Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

Lindley Landfill Site
Steuben County
Site Number 8-51-008

February 1998

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

DECLARATION STATEMENT - RECORD OF DECISION

LINDLEY LANDFILL
Lindley, Steuben County
Inactive Hazardous Waste Site No. 8-51-008

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedial action for the Lindley 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 Lindley 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 the Lindley Landfill Site and the criteria identified for evaluation of alternatives, the NYSDEC has selected a containment remedy for the landfill. The major components of the remedy are as follows:

- Continued removal and off-site treatment of leachate using the existing leachate collection and storage systems.
- Design and construction of a low permeability cover system meeting 6 NYCRR Part 360 requirements to significantly reduce infiltration into the wastes.
- A long term operation and maintenance plan for the cover system.

- A long term monitoring plan which will allow the effectiveness of the remedy to be monitored.

- A contingency for the future design and construction of additional groundwater controls, if the cover system alone does not reduce leachate generation rates to manageable levels.

- Deed restrictions will be pursued to prevent future uses of the site which are incompatible with the selected remedy.

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.

2/13/98
Date

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

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Lindley Landfill

Town of Lindley, Steuben County, New York
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SECTION 1: SITE LOCATION AND DESCRIPTION

The Lindley landfill is a 16 acre site located on the south side of Gibson Road in the Town of Lindley, N.Y. The site is approximately 420 feet wide and 1720 feet long. The area around the site is generally rural and consists of forest and farmland. Directly across Gibson Road from the site is the Lindley North landfill, which was closed and covered in 1987 per NYSDEC Division of Solid and Hazardous Materials requirements. The nearest residence is approximately 1/8 mile to the west of the site. Figure 1 shows the site location.

SECTION 2: SITE HISTORY

2.1: Operational/Disposal History

The Lindley Landfill has been owned by the Town of Lindley and operated by the Steuben County Highway Department since initial operations began in 1977. The landfill was operated until 1983, at which time operations were shifted to the Lindley North landfill. During its operating history, the Lindley site accepted both municipal and industrial wastes from within Steuben County. These industrial wastes included lead dusts and other inorganics from Corning Glass Works.

2.2: Remedial History

During the site's operating period, leachate (surface water or groundwater which is contaminated from contact with landfill waste) problems were evident and leachate was observed flowing to an adjacent stream which serves as a tributary to Glendening Creek. Beginning in 1978, efforts were undertaken to limit groundwater flow onto the site. In 1984 a study was initiated by Steuben County to identify methods of leachate control at the site. In 1986 a leachate collection system was installed to control leachate outbreaks from the landfill. This system consisted of the installation of a leachate collection trench within the waste mass, along with a 5,000 gallon leachate storage tank. Two pre-existing groundwater interceptor drains outside the limits of the waste were also connected to the collection system and tank. In 1988 and 1989 additional groundwater and leachate studies were performed. These studies concluded that several thousand gallons of groundwater flow into the site

daily, contacting the waste and producing leachate. In 1989, Steuben County installed additional groundwater diversion systems around the south and west sides of the site in order to reduce leachate generation.

In 1989 and 1990 Phase I and Phase II investigations were performed at the site on behalf of the NYSDEC. The Phase II investigation identified impacts to groundwater and nearby surface water from the site.

SECTION 3: CURRENT STATUS

A Remedial Investigation was completed by Steuben County utilizing State funding available (reimbursement of up to 75% of costs) through the 1986 Environmental Quality Bond Act (EQBA) Title 3 program. The RI report was approved by the NYSDEC in July 1997. A Feasibility Study was completed to evaluate various remedial alternatives assembled to address site contamination. The FS report was approved by the NYSDEC in August 1997. These reports can be found in the document repositories.

3.1: Summary of the Remedial Investigations

The purpose of the RI performed in 1995-1996 was to define the nature and extent of contamination resulting from previous activities at the site. Figure 2 shows site details.

The Remedial Investigation report was prepared in 1997 by C&S Engineers and described findings of field activities and investigations performed in 1995-1996.

The RI activities consisted of the following:

- Soil borings and test trenching to more precisely define the limits of waste;
- Investigations to determine potential for landfill gas migration and gas hazard potential;
- Groundwater monitoring well installation and sampling;
- Residential drinking water well sampling;
- Environmental sampling of surface water and sediment in runoff ditches and adjacent stream (the tributary to Glendening Creek);
- A health risk assessment of site groundwater contaminant migration;
- A Fish and Wildlife Impact Analysis to evaluate potential site impacts to the surrounding ecology; and

- Geophysical investigations and excavations to investigate reported disposal of drums.

To determine which media (groundwater, surface water, sediment) contain contaminants of concern, the RI analytical data was compared to environmental Standards, Criteria, and Guidance (SCGs). Groundwater, drinking water and surface water SCGs identified for the Lindley Landfill site were based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part V of NYS Sanitary Code. For the evaluation and interpretation of sediment analytical results, the Divisions of Fish and Wildlife/Marine Resources Technical Guidance for Screening Contaminated Sediments was used.

Based upon the results of the Remedial Investigation and comparison with the SCGs and potential public health and environmental exposure routes, remedial measures are appropriate at the landfill in order to reduce future impacts to site groundwater as well as potential future impacts to adjacent surface water and sediment. General results of the investigations are summarized below. More complete information can be found in the RI Report.

Geology

The overburden (above bedrock) soils in the vicinity of the site consist of a thin topsoil, sand, and silt layer over a relatively thick layer (extending 45-75 feet below grade) of glacial till. The glacial till unit is relatively compact and contains silt, clay, embedded gravel, cobbles, and numerous boulders. The till in the area overlays bedrock which typically consists of interbedded sandstone and shale.

Hydrogeology

Based upon groundwater elevations obtained from the monitoring wells located in and around the landfills on both the north and south sides of Gibson road, overburden groundwater generally follows the topography of the land and converges toward a tributary of Glendening Creek. On the south side of Gibson road (at the site), overburden groundwater flow is generally to the east and northeast. On the north side of Gibson road, overburden groundwater is generally toward the south and east. The groundwater elevations in the bedrock wells indicate that a minor downward vertical hydraulic gradient is present at the site.

Groundwater

The RI was performed in two phases over a period of about 18 months. Groundwater sampling was performed using two of the previously installed wells and 5 new monitoring wells which were installed as part of the RI.

In the first round of groundwater sampling, none of the wells sampled revealed detectable concentrations of volatile organic compounds, with the exception of a sample from one well which

had trace levels of acetone and methylene chloride. These two compounds and the concentrations at which they were detected are consistent with laboratory contamination during sample preparation and analysis. In the second round of groundwater sampling, a trace amount of one volatile organic, 1,1 dichloroethane at 5 parts per billion (ppb) was detected in one of the monitoring wells. No pesticides or PCBs were detected in groundwater samples.

Similarly, semi-volatile organic compounds were not detected in site groundwater with the exception of two compounds detected in trace concentrations in some samples. Bis(2-ethylhexl)phthalate was detected in several samples, but in concentrations much lower than NYS Class GA (suitable for drinking water) standards. Moreover, this particular compound and concentration range suggests that its presence may be attributable to sampling procedures. In addition, a very low concentration (16 parts per billion) of diethylphalate was detected in one well.

Groundwater samples indicated the presence of various metals in both the overburden and bedrock groundwater monitoring wells. The concentrations of metals detected in the wells around the landfill are generally higher than concentrations detected in the well upgradient from the landfill. Metals detected which exceeded Class GA groundwater standards included iron at up to 42 parts per million (ppm), lead at up to 0.13 ppm, magnesium at up to 115 ppm, manganese at up to 6.8 ppm, arsenic at up to 35 ppm, zinc at up to 0.62 ppm, and chromium at up to 0.07 ppm. Table 1 summarizes compounds detected in groundwater samples and their detected concentration range.

Although a downward vertical hydraulic gradient appears to exist at the site, bedrock groundwater samples did not indicate any significant contaminants. In general, concentrations of metals in the bedrock were lower than those present within the overburden.

Surface Water and Sediment

Surface water samples were taken at various points along the tributary to Glendening Creek which flows adjacent to Gibson Road. No volatile organic compounds, pesticides, or PCBs were detected in the surface water samples. With the exception of trace concentrations of bis(2-ethylhexl)phthalate and di-n-butylphthalate, no semi-volatile organic compounds were detected in surface water samples. Metals such as iron, copper, lead and zinc were detected in some surface water samples above Class "C" surface water standards, but the concentrations detected were relatively low (Class "C" standards were set to protect stream quality and allow fish reproduction and human consumption of fish). Concentrations of metals in the upgradient surface water sample were similar to those detected in the samples obtained from the landfill drainage area. Table 2 summarizes compounds detected in surface water samples and their detected concentration range.

Sediment samples taken from the tributary to Glendening Creek revealed trace amounts of one volatile organic (1,4 dichlorobenzene at 5 ppb) compound and several semi-volatiles and pesticide compounds. In addition, several metals including lead, manganese, iron, copper, and arsenic were detected above sediment guidance concentrations. In general, these compounds were detected in

similar concentrations in the upgradient sediment sample. Moreover, concentrations of semi-volatile and pesticide compounds were very low, and while several metals are present in concentrations above sediment guidance, impacts to tributary sediment from the site are considered relatively minor. Table 3 summarizes compounds detected in sediment samples and their detected concentration range.

Landfill Gas

Landfill gas investigations revealed methane gas at levels typical of those at similar landfills. Given the location of the site and the lack of gas migration conduits (such as sewers, waterlines, and other underground utilities), landfill gas migration is not considered a significant concern at this site.

Geophysical Investigations

Geophysical investigations were performed in an attempt to confirm reported drum disposal within the landfill. Based upon the results of these investigations, test trenches were excavated to identify the magnetic anomalies identified. These test trenches revealed various metal objects such as white goods (washers, dryers, etc.), metal sheeting, wire mesh, metal strapping material, etc. In addition, 3 flattened and empty steel drums and one crushed plastic drum were found. No other drums were found. Since the geophysical investigation effectiveness was limited to a depth of about 15 feet below existing grade, the presence of buried drums cannot be ruled out. However, given the depth and nature of the waste encountered, and the relatively minor groundwater contamination detected at the site, it was determined that further drum investigation was not warranted.

3.2: Interim Remedial Measures

Interim Remedial Measures (IRMs) are conducted at sites when a source of contamination or an exposure pathway can be effectively addressed before completion of the RI/FS. Prior to the start of the RI, the County identified an appropriate IRM. Historically, leachate collected from a network of underground pipes at the landfill has been stored in an underground tank located within the landfill. Leachate is periodically pumped from the storage tank to tanker trucks for shipment to a disposal facility. However, the underground tank does not have sufficient capacity to hold the collected leachate between tanker shipments. As a result, the leachate collection system has been limited in its effectiveness.

Therefore, the Consent Order was written to include a requirement to design and construct an IRM consisting of additional leachate storage and handling facilities. An IRM workplan was approved by the NYSDEC in October 1995, and the IRM design was approved in September 1996. Construction of the new 75,000 gallon leachate storage tank and loading facility has been completed and the new leachate storage and handling facilities are operational.

3.3: Summary of Human Exposure Pathways

This section describes the types of human exposures that may present added human health risks to persons at or around the site. A more detailed discussion of the health risks can be found in the Baseline Human Health Risk Assessment contained in Section 5 of the RI report.

The Baseline Human Health Risk Assessment identified potential exposure pathways from the site (i.e. how an individual may come into contact with a contaminant). The five elements of an exposure pathway are 1) the source of the 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.

Completed pathways which are known to or may exist because of the site include:

- Dermal (skin) contact with, or incidental ingestion of leachate outbreaks by site workers or trespassers; and

- Dermal contact with, or incidental ingestion of contaminated surface water or sediment by site workers or others.

Given the very low contaminant concentrations in the adjacent tributary to Glendening Creek, it is unlikely that the surface water pathway poses a significant threat to human health.

3.4: Summary of Environmental Exposure Pathways

This section summarizes the types of environmental exposures which may be presented by the site. A Habitat Based Assessment/Fish and Wildlife Impact Analysis was performed at the site. Numerous wildlife was observed at and around the site during the assessment. In general, the impacts from the landfill have likely had a negligible impact on the surrounding fish and wildlife. A detailed discussion of fish and wildlife present at the landfill can be found in Section 6 of the RI report.

SECTION 4: ENFORCEMENT STATUS

The NYSDEC and Steuben County entered into a Consent Order on April 7, 1995. The Order obligates Steuben County to implement a full remedial program. The State Assistance Contract (SAC) signed for this site (under the 1986 EQBA Title 3 program) allows the State to reimburse Steuben County up to 75% of the eligible remediation costs. In addition, the SAC provides for reimbursement of 8% (based upon the site's leachate volume) of the County's expenses to construct their leachate pretreatment plant located on Turnpike Road in Bath, N.Y.

Consent Order

Date	Index #	Subject
4/7/95	B8-0376-91-06	Remedial Program w/ IRM
7/30/86	R8-0575-86-07	Leachate Collection System

SECTION 5: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6NYCRR 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 should eliminate or mitigate all significant threats to public health and to 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 the potential for direct human or wildlife contact with site contaminants.*
- *Reduce leachate generation through the reduction of infiltration into the waste mass.*
- *Reduce present and future potential for groundwater contamination through the effective collection and management of leachate generated from the landfill.*

SECTION 6: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy should be protective of human health and the environment, be cost effective, comply with other statutory laws and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Lindley Landfill site were identified, screened and evaluated in a Feasibility Study. This complete evaluation is presented in the Feasibility Study report dated August 1997.

A summary of the detailed analysis follows. As used in the following text, the time to implement reflects only the time required to implement the remedy, and does not include the time required to design the remedy or procure contracts for design and construction.

6.1: Description of Alternatives

The potential remedies are intended to address any remedial needs beyond the IRM leachate storage and management activities. All remedial alternatives assume long term operation and maintenance of the leachate collection system and IRM facilities which have been constructed.

Alternative 1: No Action

Present Worth:	$0
Capital Cost:	$0
Annual O&M (30 years):	$0
Time to Implement:	0 months

The no action alternative is evaluated as a procedural requirement and as a basis for comparison. If selected, this alternative would leave the site in its present condition and would not provide any protection for human health and the environment.

Alternative 2: Institutional Controls

Present Worth:	$300,000
Capital Cost:	$75,000
Annual O&M (30 years):	$20,000
Time to Implement:	1 month

Alternative 2 would consist of some physical and institutional controls to limit site access. A fence with warning signs would be installed around the site to deter site access. In addition, deed restrictions would be implemented by the County. A long term monitoring and sampling plan would also be implemented.

Alternative 3: Low Permeability Cover System

Present Worth:	$2,275,000
Capital Cost:	$2,000,000
Annual O&M (30 years):	$25,000
Time to Implement:	12 months

Alternative 3 would provide for containment of the wastes through design and construction of a low permeability cover system meeting requirements of 6NYCRR Part 360. Such a cover system would include a synthetic liner (covered with a soil protective layer and a vegetative layer) to reduce infiltration of water into the waste material. A long term operation and maintenance (O&M) plan would be instituted which would include appropriate cover maintenance as well as monitoring and sampling activities to evaluate the effectiveness of the remedy. The installation of a low permeability

cover system would significantly reduce leachate generation rates due to infiltration. This reduction would be expected to allow the County to undertake long term collection and treatment of landfill leachate in a cost effective manner. There is, however, significant variability in estimates of the amount of leachate which is the result of groundwater flow into the waste. The extent of current leachate generation due to groundwater infiltration would not be determined until after the cover system has been completed.

Alternative 4: Low Permeability Cover System with Additional Groundwater Controls

Present Worth:	$2,500,000
Capital Cost:	$2,200,000-$3,000,000
Annual O&M (20 years):	$30,000
Time to Implement:	12-18 months

This alternative would be similar to Alternative 3, but would add additional groundwater controls (several options would be considered such as slurry walls or additional diversion trenches) to further reduce the amount of groundwater which contacts the waste. Previous studies have indicated that 40-60% of leachate flow volume may be the result of groundwater movement through the waste. By reducing groundwater flow though the waste, greater reductions in leachate generation would be expected from this alternative than from construction of a low permeability cover system alone.

6.2 Evaluation of Remedial Alternatives

The criteria used to evaluate the potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6NYCRR Part 375). For each of the criteria, a brief description is provided followed by an evaluation of the alternative against that criterion. A detailed discussion of the evaluation criteria and comparative analysis is contained 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. Action specific SCGs include requirements of 6 NYCRR Part 360 pertaining to closure of the landfill. The most significant chemical specific SCGs for the site include groundwater standards and guidance values contained in NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. and NYSDEC Division of Fish and Wildlife/Marine Resources Technical Guidance for Screening Contaminated Sediments.

Alternative 1:

No further action would not result in compliance with action specific of chemical specific SCGs. Groundwater at the site currently exceeds groundwater standards for several inorganic compounds. Some adjacent surface water and sediment also contain inorganic contaminants in excess of standards and guidance.

Alternative 2:

Similar to the no further action alternative, institutional controls would also not result in compliance with action specific or chemical specific SCGs.

Alternative 3:

A cover system would result in compliance with action specific SCGs, and may eventually result in compliance with chemical specific SCGs. The low permeability cover system would result in a substantial decrease in leachate generation. However, uncertainty in leachate generation rates due to contributions from groundwater results in uncertainty in the time it may take groundwater to reach SCGs. Over time, this reduction in leachate should allow groundwater contaminants to attenuate sufficiently to achieve groundwater standards. Construction of the cover system would be expected to prevent future leachate outbreaks, which would in turn virtually eliminate all adjacent surface water and sediment impacts.

Alternative 4:

Similar to alternative 3, a cover system with additional groundwater controls would result in compliance with action specific SCGs, and would likely result in compliance with chemical specific SCGs. The low permeability cover system with additional groundwater controls would also result in a substantial decrease in leachate generation. Groundwater contaminants should attenuate sufficiently over time and achieve groundwater standards. Construction of the cover system with additional groundwater controls would be expected to prevent future leachate outbreaks, eliminating all adjacent surface water and sediment 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.

Alternative 1:

The No Action Alternative would not adequately protect human health and the environment. In its present condition, site access is unrestricted and risks of potential human exposures to leachate

outbreaks would remain. In addition, continued leachate outbreaks could have future impacts to surface water and sediments in the vicinity of the landfill.

Alternative 2:

The institutional controls alternative would not be completely protective of human health and the environment. While physical controls would restrict site access, leachate outbreaks would continue to periodically occur, and could result in impacts to adjacent surface water and sediment. The potential for human exposures would remain for those off-site areas impacted by leachate outbreaks.

Alternative 3:

A low permeability cover system would be protective of human health and the environment by substantially reducing the amount of leachate generated and thereby preventing future leachate outbreaks.

Alternative 4:

Similar to alternative 3, a low permeability cover system with additional groundwater controls would also be protective of human health and the environment by reducing the amount of leachate generated and preventing future leachate outbreaks.

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 implementation of an alternative are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared with the other alternatives.

Alternative 1:

Since there are no additional construction activities associated with the no action alternative, there would not be any added short term risks to the community, workers, or the environment. This alternative would not achieve the remedial action objectives.

Alternative 2:

Institutional and physical controls would not cause any added short term impacts to the community, workers, or the environment. This alternative would not achieve all the remedial action objectives.

Alternative 3:

Construction of a cover system would pose limited short term impacts to the community, workers, and the environment. A short term increase in traffic would be expected. Appropriate health and safety measures would be taken to ensure protection of workers and the community during construction activities. Remedial action objectives would be met after construction completion.

Alternative 4:

Similar to construction of a cover system alone, the addition of groundwater controls would pose limited short term impacts to the community, workers, or the environment. A short term increase in traffic would be expected. Appropriate health and safety measures would be taken to ensure protection of workers and the community during construction activities. Remedial action objectives would be met after construction completion.

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.

Alternative 1:

The No Further Action alternative would not provide for long term effectiveness or permanence since no remedial measures would be performed. In its current state, the current cover material will deteriorate and the potential would exist for direct contact with waste materials and leachate. In addition, significant leachate generation would continue to occur, and could cause an increase in groundwater, surface water and sediment impacts from the landfill. No active controls would be implemented to limit potential exposures to site contamination.

Alternative 2:

Institutional and physical site controls would provide for improved but limited long-term effectiveness and permanence. While the controls will prevent direct contact with any on-site wastes or leachate, continued infiltration into the waste mass will continue to result in significant leachate generation. If allowed to continue in the long term, leachate generation and periodic outbreaks could cause an increase in groundwater, surface water and sediment impacts from the landfill.

Alternative 3:

This alternative would provide for greater long term effectiveness and permanence by ensuring cover integrity and by reducing leachate generation rates. A reduction in leachate generation should result in the elimination of off-site leachate flows, as well as a reduction in future groundwater impacts from

leachate. When proper operation and maintenance of a low permeability cover system is performed, it serves as a reliable means of containment of the wastes and their contaminants.

Alternative 4:

Additional groundwater controls would be expected to further reduce leachate generation beyond what would be expected from a low permeability cover system alone. Such controls would be reliable provided they where properly maintained in conjunction with the cover system. However, numerous groundwater controls have been previously installed at the site. It is uncertain to what extent further reductions in leachate volume could be achieved beyond the reduction from completion of a cover system alone.

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.

Alternative 1:

The no action alternative would not provide for any reduction in toxicity, mobility, or volume of surface water, sediment, or groundwater contaminants.

Alternative 2:

Institutional controls would not provide for any reduction in toxicity, mobility, or volume of surface water, sediment, or groundwater contaminants.

Alternative 3:

A low permeability cover system would result in a reduction in volume and mobility of landfill contaminants within the leachate. Groundwater, surface water, and sediment contaminants would be expected to attenuate.

Alternative 4:

A low permeability cover system with additional groundwater controls would also result in a reduction in volume and mobility of landfill contaminants within the leachate. As with a cover system alone, groundwater, surface water, and sediment contaminants would be expected to attenuate. However, some groundwater diversion controls have been previously installed at the site, and it is uncertain how successful additional groundwater controls would be at further reducing leachate generation.

6. Implementability. The technical and administrative feasibility of implementing each alternative is 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 personal and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.

Alternative 1:

The no action alternative would be readily implementable since no activities would be required.

Alternative 2:

Physical and institutional controls would be readily implementable. Periodic groundwater monitoring would be readily implementable.

Alternative 3:

Design and construction of a low permeability cover system is readily implementable. Such a cover system is routinely constructed at landfill sites. O&M and periodic groundwater monitoring would be readily implementable.

Alternative 4:

Design and construction of a low permeability cover system with additional groundwater controls is also readily implementable. Several groundwater controls (diversion and interceptor trenches) have been previously installed at the site. O&M and periodic groundwater monitoring would be readily implementable.

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 costs for each alternative are presented in Table 4.

Alternative 1 would cost nothing.

Capital costs for Alternative 2 are estimated at $75,000. Annual O&M costs are estimated at $20,000. Capital costs with the addition of thirty years of O&M would result in a total present worth cost of $300,000.

Capital costs for Alternative 3 are estimated at $2,000,000. Annual O&M costs are estimated at $25,000 and do not include the cost of future leachate treatment. Capital costs with the addition of thirty years of O&M would result in a total present worth cost of $2,280,000.

Capital costs for Alternative 4 are estimated at between $2,200,000 - $3,000,000. Annual O&M costs are estimated at $30,000 and do not include the cost of future leachate treatment. Capital costs with the addition of thirty years of O&M would result in a total present worth cost of between $2,540,000 - $3,340,000.

This final criterion is considered a modifying criterion and is taken into account after evaluating those above. It is focused upon 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 were evaluated. Numerous questions on the PRAP and the RI/FS reports were raised at the public meeting which was held on November 6, 1997. No written comments on the site were received. A " Responsiveness Summary" that summarizes public comments and questions and the Department responses is included in Appendix A.

SECTION 7: SUMMARY OF THE SELECTED REMEDY

Based upon the results of the RI/FS, and the evaluation presented in Section 6, the NYSDEC has selected Alternative 3 as the remedy for this site.

This selection is based upon the review of the site data and evaluation of the alternatives and their ability to meet the above discussed criteria.

This selection is also based on the following:

All of the remedial alternatives assume long term operation and maintenance of the leachate collection system and IRM facilities which have been constructed.

Alternative 1 fails to meet either of the threshold criteria and is rejected on that basis.

In comparison to no further action, Alternative 2 offers limited added benefits for protection of human health and the environment, and does not meet SCGs appropriate for landfills.

Alternative 3 would satisfy threshold criteria, would not pose any significant short term impacts to the community or the environment, and would be readily implementable. As a containment remedy, when combined with the IRM (additional tank storage and loading facility), Alternative 3 would effectively and permanently reduce the volume and mobility of landfill leachate. Alternative 3 would also provide the most cost effective solution since a cover system will significantly reduce leachate generation at the landfill. However, due to the uncertainty about future leachate derived from groundwater flow, the need for additional groundwater controls would be considered after the cover system has been completed and future leachate generation rates are re-evaluated. The reduction in

leachate generation should allow localized groundwater contamination to attenuate and achieve standards.
Alternative 4 would offer benefits similar to Alternative 3, and may offer a slightly enhanced reduction in volume and mobility of landfill leachate. However, some groundwater controls currently exist at the landfill, and it is uncertain how much additional reduction of leachate volume could be achieved with this alternative. Additional groundwater controls may be unnecessary since the cover system alone may provide sufficient reduction of the leachate generation rate.

Alternative 3 is lower in cost than Alternative 4, and since it would equally satisfy the other criteria, including the threshold criteria, it is the preferred alternative.

The estimated present worth cost to implement the proposed remedy is estimated at approximately $2,275,000.

The elements of the proposed remedy are as follows:

1. Continued removal and off-site treatment of leachate using the existing leachate collection and storage systems.

2. Design and construction of a low permeability cover system in accordance with 6NYCRR Part 360.

3. A long term Operation and Maintenance (O&M) plan will be prepared. O&M activities anticipated include periodic mowing of vegetation and repairs of the cover, gas vent, etc. as necessary.

4. A long term monitoring program will be instituted. This program will allow the effectiveness of the selected remedy to be monitored and will be a component of the operation and maintenance for the site. On-site and adjacent groundwater will be periodically sampled. In addition, a homeowner well sampling program will be implemented.

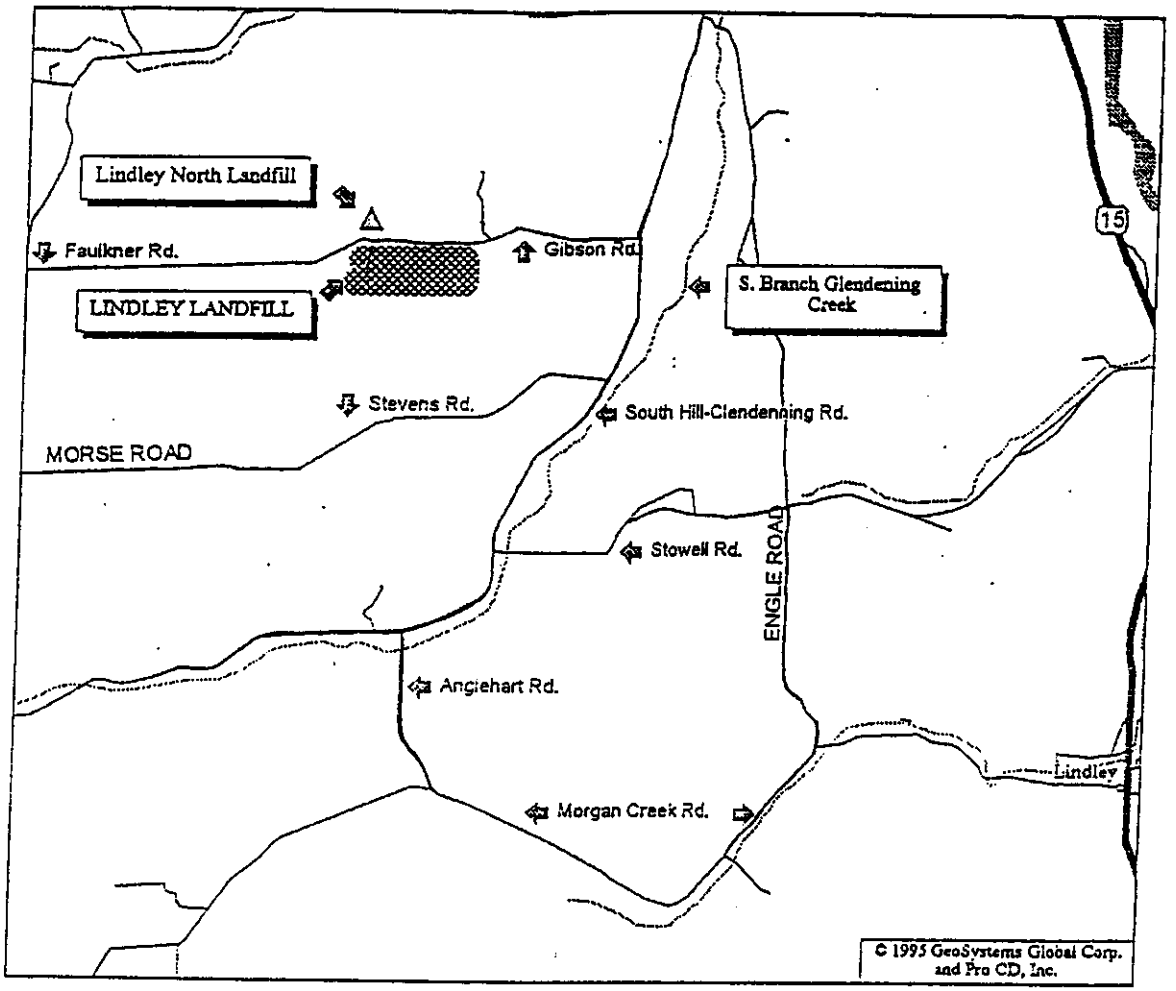
5 Monitoring of leachate generation rates will be performed after completion of the cover system. It is expected that leachate rates will be reduced to manageable levels after the cover system is completed. However, should leachate generation continue at unmanageable rates, additional groundwater controls will be re-evaluated. This contingency would allow for the future design and construction of additional groundwater controls, if necessary, to ensure the remedy selected will function effectively.

6. Deed restrictions will be pursued to prevent future uses of the site which are incompatible with the proposed remedy.

SECTION 8: Highlights of Community Participation

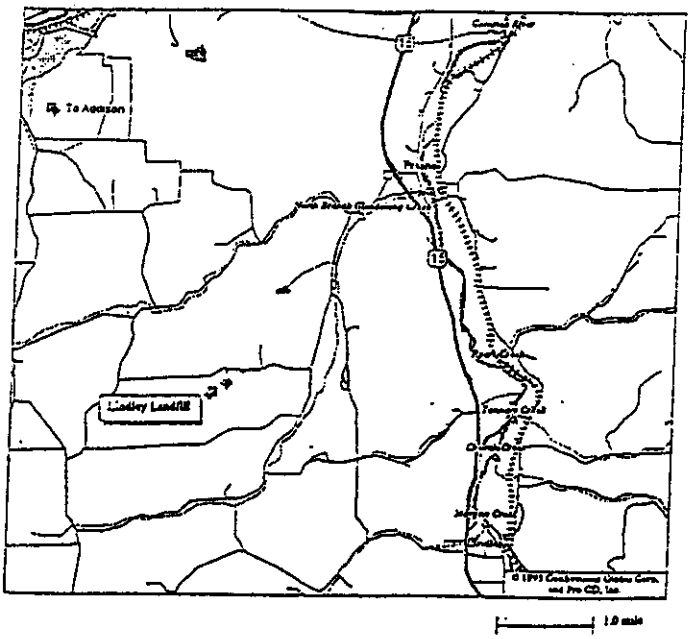
- Document repositories were established for public review of project related material.
- A site mailing list was established which included nearby property owners, local political officials, local media, potentially responsible parties, and other interested parties. This list has been periodically updated.
- A citizen participation plan was established in 1995 and updated periodically throughout the remedial process.
- Fact sheets were distributed to the mailing list on several occasions to update the public and interested parties. Fact sheets were distributed at the following times: October 1995; October 1996; October 1997.
- A public availability session was held on November 2, 1995 to discuss the RI/FS workplan and to answer questions regarding the remedial program.
- A public comment period was held from October 24, 1997 - December 1, 1997 to receive input from the public and other interested parties.
- A public meeting was held on November 6, 1997 to present the PRAP and discuss and answer questions regarding the proposed remedy and the RI/FS.
- A Responsiveness Summary which addresses comments and questions raised during the public meeting was prepared and will be made available to the public in January 1998 as part of the ROD distribution.

Figure 1. Location of Lindley Landfill



Water
Railroad
Minor Road
Primary Road
Point of Interest

0.5 mile



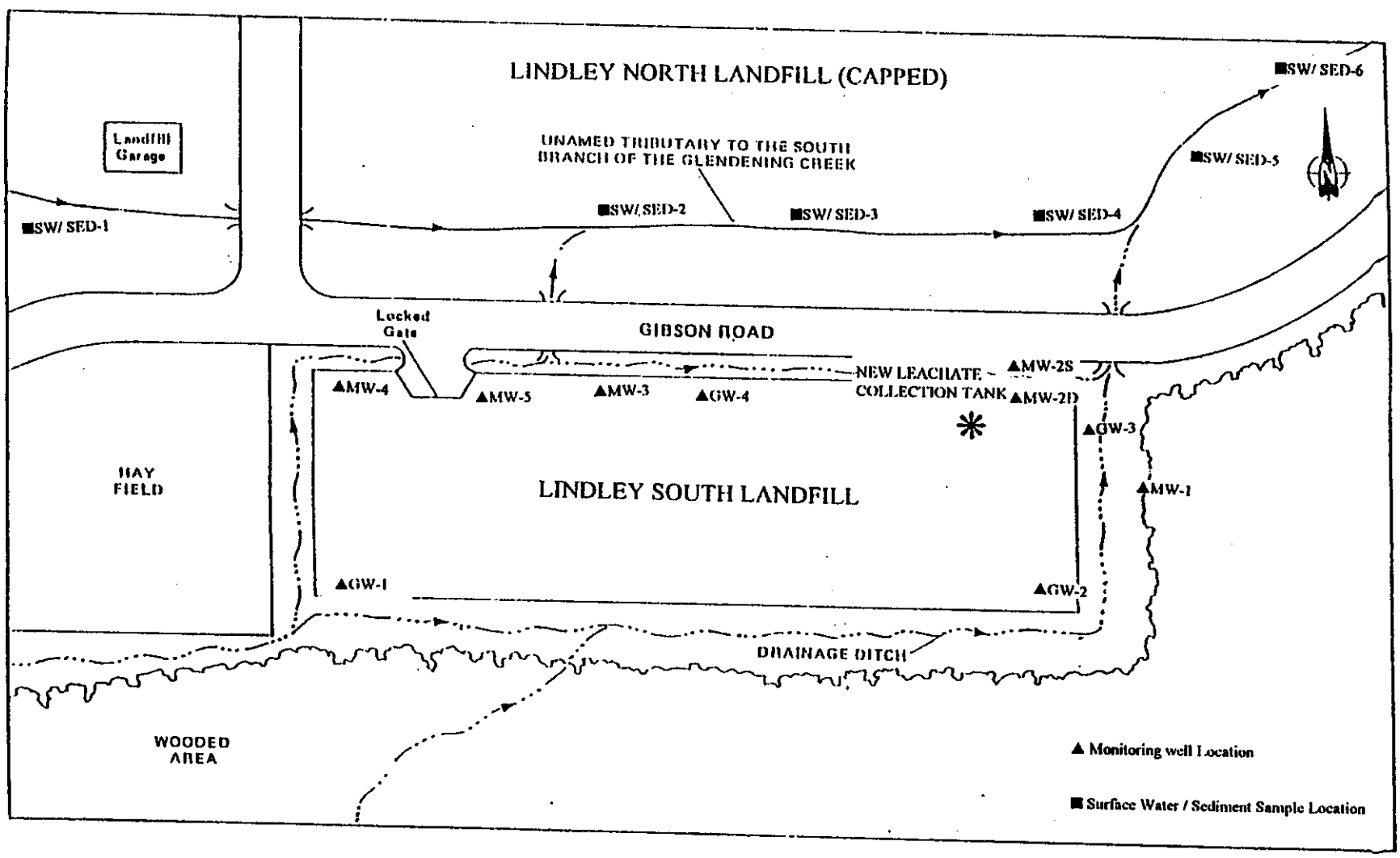


Figure 2

Lindley Landfill Record of Decision

Table 1

Nature and Extent of Groundwater Contamination

MEDIA	CLASS	CONTAMINANT OF CONCERN	CONCENTRATION RANGE (ppb)	FREQUENCY EXCEEDING SCGs	SCG [1] (ppb)
Groundwater	Volatile Organics	1,1 dichloroethane	5	1 of 12	5
	Inorganics	Iron	100 - 42,000	12 of 13	300
		lead	ND[2] - 132	4 of 13	25
		magnesium	23,000 - 115,000	10 of 13	35,000
		Manganese	89 - 6,800	12 of 13	300
		Arsenic	ND - 35	5 of 13	25
		Zinc	ND - 620	2 of 13	300
		Chromium	ND - 70	2 of 13	50

Notes:

1 NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1; "ppb"- parts per billion

2 ND - Non detectable (i.e. below detection limits)

Table 2

Nature and Extent of Surface Water Contamination

MEDIA	CLASS	CONTAMINANT OF CONCERN	CONCENTRATION RANGE (ppb)	FREQUENCY EXCEEDING SCGs	SCG [1] (ppb)
Surface Water	Inorganics	Iron	170 to 24,000	6 of 11	300
		Copper	ND[2] to 35	4 of 11	**[3]
		Lead	ND to 51	2 of 11	**[3]
		Zinc	ND to 100	5 of 11	30

Notes:

1 NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Class "C" Standard; "ppb" - parts per billion

2 ND - Non detectable (i.e. below detection limits)

3 Class "C" Standard is a function of water hardness

Table 3

Nature and Extent of Sediment Contamination

MEDIA	CLASS	CONTAMINANT OF CONCERN	CONCENTRATION RANGE (ppb)	FREQUENCY EXCEEDING SCGs	SCG[1] (ppb)
Sediment	Volatile Organics	1,4 dichlorobenzene	ND[2] - 130	1 of 9	12
	Inorganics	lead	ND - 164,000	7 of 9	31,000
		Manganese	ND - 1,920,000	4 of 9	460,000
		Iron	5,140,000-46,700,000	2 of 9	2%
		Copper	5,000 - 116,000	2 of 9	16,000
		Arsenic	4 - 29,000	5 of 9	6,000

Notes:

1 NYSDEC Division of Fish and Wildlife/Marine Resources Technical Guidance for Screening Contaminated Sediments; "ppb"- parts per billion

2 ND - Non detectable (i.e. below detection limits)

Table 4

Remedial Alternative Costs

Remedial Alternative	Capital Cost	Annual O&M[1]	Total Present Worth
Alt. 1: No Action	$0	$0	$0
Alt. 2: Institutional Controls	$75,000	$20,000	$300,000
Alt. 3: Engineered Cover System	$2,000,000	$25,000	$2,280,00
Alt. 4: Engineered Cover System w/ Additional Groundwater Controls[2]	$2,200,000-$3,000,000	$30,000	$2,540,000-$3,340,000

NOTES:

1 Annual O&M costs do not include leachate treatment costs

2 Groundwater control options vary in cost. The cost range presented includes groundwater control alternatives which range from standard collection trench techniques to slurry wall technology.

APPENDIX A

RESPONSIVENESS SUMMARY

LINDLEY LANDFILL SITE

Lindley, New York
Steuben County

The Proposed Remedial Action Plan (PRAP) for the Lindley Landfill site was prepared by the New York State Department of Environmental Conservation (NYSDEC) and issued to the public on October 24, 1997. This Plan outlined the basis for the recommended remedial action at the Lindley Landfill site and provided opportunities for public input prior to final remedy selection. The selected remedy is summarized in section 7 of the Record of Decision.

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 November 6, 1997 and included a presentation of the Remedial Investigation (RI), the Feasibility Study (FS), and the PRAP. This meeting provided an opportunity for citizens and interested parties to discuss their concerns, ask questions, and comment on the proposed remedy. The comments received at this meeting have been included in the Administrative Record for this site. The public comment period closed on December 1, 1997.

This Responsiveness Summary responds to the questions and comments raised at the November 6, 1997 public meeting. Since some of the questions received concerned similar topics or areas, some of the questions have been summarized. The following questions were raised at the public meeting:

Question: How deep are the wells that were installed as part of the investigation?

State Response:

The shallow wells are installed with screened intervals from approximately 5-10 feet below ground surface to a depth of between 25-30 feet below ground surface. The deep well which was installed in bedrock was screened from approximately 87-97 feet below ground surface.

Question: What did the habitat study involve? Were there fish in the creek or rabbits when the walkovers were done?

State Response:

Section 6 of the RI reports animal species identified at the site during the study period. The fish identified in the tributary to Glendening Creek were Eastern Blacknose Dace and Creek Chub. Mammals identified at the site included woodchuck, grey squirrel, chipmunk, and deer.

Question: Do you know the depth of the landfill waste?

State Response:

Based upon the topography of the mound and the fact that the landfill was begun as a trench and fill operation, the depth of waste is likely 30-40 feet in some parts of the landfill.

Question: Were any local industries approached to see if they had disposed of material within the landfill?

State Response:

Records do exist from "Community Right To Know" (RTK) files in which Corning Glass reported the disposal of "Baghouse Dusts" to the landfill. These dusts included inorganic contaminants such as lead. In addition, discussions were held between the NYSDEC and representatives from both Corning Glass and Ingersol-Rand (currently known as Dresser-Rand) to discuss private funding of a site investigation and feasibility study (RI/FS). After protracted discussions with those companies did not achieve any commitments for the RI/FS, the State and the County conducted the work using the 1986 Environmental Quality Bond Act funding.

Question: How do the results from the investigation of metals contamination in the creek relate to previous studies?

State Response:

During the Phase II investigation performed in 1990, metals were detected in the creek waters above Class C standards. These metals included arsenic, cadmium, chromium, iron, lead, etc. In the remedial investigation, metals detected in creek waters above Class C standards included iron, copper, lead, and zinc. In general, concentrations of the metals detected recently above Class C standards are much lower than those detected in 1990. During the Phase II investigation, metals were detected in the creek sediment above NYSDEC sediment guidance criteria. These metals included cadmium, lead, and zinc. Table 3 in the ROD presents metals detected above sediment criteria in the RI.

Question: Sewage used to be dumped on the landfill when it was in operation. What effects might that have had? Would this disposal increase methane gas releases?

State Response:

It was not uncommon for sludge from waste water treatment plants to be disposed of in landfills during the landfills operating period. Any impacts (such as surface runoff) from this practice would likely have been experienced during the disposal practice. Biological degradation of this type of material would make it extremely unlikely that there would be any long term heath or environmental threat remaining at the site from this activity. Methane gas is produced from the degradation of a variety of landfill wastes. It is unlikely that waste water sludges would significantly increase methane gas production from the landfill.

Question: Was arsenic, mercury, or chromium detected in groundwater or surface waters?

State Response:

Arsenic and chromium were detected in groundwater in concentrations slightly higher than drinking water standards (see table 1 in the ROD). Arsenic and chromium were detected in surface water below standards. Mercury was not detected in any groundwater or surface water sample.

Question: How frequently was the groundwater tested?

State Response:

Groundwater was sampled in 1989 as part of the Phase II investigation. Groundwater wells installed as part of the RI were sampled twice- December 1995 and November 1996. Several downgradient homeowner wells were also sampled (at the same time as the monitoring wells were sampled) as part of the RI. Steuben County routinely samples homeowner wells downgradient from the landfill. The County expects to continue sampling homeowner wells as part of the long term operation and maintenance for the landfill.

Question: What percentage of the water getting into the landfill is from precipitation and infiltration vs. overland runoff and groundwater flow through the landfill?

State Response:

An engineering study done in 1988 on behalf of the County estimated that approximately 50% of landfill leachate is generated from infiltrating precipitation (including some surface drainage onto the landfill) and 50% of the leachate results from groundwater flows through the waste. After the study was performed, the County installed additional subsurface and surface water diversions along the western and southern sides of the landfill. These diversion drains are believed to be only partially effective in reducing groundwater flow through the landfill waste.

Question: **The upgradient well is on private property. The property owners were not asked for permission for this well to be installed. Will this well remain as part of the long term operation and maintenance plan?**

State Response:

The upgradient well was installed in 1989 by a consultant who was working for the NYSDEC under one of the "Phase II" site investigations contracts. The consultant responsible for the installation of this well may not have been aware of the limits of the landfill property. The County has since directed it's present engineering consultant to complete an accurate survey of the property boundaries. This survey has been performed and will ensure that future remedial construction takes place within the confines of the current landfill property.

While the State has the authority to access properties adjacent to hazardous waste sites for the purposes of investigation and remediation, the NYSDEC generally attempts to identify and notify adjacent property owners prior to the start of such activities. The existing upgradient well is a necessary part of the long term groundwater monitoring plan to ensure that the cover system provides an effective site remedy. The County will contact and seek permission from the current property owner in advance of any future groundwater sampling activities at this location.

Question: **The fence along the back (southern) side of the landfill was supposed to be maintained over the years, but is no longer present. Some of the property markers in the trees, as well as some of the trees themselves have been removed by the County. This occurred on private property and should not have happened. What will the County do to make sure this type of thing doesn't occur again?**

State Response:

As the landfill was operated by the County, questions regarding County practices during landfill operations and in the years after the site was inactive should be directed to the Steuben County Department of Public works. However, a recent survey has been completed so that the limits of the property are now clearly marked. The design of the cover system will not require construction activities beyond the property boundaries. As part of the remedial construction, the County will be constructing and maintaining a new chain link fence along the southern property boundary.

Question: **What's in the typical leachate which is hauled from the Lindley Landfill?**

State Response:

Leachate samples taken in the past from the 5000 gallon underground storage tank have shown contaminants such as toluene, phenol, Diethylthalate, PCBs (aroclor 1260), and a variety of metals such as Aluminum, iron, lead, magnesium, manganese, zinc, etc. Both organic and inorganic contaminant concentrations within the leachate have historically been relatively low. Since the completion of the new leachate storage tank, the leachate collection system has been much more effective in collecting the leachate within the landfill.

Question: Can anyone explain the high incidence of cancer in the vicinity of the landfill?

State Response:

Cancer rates in the U.S. population currently indicate that approximately one person in three will develop cancer in their lifetime. In order to evaluate cancer rates in the vicinity of the Lindley landfill and whether these rates are higher than in the general population, a data base would need to be developed and would need to include information such as types of cancer, location of residence in relation to the landfill, length of time at residence, etc.

Question: Have any studies been done by the Department of Health on possible health effects from the landfill? Wouldn't you be able to correlate health effects from the landfill since it has been around since 1977?

State Response:

The NY State Department of Health has not conducted any health studies regarding the Lindley Landfill. The results of the RI did not show that any exposures are presently occurring from the site. It would be very difficult to establish a correlation between health effects and previous possible exposures from the landfill due to the limited population in the vicinity of the site and the lack of any data from possible previous exposures.

Question: Could there have been something in the groundwater or creek waters in the past which could have caused health effects in children?

State Response:

Homeowner wells sampled during the RI have not shown any impacts from the landfill. The water in the creek does not presently pose a health risk to children who play in the creek. However, during landfill operations and prior to the implementation of leachate controls, leachate did enter the creek and may have presented some risk of exposure to children playing in the creek.

Question: What is the time frame for completion of the cap?

State Response:

The County's consultant engineers have been working on the design of the cover system since the fall of 1997. The County and State expect the final design to be approved during the winter, with award of the construction contract by spring of 1998. It is believed that the construction can be completed during 1998.

Question: What will the monitoring program include?

State Response:

The County will perform groundwater monitoring through periodic sampling of existing monitoring wells around the landfill, as well as homeowner wells downgradient of the landfill. The program will require the County to make the sample results available to the public and to directly notify the NYSDEC and NYSDOH should significant contaminant concentration changes occur.

Question: How does the State know what the extent of the groundwater impacts have been from the site? Couldn't there be groundwater contamination miles away from the site by now?

State Response:

When an investigation is done to assess the potential for groundwater contamination from a source area (such as the Lindley landfill), groundwater quality and flow characteristics are first investigated near the suspected source area. Monitoring wells installed and sampled around a suspected source area provide information on flow direction and groundwater quality. In the case of the Lindley landfill, existing monitoring wells were used in conjunction with newly installed wells to assess groundwater quality and migration potential.

Groundwater sampling both around the landfill and downgradient from the landfill did not show any significant groundwater impacts. It is highly unlikely that downgradient groundwater much further away from the landfill would have higher groundwater contaminant concentrations. The more groundwater moves laterally through the soil and bedrock, the more likely that any contaminants within the water experience attenuation from dilution, natural degradation, and other processes. As a normal precaution, Steuben County has initiated homeowner well water sampling on residences downgradient from the landfill. To date there has been no significant groundwater contaminants detected in homeowner wells.

Question: How will the County know when a leak occurs in the cover system layer? Do the State and County assume that it won't leak?

State Response:

All liners will leak to some extent, regardless of how well they are constructed. The concept behind a "low permeability cover system" is to substantially reduce the amount of infiltration into the waste mass through construction of a low permeability layer within the cover. The design for the Lindley landfill includes a polyethylene (plastic) liner material which is "welded" in sections to result in a continuous liner over the landfill. Regardless of construction techniques, some of the welded seams will eventually leak to some extent. However, the design of the landfill also incorporates drainage features into the cover system to promote run off both on the surface of the cover and within the layers of the cover system itself. In addition, a large portion of any water which does leak through the cover system and into the waste would be collected by the existing leachate collection system.

Question: What will be included in the operation and maintenance program for the cover system?

State Response:

The approved O&M plan will cover normal maintenance activities for the cover system, contingency measures, and details of the groundwater monitoring program. Normal maintenance would include such details as mowing schedules for the vegetative covering, routine inspection of the cover system, etc. Contingency measures would address such issues as erosion, repairs to the cover system liner material, notification procedures for cover system damage, etc. The groundwater monitoring program will provide details such as frequency of monitoring, parameters included in analysis, homeowner wells included in the long term monitoring program, etc.

Question: What long term future use is presently planned for the landfill? Would it be possible to use the surface of the landfill for model airplane flying? Our model airplane club will be losing its field due to development. Would use of the landfill be compatible with the remedy?

State Response:

The State encourages future uses of remediated sites which are comparable with the remedy. Closed landfills have been used for numerous recreational purposes, including use as model airplane fields. The Town of Lindley and Steuben County should be contacted so that such future use scenarios can be explored and developed as appropriate.

Several questions were raised at the public meeting relating to the Lindley North landfill,

which was operated by the County after the close of the Lindley South site. These questions are generally unrelated to the Lindley South site and were answered by County representatives at the public meeting.

APPENDIX B

ADMINISTRATIVE RECORD
LINDLEY LANDFILL SITE

Site Investigations

Phase I Report - Lindley Landfill; Engineering-Science Inc.; January 1989

Phase II Report - Lindley Landfill; Ecology and Environment; January 1991

RI/FS Scoping Document - Lindley South Landfill; C&S Engineers Inc.; May 1995

Remedial Investigation/Feasibility Study Workplan - Lindley South Landfill; C&S Engineers Inc.; October 1995

Remedial Investigation Report - Lindley South Landfill; C&S Engineers Inc.; July 1977

Feasibility Study - Lindley South Landfill; C&S Engineers Inc.; August 1997

IRM

Final Work Plan: Interim Remedial Measures: Enhanced Leachate Collection - Lindley South Landfill; C&S Engineers Inc.; November 1995

Contract Specs and Contract Drawings - Leachate Storage Facilities at the Lindley South Landfill; C&S Engineers Inc.; September 1996

Other Documents

Steuben County Lindley Landfill - Evaluation of Leachate Generation From the Inactive Landfill Area I-A; Hunt Engineers & Architects; January 1989

Legal Documents

Order On Consent; Executed 4/7/95 Index # B8-0376-91-06

Order On Consent; Executed 7/30/86 Index # R8-0575-86-07

Order of Modification; Executed 6/2/87 Case # R8-0575-86-07

State Assistance Contract; Executed 9/21/95 Contract #C300366