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Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

Farwell Landfill Site
Ischua (T), Cattaraugus County
Site Number 9-05-024

March 2000

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

DECLARATION STATEMENT - RECORD OF DECISION

Farwell Landfill Inactive Hazardous Waste Site
Ischua (T), Cattaraugus County, New York
Site No. 9-05-024

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for the Farwell Landfill class 2 inactive hazardous waste disposal site which was chosen in accordance with the New York State Environmental Conservation Law. 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 on the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Farwell Landfill inactive hazardous waste site and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A listing 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 significant threat to public health and the environment.

Description of Selected Remedy

Based on the results of the Remedial Investigation/Feasibility Study (RI/FS) for the Farwell Landfill and the criteria identified for evaluation of alternatives, the NYSDEC has selected repair of the existing cap, long-term groundwater monitoring, and institutional controls as the site remedy. The components of the remedy are as follows:

- repair damaged or settled portions of the existing landfill cover;
- continue the on-going collection and off-site treatment of leachate from the landfill;
- implement a long-term groundwater sampling program, analyzing the samples for volatile organic compounds, metals and various parameters required for evaluating the progress of natural attenuation;
- place deed restrictions on the impacted County-owned property to preclude the installation of drinking water wells.

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, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

3/31/2000
Date

Michael J. O'Toole
Michael J. O'Toole, Jr., Director
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RECORD OF DECISION

Farwell Landfill Site
Ischua (T), Cattaraugus County
Site No. 9-05-024
March 2000

SECTION 1: <u>SUMMARY OF THE RECORD OF DECISION</u>

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy to address the significant threat to the environment created by the presence of hazardous waste at the Farwell Landfill, a class 2 inactive hazardous waste disposal site. As more fully described in Sections 3 and 4 of this document, the landfill accepted industrial wastes, including some material containing the chlorinated hazardous waste solvent trichloroethene. Some of the hazardous waste was released or migrated with groundwater from the site toward Ischua Creek and County-owned property south of the landfill. These disposal activities have resulted in the following significant threats associated with contamination at the site:

- a threat posed by the continuing leaching of contaminants from the wastes into the groundwater;
- a threat posed by the potential for the release of site contaminants into the adjacent Ischua Creek:
- a threat posed if the existing landfill cover system erodes exposing wastes and contaminants resulting in a surface contact threat and possible releases of contaminants; and
- a threat posed by the potential for public contact with contaminated groundwater either through consumption or dermal contact.

Portions of the landfill cover have settled, producing low areas which collect storm water. The ponded water has resulted in localized areas of with higher groundwater recharge. If the landfill cover is allowed to continue to deteriorate, the observed groundwater contamination would be expected to increase in severity and extent.

In order to eliminate or mitigate the significant threats to the environment that the hazardous wastes disposed at the Farwell Landfill have caused, the following remedy was selected:

- repair damaged or settled portions of the existing landfill cover,
- supplement the existing perimeter fence with vegetation barriers to restrict public access to the landfill,
- continue the on-going collection and off-site treatment of leachate from the landfill,
- conduct long-term groundwater sampling to monitor the natural attenuation of contaminants in the area of groundwater impact, and
- place deed restrictions on the impacted County owned property to preclude the installation of drinking water wells.

The selected remedy, discussed in detail in Section 7 of this document, is intended to attain the remediation goals selected for this site in Section 6 of this Record of Decision (ROD), in conformity with applicable Standards, Criteria, and Guidance (SCGs).

SECTION 2: SITE LOCATION AND DESCRIPTION

The landfill is owned by Cattaraugus County and has been closed since 1989. It is located on Farwell Road, off of Route 16, in the Town of Ischua, Cattaraugus County, NY (**Figure 1**). The landfill occupies approximately 16 acres, the northern end of a 205-acre, County-owned parcel along the western slopes of the Ischua Creek valley. The landfill is bounded on the south by Farwell Road and old farm fields, and on the west by a narrow strip of trees and fields (**Figure 2**). On the north and east sides, the landfill is bounded by a bend in Ischua Creek and an active Conrail railroad line. At its closest point, the creek is approximately 400 feet from the landfill. Ischua Creek flows south into Olean Creek, which in turn discharges into the Allegheny River. The land surface rises steeply to the west.

The area surrounding the landfill is primarily rural and agricultural. The area is sparsely populated, with only nine year-round or seasonal residences located within 1 mile southeast (downgradient) of the site, all on the eastern side of Ischua Creek. The closest off-site structure is a former one-room schoolhouse, located on the northwest corner of Farwell Road and Route 16, approximately 600 feet from the landfill and on the eastern side of Ischua Creek. Drinking water for the residences in the area is supplied by private wells or springs.

The landfill was closed in 1989 and capped with a minimum of 18 inches of compacted soil and 6 inches of topsoil in accordance with NYSDEC regulations. The cap has an established vegetative cover of mixed grasses and shrubs. Portions of the cover have settled and precipitation occasionally ponds on its surface. However, surface runoff from the landfill generally drains into either a pond located off the southeast corner of the landfill, or a depression located southwest of the landfill.

The site has served as a transfer station since closure. Two buildings are located on the site, south of the landfill. One of the buildings is used by the Cattaraugus County Department of Public Works as a garage for heavy equipment. The other building is used for the transfer operations. The site has a water supply well, but because of the site's groundwater contamination a warning sign has been posted that the water is non-potable.

The landfill was constructed in phases to form three contiguous areas. The Phase I and II areas that make up the eastern portion of the landfill, were built without a liner. Because of inadequate cover material and apparent groundwater mounding, leachate outbreaks were a common occurrence. So in 1986, a leachate collection system of gravel collection trenches and perforated pipe was extended into the western, eastern and southeastern faces of the Phase I and II areas where leachate seeps had been observed. The Phase III area of the landfill was built with a liner and a separate leachate collection system. Leachate from the Phase I/II and Phase III areas is collected and combined in two storage tanks located south of the landfill, near the garage and transfer station. The stored leachate is periodically pumped from the tanks and transported off site to a permitted wastewater treatment facility.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

- 1975 - Disposal operations begin. The site was used for farming prior to development. Little information is available on the type and quantity of wastes contained in the Phase I and II areas;

however, the landfill is known to have received various types of residential, commercial and industrial wastes along with resource recovery (incinerator) ash, sewage treatment sludge and construction debris. In 1985, the Phase I and II areas reach capacity and the Phase III area is opened.

- 1975-80 - According to Community Right-to-Know records, 8.5 tons of a hazardous waste mixture consisting of trichloroethene (TCE) sludge and sawdust from the Alcas Cutlery Corporation was disposed at the landfill, evidently in the Phase I and II areas.
- 1984 - An Order on Consent (File # 84-106) is issued to the County to bring the landfill into compliance with New York State regulations (6 NYCRR Part 360) for solid waste management facilities. The order requires the County to initiate comprehensive hydrogeologic studies, install an adequate groundwater monitoring system and properly close the landfill.
- 1987 - USEPA priority pollutants are added to the groundwater monitoring program. Results reveal that groundwater downgradient of the landfill is contaminated with chlorinated volatile organic compounds (VOCs), including trichloroethene.
- 1988 - A closure plan is developed and a quarterly groundwater monitoring program is initiated. The landfill stops accepting wastes at the end of the year.
- 1989 - Closure of the landfill is completed in accordance with the order on consent and approved closure plan. The entire landfill (Phase I, II and III areas) is capped with a minimum 18-inch layer of compacted, low-permeability soils and 6 inches of vegetated topsoil. Two former leachate collection ponds at the southeastern corner of the landfill are dredged and the sediments disposed in the landfill. One of the two ponds is completely backfilled with clean soils, the other is lined with compacted low-permeability soils and continues to receive surface runoff from the landfill. A construction monitoring report was prepared in early 1990, certifying that the landfill closure construction complied with the approved closure plan.
- 1989 - An Order on Consent (File # 89-71) is issued to the County to undertake a 30-year post-closure maintenance and monitoring program in compliance with New York State solid waste regulations.

3.2: <u>Remedial History</u>

- 1996 - Post-closure monitoring data indicate significant groundwater contamination immediately downgradient of the landfill. With documented evidence of hazardous waste disposal in the Phase I and II areas of the landfill, the NYSDEC adds the landfill to its registry of inactive hazardous waste disposal sites. The landfill is designated a class 2 hazardous waste disposal site; a site which poses a significant threat to public health and the environment which requires remedial action.
- 1998 - An Order on Consent (File #B-0489-96-02) is issued to the County for the completion of a Remedial Investigation of the site to supplement previous site investigations and a Feasibility Study of remedial alternatives.

SECTION 4: <u>SITE CONTAMINATION</u>

Cattaraugus County has recently conducted a Remedial Investigation/Feasibility Study (RI/FS) to further evaluate the extent of contamination at the site and evaluate remedial alternatives to mitigate any significant threat to human health and the environment posed by the presence of hazardous waste.

4.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The RI was conducted in two phases, supplementing the information gathered during previous hydrogeologic studies and groundwater monitoring program which were conducted as part of the landfill closure/post-closure activities. The first phase of the RI was conducted between August and September 1998 and the second phase between August and September 1999. A report entitled *Remedial Investigation-Farwell Landfill* has been prepared which describes the field activities and findings of the RI in detail.

The RI included the following activities:

- Installation of four additional groundwater monitoring wells to further define hydrogeological conditions;
- Sampling and analysis of groundwater from twenty of the site monitoring wells to determine the extent of contamination;
- Sampling of surface water and sediment from Ischua Creek, the pond located on the eastern edge of the landfill and the pond located near the railroad track;
- Sampling of the leachate from the landfill collection system;
- Conducting a survey to identify private drinking water wells in the area;
- Performing a qualitative Health Risk Assessment;
- Completing a Fish and Wildlife Impact Analysis.

To determine which media (soil, groundwater, etc.) are contaminated at levels of concern, the RI analytical data were compared to environmental Standards, Criteria and Guidance values (SCGs). Groundwater, drinking water and surface water SCGs identified for the Farwell Road landfill are based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part V of New York State Sanitary Code. Guidance values for evaluating contamination in sediments are provided by the NYSDEC "Technical Guidance for Screening Contaminated Sediments." Since the landfill cap effectively eliminated exposure to any contaminated soils, the RI focused on the groundwater, surface water and sediments.

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized below. More complete information can be found in the RI Report.

Chemical concentrations are reported in parts per billion (ppb) and parts per million (ppm). For comparison purposes, where applicable, SCGs are provided for each medium.

4.1.1: Site Geology and Hydrogeology

The surficial geology of the site consists of a layered assortment of glacial deposits from the advance and retreat of glacial ice during the last ice age. The uppermost stratigraphic unit is a layer of glacial till containing silts, clay, sand and gravel, which is underlain by a coarser-grained deposit of silty sand and gravel (glaciofluvial layer). Below the silty sand and gravel is another layer of till.

The upper till layer is reported to be greater than 70 to 80 feet thick in the western portion of the site and thins to approximately 30 feet thick along the eastern portion of the site, eventually being replaced by alluvial deposits of silt adjacent to Ischua Creek. The glaciofluvial layer is approximately 10 to 15 feet thick. The lower till layer is estimated to be 40 to 70 feet thick. These overburden layers rest on sedimentary bedrock consisting of highly fractured, fine-grained sandstone interbedded with thin layers of shale.

Hydraulic data from the site, recorded over the past several years, indicate that there is vertical flow of groundwater (upwards and downwards) between the overburden units at the site. Groundwater flow converges toward Ischua Creek from either side and upward from below. Groundwater flow direction across the landfill is from northwest to southeast. The average groundwater seepage velocity across the site was estimated to be 0.2 feet per day based on hydraulic conductivity tests in site wells.

4.1.2: Nature of Contamination

As described in the RI report, many groundwater, surface water and sediment samples were collected at the site to characterize the nature and extent of contamination. Sampling locations are shown in **Figure 2** (sediments were sampled at each of the surface water sample locations). On the basis of sampling conducted previously during the operation and closure of the landfill, samples collected during the RI were analyzed for:

- Target Compound List (TCL) volatile organic compounds
- Target Analyte List (TAL) metals
- 6 NYCRR Part 360 parameters: chloride, alkalinity, biological oxygen demand, total organic carbon, sulfate, ammonia and chemical oxygen demand
- dissolved oxygen, carbon dioxide, methane, and hydrogen sulfide

4.1.3: Extent of Contamination

Table 1 summarizes the extent of contamination for the contaminants of concern in groundwater and compares the data with the SCGs for the site. The following are the media which were investigated and a summary of the findings of the investigation.

Groundwater

Groundwater monitoring wells have been installed around the landfill in various phases since the 1970s. Since 1988, when quarterly groundwater monitoring for VOCs began, a number of VOCs have been detected, including trichloroethene (TCE), 1,1,1 trichloroethane (1,1,1 TCA) and benzene. Other VOCs detected include compounds that may have been produced from the chemical and/or biological degradation of TCE and 1,1,1 TCA; "degradation daughter" products such as 1,2 dichloroethene (1,2 DCE), 1,1 dichloroethene (1,1 DCE), vinyl chloride, 1,1 dichloroethane (1,1 DCA), and chloroethane have been found.

Eleven of the 19 monitoring wells sampled in the first phase of the RI contained at least one of the VOCs of concern at a concentration exceeding its SCG. It appeared that the majority of the landfill-related impacts to groundwater were confined to the immediate downgradient vicinity of the landfill. Only 2 of the 19 monitoring wells sampled are installed in the bedrock, MW-6 upgradient of the landfill and MW-18D located east of Ischua Creek. The other monitoring wells were installed in overburden: the upper till, the glaciofluvial layer and the lower till/bedrock interface. Contaminated groundwater was found in all of the overburden units at the site, including the lower till at the overburden/bedrock interface. This reflects the degree of vertical flow of groundwater between the overburden units.

The second phase of the RI included follow-up sampling of the monitoring well MW-19S and bedrock well MW-20D, which had recently been installed. Both monitoring wells are located south (downgradient) of the landfill and were placed near the anticipated edge of the area of impacted groundwater. In this second groundwater sample from MW-19S, 1,1 DCA was the only VOC detected; the 0.3 ppb found was well below the 5 ppb groundwater quality standard. In contrast, the first sample collected from MW-19S contained 20 ppb of 1,1 DCA as well as chloroethane (9 ppb) and 1,1,1 TCA (12 ppb).

Acetone and 2-butanone were the only two VOCs detected in the bedrock monitoring well MW-20D, but these two VOCs were also found in similar concentrations in the method blanks, indicating that they were likely due to laboratory contamination. Monitoring well MW-20D was installed below the fractured surface of the bedrock. The findings from the bedrock monitoring well MW-20D suggests that the groundwater contamination is confined to the overburden.

Metals detected above SCGs in one or more the unfiltered samples of groundwater included: iron, manganese, sodium, magnesium, arsenic, lead, antimony, barium, cadmium and zinc. In the one background/upgradient well sampled (MW-6), the concentrations of iron (1,830 ppb), manganese (515 ppb) and sodium (21,700 ppb) detected were above groundwater SCGs, suggesting that these substances are naturally elevated. Similarly, the concentration of magnesium (22,500 ppb) in the background well, while below the 35,000 ppb SCG, also suggests naturally elevated levels. The only instances of elevated arsenic concentrations were found in monitoring wells MW-18S and -18D located on the opposite side of Ischua Creek, and therefore unlikely attributable to the landfill. Lead exceeded the groundwater SCG in only the unfiltered samples of groundwater; it was not detected in filtered samples. The instances of elevated concentrations of antimony, barium, cadmium and zinc were generally few; the geometric mean concentrations of these metals were all below their respective groundwater SCGs.

In general, there was little correlation found between the occurrence of metals and the frequency of detection for VOCs in the site monitoring wells. For example, monitoring wells MW-18S and -18D, located east of Ischua Creek and hydraulically separated from the landfill, contained five metals above SCGs which were comparable to the six metals found in monitoring well MW-9D located west of the creek and immediately downgradient of the landfill. It is suggested that proximity to the landfill evidently has little influence over the concentrations of metals found and that the concentrations are perhaps a consequence of the natural mineralogy.

As part of the RI, the historical groundwater monitoring data were examined for trends in contaminant concentrations. In a number of the monitoring wells it was found that the concentrations of certain VOCs have been declining or attenuating over the last several years (**Table 2**). It was also found that certain geochemical indicators of natural attenuation reactions, such as dissolved oxygen, carbon dioxide, pH, and alkalinity were present in ways that support the likelihood that biological and chemical attenuation reactions are occurring.

The concentrations of certain chlorinated VOCs were also found to decline from upgradient to downgradient locations at rates that exceeded the decline in chloride concentration. Chloride is a conservative tracer; it is a contaminant that cannot be degraded or readily removed from solution. A declining chloride concentration is indicative of the rate of groundwater dilution. Contaminants that decline faster than this rate are not only being diluted but are also being destroyed.

The historical decline in concentrations, the presence of TCE degradation daughters, and the chloride tracer assessment all support the conclusion that natural attenuation of the groundwater contamination is occurring. Estimates of the natural attenuation half-life, together with estimated groundwater velocities, suggests that average concentrations for individual contaminants would be reduced to groundwater quality standards at a point approximately 1,500 feet downgradient of the landfill which is within the limits of the County-owned property.

Surface Water

VOCs were not detected in any of the water samples collected from Ischua Creek or the landfill pond. Only two VOCs, traces of 2-butanone (26 ppb) and carbon disulfide (4 ppb), were detected in the water sample collected from the railroad pond. The concentrations found were below surface water SCGs. Neither of these two compounds were detected in any of the groundwater samples; their presence in the pond was not from the seepage of groundwater to the pond. Carbon disulfide is a common metabolic breakdown product found in organic-rich sediments such as occurs in ponds and wetlands. The absence of VOCs in the landfill pond suggests that runoff from the landfill is not conveying the VOCs to the railroad pond; the railroad tracks themselves may be the source of the 2-butanone.

Iron and aluminum were the only metals found in the water sampled from Ischua Creek at concentrations exceeding surface water quality standards. The presence of similarly elevated concentrations of iron and aluminum in the upstream sample suggests that the landfill is not the contributor and that the concentrations found might be naturally occurring. Water in the landfill pond did not contain any metals above surface water quality standards. The railroad pond contained several metals above water quality standards, including aluminum, antimony, cobalt, iron, manganese, vanadium, and zinc. With the exception of iron and manganese, none of these metals were found in the groundwater at significantly elevated concentrations and none were found in the landfill pond, so it is unlikely that their presence in the railroad pond is attributable to the landfill, but may be from the railroad tracks themselves.

Sediments

Ischua Creek sediment samples generally contained only a few organic compounds and none of the specific chlorinated compounds of concern related to the landfill. The concentrations of those organic compounds found were below levels of concern. The upstream sediment sample contained traces of bromomethane (0.5 ppb) and acetone (3 ppb), while the sample at the Farwell Road bridge adjacent to the landfill contained only a trace level of acetone (4 ppb). The downstream sediment sample contained 15 ppb of 2-butanone and a trace of toluene (2 ppb). No other VOCs were detected in the creek sediments. Sediments in the landfill and railroad ponds contained similarly low concentrations of 2-butanone and carbon disulfide.

The landfill and railroad pond sediments contained several metals at concentrations exceeding the "lowest effect level" of the NYSDEC sediment criteria, including: arsenic, chromium, copper, iron, lead, manganese, nickel and zinc. However, none of these elements were found at concentrations above the "severe effect level".

Ischua Creek sediment samples collected for metals analyses from the upstream location and adjacent to the landfill were damaged during shipment to the laboratory, so no direct comparison could be made with the downstream sediment location. However, it was noted that the downstream sediment sample contained only one metal, manganese, at a concentration above the "lowest effect level" of the NYSDEC sediment criteria; 490 ppm of manganese was found which is only slightly higher than the 460 ppm criterion. With little else found, it appeared that the landfill has had little or no impacts on the creek sediments.

Leachate

A sample of the landfill leachate was collected from one of the two holding tanks on site. It contained a number of the same VOCs that have historically been identified in site groundwater samples. These included: 1,2 DCE (160 ppb), TCE (18 ppb), vinyl chloride (17 ppb), and 1,1 DCA (28 ppb). The total VOC concentration in the leachate sample was 390 ppb.

Typical of many municipal solid waste leachates, the sample also contained significant levels of iron (10,500 ppb), magnesium (88,600 ppb), potassium (251,000 ppb) and sodium (233,000 ppb). It was also noted that the concentration of dissolved carbon dioxide was generally high (192 ppm) while the concentration of oxygen was low (1 ppm), suggesting the biological decay of organic material in the landfill waste.

4.2: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the health risks can be found in Section 6 of the RI report.

An exposure pathway is the manner by which an individual may come in contact with a contaminant. The five elements of an exposure pathway are 1) the source of contamination; 2) the environmental media and transport mechanisms; 3) the point of exposure; 4) the route of exposure; and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

Pathways which are known to or may exist at the site include:

- ingestion of contaminated groundwater should it be used for potable purposes (drinking or cooking),
- dermal contact with contaminated groundwater should it be used for bathing or showering,
- dermal contact with contaminants if the landfill cover is allowed to erode exposing wastes and contaminants: and
- inhalation of VOCs in the form of vapors from contaminated water should it be used for bathing or showering.

At the present time, the only well located in the area of impacted groundwater is the landfill water supply well. The water supply well is not used for drinking water and a sign is currently posted which prohibits such use. In the future, development of the area south of the landfill is possible. Development could be accompanied by the installation of other water supply wells. Exposure to contaminants in groundwater could then occur through ingestion, inhalation and dermal contact. However, this future scenario is considered unlikely given the rural, isolated nature of the area and the fact that the County owns much of the land south of the landfill and west of the creek.

4.3: Summary of Environmental Exposure Pathways

This section summarizes the types of environmental exposures and ecological risks which may be presented by the site. The Fish and Wildlife Impact Assessment included in the RI report presents a more detailed discussion of the potential impacts from the site to fish and wildlife resources. As noted earlier in this document, there were no landfill-related contaminants of concern identified in the any of the sediment or surface water samples from Ischua Creek. Remediation of the creek was deemed unnecessary. The RI found no evidence of adverse impacts to plants or wildlife. However, the RI noted that portions of the landfill cover have settled. If not properly maintained, the landfill cover might fail in the future to adequately contain the hazardous waste. Exposed hazardous waste and/or contaminated surface water runoff would create a complete environmental exposure pathway.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The NYSDEC and the Cattaraugus County Department of Public Works entered into a Consent Order on July 23, 1998. The Order also named the Alcas Corporation as a settling party. The Order obligates the responsible parties to implement a Remedial Investigation and Feasibility Study. Upon issuance of the Record of Decision, the NYSDEC will approach the PRPs to implement the selected remedy under a new Order on Consent.

The following is the chronological enforcement history of this site:

Date	File No.	Subject of Order
1984	84-106	Landfill closure
1989	89-71	Post-closure monitoring
1998	B9-0489-96-02	Remedial Investigation & Feasibility Study

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. The overall remedial goal is to meet all Standards, Criteria and Guidance (SCGs) and be protective of human health and the environment. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or 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 site are:

- Eliminate, to the extent practicable, ingestion of groundwater affected by the site which does not attain NYSDEC Class GA Ambient Water Quality Criteria;
- Eliminate, to the extent practicable, exposures to groundwater contaminants through inhalation or dermal contact;
- Eliminate, to the extent practicable, off-site migration of groundwater that does not attain NYSDEC Class GA Ambient Water Quality Criteria.

SECTION 7: <u>SUMMARY OF THE EVALUATION OF ALTERNATIVES</u>

The selected remedy must be protective of human health and the environment, be cost effective, comply with other laws and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Farwell Landfill site were identified, screened and evaluated in the report entitled Feasibility Study-Farwell Landfill (October 1999).

A summary of the detailed analysis follows. As presented below, the time to implement reflects only the time required to implement the remedy and does not include the time required to design the remedy, procure contracts for design and construction or to negotiate with responsible parties for implementation of the remedy.

7.1: <u>Description of Remedial Alternatives</u>

As noted earlier, groundwater was the only environmental media to show evidence of significant, adverse impact from landfill-related contaminants. The potential remedies described below are primarily intended to address the contaminated groundwater at the site.

<u>Alternative 1, No Action</u>

Capital Cost	*$0*
Annual O&M Cost	*$23,000*
Present Value[1]	*$350,000*
Time to implement	*none required*

[1]Present value is based on an interest rate of 5% and project life of 30 years.

The No Action alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in its present condition. Although this alternative is termed no action, the existing operation and maintenance activities would continue. These practices include continuation of the quarterly groundwater monitoring required as part of the landfill's original closure plan, leachate collection and disposal (both current practices at the landfill), and monthly inspections. The current practice of mowing the cover once every two years would also continue. This alternative would otherwise leave the site in its present condition and would not provide any additional protection to human health or the environment.

<u>Alternative 2, Institutional Measures</u>

Capital Cost	*$12,000*
Annual O&M Cost	*$23,000*
Present Value[1]	*$360,000*

Time to implement	*< 1 month*

[1]Present value is based on an interest rate of 5% and project life of 30 years.

Alternative 2 would rely upon natural attenuation processes to decrease the levels of dissolved organic contaminants in the groundwater. However, to help preserve the integrity of the low permeability soil cap, the existing fence along Farwell Road and the railroad right-of-way would be supplemented with a hedge consisting of thorny shrubs to limit access to the landfill. By providing access restrictions, the potential for trespassers to damage the existing cover on the landfill and cause potential erosion problems would be minimized.

Alternative 2 would also include the continued implementation of the ongoing post-closure operation and maintenance activities. These activities include the long-term quarterly groundwater monitoring program developed following closure of the landfill, continued leachate collection and off-site disposal and periodic cap inspections and mowing. Continued groundwater monitoring would enable verification that attenuation of the dissolved organic contaminants is occurring as anticipated.

Finally, signs would be posted on the landfill property advising that the water from the existing site well is not for potable purposes and that bottled water should be used for drinking. The County would also enact deed restrictions on the their property south of the landfill, preventing future installation of drinking water wells within the area of impacted groundwater.

Alternative 3A, Repaired Cap, Institutional Controls

Capital Cost	*$380,000*
Annual O&M Cost	*$30,000*
Present Value[1]	*$800,000*
Time to implement	*6 months*

Alternative 3B, Repaired Cap, Institutional Controls and Natural Attenuation Monitoring

Capital Cost	*$420,000*
Annual O&M Cost	*$60,000*
Present Value[1]	*$1,300,000*
Time to implement	*6 months*

[1]Present value is based on an interest rate of 5% and project life of 30 years.

Alternative 3 (i.e. both 3A and 3B) would contain all of the same components as Alternative 2. Alternative 3 would include access restrictions (thorny hedge to supplement the existing fence), continued groundwater monitoring, continued leachate collection and off-site disposal, cap inspections and mowing, and implementation of institutional controls for the site. However, additional actions in the form of regrading and revegetating portions of the landfill are included. Some areas of settlement have occurred since the site was closed and the soil cap installed. The low areas collect ponded storm water, resulting in localized areas with higher amounts of recharge. If repairs are not made and the condition of the landfill cap is allowed to deteriorate further, hazardous wastes might be exposed, resulting in an increased threat to the environment and public health. Alternative 3 would involve regrading and reseeding specific areas where settlement has occurred, followed by a periodic inspection and maintenance program. The repairs would reduce the amount of leachate generated by the landfill, mitigate the impacts to groundwater, and eliminate the potential for human or wildlife exposure to the hazardous waste in the future if the landfill cover continues to deteriorate. It is estimated that a third of the landfill cap or approximately 5 acres would need to be repaired.

Cap repairs would be undertaken by scraping the existing topsoil layer from depressed areas and filling in the depressed area with compacted soils that match the low permeability characteristics of the original barrier layer.

Two separate monitoring options would be possible as part of this repaired cap alternative. Alternative 3A would include continued implementation of the existing post-closure quarterly groundwater monitoring plan consisting of three rounds per year of Part 360 routine parameters from nine wells and one sampling round per year of Part 360 baseline parameters from the same nine wells.

Alternative 3B would include an expanded quarterly monitoring plan designed to collect data required to monitor natural attenuation of the VOCs detected in the area of groundwater impacts. This monitoring plan would include three quarters per year of routine parameters and one quarter per year of baseline parameters from three monitoring wells. This would be supplemented by quarterly sampling from an additional 11 monitoring wells for baseline parameters and dissolved gases (carbon dioxide, oxygen, and methane).

Alternative 4, Upgrade to Latest Part 360 Cap Requirements

Capital Cost	*$1,500,000*
Annual O&M Cost	*$60,000*
Present Value[1]	*$3,000,000*
Time to implement	*9 months - 1 year*

[1]*Present value is based on an interest rate of 5% and project life of 30 years.*

Similar to Alternative 3B, this alternative would consist of implementation of a monitoring program designed to monitor the progress of natural attenuation, continued leachate collection and off-site disposal, and periodic cap inspections and mowing. However, the perimeter hedge would not be required, but might be added later if evidence of significant use of the site by trespassers occurs. This alternative would also include source containment in the form of a multi-media cap over the landfill consistent with current 6 NYCRR Part 360 regulations. Although a 12-inch gas venting layer is required over the soil covering the refuse, the adequacy of the existing gas venting trenches and vent system would be evaluated to determine if it needed to be upgraded to the current requirements. Overlying this gas venting layer is an 18-inch soil barrier layer, normally consisting of clay, or an equivalent geomembrane layer. Overlying the geomembrane would be a 24-inch barrier protection layer (two 12-inch layers separated by geotextile) with a final 6-inch topsoil layer. Construction of this cap might require some site grading. Similar to Alternative 3, the existing layers of the cap might be scraped from the landfill and stockpiled for use in construction of the Part 360 cap.

Alternative 5, Upgrade to Latest Part 360 Cap Requirements and Groundwater Collection and Disposal

Capital Cost	*$1,900,000*
Annual O&M Cost	*$170,000*
Present Value[1]	*$5,000,000*
Time to implement	*1 - 1 ½ years*

[1]*Present value is based on an interest rate of 5% and project life of 30 years.*

Alternative 5 would consist of implementation of Alternative 4 with the addition of groundwater recovery using collection wells and/or a trench. The wells and/or trench would be placed downgradient of the landfill in the southern and eastern direction. Groundwater would be pumped to storage tanks located on County owned property and managed along with the collected leachate from the existing system. This alternative would also include implementation of a revised monitoring program designed to verify the capture efficiency of the groundwater collection system. For the purposes of this document, it was assumed that two recovery wells would be sufficient for groundwater collection and that each well would recover groundwater at the rate of 10 gallons per minute. It is noted, however, that the naturally low permeability of area till would probably minimize the influence of individual recovery wells to the point that adequate groundwater control could only be achieved by a large number of wells. Thus, it is highly probable that more than two wells would be needed. This would be determined during remedial design. Recovered water would be transported to a publicly owned treatment works for disposal with the leachate under the existing contract. During remedial design, the actual recovery system size would be determined. If the cost for disposal of combined leachate and groundwater should significantly increase in the future, the County could then evaluate options, such as air stripping, for treating both the leachate and groundwater together.

7.2 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. A detailed discussion of the evaluation criteria and comparative analysis is included in the Feasibility Study.

The first two evaluation criteria are termed threshold criteria and must be satisfied in order for an alternative to be considered for selection.

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.

Five of the SCGs examined in the FS report refer to concentration limits for contaminants in groundwater. Only Alternative 5 would provide for active remedial options to address the current levels of groundwater contamination. However, because there is some evidence that the organic contaminants in the groundwater are degrading, it is likely that natural attenuation would eventually result in each of the alternatives achieving contaminant specific SCGs given enough time. Because Alternatives 3B, 4, and 5 each would include a monitoring program designed to collect the data required for monitoring the progress of natural attenuation processes, these three options can be considered the only alternatives that would verify over time that compliance with SCGs has been accomplished through natural attenuation.

Two of the SCGs identified in the FS report refer to closure requirements for landfills. Only Alternatives 4 and 5 address current NYCRR Part 360 requirements for landfill closure. However, the landfill was closed in accordance with requirements detailed in an Order on Consent and NYSDEC-approved closure plan which incorporated the Part 360 requirements of the time. The closure and post-closure requirements in effect the day the landfill closure plan were approved are applicable SCGs for the site. Because of the degree of settlement in portions of the landfill, the current condition of the cap is not considered adequate, and therefore, Alternatives 1 and 2 do not meet all of the SCGs for landfill closure.

2. **Protection of Human Health and the Environment**. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment. Because there is currently no exposure to contaminated groundwater, all the alternatives would be protective of human health. In the future, however, if the County-owned land in the vicinity of the groundwater plume is developed, it is likely that unacceptable risks would be associated with ingestion of the water or inhalation and dermal contact during showering and/or bathing. Therefore, alternatives 3B, 4 and 5, which include long-term monitoring of the groundwater, especially at the downgradient edge of the plume, would provide a greater degree of assurance that natural attenuation of the contaminants is occurring over time.

Alternatives 4 and 5 would be most protective of the environment, as both would provide for an upgraded cap over the entire landfill. The improved cap would result in reduced opportunities for storm water infiltration to the landfill which in turn would reduce the dissolution of waste-related contaminants and associated leachate production. Alternatives 3A and 3B would achieve almost the same level of environmental protection by eliminating or reducing the opportunity for storm water to pond on the surface of the landfill. The no action alternative (Alternative 1) would not provide any additional measures to protect the environment or the public health beyond what the existing cap provides. Alternative 2, institutional controls, would provide some additional protection from existing conditions by restricting the installation of water supply wells in the area of the landfill plume and reducing access to the site, thereby preventing damage to the existing cap. However, storm water ponding would not be reduced or eliminated.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

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/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives. Alternatives 1 and 2 could be implemented almost immediately; there would therefore be no adverse short-term effects associated with either of these options. Alternatives 3A and 3B would involve regrading portions of the landfill cap. If the topsoil is removed and stockpiled as part of this regrading, erosion could occur during storm events or excessive dust could be generated during dry weather. Construction of a Part 360 cap (Alternatives 4 and 5) could also result in erosion or dust. Storm water pollution prevention plans and dust suppression measures would be implemented during construction of these alternatives.

4. **Long-term Effectiveness and Permanence**. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. 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. Because the source of the groundwater contaminants remains present in the landfill with each

of the alternatives, none of the alternatives are considered fully permanent solutions. Long-term monitoring would be part of all the alternatives.

Given the apparent lack of significant impact to the surface water of Ischua Creek and the limited extent of groundwater contamination, the risks to public health and the environment following implementation of all but the no action alternative is considered low. Deed restrictions on the impacted, County-owned property (alternatives 2, 3A/B, 4 and 5) would provide adequate protection against human exposure to contaminated groundwater. Repairs or improvements to the landfill cap (alternatives 3A/B, 4 and 5) would reduce the volume of leachate produced by the landfill and the resulting impacts on the groundwater. Alternatives 3B, 4 and 5, which include groundwater monitoring programs designed to monitor the progress of natural attenuation, would offer a greater degree of reliability. The multi-layered landfill cap of the latest Part 360 landfill regulations (alternatives 4 and 5) would be more resistant to erosion/cracking and therefore somewhat more reliable in the long term than the existing single layer cap.

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. None of the alternatives would reduce the toxicity of the wastes. Alternative 5, which would include groundwater recovery within the contaminant plume, provides for actions which would reduce both the volume and mobility of the contaminants. The mobility of the contaminants is influenced by the amount of continued infiltration of storm water through the refuse mass in the landfill. Alternatives 3A and 3B, 4 and 5 all include actions that would restore appropriate grades to the site and therefore reduce ponding of storm water by promoting runoff. Consequently, these alternatives would likely result in a reduction in the mobility of the contaminants, while Alternatives 1 and 2 would likely not impact the mobility of the contaminants. Since Alternatives 4 and 5 would include significant additions to the landfill cap barrier layer, these alternatives would likely result in a greater reduction in mobility of contaminants than Alternatives 3A and 3B.

6. **Implementability**. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc. The most easily implemented alternative is the no action alternative (Alternative 1). Similarly, Alternative 2, which would include only institutional controls, would also be easy to implement. Alternatives 3A, 3B, and 4 would require more time to implement, but would not require any specialized construction equipment. Alternative 5 would be the most difficult to implement, given the number of recovery wells required or the depth to which a recovery trench would be need to be excavated. However, it should be noted that since all alternatives could be implemented using standard equipment and simple construction practices, extensive pilot testing or other specialized pre-design and construction techniques would not be required. Therefore, all of the alternatives could be readily implemented.

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. As noted previously, the capital cost for Alternative 5 might well be much

higher in the event that more groundwater recovery wells are needed to achieve hydraulic control. The costs for each alternative are presented in Table 3.

This final criterion is considered a modifying criterion and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

8. **Community Acceptance**. Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan have been evaluated. The "Responsiveness Summary" included as Appendix A presents the public comments received and the manner in which the Department will address the concerns raised. In general the public comments received were supportive of the selected remedy.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

Based upon the results of the RI/FS, and the evaluation presented in Section 7, the NYSDEC is selecting **Alternative 3B, Repaired Cap, Institutional Controls and Natural Attenuation Monitoring,** as the remedy for this site.

This selection is based on the evaluation of the five alternatives developed for this site. Alternatives 1 and 2 were rejected because both inadequately addressed the remedial objectives, neither alternative would reduce the continued storm water recharge in the areas where the landfill cap has settled, or prevent the further deterioration of the cap. If the landfill cap were allowed to continue to deteriorate, the containment of the hazardous wastes would be compromised which would increase the potential for public exposure and/or impacts to the environment. Alternatives 4 and 5 might provide for more protection against further contaminant mobility and leachate production, but the additional costs associated with the upgraded landfill cap would not be justified in a rural setting where pressures to develop the adjacent property are negligible. The RI found that the landfill has had no significant impact on the nearby Ischua Creek. The investigation also found that the significant groundwater contamination was limited to the area immediately downgradient of the landfill. There was also evidence that the groundwater contamination was naturally attenuating. Alternatives 3A and 3B would reduce the amount of storm water infiltration and would be less costly than constructing a new cap over the entire landfill. Since it will include a monitoring plan designed to assess the progress of natural attenuation at the site, Alternative 3B will provide more assurance for long-term protection of human health and the environment than Alternative 3A. Alternative 3B has therefore been selected as the site remedy.

The estimated present worth cost to implement the remedy is $1,300,000. The cost to construct the remedy is estimated to be $420,000 and the estimated average annual operation and maintenance cost for 30 years is $60,000. After the first several years of groundwater monitoring, it is expected that the information gathered will make it easier to predict the progress of natural attenuation processes. It is also expected that groundwater quality will improve. The scope of the groundwater monitoring program could then be adjusted as appropriate, which would likely result in a reduction in the annual operation and maintenance costs.

The elements of the selected remedy are as follows:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS will be resolved.

2. In those portions of the landfill where settlement of the cap has occurred, the existing top soil layer will be scraped away and the depressed area filled with compacted soils matching the low permeability characteristics of the original barrier layer. The topsoil will then be replaced and reseeded.

3. The current post-closure groundwater monitoring program will be expanded. Monitoring wells MW-19S and -20D, installed during the RI, will be added to the current list of wells sampled (MW-13D, -14S/I, -15S/I, 16S/D and 17S/I). So called "compliance monitoring wells" will also be installed farther downgradient (south) of the landfill at locations marking the point beyond which groundwater quality is expected to satisfy SCGs. The groundwater samples will be analyzed for the VOCs, TAL metals and various parameters required for evaluating the progress of natural attenuation. If adverse changes in the site conditions occur or if the progress of natural attenuation appears to no longer offer adequate protection to the public health or the environment, additional remedial action will be taken. Such action may include elements of the remedial alternatives previously considered. The community would be notified in the event that additional remedial action is deemed necessary.

4. To limit access to the site, a hedge of thorny shrubs will be planted along the perimeter of the site to supplement the existing fence.

5. The operation of the leachate collection system will be continued, with the leachate being disposed off site.

6. Property use restrictions will be placed by the County on the deed for the site to prevent future exposures to residual contamination.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation 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:

- A repository for documents pertaining to the site was established.

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

- A fact sheet was mailed to the public on July 21, 1998 describing the start of the Remedial Investigation. Another fact sheet was distributed on February 25, 2000 which described the results of the site investigation and outlined the Proposed Remedial Action Plan.

- On March 16, 2000 a public meeting was held to discuss the Proposed Remedial Action Plan.

- In March 2000 a Responsiveness Summary was prepared and made available to the public, to address the comments received during the public comment period for the Proposed Remedial Action Plan.

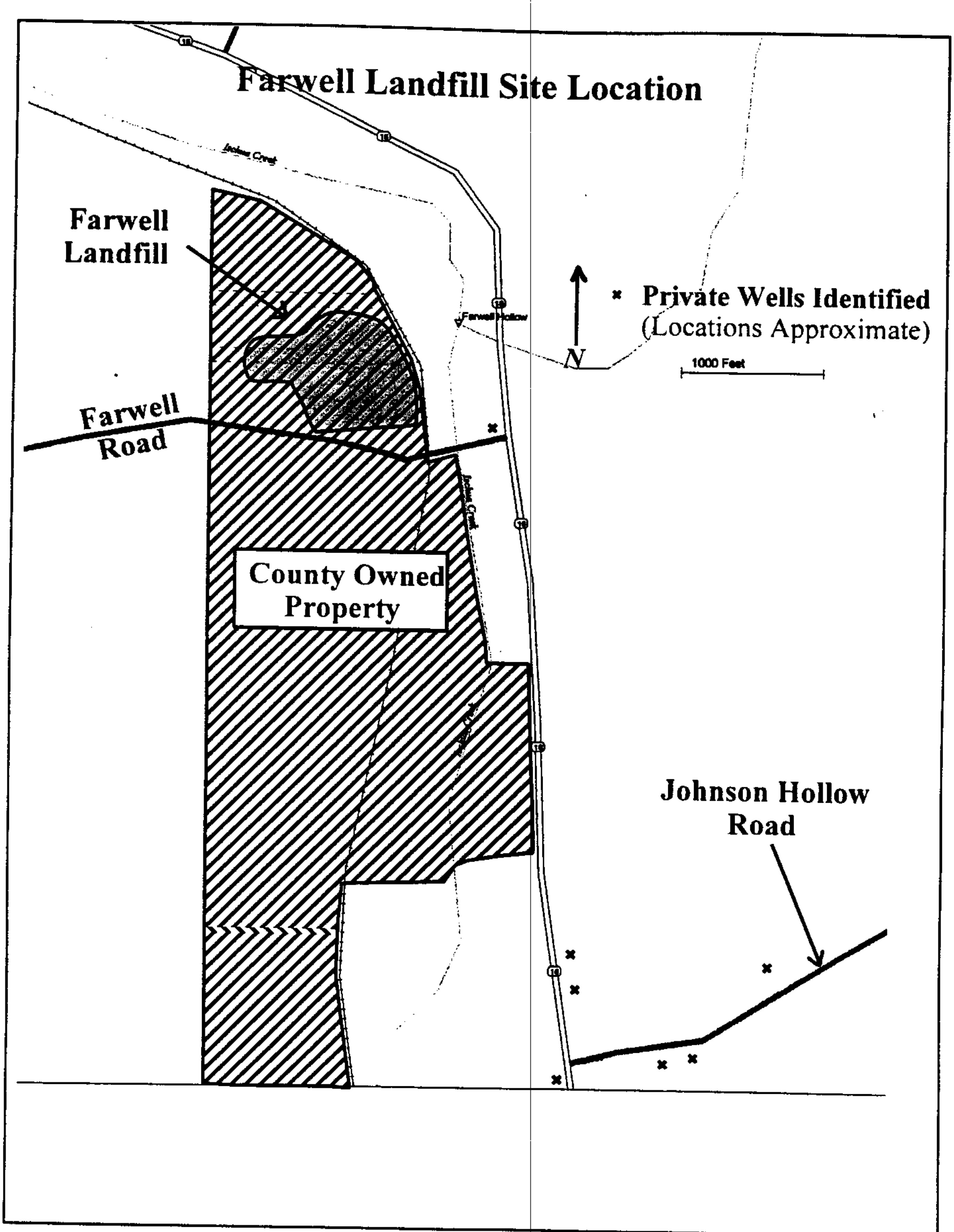

Figure 1 - Site Location

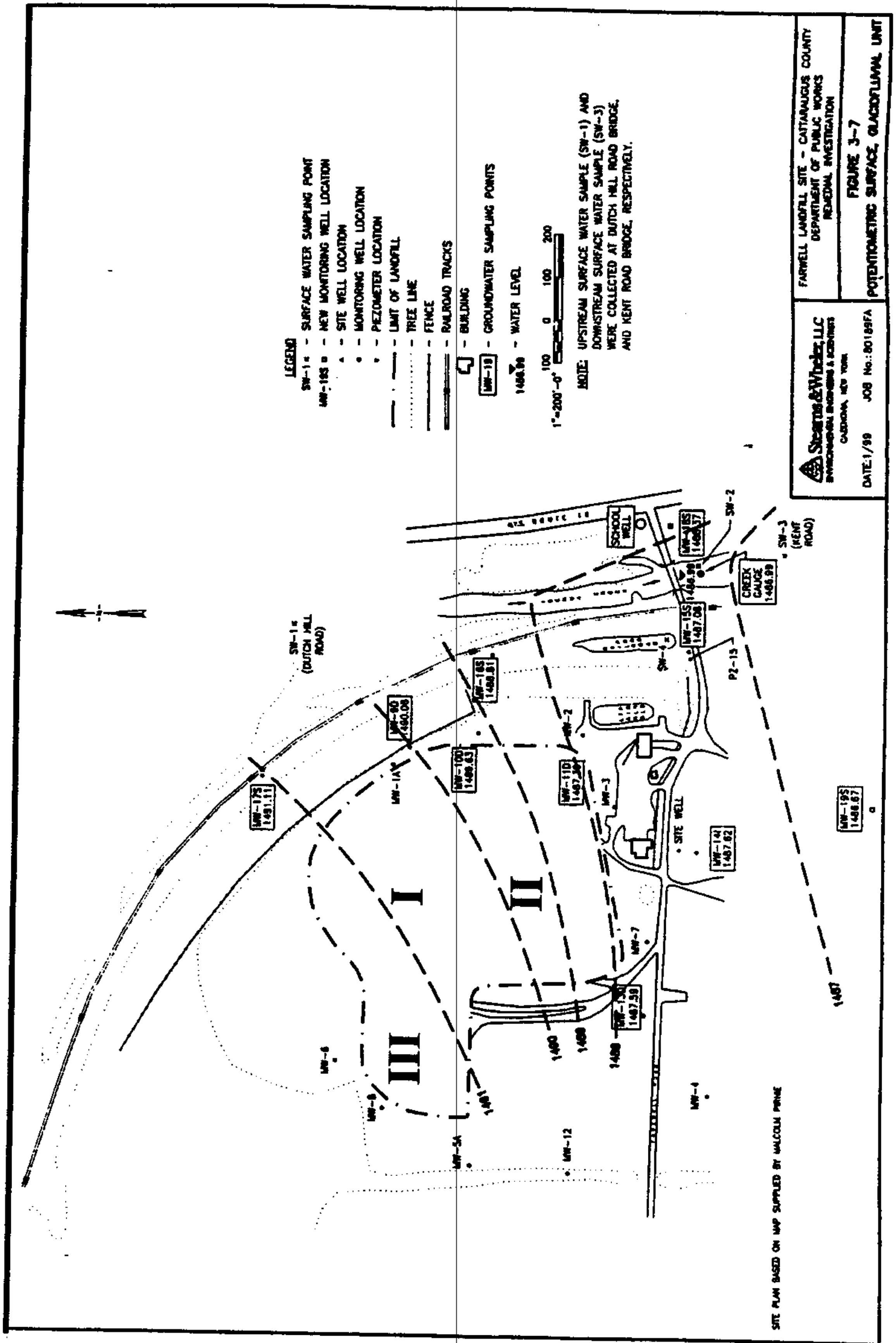

Figure 2 - Site Map

Table 1
Nature and Extent of Contamination
Groundwater

	CONTAMINANT OF CONCERN	CONCENTRATION RANGE * (ppb)	FREQUENCY of EXCEEDING SCGs	SCG (ppb)
Volatile Organic Compounds (VOCs)	Trichloroethene	ND - 45	1 of 20	5
	1,1 Dichloroethane	ND - 160	11 of 20	5
	Chloroethane	ND - 120	7 of 20	5
	1,2 Dichloroethene (total)	ND - 28	5 of 20	5
	1,1,1 Trichloroethane	ND - 27	5 of 20	5
	Vinyl chloride	ND - 9	6 of 20	2
	Benzene	ND - 2	1 of 20	1
TAL Inorganics	Antimony	ND - 6.7	3 of 20	3
	Arsenic	ND - 59.8	2 of 20	25
	Barium	53.4 - 8,490	3 of 20	1,000
	Iron	7.5 - 87,500	16 of 20	300
	Manganese	11.2 - 3,080	11 of 20	300
	Cadmium	ND - 12.8	1 of 20	10
	Sodium	ND - 39,400	8 of 20	20,000
	Zinc	9.7 - 307	1 of 20	300
	Magnesium	14,600 - 59,700	6 of 20	35,000
	Lead	ND - 55	4 of 20	25

ND - Not detected.

Table 2A
Historical Extent of Contamination
Groundwater
(parts per billion)

	TCE					1,1,1 TCA				
Monitoring Well	9D	11D	14I	15I	16S	9D	11D	14I	15I	16S
Sample Date Mo / Yr 9/88	<5	130				28	110			
4/89	<5	85				36	300			
12/89	15	70				96	100			
3/90	<3	50				140	120			
9/90	<30	46				110	95			
3/91	8	26	6	<5	10	67	55	49	1	90
9/91	8.2	39	7	<5	7.2	61	68	16	30	66
4/92	6.9	1.2	5.3	<3	11	<3	39	27	4	71
10/92			6.4	13	8.1			25	47	52
4/93			5	13	7			26	46	46
10/93			<3	6	8			<3	19	53
4/94			3	7.8	6.6			14	33	60
10/94	5.6	6.1	4.3	8.9	5.3	31	38	7.2	28	42
4/95			6.3	14	7			18.3	35	27
10/95			1.8	2.4	3.6			1.6	7.37	20.7
4/96	3.57	25.5	<1	5.98	1.98	20.2	40.6	6.49	28.7	20
10/96			1.83	2.45	3.01			6.01	11.6	27.6
4/97			4	15	7			16	33	23
10/97			43	<3	7			7	<3	25
4/98			5	16	7			11	30	16
10/98	5	61	4	10	7	14	36	<3	18	17

Table 2B
Historical Extent of Contamination
Groundwater
(parts per billion)

	1,2 DCE					Vinyl Chloride				
Monitoring Well	9D	11D	14I	15I	16S	9D	11D	14I	15I	16S
Sample Date Mo / Yr 9/88	<5	<5				<10	<10			
4/89	<5	<5				<10	<10			
12/89	<3	<3				3	<3			
3/90	<3	<3				<3	<3			
9/90	<30	<30				<30	<30			
3/91	30	18	6	<5	36	4	4	3	<10	<10
9/91	23	23	5.6	16	36	<10	<10	<10	<10	<10
4/92	20	15	5.3	<3	28	3.6	<3	4	<3	<3
10/92			6.2	19	21			<3	<3	<3
4/93			6	17	23			4	<3	<3
10/93			<3	<3	<3			4	<3	<3
4/94			4.1	9.2	18			<3	<3	<3
10/94	11	11	5.2	13	15	<3	<3	<3	<3	<3
4/95			9.4	19	14			<1	<1	<1
10/95			3.3	3.52	8.3			1.8	2.4	3.6
4/96	10.6	20.5	13.3	25.7	21.5	3.6	25.5	<1	6	2
10/96			8.5	7.9	18.4			1.83	2.45	3
4/97			9	16	12			4	15	7
10/97			7	<3	11			43	<3	7
4/98			6	19	9			5	16	7
10/98	16	31	<3	<3	8	5	61	4	10	7

Note: 1,2 DCE and vinyl chloride are possible degradation products of both TCE and 1,1,1 TCA.

Table 2C
Historical Extent of Contamination
Groundwater
(parts per billion)

	1,1 DCA					Chloroethane				
Monitoring Well	9D	11D	14I	15I	16S	9D	11D	14I	15I	16S
Sample Date Mo / Yr 9/88	85	170				<10	<10			
4/89	550	960				<10	200			
12/89	<3	250				80	75			
3/90	440	310				<3	35		-	
9/90	440	450				<30	90			
3/91	270	200	59	10	210	38	69	28	<10	36
9/91	200	230	110	130	180	23	81	77	32	34
4/92	230	140	49	19	190	24	31	34	4.6	38
10/92			52	190	140			69	59	18
4/93			29	180	110			32	62	15
10/93			14	75	130			5	19	18
4/94			17	120	130			31	44	18
10/94	140	150	46	130	93	8.5	35	85	34	10
4/95			48.7	128	87.2			<1	<1	<1
10/95			<1	<1	<1			<1	<1	<1
4/96	69.3	89.6	55.3	104	81.7			<1	<1	<1
10/96			56	36.8	53.4			<1	<1	<1
4/97			47	140	60			57	88	6
10/97			77	6	60			160	<3	6
4/98			33	140	46			33	68	5
10/98	210	160	44	71	43	20	120	120	30	6

Note: 1,1 DCA and chloroethane are possible degradation products of 1,1,1 TCA.

Table 3
Remedial Alternative Costs

Remedial Alternative	Capital Cost	Annual O&M	Total Present Worth[1]
Alternative 1: No Action	$0	$23,000	$350,00
Alternative 2: Institutional Controls	$12,000	$23,000	$360,000
Alternative 3A: Repaired Cap, Institutional Controls	$380,000	$30,000	$800,000
Alternative 3B: Repaired Cap, Institutional Controls and Expanded Quarterly Monitoring	$420,000	$60,000	$1,300,000
Alternative 4: Upgrade to Latest Part 360 Cap Requirements	$1,500,000	$60,000	$3,000,000
Alternative 5: Upgrade to Latest Part 360 Cap Requirements & Groundwater Recovery/Disposal	$1,900,000	$170,000	$5,000,000

[1]Present Value is based on an interest rate of 5% and project life of 30 years.

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

Farwell Landfill
Proposed Remedial Action Plan
Ischua (T), Cattaraugus County}
Site No. 9-05-024

The Proposed Remedial Action Plan (PRAP) for the Farwell Landfill, was prepared by the New York State Department of Environmental Conservation (NYSDEC) and issued to the local document repository on February 25, 2000. This Plan outlined the preferred remedial measure proposed for the remediation of the contaminated soil and sediment at the Farwell Landfill. The selected remedy is to repair the existing landfill cap, conduct long-term groundwater monitoring and implement institutional controls.

The release of the PRAP was announced via a notice to the mailing list, informing the public of the PRAP's availability.

A public meeting was held on March 16, 2000 which included a presentation of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. Written comments were received from Mr. Eric Meyer, a Cattaraugus County resident. The public comment period for the PRAP ended on March 29, 2000.

This Responsiveness Summary responds to the written comments received and to the questions and comments raised at the March 16 public meeting that could not be addressed by reference to the site reports or PRAP.

The following are the comments received at the public meeting, with the NYSDEC's responses:

COMMENT 1: Does chloride and metals break down in groundwater?
RESPONSE 1: No, chloride and metals do not break down in groundwater.

COMMENT 2: When chemical compounds (e.g. trichloroethene) break down, are the breakdown chemicals dangerous?
RESPONSE 2: Intermediate breakdown products of some contaminants found in the landfill have been identified in groundwater on site. These intermediate breakdown products (e.g. 1,2-dichloroethene, 1,1-dichloroethane and vinyl chloride) do have maximum contaminant levels (MCLs) allowable for public water supplies and do have adverse health effects if individuals are exposed at high concentrations. It is important to note that levels of these intermediate breakdown products decrease significantly in groundwater several hundred feet downgradient from the landfill. It is not expected that levels will exceed MCLs in sentinel monitoring wells to be located between the landfill and the nearest private

wells, let alone in the private wells. No dangers from these compounds will exist since no exposures to the compounds are expected to occur.

COMMENT 3: Why are you not going to test private wells? I want assurances that my well is not impacted.
RESPONSE 3: Private well monitoring is not planned as part of the regular operation and maintenance activities for the site. Several private drinking water wells have been identified within one mile down gradient of the site. These wells have been sampled in the past and no site-related contamination was ever found. The need for sampling these wells located immediately downgradient will be assessed by the New York State Department of Health (NYSDOH) and the Cattaraugus County Health Department (CCHD) as monitoring well data is collected as part of the site operation and maintenance activities. Should monitoring well data indicate a possible threat to the private wells, the NYSDOH and CCHD will sample those wells deemed to be at risk. The NYSDOH and CCHD are also planning to re-sample private wells previously identified as being downgradient of the site when construction work begins at the site.

COMMENT 4: How much of the existing landfill cap needs to be repaired? How will the repairs be made? How long will it take?
RESPONSE 4: For the purpose of providing a rough cost estimate, it was assumed in the Feasibility Study that one third of the landfill cap or approximately 5 acres would need some repair. A more accurate estimate will be determined during the design phase of the remedy. To make the repairs, it is expected that the cover of topsoil will first be removed to expose the underlying layer of compacted clay. Low spots and damaged portions of the clay layer will be filled with clay, matching the permeability of the existing material. The topsoil would then be replaced and reseeded. It has been estimated that repairs would take approximately six months to complete.

COMMENT 5: Is it possible that a drought or groundwater pumping could change groundwater flow patterns, pulling contamination from the landfill side of Ischua Creek to the residential wells on the opposite side?
RESPONSE 5: As part of the selected remedy, groundwater elevations will be carefully monitored for any changes in groundwater flow patterns. However, it is considered very unlikely that conditions could exist that would allow groundwater contamination to cross beneath the creek. The water level in the creek approximates the lowest groundwater elevation in the creek valley. Groundwater from both sides of the valley converge and discharge at the creek. There is no historical evidence that Ischua Creek has ever been dry, suggesting that the convergence of groundwater has always been maintained. Furthermore, sampling of the site monitoring wells has found most of them to be moderately slow in producing water, some were nearly pumped dry. This indicates that influence on the groundwater elevation or the "cone of depression" from pumping these wells extends over relatively short distances. Normal usage of the residential wells and pumping of site monitoring wells during sampling activities is unlikely to have a profound effect on the groundwater flow patterns.

COMMENT 6: Why was there no liner beneath the landfill?
RESPONSE 6: The earliest portions of the landfill were built without a bottom liner, following the common construction practices of the time. New York State regulations now require a bottom liner in all newly constructed landfills.

COMMENT 7: Is the Alcas Corporation also going to have to pay for the cleanup?
RESPONSE 7: Alcas was named as a settling party in the Order on Consent which obligated Cattaraugus County to complete the RI/FS. Alcas paid for some of the costs of the RI/FS. With the release of the Record of Decision, the NYSDEC will approach both the County and Alcas to implement the remedy under a new Order on Consent.

A letter was received on March 24, 2000 from Mr. Eric Meyer, a Cattaraugus County resident, which included the following comments:

COMMENT 1: During the March 16, 2000 public meeting, NYSDEC described Alternative 3B as the chosen remedy. The public was not given an opportunity to participate in the remedy selection process, NYSDEC had already decided on the remedy.
RESPONSE 1: The March public meeting was designed to present the information gathered over the 18 month period of the site Remedial Investigation and Feasibility Study, and to reflect the NYSDEC's preferred remedial alternative. During the meeting it was stated that a remedy would not be decided upon until all public comments received were addressed.

The goal of New York's hazardous waste site remedial program is to ensure the development of timely, effective site remedial programs that protect people and the environment, and that the public understands and supports. Citizen participation creates opportunities for the public to express preferences and provide input that New York State Department of Environmental Conservation (NYSDEC) staff need to know and which is factored into decision making. However, citizen participation does not substitute for decision making. Ultimate decision making responsibility resides with NYSDEC and other agencies charged by the people through their government with identifying, investigating, and remediating hazardous waste sites.

Under the New York State's Inactive Hazardous Waste Site Remedial Program, the NYSDEC follows a path of thorough site investigation, enforcement, remedial action selection, design and construction. Along that path, we try to keep the affected community informed and involved. Before the Farwell Landfill remedial investigation began in 1998, the NYSDEC and County distributed a fact sheet to the residents living within a mile south of the site.

The fact sheet was also provided to Town and County officials as well as the news media. At least four news articles appeared in various newspapers over the course of the investigation A second fact sheet, noting the completion of the remedial investigation/feasibility study and the availability of the Proposed Remedial Action Plan, was distributed in the same manner as the first. The NYSDEC received no inquiries from the public following the first fact sheet. Four individuals contacted the NYSDEC after the second mailing, two before the public meeting and two afterwards. You were not included on the direct mailing list for either fact sheet, but evidently learned of the project through the news media or some indirect means. While this may have left you with the impression that attempts were not made to include the community in the remedy selection process, such was not the case. Actually, your attendance at the meeting and your written comments were examples of precisely what the NYSDEC had been trying to obtain.

COMMENT 2: Alternative 5 is the only alternative that can be implemented that will have any chance of eliminating or mitigating the significant threat to public health and the environment that the hazardous

wastes pose. Alternative 5 provides for actions which would reduce both the volume and mobility of the contaminants. Alternative 3B (the proposed remedy) offers very little remedial or corrective action.
RESPONSE 2: While preference is given to alternatives which reduce contaminant mobility, toxicity or volumes, this is only one of the several criteria considered. It is important to note that Alternative 5 would be the most difficult to implement given the number of recovery wells required or the depth to which a recovery trench would need to be excavated. As stated in the PRAP (Section 7.2, item 4 Long-term Effectiveness) the risks posed to the public health and the environment following implementation of all but the no action alternative are low. When viewed against the limited current risk (with the existing cap) to the public health and the environment, the degree of added protection provided by Alternative 5 over Alternative 3B is marginal and does not outweigh the disadvantages of low cost-effectiveness and difficulties with implementability.

APPENDIX B

Administrative Record

ADMINISTRATIVE RECORD

Farwell Landfill
Ischua (T), Cattaraugus County
Site No. 9-05-024

***Preliminary Hydrogeological Investigation for Farwell Landfill Site*, Malcolm Pirnie, July 1986**

***Phase I Hydrogeological Investigation at the Farwell Landfill*, Malcolm Pirnie, September 1989**

***Phase II Hydrogeological Investigation at the Farwell Landfill*, Malcolm Pirnie, November 1989**

***Phase III Hydrogeological Investigation at the Farwell Landfill*, Malcolm Pirnie, April 1990**

***Preliminary Evaluation of Remediation Scenarios-Farwell Landfill*, Stearns & Wheler, September 1997**

Groundwater Quality Monitoring Reports (Quarterly and Annual): Malcolm Pirnie; Hayden Wegman; Science, Engineering & Technology Int'l.; and A/E Group Inc.; September 1988 to May 1999

***Remedial Investigation / Feasibility Study - Work Plan*, Stearns & Wheler, June 1998**

***Remedial Investigation Report - Farwell Landfill*, Stearns & Wheler, revised October 1999 (amended February 2000)**

***Feasibility Study Report - Farwell Landfill*, Stearns & Wheler, October 1999 (amended February 2000)**

***Proposed Remedial Action Plan*, NYSDEC, February 2000**

Correspondence from Mr. Eric Meyer to Mr. David Locey (NYSDEC), received March 24, 2000