Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision
Orange County Landfill Site
Operable Unit 01
Town of Goshen
Nassau County, New York
Site Number 3-36-007

March 1998

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* JOHN P. CAHILL, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

ORANGE COUNTY LANDFILL
TOWN OF GOSHEN, ORANGE COUNTY, NEW YORK
Site No. 3-36-007, OPERABLE UNIT 1

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedial action for Operable Unit 1 of the Orange County Landfill inactive hazardous waste disposal site which was chosen in accordance with the New York State Environmental Conservation Law (ECL). The remedial program selected is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300).

This decision is based upon the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Orange County Landfill Inactive Hazardous Waste Site and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A bibliography of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened release of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential threat to public health and the environment.

Description of Selected Remedy

Based upon the results of the Remedial Investigation/Feasibility Study (RI/FS) for Operable Unit 1 of the Orange County Landfill Site, the landfill cap constructed as part of Operable Unit 2, and the criteria identified for evaluation of alternatives the NYSDEC has selected leachate collection and disposal and continued monitoring as the remedy. The components of the remedy are as follows:

- Continued operation and maintenance of the existing leachate collection system and the off-site disposal of the leachate as currently practiced by Orange County.

- The Operation and Maintenance of the landfill will at a minimum include the following: an annual explosive gas survey; the monthly inspection of the cap; bi-annual mowing of the vegetative cover; routine maintenance/repair of erosion or stability problems, both on the cover and on the Cheechunk Canal bank; maintenance/repair of the leachate collection system.

- The continued operation of the landfill gas collection system and the co-generation/treatment system to prevent the off-site migration of air contaminants; the installation of a gas flare system for use when the gas collection system is off line for maintenance or when it is no longer cost effective to operate.

- Quarterly monitoring of surface water, groundwater and leachate as currently practiced by Orange County .

- Institutional controls and deed restrictions, restricting the future use of the land and groundwater at the site.

- The Operation and Maintenance Plan will include the long term monitoring program and will be prepared in 1998.

New York State Department of Health Acceptance

The New York State Department of Health concurs with the remedy selected for this site as being protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable.

3/27/98
Date

Michael J. O'Toole, Jr., Director
Division of Environmental Remediation

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Town of Goshen, Orange County

March 1998

SECTION 1: SITE LOCATION AND DESCRIPTION

The Orange County Landfill is located in a rural setting south of Route 17M in the Town of Goshen, New York. The County's property is approximately 300 acres in size, and is bounded on the southeast by the Cheechunk Canal and on the northwest and southwest by the Old Channel of the Wallkill River. The landfill itself covers approximately 75 acres of the southern portion of the property. Please refer to Figure 1.

The remedial program for this site was divided into two operable units. An operable unit represents a discrete portion of the remedy for a site which for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the contamination present at a site.

Operable Unit #2 (OU2), the subject of a previous ROD dated January 1994, consisted of the capping of the waste mass within the 75 acre landfill portion of the County's property. This accelerated action was completed in November of 1995 on the waste mass as a means of early source control.

Operable Unit #1(OU1), the subject of this ROD, consists of the site as a whole, including any contamination that may have migrated from the waste mass.

SECTION 2: SITE HISTORY

2.1: Operational and Disposal History

The Orange County Department of Public Works operated the landfill between 1974 and January 1992. During that time approximately seven million cubic yards of predominately municipal waste was landfilled. However, documentation also shows that quantities of waste oil, septic sludge, industrial waste and hazardous waste were also disposed of at this site: wastes include still bottom residues (D001 waste), acids (nitro, hydrofluoric, and acetic), tetrachloroethylene (F001, F002 waste), and solvents (methanol, ethanol, toluene and benzene).

2.2: Remedial History

Numerous studies and investigations have been conducted at this site, including a Phase I Inactive Hazardous Waste Site Investigation (Gibbs & Hill, June 1988), Hydrogeologic Investigation (Wehran, July 1988), Water Quality Assessment (Wehran, 1987 to 1989) and Quarterly Groundwater Sampling (Certified Environmental Service, Inc., 1989 to present).

From these past investigations, it was determined that groundwater quality parameters near the landfill area exceeded the New York State groundwater standards. These include: total dissolved solids, iron, manganese, arsenic, barium, boron, cadmium, chromium, copper, lead, sodium, magnesium, zinc, phenols, pH, sulfate, ammonia, benzene, trichloroethene,

1,1,1-tricholorethane, tetrachloroethene and toluene.

In March of 1992, NYSDEC classified the site as a "Class 2" inactive hazardous waste disposal site. The Class 2 designation indicates a site at which the disposal of hazardous waste constitutes a significant threat to the public health or the environment. Specific threat posed by the Orange County Landfill is the potiental of contaminating the principal aquifer underlying the site.

The County installed a partial leachate collection system and a surface water runoff collection system in November 1995, prior to the final capping of the landfill under OU2. Leachate and surface water runoff were collected and transported off-site for treatment. The final cap eliminated the need to transport surface water runoff, which is now handled on site as storm water by diverting it to recharge/settling basins and eventually discharging to the Wallkill River and Cheechunk Canal. Collected leachate is still being transported off site for treatment.

A landfill gas collection system, used to generate electrical power, is also in use at the landfill; and was incorporated into the final cover system.

SECTION 3: CURRENT STATUS

As with many inactive hazardous waste sites, when the major source of contamination is clearly evident, the strategy for the remedial program is to conduct an early evaluation of actions that will quickly control the source of contamination. In this way, the NYSDEC accelerates the remedial process by separately selecting, designing and implementing a portion of the remedial action to address this threat.

The Orange County Landfill typified this situation where it was clear that early containment of the source of contamination, through construction of a final cover or "cap", would afford a significant reduction in the threat to public health and the environment.

Construction of the final cover in accordance with the January 1994 OU2 Record of Decision, was completed in November 1995. Briefly, this portion of the remedial program consisted of shaping and terracing the waste mass to promote proper drainage; construction of a final cover in accordance with 6NYCRR Part 360, and stabilization of the Cheechunk Canal bank adjacent to the landfill. The action also called for continued utilization of the existing active gas collection system and perimeter leachate collection system. Figure 2 shows the capped landfill shape and other current features.

During construction of the cap, modifications to the leachate collection system were installed to contain leachate outbreaks encountered. Approximately 950 feet of leachate collection piping was installed along the canal side of the landfill to address seepage that occurred during excavation of a new drainage ditch along the perimeter road.

To ensure an over all protective remedy for this site, a Remedial Investigation/Feasibility Study (RI/FS) was conducted simultaneously with design, construction, and monitoring of the cap. The purpose of the RI was to define the nature and extent of contamination and the risks that they may pose to human health and the environment. The FS then developed and evaluated alternatives to address these risks.

3.1: Summary of the Remedial Investigation

The Remedial Investigation was conducted in several phases (PI, PII, PIII). Under PI additional groundwater monitoring wells were installed to replace wells that had been damaged and to fill potential gaps of the existing monitoring well network. Groundwater, surface water, leachate, and stream sediment samples were obtained during August and September 1994 under PI. This data indicates that the landfill impacts on the groundwater is limited to the area beneath and down gradient of the refuse mass. The overburden groundwater under the site flows eastward and discharges to the Cheechunk Canal.

A Phase II investigation was conducted in April 1996 which consisted of additional groundwater, surface water, sediment and leachate sampling. The purpose of the Phase II RI was to determine if the landfill was a significant contributor to pesticides and PCBs detected in the stream sediments during PI. Sediment samples were also taken from the then existing leachate holding ponds and trenches, as part of cap construction, and used in the assessment of the remedial investigation results.

The final landfill cap was completed in the fall of 1995. Several wet areas developed at or near the edge of the landfill cap during the summer of 1996.

It was decided that a third phase (PIII) investigation was warranted to determine the cause and condition of these wet areas. This consisted of the construction of shallow piezometers to assess groundwater levels and the collection of water samples. Soil samples were collected near each piezometer and landfill condensate samples were collected from the gas collection system.

The analytical data obtained from these investigations were then compared to applicable Standards, Criteria, and Guidelines (SCGs) established through the remedy selection process stated in 6NYCRR 375-1.10. Groundwater, drinking water and surface water SCGs identified for this Site were based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part V of the NYS Sanitary Code. NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046 - Determination of soil cleanup guidelines for the protection of groundwater, background conditions, and risk-based remediation criteria were used as SCGs for soils. A complete list of the SCGs established for this site is contained under Section 5 "Remediation Goals".

3.1.1: Nature of Contamination

3.1.1.1: Leachate Conditions

Leachate is generated by rainwater and snow melt percolating through the refuse mass, collecting and mixing with the more mobile elements of the refuse. This mechanism is considered to be the most pronounced way in which contaminants are transported from waste material to other areas of the environment and to potential receptors.

Analytical results of leachate samples, collected from manholes in the collection system, indicated the presences of pesticides, metals, volatile and semi-volatile organic compounds (see Table 1 for a summary of the contaminants detected in leachate under PI and PII).

While leachate conditions have changed over the course of the investigation and are somewhat different from one location of the landfill to another, its characteristics are typical of a municipal waste landfill.

3.1.1.2: Groundwater Contamination

Groundwater samples collected from monitoring wells constructed in the shallow aquifer immediately down gradient of the landfill contained detectable concentrations of two volatile organic compounds (VOCs), (vinyl chloride at 1 ppb and acetone from 2 to 10 ppb); one semi-volatile organic compound (SVOC) (isophorone at 2 ppb); and several metals.

All of the organic contaminants detected in these groundwater samples were below NYS groundwater standards. Thus the impacts of hazardous waste constitutents do not extend beyond the refuse mass. Table 2 provides a summary of the groundwater contaminants of concern detected in monitoring wells downgradient of the landfill.

Concentrations of total metals (i.e., unfiltered)

were elevated above background levels in the area of leachate impacted groundwater and throughout the monitoring well network for the entire site. Most of these elevated metals concentrations are considered to be the result of high turbidity in the samples or they may be the result of sources of contamination other than the landfill. This is supported by an analysis of the total metals concentrations compared to filtered or dissolved concentrations; the water quality parameters in relation to metals and other known contaminants; and of the geological conditions in the area and geochemical conditions, such as the relationship of ammonia and sulfate to alkalinity. Figure 3 illustrates the extent of leachate impacted groundwater based upon geochemical analysis of the groundwater data.

3.1.1.3: Seep Conditions

During the Phase III investigation, samples were collected from two piezometers installed in the wet areas that developed near the northwest edge of the landfill cap and from one piezometer installed in the wet areas along the southwest edge of the cap. Soil samples were collected near each piezometer, along with condensate samples from the gas collection system. The analytical results from the piezometer samples indicated that the wet areas were primarily caused by seepage of groundwater, not leachate. Although the water from the northwest piezometers were found to contain concentrations of some leachate indicators, the chemical signature of the water sampled was found to be more like groundwater than leachate. Further supporting this result, the soil samples from the seep areas were not found to be impacted by any organic compounds associated with leachate. However, concentrations of calcium, magnesium and sodium in three soil samples were found to exceed NYS SCGs. The sampling effort did indicate that one of the landfill condensate samples (from tank CT-2) was similar to leachate.

3.1.1.4: Surface Water and Sediment Impacts

A total of 17 surface water and sediment samples were collected during the RI. They were located adjacent to, up stream and down stream of the landfill, within the Old Wallkill River, the Cheechunk Canal and ponded areas at the periphery of the waste mass.

The results of the investigation indicated that the Old Wallkill River and Cheechunk Canal sediments contained contaminants likely originating from sources other than the landfill, particularly pesticides from adjacent agricultural areas.

Low levels of PCBs were also found in stream sediments; typically less than 1 ppm. PCBs were, however, not found in leachate, groundwater, nor in the sediments of leachate collection ponds used by the landfill to collect rainwater runoff before it was capped. This would indicate that the landfill was not, and is not now, a source of PCB contamination.

3.2: Summary of Human Exposure Pathways

This section discusses the potential pathways of exposure for people living near the Orange County Landfill. An exposure pathway is how an individual may come in contact with a contaminant. The elements of an exposure pathway include: the source of contamination; the contaminated environmental media (i.e., soil, water, and air); the manner the contaminant migrates from the source; the location where one may be exposed to the contamination; how the contaminant enters the body (i.e., inhalation, ingestion, and or absorption through the skin); and the population exposed to the contamination.

The potential pathways of exposure of concern at the Orange County Landfill site include the ingestion of contaminated drinking water; dermal (skin) contact with contaminated surface water to recreational swimmers in the Cheechunk Canal, and the inhalation of landfill-related air contaminants. Based on the remedial investigation (RI) conducted at the landfill, on-site groundwater is contaminated with organic and inorganic contaminants. However, since groundwater in the vicinity of this site generally flows toward and discharges into the Cheechunk

Canal, it is unlikely that private wells servicing homes near the landfill will be contaminated with site-related chemicals.

Surface water and sediment samples collected from the Cheechunk Canal during the RI indicate that the discharge of site-related contaminants to the canal have not had a significant impact on water quality. The recently constructed cap on the landfill has reduced and will continue to reduce the generation of leachate in the fill, and thus reduce the discharge of site-related contamination into the Cheechunk Canal. Surface water in the canal will be monitored periodically to ensure that any future discharge of site-related contaminants in the canal do not have a significant impact on water quality.

The generation of methane gas is typically associated with the decomposition of municipal waste. If uncontrolled, it could result in a community odor problem and/or facilitate the off-site migration of landfill-related air contaminants. To reduce the potential release of landfill gas, the landfill cap includes an active gas collection and control system. Currently, collected gas is burned to generate electricity. Since the generation of gas in a municipal landfill is a dynamic process, the gas collection/treatment system at this site would be periodically evaluated to address the potential off-site migration of site-related air contaminants.

3.3: Summary of Environmental Exposure Pathways

Construction of the landfill cap has effectively eliminated the potential for direct human or wildlife contact with the waste itself and significantly reduced the potential for rainwater and snowmelt to transport contaminants to such potential receptors.

Based on the investigations, groundwater is the only medium which has been impacted by the landfill which may complete a route of exposure. The significance of this impact is the contravention of water quality standards and possibly some metals contamination. Though present in the leachate, only trace concentrations (below SCGs) of VOCs and SVOCs were detected in the groundwater (even immediately adjacent to the landfill). This is likely due to the attenuation and biodegradation of these compounds within the aquifer and between the waste mass and aquifer. Hazardous waste constituents are not significantly migrating from the landfill.

Stream sediments contain pesticides and PCBs. However, the levels found are relatively low, and do not indicate the need for remediation. The landfill is not a significant source of this contamination.

The wet areas and soils investigated under Phase III after construction of the cap, were also not significantly impacted.

SECTION 4: ENFORCEMENT STATUS

The NYSDEC and Orange County entered into a Consent Order on January 17, 1993. The Order obligates the County to implement a full remedial program and allows reimbursement to the County of up to 75 percent of the eligible cost of the remediation under Title 3 of the Environmental Quality Bond Act of 1986.

The following is the chronological enforcement history of this site.

Orders on Consent

Date	Index	Subject
12/3/86	3-1238/8607	Violations of 6NYCRR Part 360
7/7/89	3-1238/8607	Violations of 6NYCRR Part 360 & Part 421
1/15/92	3-2342/9103	Violations of 6 NYCRR Part 360
1/17/93	W306039206	Remedial Program

SECTION 5: REMEDIATION GOALS

Program goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. These goals are established under the guidelines of meeting all standard, criteria, and guidance (SCGs) and protecting human health and the environment. Specifically for this site the SCGs have been identified as follows:

- o New York State Solid Waste Management Requirements (6 NYCRR Part 360);
- o State Pollutant Discharge Elimination Systems (SPDES - 6 NYCRR Parts 750-758): Storm water as a point-source discharge;
- o New York State Groundwater and Surface Water Standards (6 NYCRR Parts 700 - 705);
- o NYSDEC Division of Water Technical and Operations Guidance Series (TOGS) 1.1.1: Ambient Water Quality Standards and Guidance Values;
- o New York State Air Quality Regulations (6NYCRR Parts 200-257).
- o NYSDEC DER TAGM 4030 - Selection of Remedial Actions at Inactive Hazardous Waste Sites.
- o NYSDEC DER TAGM 4046- Determination of Soil CleanupObjectives and Cleanup Levels.
- o 10 NYCRR Subparts 5-1 and 5-3.

At a minimum, the remedy selected should mitigate all significant threats to public health and the environment presented by the hazardous waste disposed at the site, through the proper application of scientific and engineering principles.

The goals selected for this action are to ...

1. Reduce, control, or eliminate the generation of leachate within the waste mass.
2. Eliminate or reduce the threat to surface waters by eliminating or reducing future contaminated surface water run-off.
3. Eliminate the potential for direct human or animal contact with the waste material on site.
4. Reduce, control, or eliminate the migration of contaminants through groundwater.
5. Prevent landfill gas migration and buildup.

SECTION 6: SUMMARY OF THE EVALUATION OF ALTERNATIVES

Potential remedial alternatives for the site were identified, screened and evaluated in a report entitled " **Feasibility Study , Orange County Landfill, Orange County, New York, July 1996**". A summary of the detailed analysis follows. A copy of this report is placed in the document repositories.

6.1: Description of Alternatives

Elements Common to All Alternatives

The landfill cap has already been constructed as part of a previous remedial action. It is also an integral part of each of the additional remedial alternatives presented in this ROD. Along with the cap, each alternative (including Alterative 1) presented here includes a long-term monitoring and maintenance program.

The program would also include quarterly sampling of groundwater, surface water and leachate. Samples would be analyzed for 6 NYCRR Part 360 routine parameters, except on every fifth sampling event when they would be analyzed for Part 360 Baseline parameters (see 6NYCRR Part 360-2.11(d)(6) for a list of the routine and baseline parameters). This will, over time, provide results for the various seasons to better understand how conditions change over time. During both routine and baseline sampling

events additional samples would be analyzed for metals after being filtered, for comparison to total metals concentration. A decanting or other sampling/analytical protocol may also be required for evaluation of the metals analysis. The long term monitoring plan is currently being further evaluated and will be presented in the Operation and Maintenance Plan to be completed in 1998.

Other actions to be common to all proposed actions include: annual explosive gas survey; monthly inspections of the cap; bi-annual mowing of the vegetative cover; routine maintenance /repair of erosion or stability problems, both on the landfill cover and on the Cheechunk Canal bank (over the extent of the landfill); operation of a landfill gas collection system and co-generation plant; periodic evaluation of the gas collection/treatment system to prevent the off-site migration of air contaminants; installation of a gas flare system for the landfill's co-generation plant to be used when the plant is off line for maintenance or when it is no longer cost effective to operate.

Part 360 regulations require 30 years of post closure monitoring and is included for all of the remedial alternatives considered in this ROD. However, if monitoring results indicate attenuation of the contaminant plume, the frequency of sampling may be reduced.

The estimated capital costs for the gas flare system is $120,000. The annual maintenance and monitoring costs are estimated to be $170,000. per year. These costs are included in the cost estimates for all the alternatives.

Alternative 1: No Further Action

A "no-action," alternative is being evaluated, along with other alternatives, primarily to provide a baseline for comparison. This is required under the National Contingency Plan (NCP). Alternative 1 consists of no further actions beyond the construction of the landfill cap, completed under the previous remedial action and the monitoring/maintenance elements described above, common to all the alternatives.

Alternative 1 relies on natural biodegradation processes, combined with dispersion and dissolution and the expected decline in leachate generation (resulting from the cap) to result in the restoration of the groundwater over time. Until that time the County would use institutional measures to prevent exposure to impacted groundwater. The County would maintain a buffer zone of land around the landfill and enact long-term deed restrictions to prevent future development, including the installation of potable water wells. The area appropriate for this is currently owned by the County. Alternatively, the County would sample and monitor any wells installed down gradient of the landfill and provide and maintain point-of-use treatment systems if necessary.

Capital Cost:	$120,000.
Annual Maintenance:	$170,000
Present Worth:	$2.72 million **

**The value of land use, lost natural resources and /or liability have not been included in this cost estimate; assumed the current extent of impacted groundwater will not extend significantly beyond the currently impacted area.

Alternative 2: Leachate Collection/Disposal

Alternative 2 is identical to Alternative 1 with the addition of leachate collection and off-site disposal as currently practiced by the County as an added means of source control.

Capital Cost:	$120,000.
Annual Maintenance:	$420,000.
Present Worth:	$6.6 million

Alternative 3: Improved Leachate Collection

Alternative 3 consists of the same elements of Alternative 2 with the addition of approximately 3,800 feet of new leachate collection piping. The new collection system would be located along the, north and northeastern sides of the landfill outside the geomembrane limits, and placed approximately 8 feet below grade. The cap would then be extended over the new line. Based

on current collection rates, this new line would increase leachate recovery by approximately 3 gallons per minute (1.5 million gallons per year).

Capital Cost:	$870,000
Annual Maintenance:	$640,000
Present Worth:	$11 million

Alternative 4: Groundwater Treatment

Alterative 4 consists of the same elements of Alternative 2 with the addition of groundwater recovery wells to pump and treat contaminated groundwater. Three pumping wells would be installed in the area of impacted groundwater down gradient of the landfill. Thirty years of operation and treatment was assumed for the cost estimate.

Capital Costs:	$350,000
Annual Maintenance:	$870,000
Present Worth:	$13 million

Alternative 5: Slurry Wall

Alternative 5 consists of all the items included in Alternative 2 with the addition of a slurry wall to provide additional containment of landfill contaminants. The wall would be constructed circumferentially around the landfill. To be effective the wall would extend to an aquiclude; in this case to the bedrock. Hydraulic control would be necessary to prevent a buildup of water pressure within the containment area. This would consist of several extraction wells located beneath the cap.

Capital Cost:	$60 million
Annual Maintenance:	$680,000
Present Worth:	$70 million

6.2: Evaluation of Remedial Alternatives

The criteria used to compare the potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6 NYCRR Part 375). For each of the criteria, a brief description is provided followed by an evaluation of the alternatives against that criterion.

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs).

Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance. These were identified under Section 5.

Because all of the proposed alternatives would include the landfill cap and a long term monitoring and maintenance program consistent with 6NYCRR Part 360 regulations, all would meet the SCGs relating to solid waste management facilities and would also meet action specific SCGs relating to gas recovery facilities using combustion.

All of the alternatives include varying methods (institutional controls, leachate recovery, groundwater recovery, and containment) which would either prevent the water from being used as a drinking water source, or protect the groundwater to varying degrees from further impacts.

2. Protection of Human Health and the Environment.

This criterion is an overall evaluation of the health and environmental impacts to assess whether each alternative is protective.

With proper maintenance, all of the alternatives would eliminate the potential for direct human and animal contact with the waste which was disposed of in the land fill. Also, all the alternatives include deed restrictions which would prohibit the use of impacted water.

All alternatives would rely on the ability of the cap to reduce infiltration of rainwater and snow melt and the resulting reduction of leachate. As the volume of leachate is reduced, the amount which would impact and mixes with the natural groundwater is also reduced. This helps the natural processes, such as adsorption,

precipitation, and degradation to attenuate groundwater impacts in the area of concern down gradient of the landfill. Alternatives 2,3,4, and 5 provide additional measures to reduce the impact of leachate on the natural groundwater of the site. Alternative 2 represents the leachate collection and treatment system currently being operated by the County. Alternatives 4 and 5 would be considered the most protective.

3. Short-term Effectiveness.

The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared with the other alternatives. Alternatives 1 and 2 would not have any additional short term impacts associated with them as the cap construction is complete. Alternatives 3, 4 and 5 all contain construction related elements that have potential short term impacts. Alternatives 2 and 4 would be the least intrusive of these and therefore would have the least short term impact. Alternative 5 would be considered as having the most short term impact.

4. Long-term Effectiveness and Permanence.

This criterion evaluates the long-term effectiveness of alternatives after implementation of the response actions. If wastes or treated residuals remain on site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the controls intended to limit the risk, and 3) the reliability of these controls.

All of the alternatives would include the cap and long-term monitoring/maintenance designed for a minimum of 30 years and institutional controls to prevent potential contact with contaminated groundwater.

All alternatives would include institutional measures for continued protection with contact from impacted groundwater. Because the County owns the property with the impacted groundwater, these institutional controls (deed restrictions, user surveys, and monitoring) should provide sufficient long term protection from using impacted groundwater for potable purposes.

Alternatives 3 through 5 would also provide for an active measure which adds to the effectiveness of the remedy. These active measures would reduce the time it takes and ability for natural processes to remediate the groundwater or reduce the landfill's impact on it.

5. Reduction of Toxicity, Mobility or Volume.

Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site. Because the waste mass will remain intact under the landfill cap, none of the alternatives result in the reduction of volume of wastes; however, the cap is expected to be effective in reducing the mobility of hazardous materials present at the site.

Alternative 1 would result in a gradual reduction in toxicity of the groundwater impacts with time. Alternatives 2 through 5 would result in the reduction of impacted groundwater because of the collection and off-site treatment of the leachate (all alternatives) and additionally the groundwater recovery and off-site treatment for Alternatives 4 and 5. Alternative 5, "Slurry Wall" would have a further reduction in the mobility of hazardous materials from the site.

6. Implementability.

The technical and administrative feasibility of implementing each alternative is evaluated.. Technically, this includes the difficulties associated with the construction, the reliability of the technology, and the ability to monitor the effectiveness of the remedy. Administratively,

the availability of the necessary personal and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.

The technologies and construction methods that would be employed in all of the alternatives are well established. Materials are readily available along with an adequate number of vendors for competitive bidding. There does not appear to be any unusual administrative difficulties with any of the alternatives.

7. Cost.

Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The cost for each alternative was presented under their perspective description. All present worth analysis were based on 30 year annual cost at 5% discount rate.

Alternative 1 "No Further Action" would have the lowest estimated cost, with a present worth of $2.7 million. Costs increase with each successive alternative. Alternative 2 "Leachate Collection and Disposal" would have additional operation costs for a total present worth of $6.6 million. The costs associated with installing additional leachate collection lines and off-site treatment of the additional leachate (Alternative 3) would increase the estimated present worth to $11.0 million. The inclusion of groundwater recovery and treatment would raise the present worth of Alternative 4 to $13.0 million; while the slurry wall (Alternative 5) would be the most expensive with an estimated present worth of $70.0 million.

None of the estimates above include the $16.0 million already expended for the construction of the cap and associated engineering fees.

8. Community Assessment

Concerns of the community regarding the RI/FS report and the Proposed Remedial Action Plan have been evaluated. The " Responsiveness Summary, Appendix A" describes the public comments received and the Department's response to these concerns.

SECTION 7: SUMMARY OF THE SELECTED REMEDY

Based upon the results of the RI/FS, and the evaluation presented in Section 6.2, the NYSDEC has selected Alternative 2 as the remedy for this site.

Alternative 2 "Leachate Collection/Disposal" is chosen as the remedy because it will provide the best balance of the evaluation criteria and meets the general response actions for this site. Alternative 2 will reduce the generation of leachate within the waste mass and eliminate future contaminated surface water run-off and the potential for direct human or animal contact with the waste material. It also will reduce the migration, through groundwater, of contaminants and landfill gas migration and buildup. In summary Alternative 2 consists of the following:

Continued leachate collection and off-site treatment as currently practiced by the County as a continued means of source control to further reduce migration of contaminants and degradation of the groundwater. The long term monitoring plan is currently being further evaluated and will be presented in the Operation and Maintenance (O&M) Plan to be completed in 1998. Until the O&M plan is developed, Orange County will continue the monitoring program which includes quarterly sampling of groundwater, surface water and leachate. Samples will be analyzed for 6 NYCRR Part 360 routine parameters, except on every fifth sampling event when they will be analyzed for Part 360 baseline parameters. This will, over time, provide Baseline parameters for the various seasons to better understand how conditions change over time. During both

routine and baseline sampling events additional samples will be analyzed for metals after being filtered, for comparison to total metals concentration. A decanting or other sampling/analytical protocol may also be required for evaluation of the metals analysis.

Maintenance requirements will include: annual explosive gas survey; monthly inspections; bi-annual mowing of the vegetative cover; routine maintenance/repair of erosion or stability problems, both on the landfill cover and on the Cheechunk Canal bank (Over the extent of the landfill); and periodic evaluation of the gas collection/treatment system to prevent the off-site migration of air contaminants; installation of a gas flare system for the landfill's co-generation plant to be used when the plant is off line for maintenance or when it is no longer cost effective to operate.

Part 360 regulations require 30 years of post closure monitoring. However, if monitoring results indicate attenuation of the contaminant plume, the frequency of sampling may be reduced.

The selected remedy includes the use of institutional measures to prevent future exposure to impacted groundwater. The County will maintain a buffer zone of land around the landfill and enact long-term deed restrictions to prevent future development, including the installation of potable water wells.

Capital Cost:	$120,000.
Annual Maintenance:	$420,000.
Present Worth:	$6.6 million

SECTION 8: HIGHLIGHTS OF CITIZENS PARTICIPATION

As part of the remediaton process, a number of Citizen Participation (CP) activities were undertaken in an effort to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

The following repositories for documents pertaining to the site were established:

Thrall Library
(Reference Desk)
22-24 Orchard Street
Middletown, NY 10924
(914) 341-5454
M-Th 9-8, F 9-6,
Sat. 10-5, Sun. 1-5

Goshen Library
(Reference Desk)
203 Main Street
Goshen, NY 10924
(914) 294-6606
M-Th 9-8, F 9-6
Sat 9-5, Sun 1-5

Orange County Government Center
255-275 Main Street
Goshen, NY 10924
(914) 294-5151 ext. 1130
M-F 9:00 am to 5:00 pm

Mr. Richard J. Lilley, Jr., P.E.
Project Manager, NYSDEC
50 Wolf Rd., Rm. 242
Albany, NY 12233-7010
(518) 457-1708 or 1-800-342-9296
M-F 8:30 am to 4:45 pm

Citizen Participation Specialist
NYSDEC-Region 3
21 South Putt Corners Rd.
New Paltz, NY 12561-1696
(914) 256-3086 or 1-800-342-9296
M-F 8:30 am to 4:45 pm

A site mailing list was established which included nearby property owners, local political officials, local media and other interested parties.

Fact sheets describing all aspects of the remediation of Orange County Landfill were distributed to the public in January 1998.

Public information meetings were held in February 4, 1998 and February 11, 1998.

In March of 1998 a Responsiveness Summary, included in this Record of Decision as Appendix A, was written to address questions raised by the Public at the February 1998 public meetings and received by mail during the comment period for the Proposed Remedial Action Plan.

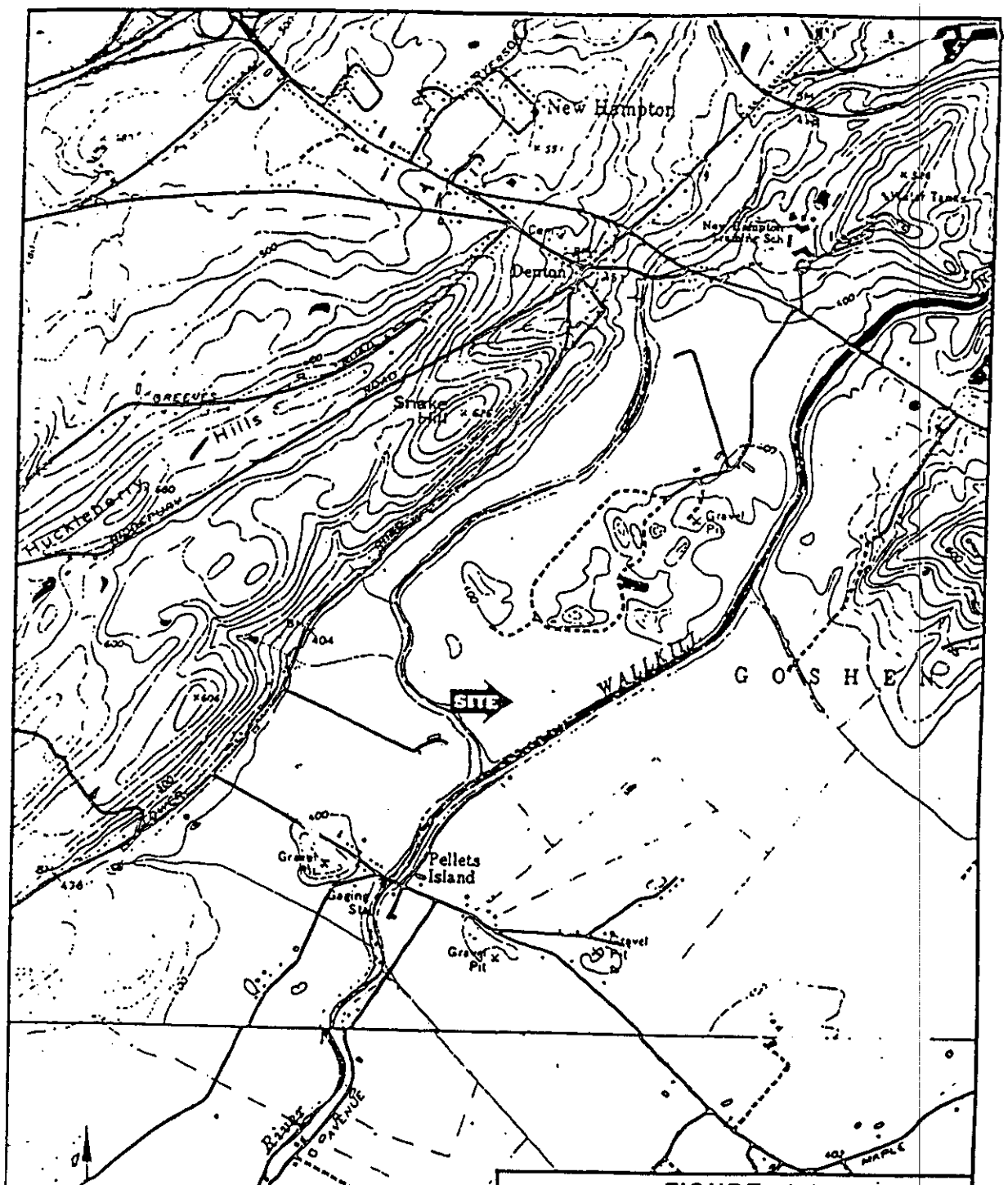
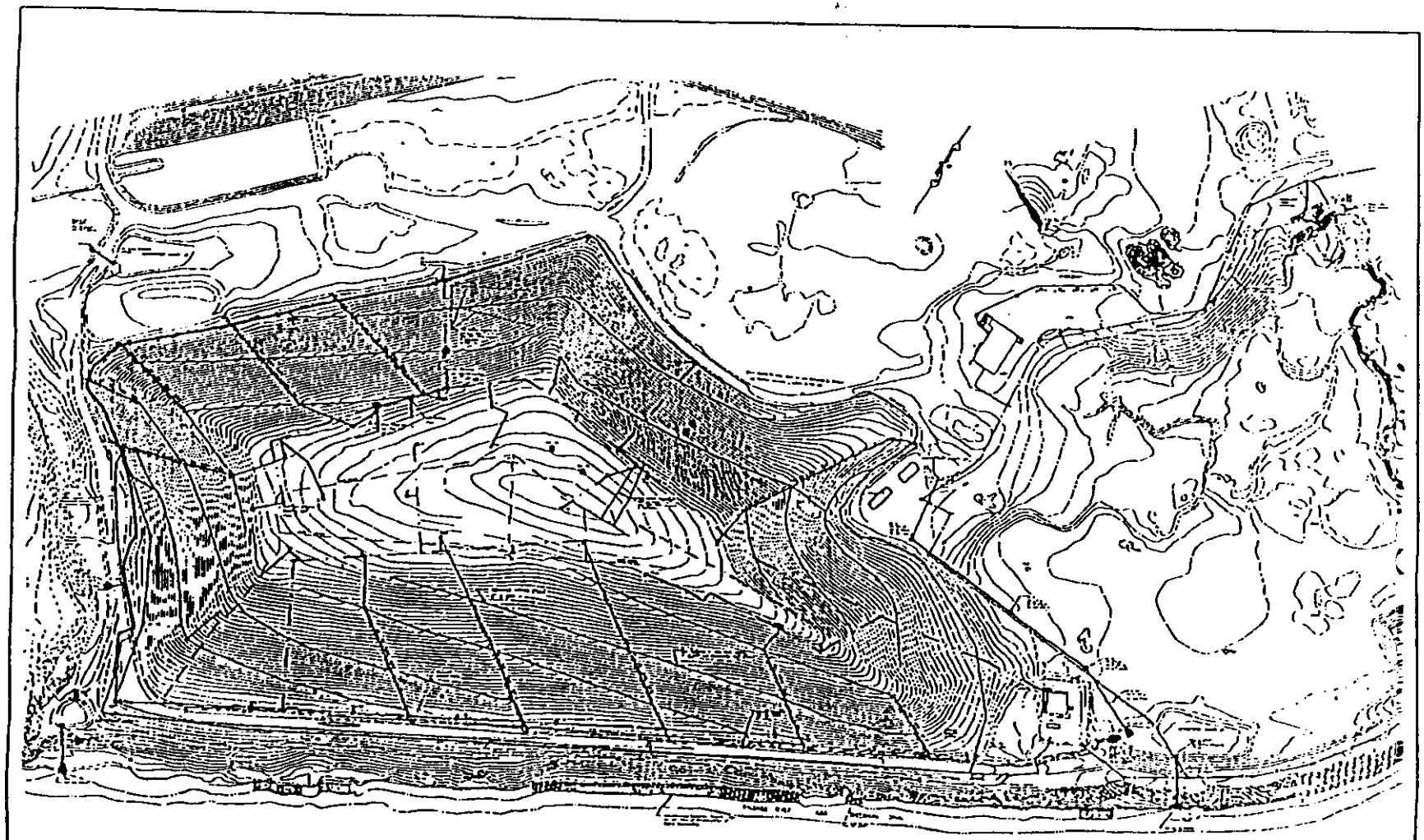


FIGURE 1-1
LOCATION MAP

ORANGE COUNTY LANDFILL
MIDDLETOWN, NY
REMEDIAL INVESTIGATION

PROJECT NO. 2538

Stearns & Wheler
ENVIRONMENTAL ENGINEERS & SCIENTISTS



Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS
CAZENOVIA, NEW YORK

DATE: 10/97 JOB No.: 425J82A

ORANGE COUNTY LANDFILL

FIGURE 2
LANDFILL CURRENT FEATURES

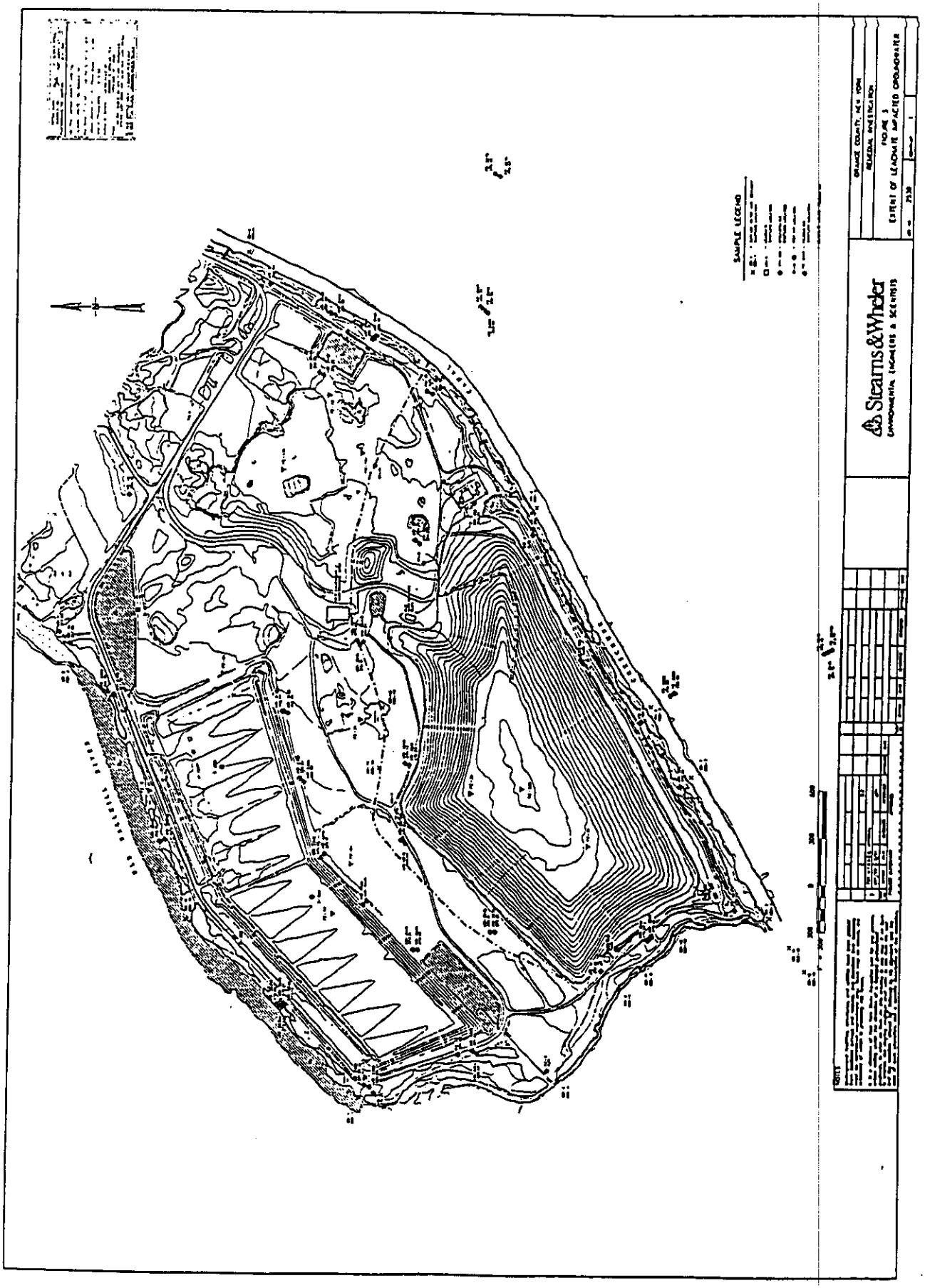

Stearns&Wheler
EXTENT OF LEACHATE IMPACTED GROUNDWATER

TABLE 1-1

WATER QUALITY PARAMETERS IN LEACHATE
AUGUST-SEPTEMBER 1994

ANALYTE (ug/l)	STANDARD (ug/l)	SAMPLE LOCATION			
		MH-1	MH-2	MH-3	MH-4
Alkalinity	None	4680	4840	4690	4840
Ammonia	2	657	396	699	686
BOD	None	37	53	32	36
COD	None	1250	1690	1600	1210
Chloride (Cl)	250	1460	1720	1940	1930
Dissolved (Cl)	250	NA	NR	NA	NA
Total Sulfate	250				
Dissolved Sulfate	250	NR	NA	NA	NA
Dissolved Alkalinity	None	NA	NR	NA	NA
TDS	None	6140	7320	6260	7370
DOC	None	NA	NA	NA	NA
TOC	None	398	487	394	362

TABLE 1-2

ORGANIC COMPOUNDS IN LEACHATE SAMPLES AUGUST-SEPTEMBER 1994

DESCRIPTION	GW STD (ug/l)	SAMPLE LOCATION			
		MH-1	MH-2	MH-3	MH-4
VOCS (ug/l)					
Chloroethane	5	9 J	ND	ND	10
Acetone	50 G	19	18	13	17
1,1-Dichloroethane	5	2 J	1 J	ND	ND
Benzene	0.7	11	6 J	8 J	25
Toluene	5	9 J	11	0.90 J	4 J
Chlorobenzene	5	10	11	7 J	38
Ethylbenzene	5	83	9 J	ND	170
Total Xylenes	5*	210	120	26	120
SVOCS (ug/l)					
1,4-Dichlorobenzene		8 J	ND	ND	ND
bis(2-Ethlylhexl)Phthalate		ND	8 J	ND	ND
Naphthalene		16 J	20 J	ND	25 J
PESTICIDES/PCBS (ug/l)					
γ- BHC (Lindane)	ND	0.40 J	0.20 J	ND	0.45 J
Heptachlor	ND	0.093 J	0.047 J	ND	0.051 J
Aldrin	ND	ND	ND	0.054	ND
Heptachlor Epoxide	ND	0.092	0.052	ND	0.067

* Standard applies to each isomer separately.
G Denotes guidance value.
ND Denotes the compound was not detected.

TABLE 1-3

INORGANICS IN LEACHATE SAMPLES
AUGUST- SEPTEMBER 1994

DESCRIPTION	G W STD (ug/l)	SAMPLE LOCATION			
		MH-1	MH-2	MH-3	MH-4
DISSOLVED METALS (ug/l)					
Aluminum					
Antimony	3 G		33.8	50.9	42.4
Arsenic	25	28.1	16.9	20.8	23.1
Barium	1,000	373	166	149	164
Beryllium	3 G				
Cadmium	10				
Calcium		94,300	52,800	60,500	61,200
Chromium	50	46.1	38.1	17.5	21.5
Cobalt		36.9	32.1	36	34
Copper	200				
Iron	A	8,010	5,670	2,620	2,370
Lead	25	15.7	14.2		
Magnesium	35,000 G	116,000	92,400	87,600	109,000
Manganese	A	506	317	281	189
Mercury	2				
Nickel		251	173	135	143
Potassium		443,000	463,000	443,000	415,000
Selenium	10				
Silver	50				
Sodium	20,000	1,330,000	1,410,000	1,380,000	1,410,000
Thallium	4 G				
Vanadium		23.7			
Zinc	300	13.9	23.1	43.8	

Note: Total of iron and manganese < 500 ug/l.

Table 2

Summary of Groundwater Chemicals of Concern Detected in Monitoring Wells Downgradient of the Orange County Landfill

Chemical (ug/l)	Frequency of Detection	Range of Detection Concentrations	NYS Groundwater Standard
<u>Volatile Organics</u>			
Acetone	3 out of 10	2 - 10	50 G
Vinyl Chloride	1 out of 10	1	2
<u>Semivolatile Organics</u>			
Isophorone	1 out of 10	2	50 G
<u>Metals, Total</u>			
Antimony	8 out of 10	51.2 - 61.5	3 G
Beryllium	1 out of 10	7	3 G
Calcium	10 out of 10	186,000 - 494,000	None
Magnesium	10 out of 10	34,800 - 105,000	35,000 G
Mercury	2 out of 10	0.24 - 0.73	2
Sodium	10 out of 10	7,830 - 63,200	20,000
<u>Metals, Dissolved</u>			
Zinc	4 out of 10	16.7 - 43.9	300

APPENDIX A

RESPONSIVENESS SUMMARY
ORANGE COUNTY LANDFILL
SITE NO. 3-36-007 , OPERABLE UNIT # 1

This document summarizes the comments and questions received by the New York Department of Environmental Conservation (NYSDEC) regarding the Proposed Remedial Action Plan (PRAP) for the subject site. A public comment period was held between January 20,1998 and March 6, 1998 to receive comments on the proposed plan. A public meetings were held on February 4, 1998, however another meeting was held on February 11, 1998 due to the ice storm which occurred after the start of the first meeting. The public meetings were held in the Orange County Fire Training Center, Town of Goshen, to present the results of the investigations and to describe the PRAP.

This Responsiveness Summary is comprised of verbal comments and questions obtained during the February 4,1998 and February 11, 1998 public meetings and written comments received during the comment period.

The following written comments were received during the comment period are available in the document repository:

Ms. Holly O'Hern, February 9, 1998
Mr. Philip J. Hopp, February 19, 1998
Mr. Michael Edelstein, February 13, 1998
Mr. Scott A. Thornton, March 6, 1998

The following comments and questions are taken directly or paraphrased from notes of the public meeting or from written comments received during the comment period.

1 C People have pled guilty to various crimes regarding illegal dumping. Has the Department looked into this, and if not it should look into this ?

R There has been an ongoing Federal investigation of the Al Turi landfill. We have no direct knowledge of these investigations.

2 C In all of your analysis, has the accumulative effect of the Orange County Landfill, the Al Turi Landfill & the Meadows been considered as a total problem? What is the impact to the ground water ? Possible high incidences of cancer in the immediate area; nine cancer incidences in thirteen homes !

R The potential threats to public health and the environment at the Orange County Landfill hazardous waste disposal site were satisfactorily addressed when the landfill was capped in accordance with Part 360 of the regulatory requirements. The Site will continue to be monitored to assure that the remedial measure are functioning as designed. During the investigation of the Orange County Landfill, it was determined that the site had no impact on the off-site groundwater and there is no accumulative effect from other sites.

NYSDOH is currently investigating the incidence of cancer in this area and are conducting a case review study.

3 C How could risk assessment be conducted without taking into account the health study prepared for Orange County?

R The NYSDOH Bureau of Occupational Epidemiology has reviewed the health study prepared by Orange County's consultant and has determined that the conclusions in the report were not supported with the data provided. ATSDR will review the document for the NYSDOH.

4 C What is the impacted groundwater area? Was there controlled samples taken?

R The impacted groundwater area includes the area directly beneath the footprint of the landfill itself and the area that includes the following monitoring wells: MW-223S/D, MW-207S/D, MW-303S/D. MW-304VS/S/D, MW-221S/D, MW-222, MW-220, MW-3B, and PZ-4. These wells are located along the perimeter of the landfill. Hydro geochemical analysis of two complete sets of groundwater analytical results indicate that these wells are impacted by leachate. Wells outside of this area were not found to be impacted by leachate for two reasons. First, geochemical analysis of groundwater samples indicated no impact by leachate. Second, wells outside of this area are not impacted because of their hydraulic relationship with the landfill, either upgradient from the landfill or separated from the landfill by a flow boundary (the Cheechunk Canal).

"Control" samples were collected from both upgradient (background) and downgradient monitoring wells. Samples were also collected from wells located in the farmland east of the Cheechunk Canal to determine water quality in these areas.

5 C Is it true that there is no impact to fish in the Wallkill River?

R We have concluded that there is little or no impact on fish in the Wallkill River. That determination was based upon results of sediment samples collected during the study.

6 C Will the proposed remedy include leachate collection and off-site treatment, as it is now performed by the County ?

R The remedial action plan includes the collection and off-site treatment of leachate, monitoring and sampling of groundwater, leachate, surface water , and sediment for thirty years. The cost of the operation and maintenance will continue to be the responsibility of by the County. Under Title 3, of the 1986 Environmental Quality Bond Act, 75% of the eligible capital cost will be reimbursed by the State.

7 C What about the individual wells in the area with high levels of metals and other contaminates?

R NYSDOH has reviewed individual well surveys conducted by Orange County in this area. Based upon the information gathered during this investigation, it was determined that there was no evidence of any contaminated groundwater flow from the landfill toward private wells in the area. The owners of the contaminated wells in the study were advised by the NYSDOH as to the appropriate the course of action in dealing with their problem.

8 C Orange Environment's consultants, their investigations and conclusions differ from those of Stearns & Wheler regarding the direction of groundwater flows, the effects of mounding within the landfill and whether the Cheechunk Canal acts as a barrier to groundwater flow. There are still breakouts of leachate into the Wallkill River, Cheechunk Canal.

R The reports submitted by Orange Environment, Inc., along with Mr. Scott A. Thornton's letter received on March 6, 1998, are currently under review by the NYSDEC. The reports prepared by Michael A. Lane, Ph.D. (3/4/98) and Ronald J. Scrudato, Ph.D. (9/22/97) addressing these issues will be considered in the preparation of the quarterly groundwater monitoring plan to be included in the Operations and Maintenance Plan for the Orange County Landfill. Until the O&M Plan is prepared and approved by the NYSDEC, Orange County will continue the existing quarterly groundwater monitoring program.

9 C A former County Deputy Sheriff, who worked at the landfill, read a March 12, 1992, memo from Mr. Richard Gardineer, referring to reports of arsenic and lead contaminated wastes being disposed at the Orange County Landfill. He requested that the waste material in the landfill be removed from this site with Federal Superfund money.

R The landfill was capped in accordance with 6NYCRR Part 360 regulations and the waste no longer represents a threat to public health or the environment. Removal of the entire 70 acre waste material would present a huge short term problem, such as public health exposure during trucking of the waste materials through local communities and would cost several hundreds of millions of dollars.

10 C Is there any relationship between the RI/FS and its findings and the NYSDEC's choice of which alternative it prefers in the PRAP ?

R The preferred remedy selected in the PRAP was based upon the results of the RI/FS and previous investigations. The NYSDEC and the NYSDOH are independent agencies which have reviewed the reports and materials prepared by Stearns & Wheeler and have found them to be acceptable.

11 C What is the amount of leachate generated by the landfill as developed under the H.E.L.P. model?

R The Hydraulic Evaluation of Landfill Performance (HELP) model was utilized during the focused Feasibility Study portion of the Accelerated Remedial Action Program to evaluate the performance characteristics of alternative landfill caps. A federal RCRA Cap was compared to a New York State Part 360 Cap under the same hydrologic conditions. The model showed that both types of landfill caps prevented infiltration of water through the cap to equivalent levels (greater than 99% effectiveness). Therefore, the Part 360 Landfill Cap was selected as the preferred remedy and presented as part of the Proposed Remedial Action Plan, the public hearing and the Record of Decision for the Accelerated Action. It was decided that leachate generation would be more fully evaluated after capping was completed utilizing the County's existing, and subsequently expanded, leachate collection system.

12 C How much rainfall is now penetrating the cap and entering the Landfill ?

R Instead of using calculated values, as mentioned above, we now have the actual values. In 1994, Orange County collected and shipped off-site for treatment 25 million gallons of leachate. The landfill cap was completed on October 24, 1995. The amount of leachate has steadily decreased from 5 million gallons in 1995, to 2.4 million gallons in 1996, and was down to 1.7 million gallons in 1997.

13 C What percentage of the leachate is collected by the collection system ? How much leachate would we anticipate being generated ?

R If one were to calculate the void space in the landfill and then assume that all the void space were filled with leachate that would result in 5.6 million gallons stored in the landfill. Since the cap has been installed, approximately 4.2 million gallons of leachate have been collected and shipped off-site. We anticipate very little new leachate to be generated. However, the piping for the leachate collection system is installed below the bottom of the refuse mass and along with the leachate, some groundwater is also being collected.

14 C Why does the groundwater flow in the direction that it does ?

R Groundwater flows from areas of high head (or elevation) to areas of low head, perpendicular to equipotential lines (or lines of equal head). This is determined by surveying and measuring the elevation of groundwater at the monitoring wells. Once the elevations are known, it is then possible to draw in the lines of equal head and determine the direction groundwater is flowing. In this area, groundwater flows from the valley walls downward toward the Cheechunk Canal. The groundwater then discharges to the canal which acts as the regional discharge zone for the Wallkill Valley Aquifer. Groundwater from both sides of the canal discharge to the Cheechunk Canal. Because of this, it is hydraulically impossible for water from one side of the canal to flow beneath the canal to the other side.

15 C Orange County hired EA Engineering to investigate the water quality in private wells in the area of the Orange County Landfill. Were the results of this study included in the RI/FS ?

R NYSDOH pushed for the study of the 76 individual wells in the vicinity of the Orange County Landfill. The hydrogeological information developed during the remedial investigation indicated that groundwater does not flow from the landfill toward any of the off-site individual private water wells. Thus, we concluded that while there is contamination in some of the individual wells in the vicinity of the landfill, the contamination is not believed to be coming from the landfill. The Orange County Health Department has been in contact with the impacted property owners and has advised them of the appropriate actions to take.

16 C Can you explain how Stearns & Wheler conclusion on the direction of groundwater flow differs from the historic groundwater flow directions? Wehran Engineers concluded that the flow of groundwater was to the northeast, along the long axis of the property, while S&W has the groundwater flow in a more southerly direction toward the Cheechunk Canal.

R During the RI scoping session, Orange Environment (OEI) advised Stearns & Wheler not to use historical data, as this data was suspect. The existing monitoring wells were examined and those wells that did not meet current standards were replaced. Other wells were installed to fill in data gaps. Upon evaluation of the data collected during the RI, the groundwater flow direction was determined to be southeasterly. The June 1988 report prepared by Wehren included a map showing the groundwater flow from the landfill site is southeast toward the Cheechunk Canal, which is in agreement with the conclusions presented by S&W in the RI report.

17 C How much leachate is not being collected by the leachate collection system?

R The leachate collection system is located around the downgradient parameter or the landfill to insure that very little leachate will bypass the leachate collection system. As stated before, the amount of leachate collected has substantially decreased each successive year since the landfill cap has been installed. The amount of leachate collected each year should continue to be reduced until it bottoms out or stabilizes.

18 C How does the PRAP deal with leachate outbreaks from the landfill?

R During construction of the cap, modifications to the leachate collection system were installed to contain leachate outbreaks that were encountered. Approximately 950 feet of additional leachate collection piping has been installed along the canal side of the Landfill.

19 C How is the leachate that flows under the collection system, and discharges upward from under the River vs that leachate which is discharged from the bank being dealt with? Please investigate the potential of leachate flow under the leachate collection system and advise us how the County may deal with this problem, if it exists?

R That is the purpose of the long term monitoring requirement.

20 C Is there a monitor at this Site and at the Al Turi Landfill across the road?

R There was a monitor on site at the Orange County Landfill during the construction of the landfill cap. There is a full time monitor for the Al Turi Landfill, who also monitors several other sites in Region 3. If and when the construction for the expansion area at the Al Turi Landfill begins, a monitor will be present on a full time basis.

21 C Are there other ways for water to enter the landfill other than for water to penetrate the cap and percolate down?

R Since the waste mass within the landfill is above the groundwater table, the only way for water to enter the landfill is through precipitation. Failure of the cap is one way for water to penetrate the landfill. Long term monitoring would detect this type of failure. The decomposition of the refuse will generate some additional water.

22 C What about the possibility of water up welling?

R Up welling into the landfill is hydraulically impossible.

23 C What about water entering the landfill from under the cap?

R The refuse in the landfill is above the groundwater table level and it is unlikely that water would enter the landfill from under the cap.

24 C How would deed restrictions be implemented? Would they be applied to County owned property or to neighboring properties as well ? Would you not want to apply deed restrictions to properties on the other side of the Cheechunk Canal?

R Deed restrictions will be applied to the landfill property currently owned by Orange County. There is no information to indicate that groundwater contamination has migrated beyond the landfill property. No, we do not feel that it would be necessary to apply deed restrictions to properties on the other side of the Canal. A deed restriction, also called "covenant" or "restrictive covenant" is a land use control restricting the use of property and is included in the chain of title of the property and other land records to alert the public and subsequent purchasers about the restricted use. The deed restriction is often recorded in a document entitled "Declaration of Covenants and Restriction" and is filed with the governmental agency responsible for keeping land records.

A Declaration of Covenants and Restrictions will be filed with the Office of the County Clerk in Orange County on the Orange County Landfill property indicating that the use of the groundwater at the site will be restricted due to groundwater contamination.

25 C There appears to be some impacts on the biota from the leachate? Why was the fish study that was requested by NYSDOH for the Wallkill during the summer of 1998, not done before issuing the PRAP?

R The leachate results, when compared with the groundwater standards (please refer to Table 1.2) show only a few instances that exceeded standards.

Based upon the information developed, we do not believe there is a problem with the fish population. The existing fish surveys taken at locations remote to this site

indicate only limited information on the impacts to the Wallkill. Since the Wallkill is such a long river, NYSDOH has requested this fish survey to expand the database for the Wallkill River Basin.

26 C The leachate samples in Table 1.2 were taken in September 1994; do those leachate samples include surface water runoff?

R. The leachate samples in Table 1.2, were taken from the manholes in the leachate collection system. These leachate samples did not include surface water runoff.

27 C The County Health Impact Study was not included in the RI/FS as explained earlier. Are there any other health studies that have been conducted relative to populations living near landfills in general?

R There is currently a study looking at the effects landfill off-gas may have on residences within 150 feet of the landfill. This study is not complete. The Huntington Landfill Cancer Study shows some increase in cancer incidence rates; but they were not directly attributable to the Landfill.

28 C Was there any consideration given to the stability of the banks of the Landfill along the Cheechunk Canal? What is the status of the inclinometers previously installed in the Landfill?

R The roadway was moved further away from the Cheechunk Canal and riprap was installed to further stabilize the bank of the Canal. The vegetation was planted to further stabilize the bank.

The inclinometers installed as part of the Wehren investigations are no longer useable.

29 C There appears to be evidence of movement of the bank. Failure of the cap may block the Cheechunk Canal and the possible impacts. Those inclinometers were installed to investigate that possibility.

R Prior to the start of the RI/FS program, Orange County authorized two independent studies to evaluate the possibility of the global movement of the landfill as a contributing factor to canal bank failures. The initial study by Wehran Engineers included the installation of inclinometers to measure and record any movement of the landfill. The conclusion of the study was that there was no movement from the landfill mass, rather the bank instability resulted from the location of a perimeter access roadway and relatively poor soil conditions along the canal. A second study by Mellick & Tully reevaluated the conclusions of the report and confirmed the original findings. Their recommendations however, included reestablishing slopes along the bank at no greater than 33%. Although not a requirement of the Record of Decision

for the landfill capping program, the County requested that S&W address the recommendations of the previous reports as part of the construction documents. In addition to the regrading and restoration of the canal banks, the design also relocated the perimeter access roadway and incorporated a storm water management strategy that collected and conveyed all runoff from the cap to four basins with controlled outlets to the canal.

30 C How much sediment sampling was done in the Cheechunk Canal?

R Seven (7) surface sediment samples were collected as part of the RI/FS.

31 C How deep would you expect to find contaminants in the sediments?

R Sediment sampling was conducted at the surface of the Canal bottom. Since low levels were detected in the surface sediment samples, no further sampling was deemed necessary.

32 C To what extend does the current network of monitoring wells presently in place characterize the depth and lateral extent of pollution under the Landfill?

R The current monitoring well system is adequate to characterize the depth and lateral extent of groundwater impacts from the landfill. However, the scope of the long term monitoring will be further evaluated and presented in the Operation & Maintenance (O&M) Plan. The O&M Plan will be prepared in 1998.

33 C To what extend does the existence of dolomite rock under the Landfill impact the long term closure of this Landfill?

R We have monitoring wells right next to the Landfill and into the bedrock. The monitoring data to date shows no impact from the past 24 years of operations of the Landfill.

34 C From the PRAP there is a list of things which the County must do, but what are they presently doing?

R Orange County is currently collecting quarterly monitoring samples of groundwater, surface water and sediments. They are performing the inspections and maintenance of the Landfill including collecting the leachate and shipping it off-site for treatment. Orange County is also operating the landfill gas collection system used to generate electrical power.

APPENDIX B

ADMINISTRATIVE RECORD

1. Phase I Investigation Orange County Landfill by Gibbs and Hill, Inc., dated June 1988.

2. Order on Consent, Index W3-0603-92-06
   Between NYSDEC and Orange County, dated January 1993.

3. Focused Feasibility Study Report for Accelerated Remedial Action
   Orange County Landfill, prepared by Stearns & Wheler, dated September 1993.

4. Record of Decision Orange County Landfill
   Site # 3-36-007, Operable Unit No. 2.

5. Remedial Investigation Orange County Landfill
   Orange County, New York, by Stearns & Wheler, dated November 1996.

6. Feasibility Study Orange County Landfill
   Orange County, New York, by Stearns & Wheler, dated July 1996.

7. Proposed Remedial Action Plan Orange County Landfill
   Site # 3-36-007, Operable Unit 1.