an important point that needs to be addressed.

4. Results from samples, i.e. raw data. Only summary data is provided (see tables 1-1, 1-3, 2-4 as examples). Acyual test results showing what was found in each sample is not provided.

Other relevant data not included:

- Results from private drinking water wells
- Results of sampling air from gas vents
- Soil testing results

Hurt most by this lack of information is the public and others interested in the cleanup of the Lipari Landfill. Without actual raw data and supporting documentation (such as well logs), the reader is asked to accept the arguments and assumptions presented without question. Further, an independent assessment of the collected data and its significance cannot be conducted without the raw data and supporting documentation. This situation is untenable and is not conducive to involving the public in decisions being made at the site.

RECOMMENDED CLEANUP OPTIONS

The FS Report evaluates 29 variations of seven (7) options and recommends three for further consideration. These are:

1. No action but pump Kirkwood sands;

2. Dewater area within existing slurry wall and pump Kirkwood sands;

3. Dewater and then flush area within existing slurry wall and pump Kirkwood sands.

The advantages and disadvantages of these options are described in the report with regard to technical feasibility (Table 4-10, pps. 4-45-55), environmental health (Table 4-17, p. 4-94) and institutional problems (Table

4-19, p. 4-99). For your convenience, these tables are copied and attached to these comments.

When reviewing these tables together, little confidence can be felt that any of the recommended options will work for any length of time. Each suffers from significant limitations; each depends on continous long-term monitoring and maintenance; and each will likely result in the need for further cleanup some time in the future. Each option is seperately evaluated below.

<u>OPTION 2 - NO ACTION BUT PUMP KIRKWOOD SANDS</u>.

This option leaves existing contaminants in place and addresses only downward migration into the Kirkwood sands, generally considered to be 40-50 feet below the surface. Currently contaminants are entering the Kirkwood sands at an estimated rate of 1750 gallons per day (FS Report, p. viii). Since some local residents obtain drinking water from these sands and since waters from this region discharge into Chestnut Branch and/or Alcyon Lake, contamination in these sands must be cleared up.

The proposed cleanup approach would tackle this problem not by removing the source of contaminants (the upper Cohansey soils) but rather by removing contaminants which have migrated away from the source. In this way, the source continues to generate leachate and treatment is needed until all the contaminants have migrated from the source to the point of cleanup (or perhaps somewhere else causing other problems). This option is an inefficient and ineffective means of cleaning up the site. It makes no sense to ignore contaminants in the upper Cohansey and address only those which have migrated into the Kirkwood sands.

There are many uncertainties with this option:

- reliance on success of the slurry wall to contain contaminants at the source
- changing hydraulic head (water pressure) altering the degree of downward migration
- changes in lateral water movement (i.e. out of containment area) altering degree of downward migration
- some chemicals won't migrate with waste and thus will remain in place indefinitely
- not all contaminants will be captured and removed
- no experience with this technique for cleaning up hazardous wastes
- time required for "cleanup" is at best an estimate relying on everything going as planned

Given these limitations and uncertainties, this option is not acceptable as a remedial option for Lipari Landfill.

OPTION 4 - DEWATER THE ENCAPSULATION AND PUMP THE KIRKWOOD SANDS.

In this option, the water level in the area contained by the slurry wall is lowered to below where wastes are present in soil and the Kirkwood sands are pumped to remove water soluble chemicals which have migrated from the original point of disposal. In theory, by lowering the water table, the wastes become isolated and immobile because they do not come into contact with water.

The success of this option is highly dependent on first knowing where the wastes are located, then being able to lower water levels to below the wastes and most importantly, on maintaining the water level below the wastes indefinitely. If for any reason the water table rises, at any time, then wastes will become mobile again causing the contamination to once again migrate away from the site.

It is highly unlikely that dewatering can be maintained indefinitely. The cap will eventually fail allowing water to enter from the surface; pumps will fail allowing water to rise from below and already the slurry wall has failed allowing water to enter from the site of the "encapsulated" area. Even if dewatering is able to work in the short term, the above failure mechanisms will come into play before long mobilizing wastes and requiring additional cleanup. Further, this technique has not been used to cleanup an waste sites that I am aware of. Consequently, its success remains to be seen.

OPTION 6 - FLUSH THE "ENCAPSULATION" AND PUMP THE KIRKWOOD SANDS.

In this option, the upper Cohansey would be dewatered as described in Option 4, then "clean" water would be flushed through the contaminated soil to remove water soluble contaminants until levels of these contaminants fal below a selected cleanup level. In addition, the Kirkwood sands would be pumped as described in Option 2.

This option is the most complicated and difficult to carry out of the recommended options. It relies on the ability to withdraw contaminants fr soil by continuous flushing. To be successful, all the soil in the "encapsulated" area must be flushed. It is unlikely this can be achieved, thus at best, only partial removal of those water soluble chemicals will b achieved. The rest of the wastes, those not moving in the water and those not effectively flushed, will remain.

The authors of the FS Report, clearly do not have much faith in this option. They describe this technique as "unproven" and "not completely effective" citing numerous limitations (see pp. 3-65 to 76 of the FS Repo including:

- Stagnant areas of low flow where water and contaminants will move little at all (pp. 3-65)

- Short circuiting caused by inconsistencies in soil makeup (p. 3-65)

- Clogging and maintenance of pump/injection system (p. 3-65)

- Chemicals not soluble in water will remain (p. 3-118)

CDM further states that "the effectiveness and efficiency of this technique has not been demonstrated for any of the chemicals, even though large amounts of such chemicals have been spontaneously mobilized in the past..." (FS Report, p. 3-118). Given the limitations and uncertainties cleary expressed in the report, this remedial option cannot seriously be considered as a viable cleanup option for the Lipari Landfill.

<u>REMOVAL AS AN OPTION</u>.

Another option considered in the FS Report was the excavation and removal of contaminated soils and wastes. This option was eliminated based on costing $288 million dollars as compared to $1-2 million for other options. While removal has its drawbacks, there is a clear and obvious bias against this option in the report. The arguments against using this option are taken to such an extreme in some cases as to be unrealistic. Examples of the unreasonable assumptions are:

1. Use of complete excavation of the upper Cohansey sands to establish cost estimates. Every single grain of contaminated soil does not need to be removed and it is unrealistic to think anyone would do this.

2. Proposal to develop a "bubble" air lock device over the entire site during excavation to control air polluntants. While this idea is interesting, no one has ever tried to do this over a 15 acre site. This is unrealistic and simply adds to the cost.

3. Claims that air pollution permits may have to be obtained if soil is excavated. The basis for this statement is not included in this report. This has never been necessary in the past.

Excavation of wastes does pose certain risks. Exposures are likely to be higher during excavation than at any other time. The trade off is higher risks for a short period of time versus lower risk for a long period of time The community should carefully consider these factors before making any decisions. Complete removal of wastes and contaminated soils may not be warranted at this site. However, partial removal with on-site storage, thus eliminating transport costs and risks and redisposal costs, may warrant more careful consideration (See discussion below).

CLEANUP OPTIONS NOT CONSIDERED.

In considering cleanup options, CDM listed 29 variations of 7 options including 7 discharge options for leachate, 1 for air, 5 for sludge and 3 for soil; 12 treatment options for collected leachate; and 1 inplace treatment option. Each of these options were evaluated and screened for established criteria (see pp. 3-42 to 3-44). Of these options, only two, both employing wet air oxidation, are conisered innovative technologies that could permanently destroy or detoxify the wastes.

The Congressional Office of Technology Assessment (OTA) * listed 26 cleanup options, currently available which can achieve permanent destruction or detoxification of wastes. There is no discussion at all as to why these (or similar) options were not considered in the FS Report. OTA also carefully evaluated existing technologies and came to the conclusion that containment technologies such as encapsulation and groundwater pumping are ineffective and inadequate. The effectiveness of a cleanup project should be measured by the ability to destroy, detoxify or permanently immobilize wastes and to decontaminate soil and groundwater. None of the recommended options achieve this goal.

* Superfund Strategies, Office of Technology Assessment (OTA) - ITE - 253, Washington, DC, April, 1985.

NEW OPTION FOR CONSIDERATION.

Another option that warrants consideration is one that encompasses elements of several options and ideas already discussed. This option is a Removal and Storage alternative which combines partial removal of inplace waste, collection and treatment of contaminated groundwater and on-site storage of excavated wastes. Groundwater isolation, collection and treatment could be achieved using some of the same alternatives already considered in the FS Report.

The major differences in this alternative (from option 1) is that some inplace wastes would be excavated and removed from the site (as opposed to complete removal), and rather than redisposal at another site, the wastes would then be temporarily stored on-site. Storage could be achieved in an above-ground cement structure which could be easily monitored and controlled. Once available treatment technologies for permanently destroying wastes become more cost effective, wastes could be removed from storage and treated. Similar storage techniques have been utilized at Times Beach, MO, and are under consideration at Love Canal in Niagara Falls, NY.

The removal and storage option offers the following advantages:

1. Removes some wastes from the ground thus reducing time needed to treat and collect contaminated groundwater by reducing the source of the contamination.

2. Provides a cost effective means of removing wastes while not simply tranfering risks to another community or landfill site.

3. Above ground storage can be easily monitored and controlled.

4. Provides a means (in the future) of permanently destroying or detoxifying wastes.

5. Can be used in conjunction with existing "traditional" technologies to make them more effective and efficient.

The biggest drawback of this alternative is the short-term risks posed during excavation. These risks ar real but can be minimized and controlled with proper care and planning.

Clearly this alternative is not fully described nor evaluated in these comments. The intent here is to raise it for consideration as a viable alternative for cleanup at the Lipari Landfill.

<u>ISSUES NOT ADEQUATELY ADDRESSED BY THE FEASIBILITY STUDY REPORT</u>

Several important factors were not adequately addressed in the FS Report. Perhaps this is the result of combining the RI and FS reports into one document. These items are listed below:

1. Influence of contamination off-site on remedial work conducted "on-site". Remedial efforts necessary to cleanup off-site contamination may influence steps taken to address on-site contamination.

2. Reliance on the success of the existing cap or cover and the slurry wall to contain or "encapsulate" wastes within the slurry wall. Cost estimates and time needed to achieve cleanup levels are based on success of the containment system. Already the slurry wall/containment system has failed raising severe doubts about the costs and time estimates in the report.

3. Lack of background and supporting data, especially quality assurance and quality control procedures (see above).

4. Dependence on modelling to predict success of different options, and time necessary to achieve cleanup levels. Many assumptions are necessarily made in order to effectively use models as a predictive tool. However, many of the assumptions may not be accurate or hold with time. For example, estimates of time to dewater the encapsulated area are based on <u>no</u> flow through the slurry wall and cap (FS Report, p 3-56). Already we know this assumption is false. Models are only as good as the assumptoins made and the data used to verify them.

5. Lack of data on how much of the inplace wastes will mobilize with water and on interactions between soil and generated leachate.

6. Estimates of costs and time to cleanup are based on everything going as planned. Failure of the cover (cap), slurry wall or pumps are not addressed.

7. None of the techniques proposed in the 3 recommended options have been proven successful as to cleanup hazardous waste sites.

SUMMARY COMMENTS AND CONCLUSIONS.

In summary, the following observations and conclusions can be drawn:

1. It is not in the best interest of the community to combine RI and FS Reports. Too much important data is omitted.

2. The recommended options provide little confidence that they will work for any length of time. Each suffers from critical limitations and inadequacies.

3. Each of the recommended options requires long-term maintenance and monitoring, ranging from 15-70 years. In addition, those wastes not mobile in water will remain forever requiring indefinitely monitoring.

4. Insufficient consideration was given to cleanup methods which permanently destroy, detoxify or immobilize wastes. Additional options, such as those suggested by OTA need to be considered.

5. None of the recommended options have been proven successful as long-term cleanup methods at hazardous waste sites.

6. The report is biased against complete removal of wastes (option 1).

RECOMMENDATIONS.

Based on my review of the Fianl Draft FS Report, I propose the followin recommendations for your consideration:

1. That all relevant background and supporting data and all raw data results be obtained for all samples collected as part of the investigation of the contamination at Lipari Landfill.

2. That the feasibility of other alternatives be considered for cleanup of Lipari, in particular that the 26 options evaluated by OTA be considered.

3. That partial removal and on-site storage be considered in conjunction with dewatering and pumping of the underlying soils.

I hope these comments are helpful. If you have any questions or [illegible] to discuss any portion of these comments, please do not hesitate to contact me.

Sincerely,

Stephen U. Lester
Science Director

SUL/gfm

TABLE 4-10

TECHNICAL ADVANTAGES/DISADVANTAGES
OF THE CANDIDATE REMEDIAL ALTERNATIVES

Remedial Alternative	Advantages	Disadvantages
1-Complete Removal	o Most reliable in removing source materials	o Most dangerous to health and safety of onsite workers o Very difficult to implement
2-No Action but Pump the Kirkwood (Enhanced Containment)	o Contains Kirkwood Seepage o Easily implemented o High level of onsite worker safety	o Has high driving head forcing contamination into Kirkwood Sands o Leaves large portion of water transport contamination in place o Hydraulic gradient is out of the containment o May allows "source" to continue to generate leachate o Chance for wall degradation o Some portion of water transportable contamination remains within encapsulation both in landfilled and non-landfilled areas
3-Dewater the Encapcapsulation (Enhanced Containment)	o Removes portion of water transport contamination o Decreases driving head into Kirkwood Sand o Induces hydraulic gradient into the containment o Leaves "source" materials above the water table o Decreases potential for wall degradation o Easily implemented o High level of onsite worker safety	o Doesn't have provisions for capturing seepage into the Kirkwood Sands resulting in continued migration of contaminants into offsite areas o Some portion of water transportable contamination remains within encapsulation both in landfilled and non-landfilled areas

4-Dewater the Encapsulation and Pump the Kirkwood (Enhanced Containment)	o Most effective alternative in achieving Enhanced Containment in both Cohansey and Kirkwood Sands o Removes portion of water soluble contamination o Decreases driving head into Kirkwood Sand o Induces hydraulic gradient into the containment o Leaves "source" materials above the water table o Decreases potential for wall degradation o Easily implemented o High level of onsite worker safety	o Pumping of the Kirkwood Sands will be required over a longer period of time than the Cleanup alternatives o Some portion of water transportable contamination remains within encapsulation both in landfilled and non-landfilled areas
5-Flush the Encapsulation (Cleanup)	o If successful, will clean up water transportable contamination faster and more thoroughly than either the No Action or Enhanced Containment Alternatives	o Flushing is an unproven technology o Doesn't have provisions for capturing seepage into the Kirkwood o O&M difficulties with re-injection o Cannot measure degree of effectiveness of flushing o potential for short-circuiting o cannot flush contaminants adsorbed onto soil particles which at some future time may become water transportable due to a change in the soil micro-environment
6-Flush the Encapsulation and Pump the Kirkwood (Cleanup)	o Captures seepage into the Kirkwood o If sucessful, will clean-up water transportable contamination faster and more thoroughly than either the No Action or Enhanced Containment Altenatives	o Flushing is an unproven technology o O&M difficulties with re-injection o Cannot measure degree of effectiveness of flushing o Cannot flush contaminants adsorbed onto soil particles which at some future time may become water transportable due to a change in the soil micro-environment
7-No Action	o Safest of all alternatives for onsite workers	o Does not contain, cleanup, or remove contamination. Seepage will continue into Cohansey and Kirkwood formations

TABLE

SUMMARY OF THE RESULTS OF THE PUBLIC HEALTH EVALUATIONS

Alternate	Acceptable	Unacceptable because of technology inadequacies related to: Collection	Treatment	Disposal
1a			L,E	
1b			E	
1c			E	X
1d			E	X
2a		X	L	
2b		X		
2c		X		X
2d		X		X
3a		X	L	
3b		X		
3c		X		X
3d		X		X
4a			L	
4b	OK			
4c				X
4d				X
5a		X		
5b		X		
5c		X		
5d		X		X
5e		X		X
5f		X		
6a		X		
6b		X		
6c		X		
6d		X		X
6e		X		X
6f		X		
7		X		

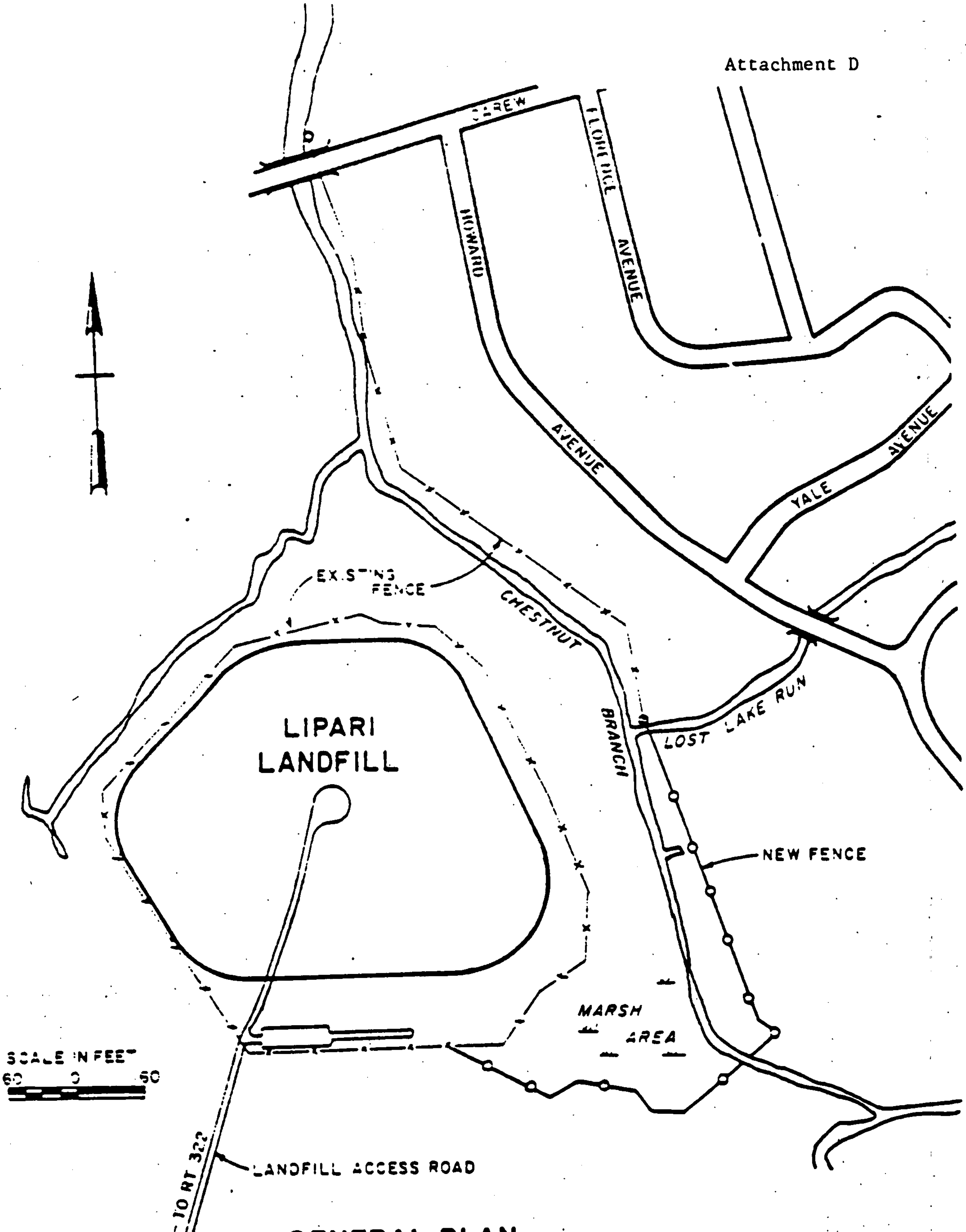
X = Excessive discharge of bis-(2-chloroethyl)ether to surface waters
L = High number of truck accidents due to off-site transport of liquids
E = High number of truck accidents due to off-site transport of soil
OK = No significant inadequacies.

TABLE 4-19

INSTITUTIONAL ADVANTAGES/DISADVANTAGES OF THE CANDIDATE REMEDIAL ALTERNATIVES

Remedial Alternative	Advantages	Disadvantages
Complete Removal (Alternative 1)	o Probably most acceptable alternative in the public eye	o Permits needed for offsite disposal of untreated/pre-treated leachate o Permits needed to haul contaminated soil to offsite areas o Air permits may be needed to operate onsite pretreatment facility o Air permits may be needed for exhaust from any onsite enclosure used during excavation
Enhanced Containment (Alternatives 2, 3, 4)		o May meet with skepticism from public as to whether the hazardous materials could be contained. Alternative does not seek to actively cleanup the site o Permits needed for offsite disposal of untreated/pre-treated leachate o Air permits may be needed to operate onsite pretreatment facility
Cleanup (Alternatives 5,6)	o Probably acceptable to public since it demonstrates an attempt to actively cleanup the contamination at the site	o Permits needed for offsite disposal of untreated/pre-treated leachate should this material not be reinjected o permits may be needed for underground injection o Air permits may be needed to operate onsite pretreatment facility
No Action (Alternative 7)	o Does not require any permits to implement	o Alternative perceived to be entirely unacceptable to the public

Attachment D



GENERAL PLAN

CDM

environmental engineers, scientists, planners & management consultants

FIGURE 1-4

FENCE INSTALLATION

Attachment E

SEP 16 1985

Mr. Douglas Stuart
205 Lakeside Avenue
Pitman, New Jersey 08071

Dear Mr. Stuart:

This is in response to your letter of August 19, 1985 to Mr. Robert Hyde of Camp, Dresser and Mckee (CDM), concerning the analysis performed for samples taken at Betty Park.

Soil samples were collected in six locations in Betty Park on March 1, 1985. The samples were obtained with a hand-held coring device appropriately cleaned and decontaminated after each use in accordance with EPA procedures which are outlined in the approved Project Operations Plan for this site. Two samples were collected from each of the six locations, and at an interval from the ground surface to a depth of 6-inches, and at an interval from 6-inches to 18-inches. The sample locations can generally be described as:

- Seven feet off the fenceline running parallel to Lake Avenue approximately 100 feet from Cedar Avenue.
- In area of monkey bars, west of swings, 104 feet off fenceline running parallel to Lake Avenue.
- Approximately 100 feet from green building in the southern half of the park. Approximately 4 feet from the shoreline.
- Approximately 6 feet from shoreline midway in the park.
- Approximately 50 feet from the shoreline, 35 feet north of the green building in the northern portion of the park.
- Adjacent to picnic bench, approximately 30 feet from Cedar Avenue.

Each sample was analyzed for a full priority pollutant scan incorporating the following sample fractions: acids, base/neutrals, volatiles, pesticides, and polychlorinated biphenols (PCB). As concerns bis (2-chloroethyl) ether, this compound was tested for in each and every sample. In each instance the analytical laboratory indicated that this compound was not detected.

Sincerly yours,

Ronald J. Borsellino, P.E.
Southern New Jersey Remedial Action Section

cc: Pitman Environmental Commission
Robert Hyde, CDM

Attachment F

PITMAN ENVIRONMENTAL COMMISSION

8 N. Broadway, Pitman, N.J 08071

September 6, 1985

Mr. Christopher Daggett
Environmental Protection Agency
Region II Administrator
26 Federal Plaza
New York, NY 10278

Dear Mr. Daggett:

Be informed that the Pitman Environmental Commission, at its September 5, 1985 regular meeting, voted to recommend that the Boro Council and the Environmental Commission employ an outside consultant to review and evaluate the Alcyon/Lipari EPA report that was presented by the EPA in Council Chambers on August 1, 1985.

The consultant will make recommendations to council and the commission with regard to the procedures used in the study as well as to the corrective options presented and to offer alternatives not presented in the report.

The consultant fees for the services are to be born by the EPA.

Sincerely,

Thomas Miller, Chairman

cc Congressman Hughes
Congressman Florio
Mayor Hannum
Council Members
Commission Members

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

SEP 27 1985

Mr. Thomas Miller, Chairman
Pitman Environmental Commission
8 North Broadway
Pitman, New Jersey 08071

Dear Mr. Miller:

I would like to take this opportunity to thank you and the entire Pitman Environmental Commission for the assistance and attention afforded the representatives of the Environmental Protection Agency (EPA) at the public meeting held on August 15, 1985. I would also like to respond to the proposal made in your letter of September 15, 1985 to Christopher Daggett, Regional Administrator, that the Borough of Pitman hire an outside consultant to review and evaluate the On-site Feasibility Report (FS) for the Lipari Landfill presented at the August 15th meeting.

EPA encourages communities to become involved in the development of alternatives and to express their opinions concerning the selection of recommended alternatives of remedial actions at Superfund sites. As EPA involves all communities affected by Superfund sites, EPA has given the community surrounding the Lipari Landfill the opportunity to input into the development and selection process for past and ongoing remedial actions. Within the past year, two public meetings were held to inform the community of EPA's progress at Lipari and to address the public's comments. After the last public meeting, EPA extended the public comment period for the draft On-site Feasibility Study over 3 weeks to give the community more time to respond. Upon request, EPA also sent a copy of the FS to the Citizen's Clearinghouse for Hazardous Waste, Inc. Response to the comments developed from the Clearinghouse's review is being prepared. The Regional Administrator will presently be making a decision to implement a recommended alternative for the second phase on-site remedial action at the Lipari Landfill. This decision will be made considering all the comments received to date.

As a matter of policy, EPA does not finance reviews of studies that were prepared for and funded by EPA. Remedial Investigation/ Feasibility Studies go through several reviews to ensure that the alternatives considered protect public health and the environment and are consistant with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and other relevant environmental laws. Therefore, it is EPA's position that another review is unnecessary and counter-productive.

In addition, my staff is always ready to meet with the Pitman Environmental Commission and other local officials to discuss any aspect of EPA's response at the Lipari Landfill.

Your concern for the environment and your continued support of EPA's efforts at the Lipari Landfill are appreciated.

Sincerely yours,

John S. Frisco

for William J. Librizzi, Director
Emergency & Remedial Response Division