DECLARATION FOR RECORD OF DECISION

SITE NAME AND LOCATION

Syosset Landfill Site
Town of Oyster Bay
Nassau County, New York

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Operable Unit One ("OU 1") of the Syosset Landfill (the "Landfill") located in the Town of Oyster Bay, Nassau County, New York, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA") and the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"). This decision document summarizes the factual and legal basis for selecting the remedy for this Site.

The New York State Department of Environmental Conservation ("NYSDEC") concurs with the selected remedy. A letter of concurrence from NYSDEC is appended to this document.

The information supporting this remedial action decision is contained in the administrative record for this Site.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE SELECTED REMEDY

The OU 1 remedy for the Landfill is a source control remedy. It consists of covering the Landfill with a geosynthetic membrane cap and undertaking other actions consistent with New York State landfill closure requirements. These activities constitute the first Operable Unit at this Site; the second Operable Unit will address the possible migration of contaminants from the Landfill property.

The major components of the selected remedy include:

- Implementing New York State landfill closure requirements as specified in 6 NYCRR Part 360, Solid Waste Management Facilities Regulations, which includes construction of a geosynthetic membrane cap on the top surface of the landfill;

- Providing long-term operation and maintenance of the Landfill cap, including routine inspection and repair;

- Providing long-term air and groundwater quality monitoring in accordance with the New York State landfill closure requirements;

- Monitoring and maintaining the passive gas venting system installed under a previously implemented response action, including routine inspection and repair;

- Installing an additional passive gas venting system, designed so that it can easily be converted to an active system should conversion become a necessary part of the remedy in the future;

- Maintaining the existing boundary fence around the perimeter of the Landfill property to continue to restrict access to the Landfill;

- Placing institutional controls on the Landfill property to restrict future use of the Landfill in order to ensure the integrity of the cap;

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. However, because treatment of the principal threats at the site was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. As this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Constantine Sidamon-Eristoff
Regional Administrator

9/27/93
Date

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DECISION SUMMARY

SYOSSET LANDFILL SUPERFUND SITE

SYOSSET, NEW YORK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

NEW YORK

1 SITE LOCATION AND DESCRIPTION

The Syosset Landfill Site (the "Site") is located in Nassau County in the Town of Oyster Bay, Syosset, New York. The Site includes property formerly operated as the Syosset Landfill (the "Landfill"), and all areas which may have been affected by contaminants migrating from the Landfill. The Landfill covers approximately 35 acres and is 50 yards north of the Long Island Expressway. As illustrated in Figure 1, it is bordered by Miller Place to the southeast, by property formerly occupied by Cerro Wire and Cable Corporation ("Cerro") to the southwest, and by the Long Island Railroad to the northwest. A residential area and the South Grove Elementary School (the "School") border the Landfill to the northeast. The entire Landfill is enclosed by a six foot high cyclone fence. The Site also includes offices and maintenance facilities for the Town of Oyster Bay Department of Public Works. This area is located to the east, immediately adjacent to the Landfill, and occupies approximately 18 acres. According to the 1980 Census, the population of the Village of Syosset was approximately 10,392.

Topographically, the Landfill is relatively flat and at similar elevation to the surrounding area. The Landfill is characterized by a barren landscape with clumps of trees. Well locations, structures and other features at the Landfill are shown in Figure 2. There are two recharge basins owned by Nassau County which border the Landfill to the north and northeast. Both basins collect storm water runoff from the neighboring residential area for recharge to the underlying groundwater aquifers.

The Landfill is located in a densely populated residential and industrial area. This area is not known to contain ecologically significant habitat, agricultural land, historic or landmark sites directly or potentially affected. There are no wetlands on or adjacent to the Landfill. However, a low area on the northerly side of the Landfill supports the growth of Giant Reed, a common freshwater wetland species. The occurrence of this species is most likely due to the infrequent ponding caused by storms.

There are four public supply wells within a 1-mile radius of the Landfill; none of these wells are currently in service. There are eight public supply wells located within 3 miles of the Landfill in the general direction of groundwater flow (northeast). The closest are two public supply wells located approximately 2 miles to the northeast of the Landfill. These wells are screened in a deeper part of the Magothy aquifer and are still in service.

The Landfill is located in Long Island, New York within the glaciated part of the Atlantic Coastal Plain physiographic province. The Landfill is underlain by more than 1,000 feet of unconsolidated deposits of sand, silt, gravel, and clay which rest unconformable on the bedrock surface. There are three unconsolidated geologic formations underlying the Landfill (the Upper Glacial, Magothy, and Raritan). However, only two are saturated: the Magothy and the Raritan Formation. The Upper Glacial Formation is unsaturated in the vicinity of the Landfill. The saturated portion of the Magothy Formation (Magothy aquifer) is the principal source of water for public and industrial use; therefore, this is the aquifer of interest.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Landfill is owned by the Town of Oyster Bay (the "Town"), which operated it from approximately 1933 to 1975. Between 1933 and 1967, no restrictions were imposed on the types of wastes accepted at the Landfill. Waste types included commercial, industrial, residential, demolition, and agricultural wastes, as well as, sludge material and ash. In 1967, with the opening of another landfill to the east of Syosset in Old Bethpage, the Town stopped using the Landfill for the disposal of its domestically generated wastes. The Town also directed some industrial generators to use the Old Bethpage facility, but some industrial wastes continued to be disposed of at the Landfill until it was closed. The Landfill also accepted scavenger cesspool waste.

The Landfill was excavated into two cells to a depth of approximately 60 to 90 feet below land surface, and was then backfilled with garbage. There is also evidence that buried combustible fill materials were reportedly ignited and allowed to burn in portions of the Landfill. The Landfill was closed on January 28, 1975 by the Nassau County Department of Health ("NCDOH") because of a suspected groundwater pollution problem.

Several large companies have been identified as generators of large quantities of wastes that were disposed of at the Landfill over a period of years. According to information in EPA's possession, Hooker Chemicals and Plastics ("Hooker") disposed of approximately 48 tons of hazardous wastes at the Landfill from 1946 to 1968. The wastes included heavy metals, solvents, organics, oils and sludges, plasticizers, and small amounts of polychlorinated biphenyls ("PCBs"). Hooker was acquired by Occidental Chemical Corporation in 1982. EPA'S records also indicates that Cerro disposed of between 700 and 1080 tons annually of industrial sludges at the Landfill from 1950 to 1975. These sludges contained high concentrations of metals, including iron, chromium, copper, zinc, lead, cadmium, and nickel. EPA records also indicate that Columbia Corrugated Container Company disposed of approximately 108,000 gallons of industrial sludges similar in composition to those of Cerro, annually at the Landfill. In addition, Grumman Aerospace Corporation has reported that it disposed of 4,889 tons of sludge from its industrial waste treatment plant at the Landfill from 1949 to 1966. This sludge consisted primarily of hydroxides of chromium, aluminum, and iron. It should be noted that the above-mentioned generators are only some of the generators who are known to have disposed of hazardous substances at the Landfill. The Town approached EPA in 1986 and expressed an interest in performing the RI/FS. Subsequently, EPA mailed general notice letters to nine additional potentially responsible parties. All potentially responsible parties declined to perform the RI/FS.

In January, 1983, Environmental Resources Management-Northeast ("ERM") prepared a report summarizing the results of a study that it performed for NCDOH. The report concluded that the groundwater underlying and near the Site was being impacted by Landfill leachate. Heavy metals concentrations of arsenic, cadmium, chromium, and lead were detected at levels exceeding New York State drinking water standards.

The Site was placed on the Superfund National Priorities List ("NPL") in September 1983. After a series of negotiating sessions between the Town and EPA, the Town indicated a willingness to perform the Remedial Investigation and Feasibility Study ("RI/FS") for the Site. On June 19, 1986, EPA and the Town entered into an Administrative Order on Consent, Index No. II CERCLA-60203 (the "Order"). The Order required the Town to conduct an RI/FS for the Site with provisions for performing investigations of contaminant migration away from the Landfill property, as deemed necessary. Since that time, EPA has separated the cleanup of the Site into two phases or operable units. The first operable unit addresses the identification and abatement of the source of Site contamination at the Landfill property. The second operable unit will assess the nature and extent and need for abatement, if any, of migration of contaminants from the Landfill property into nearby groundwater and will be addressed at a later date.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI/FS Reports and the Proposed Plan for the first operable unit at the Site were released to the public in July 1990. These documents were made available at two information repositories maintained at the Syosset Public Library and the Oyster Bay Town Hall. The notice of availability for these documents was published in _Newsday_ on July 28, 1990. A public comment period was held from July 28, 1990 through August 28, 1990. In addition, a public meeting was held on August 15, 1990 to present the results of the RI/FS and the preferred alternative as presented in the Proposed Plan for the Landfill. At this meeting, representatives of the EPA presented the Proposed Plan regarding remediation of the Site, and later answered questions and responded to comments concerning such plan and other details related to the RI/FS reports. Responses to the comments and questions received during the public comment period, are included in the Responsiveness Summary, which is part of this ROD.

IV. SCOPE AND ROLE OF RESPONSE ACTION

As with many Superfund sites, the problems at the Syosset Landfill Site are complex. As a result, EPA and NYSDEC have divided the work into two operable units. The operable units are:

- OU 1: Source control of Landfill property
- OU 2: Study of migration of contaminants from the Landfill property into the groundwater.

This ROD addresses the First Operable Unit at the Landfill. The three predominant contaminant transport media to be addressed are soil, air and generation of leachate that may impact the groundwater. The contaminant transport through groundwater will be addressed during the Second Operable Unit ROD. Source control management of the Landfill will address the closure of the portion of the Site which was formerly operated as the Syosset Landfill proper.

The results of the RI revealed that the groundwater beneath and down-gradient from the Landfill has been contaminated with leachate. The highest concentrations of leachate parameters (chloride, ammonia, alkalinity, hardness, iron) were found in down-gradient groundwater monitoring wells. These results suggest the existence of a plume of leachate-contaminated groundwater emanating from the Landfill. The extent of this plume as well as the need for mitigation will be delineated in the Second Operable Unit Remedial Investigation. The remediation of the Site will be complete only after EPA has selected and implemented remedial actions for both operable units.

V. SUMMARY OF SITE CHARACTERISTICS

The nature and extent of contamination at the Landfill was investigated during three phases of the OU 1 RI. These three phases consisted of: Landfill groundwater study, Landfill dimension study, and sub-surface gas study.

GROUNDWATER

The purpose of the Landfill groundwater study was to characterize the previously reported impacts to groundwater quality from the Landfill. The scope of work for this study included drilling and installing seven monitoring wells, collecting groundwater and soil samples for laboratory analyses, and monitoring water levels in the monitoring wells on the Landfill property.

Two rounds of groundwater sampling were conducted at the Landfill. Filtered and unfiltered samples were collected for metals. The analytical results for Volatile Organic Compounds ("VOCs") detected are summarized in Table 1. The concentrations and distribution of VOCs detected did not suggest a plume or body of VOC-impacted water attributable to the Landfill.

A number of metals were also detected in groundwater samples. Table 2 provides a summary of the metals analytical results. Both filtered and unfiltered samples were collected for metal analyses during the first round of sampling and only filtered samples were collected for the second round. Some of the unfiltered samples, exceeded the primary drinking water standards for arsenic and lead, and zinc exceeded the secondary drinking water standards promulgated pursuant to the Safe Water Drinking Act 42 U.S.C 300f-300j.

In addition to the organic and metal contaminants detected in groundwater samples, a number of inorganic compounds were detected above background levels. The group of compounds include naturally-occurring anions and cations, some of which are extremely useful in determining landfill leachate impacts to groundwater. Ammonia, hardness, alkalinity, iron, sodium, potassium, dissolved solids, and chloride have been employed as indicator parameters for landfill leachate. The analytical results for these parameters are presented in Table 3. The distribution of leachate indicator parameters clearly indicates that groundwater is being impacted by landfill leachate, as evidenced by elevated concentrations of dissolved solids, chloride, ammonia, alkalinity, and hardness. The relatively higher concentrations of leachate indicator parameters detected in both shallow and deep down-gradient groundwater monitoring wells suggest the existence of a plume of leachate-impacted groundwater emanating from the Landfill in the direction of groundwater flow. However, this will be further investigated during the second operable unit RI/FS.

LANDFILL DIMENSION STUDY

The principle objective of the Landfill dimension study was to characterize the waste in the Landfill. A total of four soil borings (B-1, B-2, B-3, B-4) were drilled in the Landfill area at the locations shown in Figure 2. The locations were selected based on the result of historical information. Borings B-1 and B-2 were drilled through the Landfill material to penetrate ten feet into native soil, and Borings B-3 and B-4 were drilled to below the water table (100 - 115 ft below land surface) so that monitoring wells could be installed.

Samples of Landfill materials and native soil were collected at five foot intervals. Three samples of the Landfill material were collected for laboratory analysis from each of the four soil borings to chemically characterize the fill material; these samples were selected from the set of samples collected at five foot intervals. Two shallow monitoring wells were installed in two of the four soil borings (B-3 and B-4) and numbered as W-3 and W-4, respectively.

The results of the VOC analyses for the soil samples collected from the soil borings are presented in Table 4. VOCs were detected in total concentrations ranging from 19 ppb in B-1 (55 feet below land surface) to 180 ppb in B-3 (40 feet below land surface). VOCs were not detected in samples collected from B-2 (85 feet below land surface), B-3 (80 feet below land surface and 110 feet below land surface), and B-4 (70 feet below land surface, 100 feet below land surface). In each of these instances, except for the 80 foot sample from B-3, the samples were collected from the bottom of the Landfill. Several VOC compounds were detected in approximately the same concentration range (approximately 0-40 ppb), the summation of which yield the total VOC values. The exception is the detection of chlorobenzene in B-3 in a concentration of 180 ppb, which is the highest single concentration for an individual VOC and also the highest total concentration.

The results for soil samples collected from the well borings drilled during the Landfill groundwater study are presented in Table 5. Only two soil samples collected from the well borings during this study detected VOCs. Total VOCs were detected in concentration ranging from 5ppb - 335 ppb.

PCBs were detected in total concentrations of 730 ppb and 380 ppb in Boring B-1 (15 and 40 feet below land surface, respectively) and 4,600 ppb, 560 ppb, and 171 ppb in Boring B-4 (40, 70, and 100 foot below land surface, respectively).

SUB-SURFACE GAS STUDY

The sub-surface gas study was designed and implemented to determine the nature and extent of Landfill gases. A total of 19 gas monitoring wells were installed at the locations shown in Figure 3. Five of the 19 gas wells(G-2, G-10, G-17, G-18, and G-19) penetrated the clean Landfill cover into Landfill material. The remaining 14 gas wells were positioned very close to the Landfill boundaries. The gas wells were sampled on a monthly basis with an Organic Vapor Analyzer ("OVA") for the presence of methane and total volatile organic vapors. In addition, two rounds of gas samples were collected for laboratory analyses.

The results of the monthly well monitoring programs are summarized in Table 6. As shown in Table 6, in ten of the wells, Landfill gases were not detected for the majority of the monitoring period. When gases were detected, they were found in the low parts per million range. In the remaining nine wells, located along the middle and the southwestern corner of the Landfill, high concentrations of landfill gases were detected frequently in concentrations exceeding the upper quantification limit (1,000 ppm to 100,000 ppm depending on the OVA model used) of the OVA.

A passive gas ventilation system consisting of a trench and a series of vertical venting pipes within the trench, parallels the fence separating the Landfill from the School. This system has been monitored for the presence of methane gas since 1981. Since that time, methane has occasionally been detected in the vent pipes. However, methane has reportedly never been detected in two permanent gas monitoring points on the School's property.

The two rounds of Landfill gases sampled were collected from the ten gas monitoring wells which consistently exhibited the highest concentrations of methane and non-methane compounds measured with the OVA. The analytical results for both sampling rounds are presented in Table 7.

As shown in Table 7, total VOCs were detected in concentrations ranging from 45 ppb to greater than 1,335 ppb and from 40 ppb to 432 ppb for rounds one and two, respectively. Individual VOCs that were detected in highest concentrations included vinyl chloride, chloroethane, methylene chloride, tetrachloroethylene, benzene, toluene, ethylbenzene, and xylene. Vinyl chloride was detected in concentrations exceeding the upper quantification limit (400 ppb) in Wells G-2, G-7, and G-17. Chloroethane was also detected in a concentration exceeding the upper quantification limit in Well G-2. The upper limits were exceeded for both compounds because the trap used to collect the samples became saturated with the compounds before the fixed volume of sample (250 ml) was fully collected. Therefore, to permit quantification of these compounds, a second round of samples was collected using a smaller sample volume (100 ml).

Although vinyl chloride and chlorethane were detected above the upper quantification limit in round one of sampling, these compounds were not detected in any of the wells sampled during the second round.

VI. SUMMARY OF SITE RISKS

EPA conducted an Endangerment Assessment ("EA"), or risk assessment of the "no-action" alternative to evaluate the potential risks to human health and the environment associated with the Landfill in its current state. The EA focused on the Landfill contaminants which are likely to pose the most significant risks to human health and the environment ("indicator chemicals"). These indicator chemicals and their concentrations in Site media are shown in Table 8.

Exposure Assessment

EPA's EA identified several potential exposure pathways by which the public may be exposed to contaminant releases from the Landfill. These pathways and the populations potentially affected are shown in Table 9. The three potential exposure routes identified in the EA include: 1) exposures to organic compounds and metals from ingestion of or contact with contaminated groundwater in the vicinity of the Site; 2) inhalation exposures to volatile organic compounds emitted from contaminated soils; and 3) inhalation exposures to volatile organic compounds released from contaminated groundwater during showering. The potentially exposed populations include workers at the Town of Oyster Bay Department of Public Works, located on the southern margin of the Landfill; children, faculty, and staff at the School; and residents of the surrounding neighborhoods.

Toxicity Assessment

The EA assessed the risks associated with exposures to carcinogenic (cancer causing) and noncarcinogenic indicator chemicals.

Noncarcinogenic risks were assessed using a hazard index ("HI") approach, based on a comparison of expected contaminant intakes and safe levels of intake (Reference Doses). Reference doses ("RfDs") have been developed by EPA for indicating the potential for adverse health effects. RfDs, which are expressed in units of mg/kg-day, are estimates of daily exposure levels for humans which are thought to be safe over a lifetime (including sensitive individuals). Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) are compared with the RfD to derive the hazard quotient for the contaminant in the particular media. The HI is obtained by adding the hazard quotients for all compounds across all media. A HI greater than 1 indicates that potential exists for non-carcinogenic health effects to occur as a result of site-related exposures. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. The RfDs and HIs for the indicator chemicals at the Landfill are presented in Tables 10 A-D.

The HI for non-carcinogenic effects from the Landfill is less than one for adults and for chronic exposures to contaminated groundwater for children. However, the subchronic HI for children is greater than one (2.61) due to ingestion of groundwater contaminated with arsenic. This value comes mostly from ingestion of arsenic, and is above the EPA guidance level of one.

Potential carcinogenic risks were evaluated using the cancer potency factors developed by the EPA for the indicator compounds. Cancer potency factors ("CPFs") have been developed by EPA's Carcinogen Risk Assessment Verification Endeavor for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to generate an upper-bound estimate of the excess lifetime cancer risk associated with exposure to the compound at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes the underestimation of the risk highly unlikely. The CPFs for the indicator chemicals and their corresponding cancer risk levels are presented in Tables 11A and 11B.

Human Health Risk Characterization

For known or suspected carcinogens, the USEPA considers excess upper bound individual lifetime cancer risks of between 1×10^{-4} to 1×10^{-6} to be acceptable with 10^{-6} being the point of departure. This level indicates that an individual has not greater than a one in ten thousand to one in a million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year period under specific exposure conditions at the site. The cumulative upper bound risk for adults for all carcinogens at the Landfill is 4.0×10^{-5}. The cumulative upper bound risk for children for all carcinogens at the Landfill is 3.0×10^{-5}. Hence, the risks for carcinogens at the Landfill fall within the acceptable EPA risk range of 10^{-4} to 10^{-6}. However, EPA's preference is to select remedies that are at the more protective end of the risk range. Therefore, EPA has determined that the target risk for the Landfill should be on the order of 1×10^{-6}, given the size and proximity of potentially exposed neighboring populations to the Landfill and the likelihood of exposures. Therefore, Landfill remediation will be performed.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis
- environmental parameter measurement
- fate and transport modeling
- exposure parameter estimation
- toxicological data

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry analysis uncertainty can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled. Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals of concern at the point of exposure. In the EA for the Syosset Landfill Site, contact with arsenic-contaminated groundwater was assumed to occur from a public water supply well located approximately 1000 feet from the Landfill (N-4133). Although, this well was abandoned and sealed in 1982, so that it can no longer be used, the assumption was made to utilize this well in the EA to determine the effect that a future well might have if it were located at a similar distance down gradient of the Landfill. This is a conservative assumption since the NYSDEC strictly regulates the placement of groundwater supply wells on Long Island. Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the EA provides upper bound estimates of the risks to populations near the Landfill, and is highly unlikely to underestimate actual risks related to the Landfill.

Risk Summary

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

VII. DESCRIPTION OF REMEDIAL ALTERNATIVES

The goal of the RA is to prevent, reduce, or control the contaminants that may be leaving the Landfill and entering the groundwater and air. Technically applicable technologies were identified in the FS Report. In general, treatment or removal alternatives that reduce toxicity, mobility, or volume are preferred. However, it has been estimated that a total of three million cubic yards of waste were landfilled at the 38- acre Landfill. These wastes were placed at depths to 90 feet below ground surface. If the waste is removed, clean fill material would have to be brought in to bring the Landfill to existing ground surface elevations. The cost for removal, disposal, and filling operations for this Landfill would be approximately 775 million dollars. The total cost for removal, treatment, and filling operations would be in the order of one billion dollars. Partial ("hot spot") removal or treatment would be a more feasible option. However, it is not appropriate at the Landfill, because no discrete areas, contaminated by high levels of an identifiable waste type which represented a principal threat to public health or the environment, were located. Results from the OU 1 RI observed low concentration contaminants dispersed throughout the Landfill. Removal and disposal technologies were eliminated in the screening process due to excessive cost and impracticability.

The First Operable Unit FS focused on the no-action alternative and three landfill closure alternatives for detailed evaluation. The Landfill closure alternatives consisted of three containment options. Estimated costs and implementation times are summarized here from the FS. It should be noted that the implementation periods include a component for the design of the intended remedial action.

ALTERNATIVE 1: No Action

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires that the "no-action" alternative be considered at every site. Under this alternative, the Landfill would be retained in its current condition. No remediation measures would be implemented. However, long-term monitoring of the groundwater and subsurface gas at the Landfill would be necessary to monitor contaminant migration. Monitoring can be implemented by using previously-installed gas and ground-water monitoring wells. Costs incurred for this alternative would be limited to landfill maintenance and monitoring costs.

No capital cost would be required to implement this alternative. The present worth value for the estimated annual maintenance and monitoring cost of the no-action alternative is approximately one million dollars per year. There would be no change in the level of protection of public health.

Source Control Measures:

Containment of potentially contaminated soil and waste at the Landfill involves the placement of an impermeable cover over the existing fill material. Containment technologies are advantageous since they allow the waste materials to remain in place while the cover system minimizes future exposure pathways. Capping systems have been used for many years during landfill closure operations and have proven to be an effective and reliable means of protecting human health and the environment. The cap system would be designed and constructed to minimize erosion of the cover, and provide long-term minimization of migration of liquids through the underlying contaminated soils.

All of the capping systems that were evaluated consist of a bottom layer of permeable gas venting material, overlain by a low permeability barrier layer covered by a barrier protection layer.

The permeable gas venting layer must have provisions for a gas venting and collection system to release any landfill gases trapped under the cap to prevent gas migration and cap degradation. The gas control system must be designed to prevent gas migration away from the Landfill; prevent the accumulation of gas in concentrations greater than 25 percent of the lower explosive limit for gases in structures on or off the Landfill property; and control objectionable odors from gas emission.

The required low permeability barrier may consist either of a layer of low permeability soil or a geosynthetic membrane.

The barrier protection layer would consist of bituminous asphalt concrete layer where future land use by the Town of Oyster Bay Department of Public Works is anticipated. Anticipated uses for the Landfill include utilizing a portion of the Landfill for highway yard operations, materials storage, composing, vehicle parking or construction of a recycling facility. Any areas on the Landfill property whose anticipated use does not require an asphalt surface will utilize the standard vegetative cover material specified in NYCRR Part 360.

Disadvantages of capping include the concern of waste material remaining in place, the potential for the cap to leak and generate additional leachate unless properly maintained, and the magnitude of grading required to minimize standing water because the landfill is relatively flat. Leakage of the cap is a potential concern because of the potential for future leachate generation. To reduce the risk of leaks developing in the system over time, which would have an impact on the groundwater, long-term operation and maintenance (O&M) would be required.

ALTERNATIVE 2A: NEW YORK STATE PART 360 REGULATIONS-LOW PERMEABILITY SOIL CAP

Capital cost:	$30.3 million
Annual Operation and Maintenance:	$280,000
Estimated Present Worth:	$32.9 million
Time to Implement the Remedial Action:	36 months

Alternative 2A consists of a low permeability soil cap (clay) for Landfill closure which complies with 6 NYCRR Part 360. The minimum cap section utilizing asphalt for the barrier protection layer, where future land use for the Town's Department of Public Works is anticipated, is shown in Figure 4. The minimum cap section utilizing vegetative cover, where future land use is not anticipated is shown in Figure 5, and consists of the following layers:

- 24 inches barrier protection layer

- 3 inches asphalt top course or	- 6 inches vegetated top soil
- 8 inches asphalt base course or	- 18 inches silty sand or other suitable soil cover
- 13 inches subbase course	

- 18 inches of low permeability soil layer (permeability 1×10^{7} cm/sec)
- 2 layers of geosynthetic filter fabric
- 12 inches of gas venting layer (permeability 1×10^{-3} cm/sec)
- clean soil fill of varying thickness to construct a cap system foundation with a minimum 4.0 percent slope
- gas riser vents extending from within the refuse material to 3 feet above the final ground surface elevation (minimum of one gas riser vent per acre); and
- crushed stone backfill around gas venting risers.

ALTERNATIVE 2B: NEW YORK STATE PART 360 REGULATIONS - GEOSYNTHETIC MEMBRANE CAP

Capital cost:	$24.1 million
Annual Operation and Maintenance:	$222,000
Estimated Present Worth	$26.2 million
Time to Implement the Remedial Action:	30 months

Alternative 2B consists of a geosynthetic membrane cap for landfill closure which complies with 6 NYCRR Part 360. The minimum cap section utilizing asphalt for the barrier protection layer, where future land use for the Town's Department of Public Works is anticipated, is shown in Figure 4. The minimum cap section utilizing a vegetative cover, where future land use is not anticipated, is shown in Figure 5, and consists of the following layers:

- 24 inch barrier protection layer which is made up of:

  - 3 inches asphalt top course or
  - 8 inches asphalt base course or
  - 13 inches subbase course

  - 6 inches vegetated top soil
  - 18 inches silty sand or other suitable soil cover

- geosynthetic membrane (40 MIL with permeability 1×10^{-12} cm/sec);
- 3 layers of geosynthetic filter fabric;
- 12 inches of gas venting layer (permeability 1×10^{-3} cm/sec);
- clean soil fill of varying thickness to construct a cap system foundation with a minimum 4.0 percent slope;
- gas riser vents extending from within the refuse material to 3 ft above the final ground surface elevation (minimum of one gas riser vent per acre); and
- crushed stone backfill around gas venting risers.

Alternative 2B is similar to Alternative 2A except for the use of geosynthetic membrane which replaces the low permeability soil (clay) in Alternative 2A. Alternative 2B also has 3 layers of geosynthetic filter fabric instead of 2.

ALTERNATIVE 2C: LANDFILL CLOSURE FOR MUNICIPAL LANDFILLS USING A LOW PERMEABILITY ASPHALT CAP

Capital cost:	$ 21.3 million
Annual Operation and Maintenance:	$ 212,000
Estimated Present Worth:	$ 23.3 million
Time to implement the Remedial Action:	24 months

Alternative 2C consists of a low permeability asphalt cap that will meet the 6 NYCRR Part 360 regulations. The minimum cap section utilizing asphalt for the barrier protection layer, where future land use for the Town's Department of Public Works is anticipated, is shown in Figure 4. The minimum cap section utilizing a vegetative cover, where future land use is not anticipated, is shown in Figure 5, and consists of the following layers:

- 3 inches impermeable asphalt (permeability 1.2 x 10^{8} cm/sec) placed in two 1-1/2 inch lifts;

- 8 inches aggregated base course;

- 13 inches subbase course (gas venting layer);

- geosynthetic filter fabric;

- clean soil fill of varying thickness to construct a cap system foundation with a minimum 4.0 percent slope;

- gas riser vents extending from within the refuse material to 3 ft above the final ground surface elevation (minimum of one gas riser vent per acre); and

- crushed stone backfill around gas venting risers.

<u>Additional components of the remedial action common to all of the Capping Alternatives</u>

All of the capping alternatives, consistent with NYSDEC closure requirements, would require post-closure operation and maintenance to operate and maintain the vegetative and asphalt covers, drainage structures and gas venting systems. In addition, a gas, air, and groundwater monitoring program would be required. Institutional controls would be implemented in Alternative 2A, 2B and 2C as well.

Current New York State landfill closure regulations require the installation of a passive gas venting system comprised of at least one gas vent riser per acre, to minimize landfill gas build up within the fill. If levels of VOC's or methane in landfill gases are expected to be high, then an active system would be appropriate.

In general, methane gas levels measured at this Landfill during the RI were generally low with the exception of one area in the southwestern portion of the Landfill. Levels of VOC's detected were lower than applicable ARAR's (Maximum Contaminant Levels with the exception of vinyl chloride which was measured slightly above the ARAR's during one of the sampling rounds. Considering that the levels of VOC's measured in Landfill soil and ground- water samples were also equal to or below ARAR's, it is likely that the higher reading measure during that one gas sampling round is not representative of Landfill conditions. Therefore, based on the Landfill characteristics, it is anticipated that a passive gas venting system would be the appropriate method for gas control. However, the passive gas system will be monitored and should levels of VOC's be detected in excess of ARAR's emission standards, the passive system will be designed so that it can easily be converted to an active system. After the installation of the final cap and venting system, two quarterly rounds of sampling of the gas vents for methane and non-methane volatile organic compounds, will be conducted. The sampling results will be utilized to make a determination as to whether conversion to an active system and/or treatment of gas is necessary.

SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

In accordance with the National Contingency Plan (NCP), a detailed analysis of each alternative is required. The purpose of the detailed analysis is to objectively assess the alternatives with respect to nine evaluation criteria that encompass statutory requirements and include other gauges of the overall feasibility and acceptability of remedial alternatives. This analysis is comprised of an individual assessment of the alternatives against each criterion and a comparative analysis designed to determine the relative performance of the alternatives and identify major trade-offs, that is, relative advantages and disadvantages, among them.

The nine evaluation criteria against which the alternatives are evaluated are as follows:

Threshold Criteria - The first two criteria must be satisfied in order for an alternative to be eligible for selection.

1. Overall Protection of Human Health and the Environment addresses whether a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with Applicable, or Relevant and Appropriate Requirements (ARARs) is used to determine whether each alternative will meet all of its Federal and State ARARs. When an ARAR is not met, the detailed analysis should discuss whether one of the six statutory waivers is appropriate.

Primary Balancing Criteria - The next five 'primary balancing criteria' are to be used to weigh major trade-offs among the different hazardous waste management strategies.

3. Long-term Effectiveness and Permanence focuses on any residual risk remaining at the Site after the completion of the remedial action. This analysis includes consideration of the degree of threat posed by the hazardous substances remaining at the Site and the adequacy of any

controls (for example, engineering and institutional) used to manage the hazardous substances remaining at the Site.

4. **Reduction of Toxicity, Mobility, or Volume Through Treatment** is the anticipated performance of the treatment technologies a particular remedy may employ.

5. **Short-term Effectiveness** addresses the effects of the alternative during the construction and implementation phase until the remedial response objectives are met.

6. **Implementability** addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation.

7. Cost includes estimated capital, and operation and maintenance costs, both translated to a present-worth basis. The detailed analysis evaluates and compares the cost of the respective alternatives, but draws no conclusions as to the cost-effectiveness of the alternatives. Cost-effectiveness is determined in the remedy selection phase, when cost is considered along with the other balancing criteria.

Modifying Criteria - The final two criteria are regarded as "modifying criteria," and are to be taken into account after the above criteria have been evaluated. They are generally to be focused upon after public comment is received.

8. State Acceptance reflects the statutory requirement to provide for substantial and meaningful State involvement.

9. Community Acceptance refers to the community's comments on the remedial alternatives under consideration, along with the Proposed Plan. Comments received during the public comment period, and the EPA's responses to those comments, are summarized in the Responsiveness Summary which is a part of this ROD.

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

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

Each of the closure alternatives would provide similar protection in regards to subsurface gas, since similar gas control systems are used for each alternative. Installation of any of the multi-layer impermeable caps would provide overall protection by effectively preventing public exposure to the Landfill materials. The three capping alternatives would prevent infiltration of precipitation into the Landfill thereby minimizing leachate production which could affect groundwater.

2. Compliance With ARARs

The ARARs are separated into three categories: chemical-specific, action-specific, and location specific. Both Federal and State ARAR's were evaluated with respect to their applicability to the first operable unit remediation activities at the Landfill, and are listed in Tables 12 and 13, respectively.

All of the landfill closure alternatives will comply with New York State air quality guidelines and New York State requirements for subsurface gas control. However, monitoring of the gas control systems will be required to ensure compliance with New York State ambient air quality guidelines. Alternatives 2A and 2B would meet and exceed the New York State requirements for closure of solid waste landfills. Although Alternative 2C is also consistent with the State landfill closure regulations, NYSDEC may require a longer review process prior to approval, because the State's closure regulations do not specifically authorize the proposed capping material specified in Alternative 2C.

Since the Landfill ceased operations in January 1975, prior to the effective date of the Resource Conservation and Recovery Act ("RCRA") Subtitle C regulations (November 19, 1980), and the remedy does not involve the disposal of RCRA-regulated waste, the RCRA Subtitle C closure standards are not applicable. However, information available indicates that hazardous substances disposed of at the Landfill may be similar to RCRA wastes. In addition, the purpose of some of the RCRA closure requirements is similar to the purpose of this CERCLA action. For these and other reasons, certain of the RCRA Subtitle C closure requirements, although not applicable, are relevant and appropriate for the remedial action at this Landfill.

The closure alternatives evaluated will comply with all provisions of the RCRA hazardous waste landfill closure regulations which are relevant and appropriate to the Landfill; specifically, 40 CFR Part 264, Subpart N, Sections 264.303 and 264.310, as well as the NYS Part 360 regulations for closure.

Due to the current limited threat for direct contact with the Landfill wastes, the appropriate closure regulations include the New York State closure requirements specified in 6 NYCRR Part 360, Solid Waste Management Facilities Regulations. This type of closure, which incorporates solid waste and hazardous waste regulatory requirements, is often called "alternate landfill closure".

RCRA Land Disposal Restrictions (LDRs) preclude the placement of restricted RCRA hazardous waste into a land disposal unit. For the LDRs to be applicable to a CERCLA response, the action must constitute placement of a restricted RCRA hazardous waste. Because the waste is being capped in place, LDRs do not apply.

3. Long-term Effectiveness

Landfill capping is considered a reliable option for low level contaminants and if properly installed, a cap system is expected to continue to provide a high level of protection. Each of the cap alternatives will be equally effective in achieving their objective of eliminating contact with Landfill soil and reducing the risk of contaminant migration as a result of leachate generated by surface precipitation.

However, alternative 2B is the most effective cover system for minimizing leachate production since its geosynthetic barrier and asphalt cover provides an initial efficiency of 99.43 percent. Alternative 2A has an intermediate effectiveness in reducing leachate generation (total cap efficiency = 99.04 percent), while Alternative 2C will be least effective (cap efficiency = 91.40 percent).

Alternative 2A provides minimal potential for cap failure since the low permeability clay has self-sealing properties which minimize failure caused by freezing and Landfill settlement. Differential settling of the Landfill wastes with subsequent detrimental effects on any cover system installed would be expected Alternative 2B has an intermediate potential for failure both during and after construction due to punctures and tears. Alternative 2C maintains the greatest potential for failure due to freezing and cracking, however, since the capping material is at the surface, cracks can be easily identified and repaired quickly. Unlike alternatives 2A and 2C, the useful life of geosynthetic membranes used in Alternative 2B is unknown and the membrane may have to be replaced sometime in the future.

In areas where vegetative cover will be utilized, frost action can damage the barrier layer and reduce its effectiveness. Alternative 2A has the greatest potential for frost damage because it is not protected by additional cover or a geosynthetic membrane Alternative 2B should be the least affected by frost because it includes geosynthetic materials.

4. **Reduction of Toxicity, Mobility, or Volume**

None of the alternatives utilize treatment of waste to reduce Toxicity, Mobility, or Volume. However, all of the capping alternatives would reduce the volume of leachate being generated in the Landfill by preventing infiltration of rainwater into the waste.

5. Short-term Effectiveness

There are slight differences in short-term effectiveness between the closure alternatives. Alternatives 2A, 2B, and 2C have minor short-term effects on the surrounding community, including increased vehicular traffic, a slight increase in noise level from construction equipment, and fugitive dust emissions. Measures would be taken to minimize these impacts for the construction periods, which vary among closure alternative as follows Alternative 2A: 36 months; Alternative 2B: 30 months; and Alternative 2C: 24 months. In addition, with the use of Alternative 2C, no penetration of or encounter with the Landfill wastes should occur. The thickness of the existing Landfill cover material is reported to vary from six inches to forty-eight inches. Therefore, encounters with Landfill waste material for Alternative 2C will be limited to the installation of gas vent piping, since the cap depth for this alternative is only twenty-four inches. Alternatives 2A and 2B, however, have greater depths, which may require a minimal excavation of Landfill waste materials. This excavation may warrant the use of air monitoring equipment and possibly the use of protective respiratory equipment during construction activities.

6. Implementability

Alternatives 2A, 2B and 2C are all technically and administratively feasible. The majority of the materials and services for all of the alternatives are readily available.

Alternative 2A utilizes a clay cover system that is a proven and reliable landfill closure technology. Although the majority of the materials and services for Alternative 2A are readily available, $1 \times 10^{-}$ cm/sec clay is no longer available locally. Alternative 2B utilizes a geosynthetic membrane cover system which is considered a proven and reliable technology, although its useful life may be uncertain. Alternative 2C is the most easily implemented closure alternative since the actual depth of the cap is estimated to be twenty-four inches. The other two Capping Alternatives have greater depths.

7. Cost

Capital cost is the present value for implementing the remedial action. Annual operation and maintenance ("O&M") costs are used to quantify the yearly expense of O&M. The 30 year annual cost is then calculated and expressed in current value terms. Alternative 2C has the lowest capital cost while Alternative 2A has the highest. The estimated capital cost for each of the closure alternatives are as follows:

- Alternative 2A - $30.3 million
- Alternative 2B - $24.1 million
- Alternative 2C - $21.3 million

Alternative 2A costs are sensitive to the availability and prices for clean fill and $1x10^{-7}$ cm/sec clay. Currently this clay is not locally available, which accounts for the high cost for Alternative 2A. Alternative 2B is sensitive to the availability and unit prices for clean fill material and geosynthetic membranes. Alternative 2C costs are sensitive to the availability and unit prices for clean fill and low permeability asphalt.
The annual O&M cost for each alternative are estimated as follows:

- Alternative 2A - $280,000
- Alternative 2B - $222,000
- Alternative 2C - $212,000

Detailed cost figures for each alternative are included in Table 14.

8. State Acceptance

The New York State Department of Environmental Conservation concurs with the selected remedy.

9. Community Acceptance

All comments submitted during the public comment period were evaluated and are addressed in the attached Responsiveness Summary.

IX. SELECTED REMEDY

Based on the results of the OU 1 RI/FS report, as well as a detailed evaluation of all comments submitted by interested parties during the public comment period, EPA has selected Alternative 2B as the preferred choice for addressing source control management of the Landfill. The cost of this remedy is estimated to be $26.2 million. This alternative involves includes:

1. Implementing New York State closure requirements specified in 6 NYCRR Part 360, Solid Waste Management Facilities Regulations, which includes constructing a geosynthetic membrane cap on the top surface of the landfill, as described below:

- 24-inch barrier protection layer which is made up of:

  - 3 inches asphalt top course or
  - 8 inches asphalt base course or
  - 13 inches subbase course

  - 6 inches vegetated top soil
  - 18 inches silty sand or other suitable soil cover

- geosynthetic membrane (40 MIL with permeability 1 x 10[illegible] cm/sec);
- 3 layers of geosynthetic filter fabric;
- 12- inches of gas venting layer (permeability 1 x 10[illegible] cm/sec);
- clean soil fill of varying thickness to construct a cap system foundation with a minimum 4.0 percent slope;
- gas riser vents extending from within the refuse material to 3 ft above the final ground surface elevation (minimum of one gas riser vent per acre), and
- crushed stone backfill around gas venting risers.

2. Providing long-term operation and maintenance of the Landfill cap, including routine inspections and repair;

3. Providing long-term air and groundwater quality monitoring in accordance with the New York State closure requirements;

4. Monitoring and maintaining the passive gas venting system installed under a previously implemented response action, including routine inspection and repair.

5. Installing an additional passive gas venting system, constructed so that it can be easily converted to an active gas system, should conversion become a necessary part of the remedy in the future;

6. Maintaining the existing boundary fence around the perimeter of the Landfill property to continue to restrict access to the Landfill; and

7. Placing institutional controls on the Landfill property to restrict future use of the Landfill in order to ensure the integrity of the cap.

The selected alternative provides the best balance among the nine criteria used by the EPA to evaluate remedial action alternatives. LDRs are not applicable for this Landfill because the waste is capped in place. Alternative 2B uses proven containment techniques and will minimize future contaminant migration by reducing the volume of precipitation which percolates through the landfilled wastes. The effectiveness of the selected cover system in protecting groundwater quality will be verified as per the New York State closure requirements.

The precise location of each aspect of the selected remedy will be determined during the Remedial Design phase of this overall remediation project. After the installation of the final cap and venting system, two quarterly rounds of sampling of the gas vents for methane and non-methane volatile organic compounds will be conducted. The sampling results will be utilized to make a determination as to whether conversion to an active system and/or treatment of gas is necessary.

X. STATUTORY DETERMINATIONS

1. Protection of Human Health and the Environment

   The selected remedy is protective of human health and the environment since it provides protection for site surface soils and gas control and maintains the highest cap efficiency. The fencing, institutional control and capping all provide protection from direct contact with contaminated materials. Capping of the Landfill also reduces the emissions of methane and VOCs and reduces percolation of precipitation through the Landfill and thus the migration of hazardous substances into groundwater. Monitoring of the groundwater will identify any failures of the containment system. The selected remedy will not pose unacceptable short-term risks.

2. Compliance with ARARs

The selected remedy will comply with all applicable or relevant and appropriate Federal and State requirements.

The Landfill capping and the long-term monitoring will meet the NYCRR Part 360 landfill closure requirements for a solid waste facility and will comply with all provisions of RCRA hazardous waste landfill closure regulations which are relevant and appropriate to the Landfill.

New York State Pollution Control Regulations, 6 NYCRR Parts 201, 202 and 219, with regard to air emissions will be complied with as well.

3. Cost-Effectiveness

The selected remedy is prescribed by compliance with state and federal solid waste landfill closure ARARs. The chosen alternative is cost-effective because it has been demonstrated to provide an overall effectiveness proportional to its cost.

A cost analysis was done to estimate a range of costs for capital and annual operation and maintenance. The range of estimated costs considers whether the cover materials are readily available in the vicinity of the Landfill. The final construction cost is expected to fall within the range of costs provided.

4. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

EPA and the State of New York have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost effective manner for the remediation of the Landfill. Assuming that the threshold criteria of "Overall protection of human health and the environment" and "compliance with ARARs" were met, the critical decisional role was given to the five balancing criteria of "long-term effectiveness and permanence", "reduction of toxicity, mobility, or volume", " short-term effectiveness", "implementability", and "cost." The balancing criterias are summarize below to assess their collective impacts on the remedy selection process. First, "long-term effectiveness" as a factor in the selected remedy is adequate in terms of the degree of permanence which it offers. However, long-term monitoring will be required to insure that engineering controls are performing as intended. The selected alternative is the most protective alternative with respect to future leachate production. Other options such as incineration or in-situ treatment are either deficient on the long- term basis or as in the case of in-situ treatment is technically impractical. Incineration offers a very high degree of permanence at a very high cost. The "reduction of toxicity, mobility or volume" will be achieved to some degree by reducing the volume of leachate being generated in the Landfill by preventing infiltration of precipitation into the waste. Other options such as incineration would be highly effective but it would be impractical because of the volume of waste present and the overreaching cost factor ($26.2 million versus $1 billion). Regarding "short-term effectiveness", the selected remedy would achieve the remediation goal in a shorter period of time (30 months) without any uncontrollable excavation, while incineration or in-situ treatment options would take far longer, up to 15 years, before the requisite goals are attained. In terms of "implementability", the selected remedy will utilize a proven technology, while other options such as in-situ treatment would not be effective for the low concentrations of contaminants found at the Landfill.

5. Preference for Treatment As A Principal Elements

The selected remedy does not satisfy the statutory preference for treatment because it is impractical to do so and not cost-effective. The Landfill wastes are the principal threat at the Site. The exact location of any hazardous waste that may have been disposed of at the Landfill is unknown. Therefore, the entire Landfill volume, approximately 3 million cubic yards, placed at depths of up to 90 feet below ground surface, would require excavation and removal in order to effectively treat the waste. This excavation of such a large volume of waste is cost-prohibitive. Furthermore, in-situ treatment of waste is technically impractical because no discrete areas, contaminated by high levels of an identifiable waste type which represented a principal threat to public health or the environment, were located. Results from the OU 1 RI observed low concentration contaminants dispersed throughout the Landfill. "Hot spots" which may have been amenable to treatment, were not located.