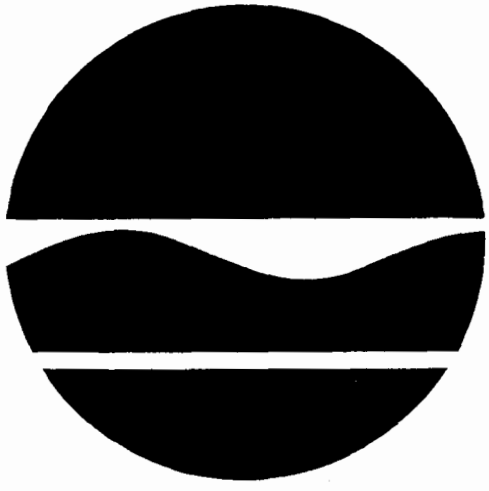
PROPOSED REMEDIAL ACTION PLAN
GLENS FALLS LANDFILL SITE

Town of Queensbury, Warren County
New York
Site No. 5-57-003

January 2003



Prepared by:

Division of Environmental Remediation
New York State Department of Environmental Conservation

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the Glens Falls Landfill site. The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this proposed remedy. As more fully described in Sections 3 and 5 of this document, landfill activities have resulted in the disposal of hazardous wastes, including ink sludge waste and an unknown quantity of capacitors containing polychlorinated biphenyls (PCBs). These wastes have contaminated the soil and groundwater at the site, and have resulted in:

- a significant threat to human health associated with current and potential exposure to contaminated soil and potential exposure to contaminated groundwater.
- a significant environmental threat associated with the impacts of contaminants to groundwater.

To eliminate or mitigate these threats, the NYSDEC proposes the following remedy:

- Select off-site and on-site waste consolidation, site regrading, and covering the areas that contain waste with a modified Part 360 cover system. The cover system will minimize the production of leachate and eliminate surface exposures.
- The cover system will include a gas venting layer, a geomembrane low permeability barrier layer, a soil drainage layer, a barrier protection layer, and a topsoil and vegetative cover layer.
- Implementation of a long-term monitoring program to evaluate the effectiveness of the cover system would be instituted as a component of the operation, maintenance and monitoring (OM&M) Plan for the site. Monitoring would consist of groundwater and surface water (if present) sampling and analysis, landfill gas monitoring, and landfill inspections.
- To prevent future exposures to contaminated subsurface soil and groundwater, the NYSDEC would seek to have restrictions placed upon the use of the site.

The proposed remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially promulgated standards and criteria that are directly applicable, or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, criteria and guidance are hereafter called SCGs.

This Proposed Remedial Action Plan (PRAP) identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for this preference. The NYSDEC will select a final remedy for the site only after careful consideration of all comments received during the public comment period.

The NYSDEC has issued this PRAP as a component of the Citizen Participation Plan developed pursuant to the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375. This document is a summary of the information that can be found in greater detail in the October 7, 2002 "Remedial Investigation (RI) Report Glens Falls Municipal Landfill,"the November 25, 2002 "Draft Final Feasibility Study (FS) Glens Falls Municipal Landfill," and other relevant documents. The public is encouraged to review the project documents, which are available at the following repositories:

Crandall Public Library - Reference Desk
Mr. Albert Fowler
251 Glen Street
Glens Falls, NY 12801-3539
Hours: MTW 9-9; ThF-9-6; S 9-5; Su 1-5
(518) 792-3360

Glens Falls City Hall
Attn: Mr. Bob Curtis
City Clerk's Office, 1st Floor
42 Ridge Street
Glens Falls, NY 12801
Hours: M-F 8:30am to 4:30pm
Appointment needed, call
(518) 761-3800

Documents are also available for review (by appointment) at the NYSDEC's Region 5 Headquarters:

Mr. Russell Huyck, Regional Project Manager
NYSDEC Region-5 Office
Route 86, P. O. Box 296,
Ray Brook, NY 12977.
Hours: M-F 8:30am to 4:00pm
(Tel: 518/897-1243).

Or you may contact

Mr. Shive R. Mittal, Project Manager
NYSDEC Div. of Environmental Remediation
625 Broadway, 11th Floor
Albany, New York 12233-7017
(Tel: 518/402-9671)

The NYSDEC seeks input from the community on all PRAPs. A public comment period has been set from February 3, 2003 to March 5, 2003 to provide an opportunity for public participation in the remedy selection process. A public meeting is scheduled for February 18, 2003 at the West Glens Falls Fire House, 33 Luzerne Road, Glens Falls, New York beginning at 7:00 PM.

At the meeting, the results of the RI/FS will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP. Written comments may also be sent to Mr. Mittal at the above address through March 5, 2003.

The NYSDEC may modify the preferred alternative or select another of the alternatives presented in this PRAP, based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives identified here.

Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the NYSDEC's final selection of the remedy for this site.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Glens Falls Municipal Landfill site is located on an approximately 15 acre parcel north of Luzerne Road and east of Interstate 87 (Adirondack Northway) in the Town of

Queensbury, Warren County, New York. A site location Map is presented as Figure 1. The site's longitude and latitude are reported to be 73°40'36" and 43°18'12". An active transfer station operated by the Town of Queensbury is located between the landfill mass and Luzerne Road. The transfer station opened on January 2, 1977 and accepts municipal waste and recyclables. The main entrance to the site is through the transfer station.

Currently, the landfill is covered with trees and overgrown grass/weed vegetation. Several dirt trails traverse the landfill in various directions and appear to be regularly utilized by off-road recreational vehicles. There are sporadic locations where the landfill mass has limited soil cover causing its contents to become exposed. The area surrounding the landfill is an urban area, encompassing residential and light commercial properties, and to a lesser extent vacant land. A storage facility and three residential dwellings are located immediately north of the landfill. A six lane highway (Interstate 87) is located immediately west of the site. Residential dwellings and a cemetery occupy the land to the south. A federally designated wetland is located to the northeast of the site. The Luzerne Road Site (5-57-010), a Class 2 Inactive Hazardous Waste Disposal Site containing a PCB cell is located immediately east of the site (Figure 2). An RI/FS is being conducted at the Luzerne Road site under the state superfund program. This is likely to be completed in 2003.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

The City of Glens Falls operated the Glens Falls Municipal Landfill as a municipal solid waste (MSW) landfill for approximately 16 years from 1961 to 1977. It has been reported that the landfill was used primarily for disposal of municipal refuse. An unknown quantity of PCB capacitors may have been deposited at this landfill. It was reported that five (5) tons of ink sludge waste (D001) from Valcour Imprinting, Inc. were disposed at the landfill. There is no known documentation of the quantity or characteristics of either solid or hazardous waste at the landfill nor data pertaining to the receipt of any waste other than general refuse (MSW). In the late 1970's, closure efforts were made through grading and seeding, but they were not considered sufficient to properly close the landfill, resulting in the City being in non-compliance with NYSDEC Part 360 landfill closure requirements. An alternative to complete closure was implemented by the Glens Falls Rotary Club in 1979. Some work was done to regrade side slopes and place clean vegetated soil cover over the site. A detailed description of the site history is presented in Section 1.5 of the RI Report.

3.2: Remedial History

In 1988, the NYSDEC listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

Several investigations were performed between 1983 and 1997 at this site prior to the current RI/FS activities. These investigations included:

- A Phase I Investigation completed in 1983 to do a preliminary assessment of the site;
- A Phase II Investigation completed in 1987 to characterize the site;
- A groundwater sampling and analysis program completed by the City of Glens Falls in 1990. The conclusion of the program was that further investigation was needed to delineate PCB contamination detected in the groundwater; and
- A supplemental sampling project was completed by NYSDEC in 1996. The purpose of this sampling project was to determine if the landfill was a source of PCB contamination in groundwater and if

the site could be delisted. The recommendation was that the site remain classified as Class 2 Inactive Hazardous Waste Disposal Site.

A detailed description of the previous investigations is presented in Section 1.6 of the RI Report.

SECTION 4: 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 City of Glens Falls entered into a Consent Order on March 31, 2000. The Order obligates the City of Glens Falls to implement a full remedial program and allows reimbursement to the City of Glens Falls of up to 75 percent of the eligible remediation cost.

SECTION 5: SITE CONTAMINATION

A remedial investigation/feasibility study (RI/FS) has been conducted to evaluate the alternatives for addressing the significant threats to human health and the environment.

5.1: 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 between October 2001 and August 2002. The field activities and findings of the investigation are described in the RI report.

The following activities (see section 5.1.3 below for further explanation of the activities) were conducted during the RI:

- Research of historical information;
- Excavation of 43 test pits around the perimeter of the landfill to delineate the extent of waste deposition;
- Installation of 8 soil borings and 8 monitoring wells for analysis of soils and groundwater as well as physical properties of soil and hydrogeologic conditions;
- Sampling of groundwater from 13 new and existing monitoring wells;
- Incorporated the survey of public and private water supply wells in the area around the site completed by the NYSDEC and NYSDOH for the adjoining Luzerne Road Site;
- Collection of approximately 11 surface soil samples;
- Collection of approximately 3 aquatic sediment samples; and
- Collection of approximately 126 landfill gas samples.

To determine whether the soil, sediment, and groundwater contain contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater, drinking water, and surface water SCGs are based on NYSDEC "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.
- Soil SCGs are based on the NYSDEC "Technical and Administrative Guidance Memorandum (TAGM) 4046; Determination of Soil Cleanup Objectives and Cleanup Levels".
- Sediment SCGs are based on the NYSDEC "Technical Guidance for Screening Contaminated 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.

5.1.1: Site Geology and Hydrogeology

The primary soil unit at the site is sand (very fine to medium and occasionally coarse) with periodic appearances of little to trace silt. The sand was encountered from grade and extended below the termination depths of the soil borings, which were up to 53 feet deep. The Fill materials (i.e., ash material or refuse) were encountered at several test pit locations.

The bedrock in the immediate vicinity of the site is reported to vary between shale and limestone; and is present at an approximate depth of 120 feet. The overburden is predominantly composed of quartz sand deposits which are associated with depositional environments in large bodies of water.

The groundwater flows towards the southeast. Groundwater was generally observed from 8 to 24 feet below the ground surface or 357 to 363 feet above mean sea level.

Utilizing the water level data, the hydraulic gradients between select upgradient and downgradient wells were calculated. The hydraulic gradient ranged between 0.003 and 0.006 feet/feet. The velocity of flow was calculated to be on the order of 0.001 feet per minute or 518 feet per year.

5.1.2: Nature of Contamination

As described in the RI report, many soil, groundwater and sediment samples were collected to characterize the nature and extent of contamination. As summarized in Table 1, the main categories of contaminants that exceed their SCGs are volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs) and polychlorinated biphenyls (PCBs), and inorganics (metals).

The VOCs of concern are benzene, chlorobenzene, chloroform, *cis*-1,2-dichloroethene, methyl tert-butyl ether and tetrachloroethene. The SVOCs of concern are benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene and dibenzo(a,h)anthracene. The inorganics of concern are arsenic, barium, beryllium, chromium, copper, iron, lead, magnesium, manganese, mercury, sodium, and zinc. The PCBs of concern are Aroclor 1242 and Aroclor 1254.

5.1.3: Extent of Contamination

This section describes the findings of the investigation for all environmental media that were investigated.

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

Table 1 summarizes the degree of contamination for the contaminants of concern in 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.

Waste Materials

Forty -three exploratory test pits were advanced around the perimeter of the landfill to define the extent of waste deposition. In general the waste encountered during the test pits consists of municipal solid waste (MSW). Other types of waste material encountered include construction and demolition (C&D) debris waste, compressed paper, and bulky waste (e.g., white goods) on the east side of the landfill. An ash, slag, glass, and cinders material mixed with sand was encountered on the west side of the landfill.

Surface Soil

Eleven surface soil samples were collected and

analyzed for SVOCs, PCBs, pesticides, herbicides, cyanide and metals. The only SVOCs detected above the recommended soil clean up value were benzo(a)anthracene, benzo(a)pyrene and chrysene. One PCB (Aroclor 1254 at 1.7 ppm) was detected above the soil clean up value of 1 ppm in one of the eleven samples. Mercury was detected in one sample at 2.3 ppm slightly above the clean up objective of 0.1 ppm. Zinc was detected in two of the eleven samples above the soil clean up value of 20 ppm. The surface soil samples were collected from a depth of 0 to 2 inches below the vegetative cover.

Subsurface Soil

Eleven subsurface soil samples (six from select test pits taken from 3 to 8 feet below grade and five from soil borings taken from 0 to 6 feet below grade) were collected and analyzed for PCBs. In addition, four samples of ash material were collected from test pits on the west side of the site and analyzed for SVOCs, PCBs, metals, cyanide, and hazardous waste characteristics. Two PCBs (Aroclor 1248 and Aroclor 1254) were detected within the landfill waste mass, none of which were above NYSDEC TAGM 4046 soil cleanup objective values.

Several SVOCs were detected in the ash material samples slightly above NYSDEC TAGM 4046 soil cleanup objective values, but have the tendency to adsorb to that media and not migrate with storm water runoff. SVOCs have historically not been detected in groundwater samples collected from the existing monitoring wells at the site. No PCBs were detected in the ash material samples above the NYSDEC cleanup objective values. Copper, mercury and zinc were detected in several samples above NYSDEC TAGM 4046 soil cleanup objective values. Analysis of the ash material samples for hazardous waste characteristics showed that the ash material is not corrosive, ignitable, reactive or TCLP hazardous.

Sediments

Two sediment samples were collected and analyzed from a wetland area located northeast of the landfill site and one sediment sample was collected and analyzed from a low-lying area located west of the landfill site. The samples were analyzed for SVOCs, PCBs, pesticides, herbicides, cyanide and metals. In general there were no contaminants of concern identified above NYSDEC sediment criteria. One PCB (Aroclor 1254) was detected in one sediment sample at a concentration slightly above the NYSDEC wildlife bioaccumulation sediment criteria. Based on the RI sediment sampling results, sediment near the landfill site has not been significantly impacted by the landfill operations and remediation is not warranted. Therefore, remediation of the nearby sediment was not considered as part of the remedial action objectives.

Groundwater

Eight groundwater monitoring wells (five shallow and three intermediate) were installed as part of this RI. Twenty six groundwater samples were collected from eight new and five existing wells on two sampling events (November 2001 and March 2002). The samples were analyzed for VOCs, PCBs, metals, and leachate indicator parameters. An additional sample was collected from one of the existing wells and analyzed for VOCs during August 2002. The depth of shallow wells ranged from 13 to 27 feet below grade. The depth of intermediate wells ranged from 43 to 52 feet below grade.

Five site-related VOCs were detected in groundwater (five in one well and one in a second well) at concentrations between 1.9 ppb and 18 ppb (groundwater standards between 1 and 7 ppb). MTBE was detected in one well (MW-101-1) at 140 ppb but this does not appear to be site-related. Upon re-sampling in August 2002, the concentration of MTBE was found to be 35 ppb. PCBs were detected in 4 of 26 groundwater samples at concentrations between 0.87 to 7.4 ppb exceeding the groundwater standard of 0.09 ppb.

Several metals were detected at concentrations above the groundwater standards.

Soil Vapor

A total of one hundred and twenty six landfill gas sampling points were performed as part of the RI. There were isolated areas of elevated landfill gases detected below grade, primarily at higher elevations on top of the landfill waste mass and at a few perimeter locations on the southeast and south sides of the landfill. The elevated perimeter readings did not extend beyond the property boundary. No landfill gases were detected in the buildings on-site at the transfer station. The installation of an impermeable cover system over the landfill would require the use of a gas venting system to prevent the build-up of landfill gases under the cover.

5.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the RI/FS. There were no IRMs performed at this site during the RI/FS.

5.3: 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 human exposure pathways can be found in Section 6.0 of the RI report and Section 1.0 of the FS report.

An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

Current pathways which are known to or may exist at the site include the following:

Groundwater

Based on the remedial investigation at the Glens Falls Municipal Landfill site, exposure to VOCs, PCBs and metals in groundwater is the primary exposure pathway of concern. However, current and future use of groundwater for drinking is unlikely as the community in the vicinity of the site uses a public water supply. There is a potential for exposures if contaminated groundwater migrates off-site to at least one known private well that is occasionally used to water lawns or gardens.

Soil

Contaminants were not detected in surface soil at levels of concern. However, trespassers may come in contact with landfill waste uncovered by erosion of current soil cover.

5.4: Summary of Environmental Impacts

This section summarizes the existing and potential future environmental impacts presented by the site. Environmental impacts include existing and

potential future exposure pathways to fish and wildlife receptors, as well as damage to natural resources such as aquifers and wetlands.

The Fish and Wildlife Impact Analysis, which is included in the RI report, presents a detailed discussion of the existing and potential impacts from the site to fish and wildlife receptors.

Significant wildlife resources do not exist at the site. No fish resources were identified as no surface water bodies are present on the subject site. A completed exposure pathway for human consumption of fish and wildlife was not identified. In general there were no contaminants of concern identified above NYSDEC sediment criteria, except one PCB (Aroclor 1254) was detected in one sediment sample at concentration of 0.15 ppm which is slightly above the NYSDEC wildlife bioaccumulation sediment criteria of 0.14 ppm. This sediment sample was collected from a low lying area northeast of the landfill.

Site contamination has impacted the groundwater resource in the vicinity of the site. PCBs were detected in 4 of 26 groundwater samples at concentrations 0.87 to 7.4 ppb exceeding the groundwater standard of 0.09 ppb. Five site-related VOCs were detected in groundwater (five in one well and one in a second well) at concentrations between 1.9 ppb and 18 ppb (groundwater standards between 1 and 7 ppb). Several metals were detected in the groundwater above the groundwater standards. However, the local groundwater is not used as a source of drinking water. The area is serviced by public water from the City of Glens Falls or the Town of Queensbury.

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. 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 remediation goals for this site are to eliminate or reduce to the extent practicable:

- exposures of persons at or around the site to PCBs and other contaminants in the landfill waste material;
- environmental exposures of flora or fauna with the exposed landfill contents;
- the release of contaminants from the waste mass into groundwater that may create exceedances of groundwater quality standards; and

Further, the remediation goals for the site include:

- control of surface water runoff and surface erosion; and
- control of landfill gas migration.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Glens Falls Municipal Landfill Site were identified, screened and evaluated in the FS report which is available at the document repositories identified in Section 1.

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) contains the expectation that engineering controls, such as containment, will be used for waste that poses a relatively low long-term threat where treatment is impracticable. The preamble to the NCP identifies municipal landfills as a type of site where

treatment of waste may be impracticable because of size and heterogeneity of the contents. EPA generally considers containment to be the appropriate response action, or the "presumptive remedy," for the source areas of municipal landfill sites. The RI/FS work plan for the Glens Falls Municipal landfill site was developed to follow the protocols for remedy selection that are presented in the Presumptive Remedy for CERCLA Municipal landfill sites.

A summary of the remedial alternatives that were considered for this site are discussed below. The present worth represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved.

7.1: Description of Remedial Alternatives

The following potential remedies were considered to address the contaminated soils and groundwater at the site.

Alternative 1: No Action

Present Worth: *$648,000*
Capital Cost: *$67,000*
Annual OM&M:
(Years 1-5): *$49,630*
(Years 5-30): *$32,703*

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 an unremediated state. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Under Alternative 1, a new 6-foot chain link fence would be installed around the landfill outside the limit of waste, except along Luzerne Road where there is an existing fence in good condition. Some clearing of trees and brush around the perimeter of the landfill limit of waste would need to be performed in order to be able to install the fence.

A portion of four adjoining parcels of property where waste extends over the landfill property line (Figure 3) would need to be obtained through eminent domain. Where waste extends onto State of New York property (i.e., under NYSDOT control) on the west side of the landfill (Figure 3), an easement, use and occupancy permit or other agreement would need to be obtained to allow access to the site.

Institutional controls would include deed restrictions incorporated into the property deed to limit the current and future use of the property and would include groundwater use restrictions.

Landfill monitoring would consist of groundwater and surface water sampling and analysis, landfill gas monitoring, and landfill inspections. Groundwater sampling would consist of sampling of up to thirteen existing monitoring wells associated with the landfill and laboratory analysis of groundwater samples for Part 360 baseline and routine parameters as required by a monitoring plan to be developed for the site. Surface water sampling would consist of the collection and analysis of surface water when present.

Landfill gas monitoring would include installation of permanent gas monitoring points every 400 feet around the perimeter of the waste mass to sample the landfill gases potentially being emitted from the decomposing waste at the landfill.

This alternative would require six months to design and six months to implement the remedy.

Alternative #2A: Part 360 Cover System, Gas Venting Layer and No Waste Consolidation

Present Worth: $5,861,000
Capital Cost: $5,179,750
Annual OM&M:
(Years 1-5): $56,450
(Years 5-30): $39,500

This alternative consists of grading the landfill waste mass for erosion and drainage control and to meet minimum and maximum Part 360 slope requirements, and installing a Part 360 cover system over the entire landfill waste mass. The areas of waste mass that exist on adjoining properties would be left in-place, obtained through eminent domain, and capped. The minimum and maximum Part 360 slope requirements would be achieved by importing, placing and grading clean fill over the landfill surface instead of excavating and regrading the existing waste. A portion of the area with ash material would likely be covered by the cap materials as a result of grading to achieve the required slopes. There would be some excavation of waste on the south side of the landfill so that the cover system would not extend over into the transfer station. The Part 360 cover system would consist of a soil gas venting layer (12-inch depth), a geomembrane low permeability barrier layer (40 mil textured LLDPE), barrier protection layer (24-inch depth), and topsoil (6-inch depth) and vegetative cover layer. The actual thicknesses of each layer and the side slopes would be determined during remedial design phase.

The cover system installation would result in containing the waste mass, preventing exposures, and reducing the release of contaminants to groundwater.

As discussed in more detail under Alternative 1, this alternative also would include installation of fencing; acquisition of property through eminent domain; obtaining an easement or use and occupancy permit; implementing and maintaining institutional controls, and post-closure landfill OM&M.

This alternative would require approximately twelve months to design and eighteen months to implement the remedy.

Alternative #2B: Part 360 Cover System, Gas Venting Layer and Consolidation of Select Off-Site Waste Mass (Balanced Cut and Fill)

Present Worth: $5,223,000
Capital Cost: $4,541,550
Annual OM&M:
(Years 1-5): $56,450
(Years 5-30): $39,500

This alternative consists of consolidating select areas where waste extends onto the adjoining properties and transferring the material back onto the surface of the landfill within the site's property boundaries, backfill and grading the excavated areas, regrading the landfill waste mass for erosion and drainage control to meet minimum and maximum Part 360 slope requirements and to obtain a balanced cut and fill, and installing a Part 360 cover system over the new smaller footprint of the landfill waste mass. A portion of the area with ash material would likely be covered by the cap materials as a result of grading to achieve the required slopes.

Consolidation would include:

- moving waste from the property on the north side of the landfill back onto the landfill property
- cutting of the north slope back to a maximum of 33 percent slope to be able to accept the cap without extending over the property line
- excavating some waste on the south side of the landfill so that the cover system would not extend over into the transfer station
- excavating some waste on the northeast side so that the cover system would not

extend into the wetlands on the northeast side of the landfill, and

- consolidation of some waste from the property on the east side of the landfill (55 Luzerne Road property) back onto the landfill property to achieve a smooth curvature for installation of the cap materials.

The limit of the waste mass in relation to the existing property line is shown on Figure 3. There would also be general cutting of side slopes (refuse) to achieve a more balanced cut and fill. The other areas of waste mass that exist on adjoining properties would be left in-place, obtained through eminent domain, and capped. The Part 360 cover system would consist of a soil gas venting layer (12-inch depth), a geomembrane low permeability barrier layer (40 mil textured LLDPE), barrier protection layer (24-inch depth), and topsoil (6-inch depth) and vegetative cover layer. The actual thicknesses of each layer and the side slopes would be determined during remedial design phase.

The cover system installation would result in containing the waste mass, preventing the exposures and reducing the release of contaminants to groundwater.

As discussed in more detail under Alternative 1, this alternative also would include installation of fence; acquisition of property through eminent domain; obtaining an easement or use and occupancy permit; implementing and maintaining institutional controls and post-closure landfill OM&M.

This alternative would require approximately twelve months to design and eighteen months to implement the remedy.

Alternative #3A: Modified Part 360 Cover System, Gas Venting Layer, Drainage Layer and No Waste Consolidation

Present Worth: $6,088,000
Capital Cost: $5,407,300
Annual OM&M:
(Years 1-5): $56,450
(Years 5-30): $39,500

This alternative is the same as Alternative 2A, with the exception that a Modified Part 360 cover system would be installed instead of a Part 360 cover system. The Modified Part 360 cover system would consist of a soil gas venting layer (12-inch depth), a geomembrane low permeability barrier layer (40 mil textured LLDPE), a soil drainage layer (12-inch depth), a barrier protection layer (12-inch depth), and a topsoil (6-inch depth) and vegetative cover layer. The modified Part 360 cover system includes a drainage layer. The 12-inch thick layer of the barrier protection layer immediately above the LLDPE is replaced with sand or gravel to act as a drainage layer. The drainage layer helps in reducing the pore water pressure within the cover system and improves slope stability. The actual thicknesses of each layer and the side slopes would be determined during remedial design phase.

This alternative would require approximately twelve months to design and eighteen months to implement the remedy.

Alternative #3B: Modified Part 360 Cover System, Gas Venting Layer, Drainage Layer and Consolidation of Select Off-Site Waste Mass (Balanced Cut and Fill)

Present Worth: $5,431,000
Capital Cost: $4,749,750
Annual OM&M:
(Years 1-5): $56,450
(Years 5-30): $39,500

This alternative is the same as Alternative 2B, with the exception that a Modified Part 360 cover system would be installed instead of a Part 360 cover system. The Modified Part 360 cover system would consist of a soil gas venting layer (12-inch depth), a geomembrane low permeability barrier layer (40 mil textured LLDPE), a soil drainage layer (12-inch depth), a barrier protection

layer (12-inch depth), and a topsoil (6-inch depth) and vegetative cover layer. The modified Part 360 cover system includes a drainage layer. The 12-inch thick layer of the barrier protection layer immediately above the LLDPE is replaced with sand or gravel to act as a drainage layer. The drainage layer helps in reducing the pore water pressure within the cover system and improves slope stability. The actual thicknesses of each layer and the side slopes would be determined during remedial design phase.

This alternative would require approximately twelve months to design and eighteen months to implement the remedy.

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York State. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

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

1. 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.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the NYSDEC has determined to be applicable on a case-specific basis.

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.

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 engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

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.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

7. Cost-Effectivness. Capital costs and operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision. The costs for each alternative are presented in Table # 2.

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 PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the NYSDEC will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

SECTION 8: SUMMARY OF THE PROPOSED REMEDY

The NYSDEC is proposing Alternative #3B, **Modified Part 360 Cover System, Gas Venting Layer, Drainage Layer and Consolidation of Select Off-Site Waste Mass (Balanced Cut and Fill)** as the remedy for this site. The elements of this remedy are described at the end of this section.

The proposed remedy is based on the results of the RI and the evaluation of alternatives presented in the FS.

Alternative 3B is being proposed because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It would achieve the remediation goals for the site by containing the wastes that create the significant threat to public health and the environment, it would reduce the leaching of contaminants to groundwater, and it would create the conditions needed to restore groundwater quality to the extent practicable. Alternatives 2A, 2B, and 3A would also comply with the threshold selection criteria.

Because Alternatives 2A, 2B, 3A, and 3B satisfy the threshold criteria, the five balancing criteria are particularly important in selecting a final remedy for the site.

Alternatives 2A and 3A (capping with no waste consolidation), and 2B and 3B (capping with waste consolidation) would all have short-term impacts which can easily be controlled. There would potentially be increased risk to the community and construction workers during construction of Alternatives 2B and 3B due to the amount of waste that would need to be excavated/disturbed during consolidation. However, during the construction of Alternatives 2A and 2B, there would be considerably more short-term impacts to the community with respect to truck traffic to deliver the large amount of capping materials to the site. This would occur because soils needed to achieve proper side slopes would need to be imported rather than using materials from site consolidation.

For long-term effectiveness, there is the potential for additional settlement under Alternatives 2B and 3B due to the amount of waste being excavated/disturbed and recompacted. However, this can be controlled during construction by better compaction techniques and quality control. There would be considerable added effectiveness for Alternatives 3A and 3B compared to Alternatives 2A and 2B due to the presence of the drainage layer above the low permeability barrier layer. The drainage layer would reduce the potential for erosion and provide additional slope stability during significant or prolonged storm events.

Alternatives 2A, 2B, 3A and 3B are all readily implementable. However, Alternatives 2A and 3A would require a large amount of grading and capping materials to be imported rather than using materials from site consolidation.

There would be some reduction in toxicity for all the alternatives as the waste decomposes and natural attenuation breaks down the chemical constituents. Alternatives 2A, 2B, 3A and 3B would provide the same degree of reduction in mobility, as the cap would cover the exposed refuse and prevent contact, prevent leaching of contaminants with storm water runoff, and minimize infiltration of storm water/precipitation

and potential leaching of contaminants to groundwater. There would be no reduction in volume of the waste mass for any of the alternatives.

The cost of the Alternatives 2A, 2B, 3A and 3B varies slightly. Alternative 3B is less expensive than Alternatives 2A and 3A but slightly more expensive than Alternative 2B. However, Alternative 3B would provide better long term effectiveness as compared to Alternative 2B due to the presence of drainage layer.

Alternative 3B is more favorable compared to Alternatives 2A and 3A because the side slopes are achieved by waste consolidation thereby reducing the footprints of the landfill and eliminating the need to import soil for grading. The Alternative 3B is more favorable as compared to Alternative 2B because the drainage layer in Alternative 3B would provide better long-term effectiveness and less maintenance of the cover system.

The estimated present worth cost to implement the remedy is $5,431,000. The cost to construct the remedy is estimated to be $4,749,750 and the estimated average annual operation, maintenance, and monitoring costs for the years one to five is $56,450 and for years six to thirty is $39,500.

The elements of the proposed remedy are as follows:

1. A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program.

2. Select off-site and on-site waste consolidation, site regrading and covering the areas that contain waste with a modified Part 360 cover system. The cap would minimize the production of leachate and eliminate surface exposures.

3. The cover system would include a gas venting layer, a geomembrane low permeability barrier layer, a soil drainage layer, a barrier protection layer and a topsoil and vegetative cover layer.

4. An institutional control would be imposed, in such form as the NYSDEC may approve, that would prevent the use of groundwater as a source of potable or process water without necessary water quality treatment as determined by the New York State Department of Health.

   "The property owner would complete and submit to the NYSDEC an annual certification until the NYSDEC notifies the property owner in writing that this certification is no longer needed. This submittal would contain a certification that the institutional controls and engineering controls put in place pursuant to the Record of Decision, are still in place, have not been altered, and are still effective. This certification could be part of the regular reporting required by the Operation, Monitoring, and Maintenance Plan."

5. Since the remedy results in untreated hazardous waste remaining at the site, a long term monitoring program would be instituted. Landfill monitoring would consist of groundwater and surface water sampling and analysis, landfill gas monitoring, and landfill inspections. This program would allow the effectiveness of the landfill cap to be monitored and would be a component of the operation, maintenance, and monitoring for the site.

TABLE 1
Nature and Extent of Contamination
{sampling dates; November 2001-August 2002}

SURFACE SOIL	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Semivolatile Organic Compounds (SVOCs)	Benzo(a)anthracene	0.039 to 0.45	0.224	1 of 11
	Benzo(a)pyrene	0.045 to 0.49	0.061	5 of 11
	Chrysene	0.059 to 0.48	0.4	1 of 11
PCB/Pesticides	Aroclor 1254	0.022 to 1.7	1.0	1 of 11
Inorganic Compounds	Mercury	ND to 2.3	0.1	1 of 11
	Zinc	14.7 to 425	20	3 of 11

ASH MATERIAL	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Semivolatile Organic Compounds (SVOCs)	Benzo(a)anthracene	0.099 to 1.1	0.224	2 of 4
	Benzo(a)pyrene	0.088 to 1.6	0.061	4 of 4
	Benzo(b)fluoranthene	0.13 to 2.7	1.1	1 of 4
	Benzo(k)fluoranthene	0.055 to 1.9	1.1	1 of 4
	Chrysene	0.12 to 2.0	0.4	2 of 4
	Dibenzo(a,h)anthracene	0.047 to 0.42	0.42*	1 of 4
Inorganic Compounds	Copper	63.4 to 350	25	3 of 4
	Mercury	0.31 to 1.3	0.1	4 of 4
	Zinc	766 to 2150	20	4 of 4

SEDIMENTS	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
PCB/Pesticides	Aroclor 1254	0.041 to 0.15	0.14	1 of 3

GROUNDWATER	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
Volatile Organic	Benzene	ND to 4.0	1.0	3 of 27

GROUNDWATER	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
Compounds (VOCs)	Chlorobenzene	ND to 18	5.0	2 of 27
	Chloroform	ND to 18	7.0	1 of 27
	cis-1,2-Dichloroethene	ND to 11	5.0	3 of 27
	Methyl tert-butyl ether	ND to 140	10.0	2 of 27
	Tetrachloroethene	ND to 8.4	5.0	1 0f 27
PCB/Pesticides				
	Aroclor 1242	ND to 7.4	0.09	4 of 26
Inorganic Compounds	Arsenic	ND to 73.8	25	2 of 26
	Barium	1.7 to 1,740	1,000	1 of 26
	Beryllium	0.3 to 6.9	3	2 of 26
	Chromium	ND to 141	50	2 of 26
	Copper	ND to 209	200	1 of 26
	Iron	195 to 225,000	300	25 of 26
	Lead	ND to 102	25	4 of 26
	Magnesium	1,970 to 87,100	35,000	5 of 26
	Manganese	3.9 to 15,600	300	21 of 26
	Sodium	5,200 to 262,000	20,000	20 of 26

[a] ppb = parts per billion, which is equivalent to micrograms per liter, ug/L, in water;
ppm = parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;

[b] SCG = standards, criteria, and guidance values;

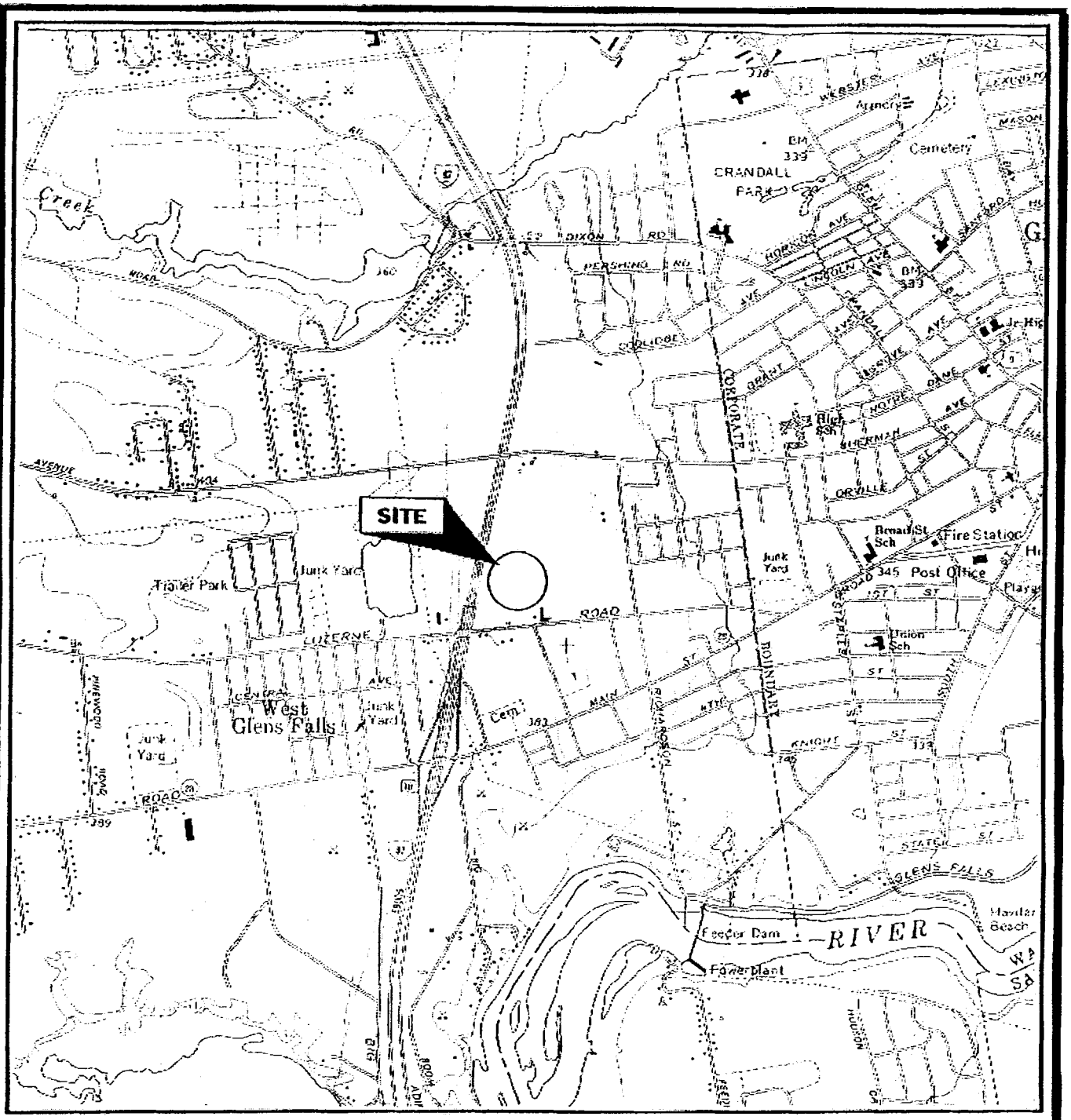
ND = Non detect
* SCG based on MDL (method detection limit)

Table 2
Remedial Alternative Costs
Glens Falls Municipal Landfill

Remedial Alternative	Capital Cost	Operation, Maintenance & Monitoring Costs		Total Present Worth [1]
		Annual Cost Years 1-5	Annual Cost Years 6-30	
1- No Action	$67,011	$49,630	$32,703	$648,000
2A - Part 360 Cover system with no waste consolidation	$5,179,769	$56,438	$39,511	$5,861,000
2B - Part 360 Cover system with waste consolidation	$4,541,571	$56,438	$39,511	$5,223,000
3A- Modified Part 360 Cover system with no waste consolidation	$5,407,322	$56,438	$39,511	$6,088,000
3B - Modified Part 360 Cover system with waste consolidation	$4,749,755	$56,438	$39,511	$5,431,000

(1) The present worth cost is based on a discount rate of 5%.

Note: The costs are preliminary and based on conceptual design only. The costs could vary from ± 15% to ± 25%.



MAP REFERENCE

United States Geologic Survey
7.5 Minute Series Topographic Map
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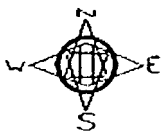
Date: Second Edition 1980



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FAX (518) 786-7299

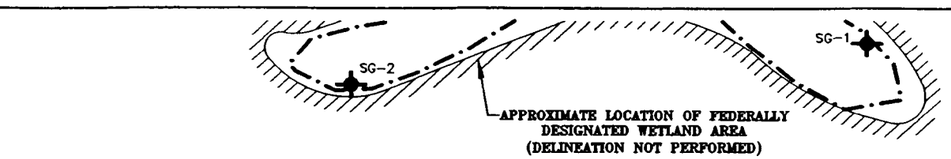
C.T.MALE ASSOCIATES, P.C.
50 CENTURY HILL DRIVE, PO BOX 727, LATHAM, NY 12110

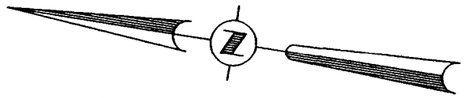
FIGURE 1 - SITE LOCATION MAP

GLENS FALLS MUNICIPAL LANDFILL AT LUZERNE ROAD

TOWN OF QUEENSBURY	WARREN COUNTY, NY
SCALE: 1"=2000'±	
DRAFTER:	
PROJECT NO. 00.6801	

NO XREFS





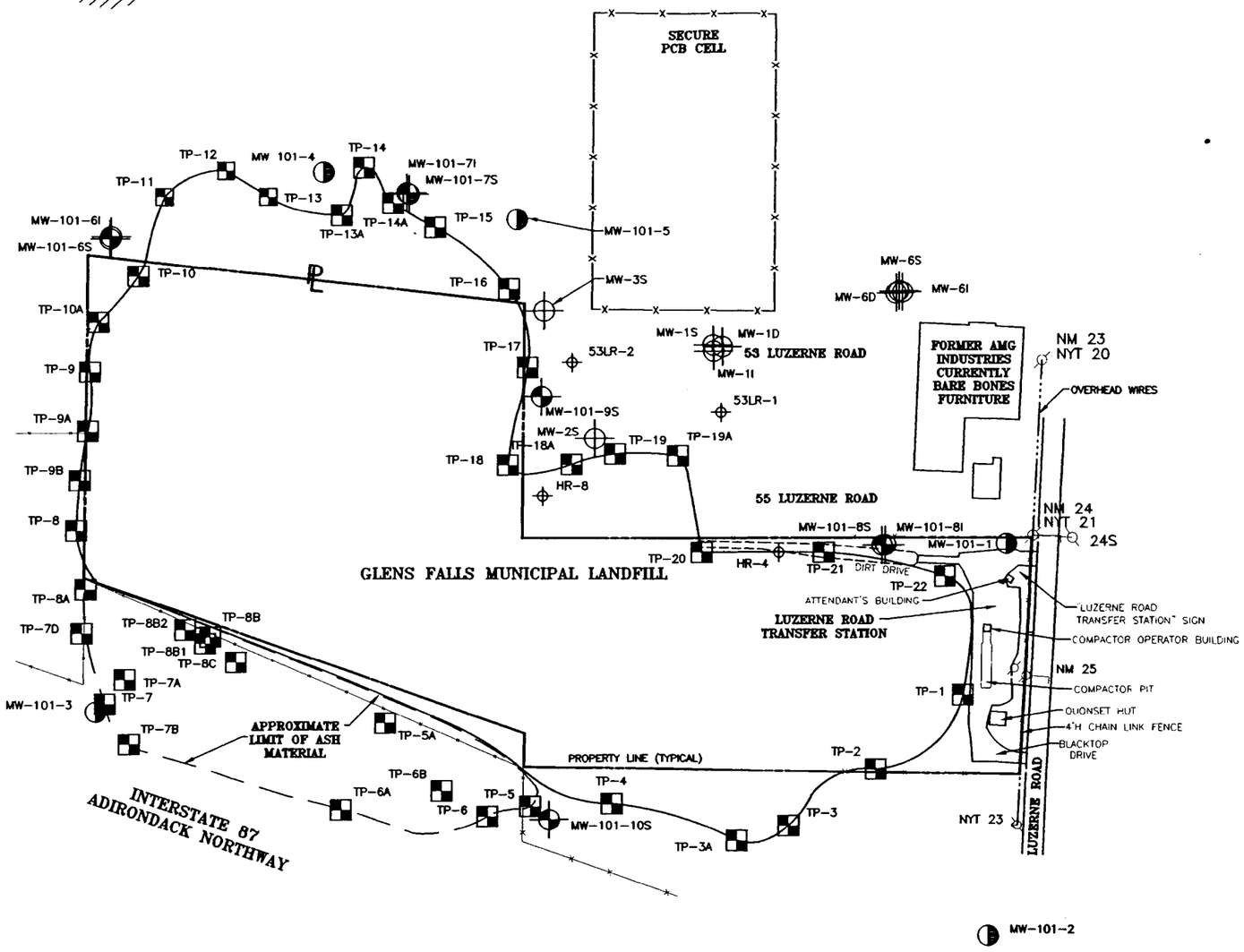
LEGEND

- UTILITY POLE
- APPROXIMATE LIMIT OF REFUSE/ WASTE BASED ON EXPLORATORY TEST PIT EXCAVATIONS COMPLETED AS PART OF THE 2001 RI/FS FIELD ACTIVITIES (TYPICAL)
- APPROXIMATE LIMIT OF ASH MATERIAL BASED ON EXPLORATORY TEST PIT EXCAVATIONS COMPLETED AS PART OF THE 2001 RI/FS FIELD ACTIVITIES (TYPICAL)
- HR-4 — EXISTING PIEZOMETER LOCATION AND I.D. (TYPICAL)
- MW-3S — EXISTING MONITORING WELL LOCATION AND I.D. FOR LUZERNE ROAD SITE (TYPICAL)
- MW-101-3 — EXISTING MONITORING WELL AND I.D. FOR GLENS FALLS MUNICIPAL LANDFILL (TYPICAL)
- TP-7B — EXPLORATORY TEST PIT EXCAVATION AND I.D. AS PART OF THE 2001 RI/FS FIELD ACTIVITIES (TYPICAL)
- SG-1 — STREAM GAUGE LOCATION AND I.D. AS PART OF THE 2001 RI/FS FIELD ACTIVITIES (TYPICAL)
- MW-101-10S — MONITORING WELL AND I.D. AS PART OF THE 2001 RI/FS FIELD ACTIVITIES (TYPICAL) "S" DESIGNATES SHALLOW WELL "I" DESIGNATES INTERMEDIATE WELL
- FENCE

BAR SCALE

200 0 100 200 400

1 inch = 200 ft.



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PROJ. NO : 00.6801

SCALE : 1"=200'

DATE : DEC. 2002

FIGURE 2
SITE PLAN MAP

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
GLENS FALLS MUNICIPAL LANDFILL AT LUZERNE ROAD

TOWN OF QUEENSBURY — WARREN COUNTY, NEW YORK

C.T. MALE ASSOCIATES, P.C.
50 CENTURY HILL DRIVE, P.O. BOX 727, LATHAM, NY 12110
518.786.7400 • FAX 518.786.7299
ARCHITECTURE & BUILDING SYSTEMS ENGINEERING • CIVIL ENGINEERING
ENVIRONMENTAL SERVICES • SURVEY & LAND INFORMATION SERVICES

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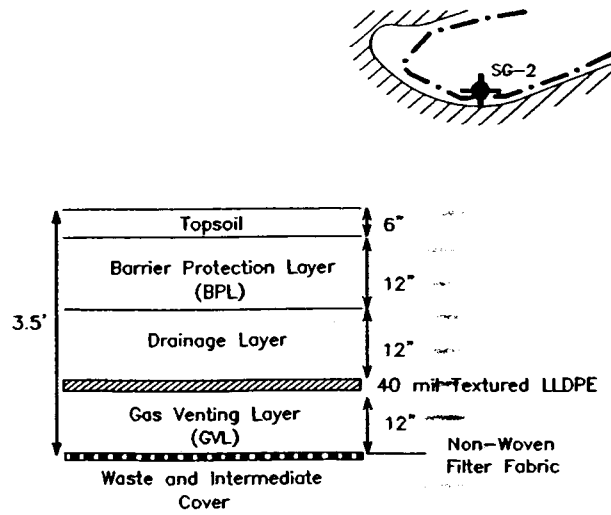
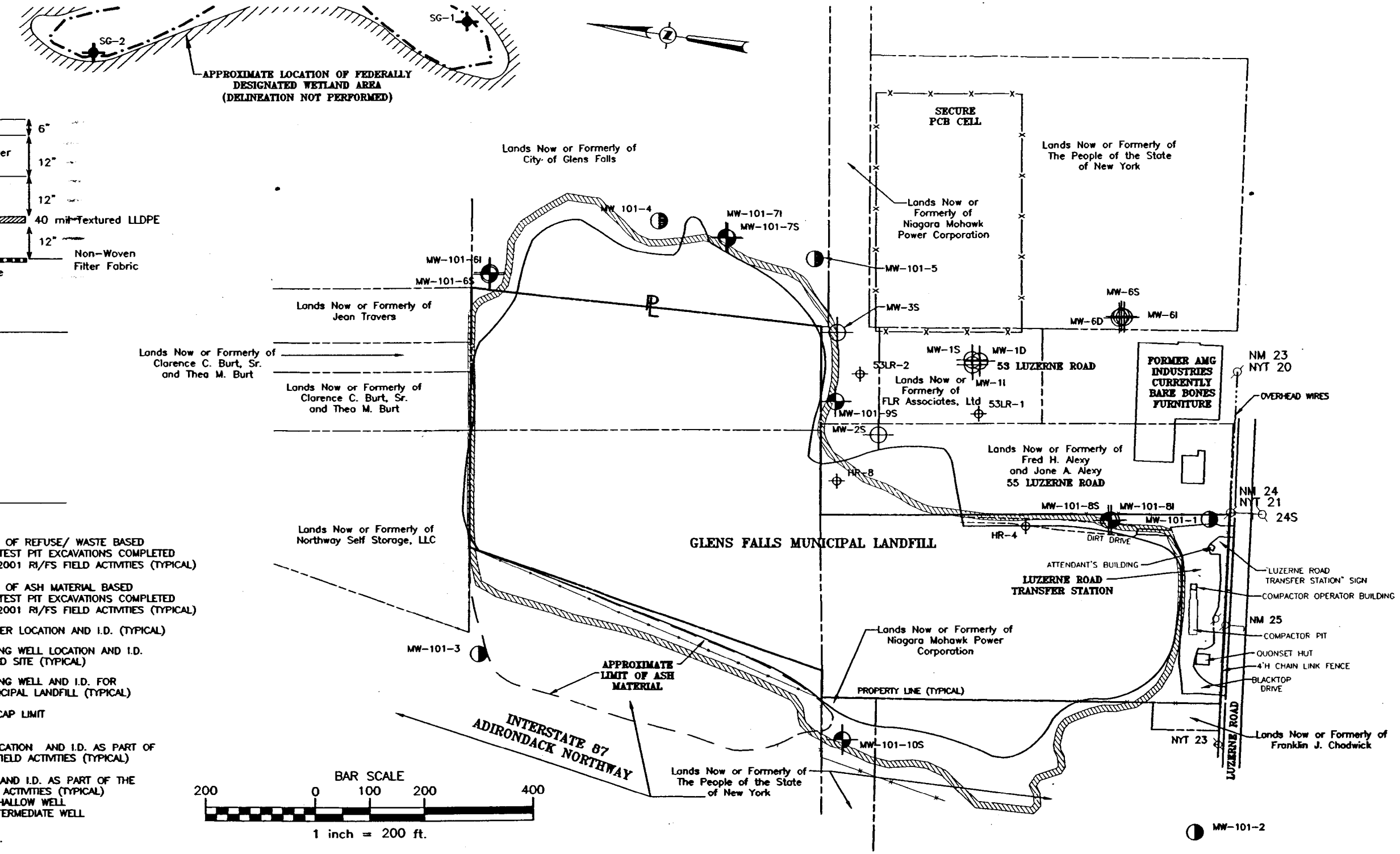


CAP CROSS-SECTION
NOT TO SCALE

LEGEND

- UTILITY POLE
- APPROXIMATE LIMIT OF REFUSE/ WASTE BASED ON EXPLORATORY TEST PIT EXCAVATIONS COMPLETED AS PART OF THE 2001 RI/FS FIELD ACTIVITIES (TYPICAL)
- APPROXIMATE LIMIT OF ASH MATERIAL BASED ON EXPLORATORY TEST PIT EXCAVATIONS COMPLETED AS PART OF THE 2001 RI/FS FIELD ACTIVITIES (TYPICAL)
- HR-4 — EXISTING PIEZOMETER LOCATION AND I.D. (TYPICAL)
- MW-3S — EXISTING MONITORING WELL LOCATION AND I.D. FOR LUZERNE ROAD SITE (TYPICAL)
- MW-101-3 — EXISTING MONITORING WELL AND I.D. FOR GLENS FALLS MUNICIPAL LANDFILL (TYPICAL)
- PROPOSED FINAL CAP LIMIT
- SG-1 — STREAM GAUGE LOCATION AND I.D. AS PART OF THE 2001 RI/FS FIELD ACTIVITIES (TYPICAL)
- MW-101-10S — MONITORING WELL AND I.D. AS PART OF THE 2001 RI/FS FIELD ACTIVITIES (TYPICAL) "S" DESIGNATES SHALLOW WELL "I" DESIGNATES INTERMEDIATE WELL
- FENCE



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SCALE : 1"=200'
DATE : DEC. 2002

FIGURE 3
ALTERNATIVE 3B

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
GLENS FALLS MUNICIPAL LANDFILL AT LUZERNE ROAD

TOWN OF QUEENSBURY — WARREN COUNTY, NEW YORK

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SHEET 1 OF 1
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CAD DWG. FILE NAME: DEC FIG 3.DWG